Butt-littering behaviour in context

The Butt Litter Check: A foundation for the NSW EPA cigarette butt litter reduction program

Prepared for

NSW Environment Protection Authority

by

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CONTENTS

List of figures

List of tables

ABBREVIATIONS

BLC	Butt Litter Check
CBD	central business district
CLAS	Cigarette Littering Action Score
EPA	New South Wales Environment Protection Authority
LC	Litter Count
LI	Local Inspection
LLC	Local Litter Check
smoking area	designated outdoor smoking area

TERMINOLOGY: smoking areas

Smoking areas are places where smoking is permissible and where smokers may pass through or congregate while smoking.

This research has chosen or 'designated' outdoor smoking areas using two categories, 'streamlined smoking areas' and 'hotspot smoking areas'.

'**Streamlined smoking areas**' are places where the expectations of correct disposal of butts are obvious and clear. Typically, these areas are clean, well-prepared for capturing butts, relatively free of butt litter, streamlined for litter prevention and may have clear signage and places for smokers to meet out of the weather.

'**Hotspot smoking areas**' are where expectations of correct butt disposal are unclear, butt littering is a problem and there are inadequate butt bin facilities available.

Four site types were examined for streamlined and hotspot smoking areas:

- car park
- retail
- public transport
- work break.

Legislative and Ministerial context

In NSW, the *Smoke-free Environment Act 2000*, Smoke-free Environment Amendment Regulation 2009, and the Smoke-free Environment Regulation 2007 ban smoking in the following outdoor public areas:

- within 10 metres of children's play equipment in outdoor public places
- public swimming pools
- spectator areas at sports grounds or other recreational areas used for organised sporting events
- public transport stops and platforms, including ferry wharves and taxi ranks
- within 4 metres of a pedestrian access point to a public building.

The smoking bans impact on where people smoke. Many smokers continue to litter cigarette butts and cigarette accessories. Cigarette butts continue to be the most littered item in NSW, and therefore are a litter reduction priority for the NSW Government.

Foreword

This is the last Community Change partnership report written by Karen Spehr (Curnow) and Rob Curnow. For over 20 years they have guided behaviour change programs based on *'what people do'* rather than what they *'say they do'* about environmentally responsible actions.

The NSW EPA introduced an innovative and reliable location-based approach to gathering evidence designed to drive community interventions and improve the targeting of programs. At the centre of this approach is a commitment to using citizen-science to help communities understand their litter challenges and guide improvements to local litter prevention efforts. The Local Litter Check tool[1] measures changes in litter prevention and has been adapted for use in a wide variety of contexts from roadsides to schools.

Most recently the location-based approach has been adapted to assess littering in outdoor places where people gather to smoke, and the Local Litter Check has been extended to include an accessible behavioural observation methodology.

Our final partnership project provides insights that will contribute to a significant step forward in litter prevention. Like so many of our previous activities it has been made possible by the support of passionate people committed to a clean world.

Thank you all.

Rob Curnow

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[1] The Local Litter Check tool can be found at http://www.epa.nsw.gov.au/litter/understand-problem.htm.

EXECUTIVE SUMMARY

The EPA is designing a program to reduce cigarette butt litter and butt-littering behaviour. This is the first major component of research undertaken to help understand cigarette butt-littering behaviour.

To better understand smokers' cigarette disposal behaviour, the Butt Litter Check (BLC) was developed to measure contextual factors in outdoor smoking areas that influence disposal behaviour and capture littering behaviour data.

The BLC provides the EPA with a detailed understanding of smokers' behaviour, attitudes and knowledge towards cigarette butt disposal.

This research approach has *designated* outdoor smoking areas into two types to compare contextual influence on behaviour:

1. ***Streamlined smoking areas*** which are set up to encourage proper cigarette butt disposal.
2. ***Hotspot smoking areas*** which do not encourage proposer disposal.

Research overview and insights

- Data collection generated 2,700 observations and 1,097 surveys from 41 streamlined and 46 hotspot smoking areas.
    - Two thirds of the observation and survey data was generated from male smokers aged 38 years (on average) present in streamlined smoking areas.

  Conclusion: A viable baseline of butt-littering behaviour has been established based on a similar cohort of smokers and a large sample size. This allows robust comparisons to be made of the impact of location features (contexts) on butt disposal behaviour.

- In NSW half (52%) of smokers in public places were observed littering their butts.
    - The butt-littering rate in hotspot smoking areas was 80%, more than twice the rate of littering in streamlined (32%) smoking areas.
    - Different butt-littering rates were found between hotspot and streamlined smoking areas in all CBD, urban and rural population centres.
    - Different butt-littering rates were found between hotspot and streamlined smoking areas in all site types (retail, car park, transport and office work break sites. Streamlined office work break sites have the lowest littering rate (30%) while hotspot car park sites have the highest butt-littering rate at 91%.

  Conclusion: Smokers dispose of butts differently and the butt-littering rate varies in response to different environmental contexts associated with the different features of streamlined and hotspot smoking areas.

- The BLC effectively differentiates environmental amenity in streamlined and hotspot smoking areas. It provides a:

- Viable method for gathering location gradings, observational data, butt litter counts and survey responses to characterise the context. The BLC has been validated against other external measures.
- Consistent pattern of results for Location Inspection (LI) and Location Inspection survey scores to differentiate between streamlined and hotspot smoking areas. Butt-littering rates drop as LI scores increase and indicate the location is better equipped to encourage appropriate disposal of butts. As LI scores fall, butt-littering rates increase.
- Baseline for smoking areas in NSW, where the average LI score for streamlined smoking areas was 65 out of 100 while hotspot smoking areas scored 35 points.
- Method for guiding interventions based on variations in sub-scale performance by focusing attention on strengths and gaps in key pillars for supporting changes in butt-littering behaviour (location cleanliness, bins, information [signs], surveillance [visibility of disposal acts]) and involvement or sense of ownership.

Conclusion: The BLC provides an accessible citizen-science approach to gathering evidence of the factors influencing cigarette butt disposal that can guide actions to improve disposal behaviour and evaluate intervention programs.

- Conversations with smokers showed an awareness of the differences in features in smoking areas although smokers tended to be more positive in their assessments than trained assessors.
  - Smokers who use the location regularly may become more tolerant of less adequate facilities than outside assessors.
  - Smokers underestimated the extent of their butt littering in response to general questions. However, with more focussed awareness were more likely to accurately describe their littering behaviour. Smokers in hotspot smoking areas were less able to accurately reflect on, and significantly underestimated, their actual littering behaviour.

Conclusion: Understanding the extent of smoker awareness about the factors underlying their habitual disposal of butts requires detailed exploration. This is particularly important in relation to the different perspectives in streamlined compared to hotspot sites.

Recommendations

Insights from the behavioural data should be used to guide examination of the mindset of smokers in relation to their behavioural response to environmental amenity (smoking area context). It is vital to know what configuration of features best encourage appropriate disposal behaviour.

In-depth surveys with detailed behaviour sequencing, particularly in relation to contradictions and anomalies in the observational database, will help to fully understand the mindset of smokers before, during and after disposal of butts.

Information could be gathered by well-targeted and selected in-depth surveys, grounded by analysis of smoker behaviour in hotspot and streamlined smoking areas. Data gathering could include:

- Methods for capturing and exploring details around key features and cues for smokers at the time of cigarette butt disposal.
- Identifying factors associated with extreme examples of butt littering and bin use in a broadened variety of smoking areas and site types.
- Exploring anomalies between what smokers say and do in relation to butt disposal in different contexts.

The assumptions underlying the 'accepted wisdom' of butt littering require further exploration in qualitative research and targeted intervention trials using the BLC to guide reductions in butt littering. These assumptions include:

- Smokers are unaware of contextual factors that influence their behaviour and understanding how to alter that awareness will positively affect disposal actions.
- Smokers will 'always' extinguish a butt and respond to an expectation of 'putting-it-out' before littering or using a bin.
- Providing litter or butt bins is 'enough' to reduce butt littering.
- Transition points with smokers walking between activities 'should be a major focus' for litter prevention compared to smokers sitting or standing in a smoking area.
- Converting a hotspot to a streamlined smoking area will always be associated with lower littering rates.
- A hotspot smoking area will always lead to more butt littering.

BUTT-LITTERING BEHAVIOUR IN CONTEXT

Cigarette butt litter reduction program

The EPA is designing a program to reduce cigarette butt litter and butt-littering behaviour. The program is taking a long-term, strategic, and thoughtful approach to behaviour change. This is the first major component of research undertaken to help understand cigarette butt-littering behaviour.

Background

The EPA uses an evidence-based approach to litter prevention based on gathering insights using the Local Litter Check (LLC). The LLC is a community accessible tool for guiding initiatives to reduce littering. As a location-based methodology, the LLC combines information from the inspection and grading of a location's features with insights from community conversations (individual surveys) and counts of litter on the ground. The LLC has been adapted to suit local litter challenges in a variety of settings, resulting in a School Litter Check and a Roadside Litter Check. The location-based approach seeks to understand the features of public places that influence disposal actions while generating data to inform and improve litter prevention strategies.

Location-based approach: designated outdoor smoking areas

This research is focused on cigarette disposal behaviour in chosen or designated outdoor smoking areas (smoking areas). These are areas where smokers congregate. They can be characterised by particular infrastructure features and are often associated with activities specific to the areas immediately surrounding smokers. For example, a smoking area in Pitt Street Mall might be in an area predominantly used by office workers on breaks, by shoppers resting between retail stores or by people waiting at public transport collection points adjacent to the mall. In the NSW location-based approach, each of these areas within the overall Pitt Street Mall location would be assessed as a separate smoking area each with unique features for influencing cigarette butt-littering behaviour.

Butt Litter Check

In 2016, the NSW EPA adapted the LLC to focus specifically on cigarette butt litter, by creating the Butt Litter Check (BLC). The BLC methodology builds on litter measurement approaches that were successfully implemented in Queensland, Victoria and Tasmania. Community Change's Cigarette Littering Action Score (CLAS) was the common foundation of those efforts to measure changes in cigarette butt disposal behaviour. The CLAS methodology, with its focus on behavioural observations, was redesigned and adapted to fit into the LLC structure which was the foundation for the BLC.

The CLAS shows the ease of observing and recording smokers' actions as they discard cigarette butts. Measuring a smoker's butt disposal behaviour, whether littering or using a bin in public places, offered the opportunity for including behavioural data into the EPA location-based approach. The addition of systematic observations aimed to improve

accuracy of insights because it reflected actual disposal acts and reduced reliance on smokers' self-reports.

The BLC provides a more complete picture of factors influencing cigarette butt disposal behaviour in a location. It captures butt disposal actions, grading of features in the smoking area, on-ground butt litter, and smokers' views captured in surveys.

Information related to butt littering in each smoking area is measured by four BLC components that collect information.

1. **Location Inspection (LI)**: an indicator of the likelihood that the smoking area provides a context for supporting cigarette butt litter prevention and encouraging smokers to use bins. The LI assessment is based on either a true or false grading for specific attributes and features of the smoking area. A total LI score out of 100 for a smoking area is based on adding together those positively scored attributes. The LI grading approach groups attributes into five sub-scales and each sub-scale can be scored to provide detailed guidance on strengths and gaps in smoking areas for preventing butt litter. The sub-scales include:
    - Clean location – lack or presence of butt litter in the smoking area.
    - Bins and infrastructure – adequacy of butt bins, to capture used butts, and other infrastructure.
    - Information – communication about disposal expectations (signs).
    - Surveillance – visibility of disposal actions and likelihood of detection of butt littering.
    - Involvement – sense of attachment or pride shown by smokers and users of an area.

2. **Behavioural observation**: recording butt disposal actions as they occur and noting key features of smokers associated with either using bins or littering.

3. **Litter count**: standardised measure of the number of butts and other litter in the location.

4. **Survey**: structured conservations with people in smoking areas to gain insights into smokers' views on the key features of the location and their disposal actions.

Guidelines for using the BLC, including descriptions of the full approach for helping community members to reduce the volume of cigarette litter in NSW, are available at www.epa.nsw.gov.au/litter/prevent-litter.htm.

Streamlined and hotspot smoking areas: a comparison

Many smoking areas in NSW are set up, or streamlined, to facilitate correct cigarette butt disposal, by creating a context, such as butt bins and signage, to encourage smokers to be

responsible when discarding butts. These have been designated "**streamlined smoking areas**".

In contrast, smoking areas can be set up in a way that is difficult for smokers to appropriately dispose of butts, often because the location facilities are inadequate to meet the needs of smokers who may not want to litter their butts but have limited disposal options. These have been designated "**hotspot smoking areas**".

This research looked to identify the features of streamlined smoking areas, seen in Photo 1, that were expected to influence correct disposal behaviour. Comparisons were made of hotspot smoking areas, seen in Photo 2, to indicate what contextual features influence incorrect disposal.

Photo 1 Streamlined smoking area

Photo 2 Hotspot smoking area

Site types near smoking areas

To understand the effects of context in butt disposal behaviour and to identify potential areas for improvements, the EPA led a process to identify site types near smoking areas as priorities for the BLC baseline. These priorities were determined through stakeholder feedback, consultations, a ranking of a range of site types based on expected littering rates, and importantly, the expected potential for forming collaborative partnerships with site owners in the development of interventions.

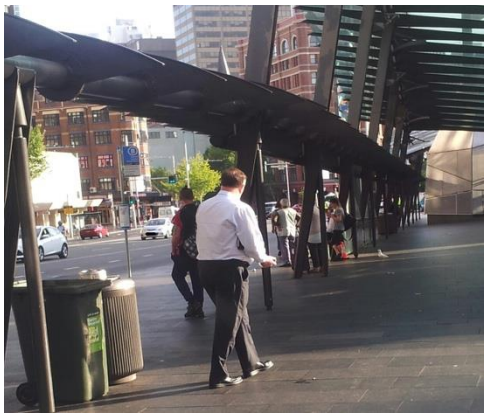

Photo 3 Transport site

Photo 4 Car park site

Smoking areas near the following four site types were studied in the project:

1. public transport hubs, stops and interchanges, shown in Photo 3
2. car parks with smokers transitioning to and from cars, shown in Photo 4
3. office work break sites specifically targeting office workers, shown in Photo 5
4. retail shopping strips and centres, shown in Photo 6.

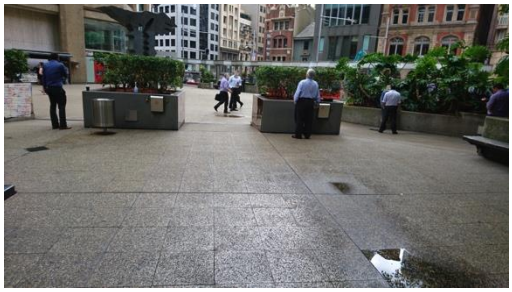

Photo 5 Office work break site

Photo 6 Retail site

BLC methodology and data collection

Trials of the BLC method commenced in July 2016 and were followed by state-wide fieldwork that ran from November 2016 to February 2017. The state-wide field study is a more detailed approach to observations and surveys to ensure a solid baseline for guiding and tracking future progress with butt litter prevention, compared to the accumulated results from community research conducted by councils and others.

Experienced market researchers, who were briefed and trained on the BLC approach, collected the state-wide information. Methodological pilots were conducted to ensure consistency in the approach. Researchers worked in pairs, where one person in the fieldwork team was nominated as the 'observer' and the other as the 'interviewer'. The team visited central business districts (CBD), urban and rural smoking areas across NSW.

The focus for both observations and interviews were smokers who had disposed of their cigarette within the observation zone. Observations continued until the smoker had discarded the butt or left the area. Once the butt was discarded, the interviewer in the team approached the smoker for a structured conversation about the location and smoker's butt-littering behaviour.

When smokers discarded a butt the disposal action was categorised as 'littering' when butts were not placed in a suitable receptacle to contain the litter and 'non-littering' if any kind of bin was used to contain butts.

Other non-littering acts such as carrying away a cigarette were not recorded in the sample because observers could not be sure of the outcome from this final action.

A butt-littering rate was calculated to represent the proportion of butts observed littered compared to all cigarette disposals (littering and non-littering) in the smoking area. The lower the littering rate, the less cigarettes butts were being littered.

Observations of smokers who were smoking on private property, such as outside a coffee shop, were included in the sample if the smoker disposed of their butt in the public area. Structured conversations conducted with smokers who carried butts away were included in the overall sample of surveys, but behavioural data only covered people disposing of cigarettes and other items in the observational zone.

Scheduling of data collection ensured peak worker and pedestrian times in the morning and afternoon were sampled. Generally, two locations were assessed per day with fieldwork aiming for a minimum of a three-hour session at each smoking area, conducted between the hours of 7am and 7pm on weekdays. The objective was to conduct as many observations and interviews of smokers as possible in each session.

Observers generally focused on up to five smokers at once so that the details of their disposals could be recorded without compromising information collection. Often smokers immediately left the area after finishing the cigarette so it was not possible to conduct the structured conversation with all smokers observed discarding butts. The conversations about butt litter and how to reduce it generally took around four minutes to complete, however the smoker was often interested and that led to extended conversations, which made linking observations and conversations difficult. Therefore, data collected from observations and conversations are independent, although often the smokers seen disposing of a butt were also involved in the structured conversation.

To improve the spread of behaviours and attitudes sampled, data collection scheduling aimed for a second visit in the same smoking area to repeat the BLC method on a different day and at a different time of day. Unforeseen circumstances prevented the team from returning to the same area for some subsequent visits. When this occurred a slightly different area within the broader location was assessed and resulted in information being collected for two separate smoking areas with distinct Location Inspection (LI) grading, observations, surveys and Litter Count (LC) data.

Where the same smoking area was revisited and multiple sets of data recorded, then an average was calculated to represent the location for the LI and LC measures. All observation and survey (structured conversation) data collected at each visit was combined to represent

smokers in that area. The BLC sample includes smoking areas where both LI and LC data were obtained, along with observations of actions and conversations with smokers.

The research

This research was generated using the BLC as well as incorporating research from previous butt litter prevention studies using the CLAS. It incorporates results from BLC trials conducted by NSW council officers and consultants who gathered insights into the features of a sample of smoking areas across the state[2].

This research establishes a state-wide baseline level of features of smoking areas that influence butt littering. It also measures the influence on smoker disposal actions. It does this by:

- Providing a contrast between subjectively classified streamlined and hotspot smoking areas.
- Validating the BLC area grading system to characterise litter prevention in smoking areas and contrasting with previous CLAS baseline findings.
- Establishing a cigarette butt-littering baseline specifically for NSW that could be used as a benchmark to set behavioural targets and monitor progress towards reduced butt litter.
- Comparing the effects on smokers' littering behaviour across different site types (retail, transport, car parks and office work break), and population centres (CBD, urban, rural).
- Providing insights into factors underlying smokers' habitual disposal of butts.

[2] Including Queensland Department of Environment and Heritage Protection, Brisbane City Council, City of Canada Bay Council, Cumberland Council, Instinct and Reasoning, and Community Change. The state-wide assessment was more detailed than the community BLC and included additional observation categories and surveys questions to gain a more sophisticated insight into smokers' intentions, attitudes and actions.

Data sample

Site types and population centres sample size

The research assessed cigarette butt disposal behaviour in streamlined and hotspot smoking areas adjacent to the four priority site types and across the three population centres.

There were 87 unique smoking areas assessed in NSW with half (51%) of the areas assessed twice and 49% assessed once. Streamlined smoking areas in CBD and urban centres were more likely to be assessed twice compared to hotspot smoking areas in those centres. In rural centres, hotspot smoking areas received the greater share of assessments.

The geographical spread of the baseline smoking areas sampled in different population centres in NSW and in the CLAS database is summarised in Table 1.

Table 1 Geographical spread of baseline smoking areas sampled in different population centres in NSW and in the CLAS database

Locations			
Sample	**Streamlined**	**Hotspot**	**Total**
CBD	23	13	36
Urban	13	24	37
Rural	5	8	13
NSW overall	41	45	86
CLAS	32	81	113

Streamlined and hotspot sample size

Overall, the NSW sample of streamlined and hotspot smoking areas was well-balanced with 47% of data sourced in streamlined smoking areas and 53% in hotspots.

In contrast to the NSW sample, the CLAS validation sample consisted of 113 smoking areas of which 28% were streamlined and 72% were hotspot.

In the NSW sample, some differences in sampling were evident at the population centre level of analysis. Streamlined smoking areas provided 62% of the CBD data, while in contrast, hotspot smoking areas provided 65% of urban and 62% of rural assessments.

Figure 1 shows it was not possible to find a closely balanced sample of streamlined and hotspot smoking areas in NSW across all four priority site types.

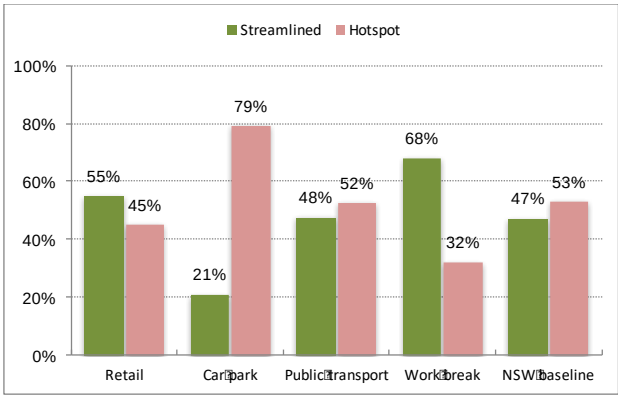

Figure 1 Site type locations included in sample

There was a reasonable balance of about half each of streamlined and hotspot smoking areas in the overall NSW baseline sample. This same approximate balance was found for retail and public transport sites.

Streamlined smoking areas made up 68% of office work break sites and hotspot smoking areas made up under a third.

Car park sites were often found to be hotspot smoking areas. It was difficult to find streamlined smoking areas near car parks, making up 21%.

In all population centres, office, public transport and retail streamlined and hotspot smoking areas were relatively easy to find. Streamlined smoking areas proved most difficult to find in the rural centres sampled.

Table 2 summarises these results across site types and population centres.

Table 2 Breakdown of sampled site types in population centres

Site type and population centre	Streamlined			Hotspot			Total
	CBD	Urban	Rural	CBD	Urban	Rural	
Retail	6	5	0	2	5	2	**20**
Car park	3	1	1	6	10	2	**23**
Public transport	6	2	2	3	6	2	**21**
Work break	8	5	2	2	3	2	**22**
Total BLC Sample	23	13	5	13	24	8	**86**

Overall sample size

Finding a balanced sample of suitable car park sites was difficult and while revisiting sites to provided solid data for other site types, car parks needed a more tailored approach. Many car parks sites had evidence of butt litter on the ground but there were very few people observed smoking and disposing of butts. Consequently, to build observation numbers, the sample of car park sites visited was increased which unfortunately resulted in shorter observation sessions and much of the car park data is based on single visits generally lasting an hour.

In total, 131 site assessments were conducted in 87 smoking areas across NSW at an average of 1.5 visits per location. This generated 2,700 observations of smokers disposing of butts, although no observations were recorded in four site assessments, which were all hotspot smoking areas.

In 75 of the 87 sites, 1,097 smokers participated in brief conversations. No surveys were possible in 12 sites consisting of eight hotspot and four streamlined smoking areas.

The average number of observations of butt disposals in streamlined smoking areas (43), was almost double the average number of observations in hotspot smoking areas (22).

Conversations were more likely to be recorded in streamlined smoking areas (18 on average), compared to hotspot smoking areas (11).

Streamlined smoking areas provided the majority of data (66% of observations and 61% of surveys).

Table 3 shows the overall observations and survey sample sizes in streamlined and hotspot smoking areas.

Table 3 Overall observations and survey sample size

	Streamlined		Hotspot		Overall		Locations
	Mean	Sum	Mean	Sum	Mean	Sum	
Observations	43	1774	22	926	33	2700	83
Overall percentage		66%		34%		100%	
Surveys	18	669	11	428	15	1097	75
Overall percentage		61%		39%		100%	

Demographics

Demographic analysis of smokers in streamlined or hotspot smoking areas found they were very similar. Overall in the baseline sample, the typical person observed and involved in a conversation was likely to be male, aged around 38 years and smoked for approximately 15 years.

Overall the gender profile for people observed and surveyed in streamlined and hotspot smoking areas was similar. Male smokers formed the majority of people disposing of cigarettes and participating in conversations about butt litter prevention.

Overall the age profile for people observed and surveyed in streamlined and hotspot smoking areas was similar.

Observation and survey samples for streamlined and hotspot smoking areas found in population centres and amongst site types had similar age ranges which indicated the two measures were focussed on similar cohorts of smokers. For example, the age of rural smokers observed and surveyed in both streamlined and hotspot smoking areas were older than all other groups.

Figure 2, 3, 4 and 5 show the demographics for gender and age of smokers observed and surveyed.

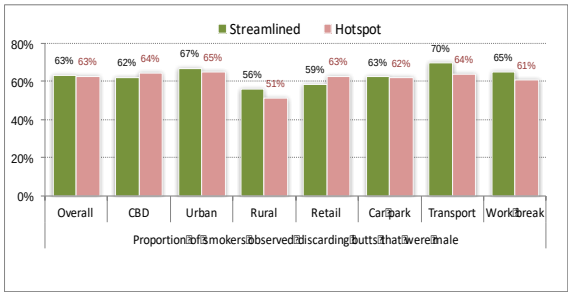

Figure 2 Gender of observed smokers

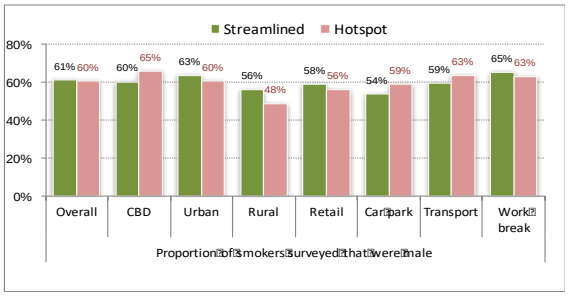

Figure 3 Gender of surveyed smokers

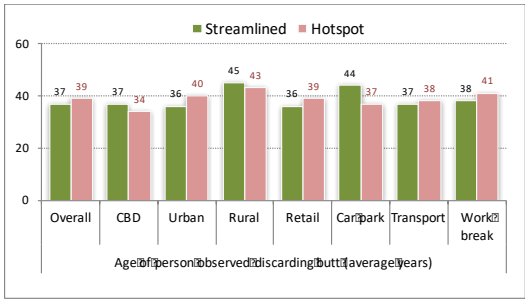

Figure 4 Age of observed smokers

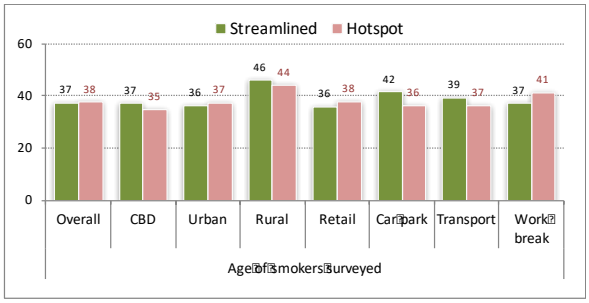

Figure 5 Age of surveyed smokers

Years smoking

Conversations with smokers revealed how long they had been smoking. Overall, smokers in streamlined and hotspots had been smoking for a similar number of years, and the same was evident in most site types and population centres. Figure 6 shows the results.

Rural smokers, who were older than most other survey respondents, had been smoking for longer periods, while those surveyed in streamlined rural smoking areas had been smoking for an average of 23 years.

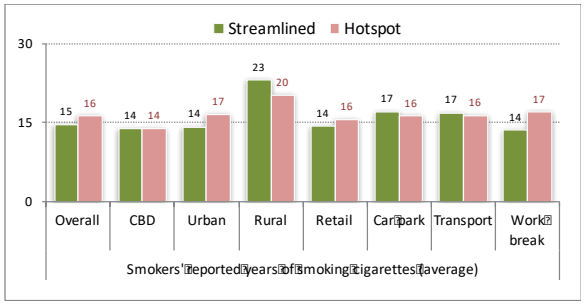

Figure 6 Number of years smoking cigarettes

Activity while smoking

The size of the group with which smokers were observed interacting with while smoking and the activities that smokers were typically engaged in while smoking were captured.

In streamlined and hotspot smoking areas there were similarities for the patterns of observed activities and the size of the group across population centres and site types. However, there were some notable exceptions, namely:

- Compared to those in streamlined smoking areas, smokers in hotspots tended to be more likely to be sitting or standing in a slightly bigger group of people with whom they were talking, both while they were smoking and before discarding their butt.
- Smokers in hotspot smoking areas in the CBD and in car parks were found to be smoking with around two people on average.
- Smokers in streamlined smoking areas were more likely to be using their mobile phones while smoking compared to smokers in hotspots. In both streamlined and hotspot smoking areas the use of mobile phones for talking was at similar levels.

Smokers in the three population centres and four site types were found to have similar personal characteristics for both observation and survey data in streamlined and hotspot smoking areas as shown in Figure 7 and 8. A similar cohort of smokers was sampled during the baseline study that enabled viable comparisons of the impact of location features on disposal actions.

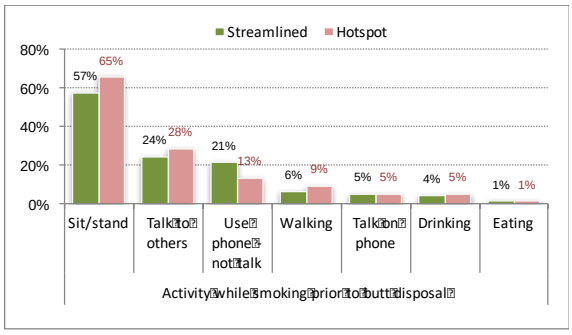

Figure 7 Activities prior to disposing of butt

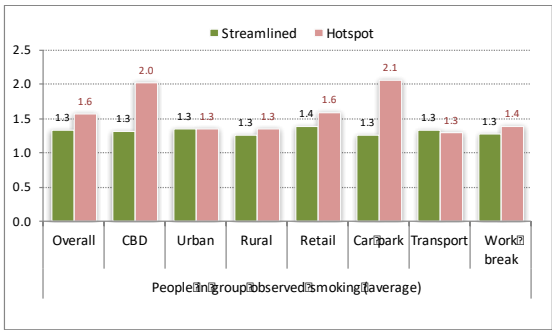

Figure 8 Number of people in smoking group

Findings

Distinguishing between streamlined and hotspot smoking areas

The approach taken for this research was to allow the researchers to identify the smoking areas for assessment. Research assessors then categorised each site as either a streamlined or hotspot smoking area, based on an initial subjective impression on whether the site was set up to positively (streamlined) or negatively (hotspot) influence butt disposals.

The key point here is that the subjective classification often corresponds to the process that community member or councils adopt when seeking to intervene to reduce cigarette butt in smoking areas. Subjective views on whether a smoking area appears to be a streamlined or a hotspot help community members to distinguish between areas that seem to be working well in preventing cigarette butt litter and those where littering seems habitual and endemic. The BLC was introduced to provide a method for assessing smoking areas and to guide interventions based on systematic grading of a smoking area's location features and context.

The first priority of this research was to determine if the BLC could reliably discriminate the features associated with smoking areas that were likely to positively (streamlined) or negatively (hotspot) influence butt disposals, based on an initial subjective classification of a smoking area.

Once the features of a smoking area were well understood, the next priority was to establish what factors influenced butt-littering behaviour and had a role in determining differences between how smokers disposed of butts in different smoking areas.

Location Inspections

Location Inspections (LI), step 1 of the BLC, graded each smoking area on a range of location features thought to influence disposal behaviour. This included the presence of clean bins, signage and a smoker's visibility when discarding butts. Higher LI scores are an indicator of a location context with a greater likelihood to positively influence butt disposal (that is, not littering and using bins or carrying away butts).

The overall LI score is a combination of all positively graded aspects of a smoking area and is scored up to 100 points.

Table 4 Location Inspection scores across all NSW sampled sites

BLC measure of butt litter prevention	Smoking area		
	Streamlined	Hotspot	Overall
	Mean	Mean	Mean
Location Inspection Score	65	35	49

Table 4 shows the LI scores across all NSW sampled sites. The results showed:

- Smoking areas were moderately likely to be able to prevent cigarette butt littering with an average LI score of 49 from a possible 100 points.
- The LI scores provide a reliable confirmation of subjective judgements by discriminating smoking areas across NSW that are likely to:
  - Have better potential for facilitating smokers' use of bins (i.e. streamlined smoking areas) shown by an average score of 65 from a possible 100 points.
  - Lead to higher littering and have less potential for encouraging bin use and preventing butt litter (i.e. hotspot smoking areas) represented by an average LI score of 35.
- Streamlined smoking areas were almost twice as likely as hotspots to have features that encourage appropriate disposal of butts.

Table 5 Overall Location Inspection scores for population centres

Location Inspection Score for butt litter prevention	Smoking area		
	Streamlined	Hotspot	Total
	Mean	Mean	Mean
CBD	67	35	55
Urban	60	31	42
Rural	69	45	54

Table 5 shows the overall LI scores for population centres and shows:

- Urban sites were the least well equipped with features to prevent cigarette butt littering, while CBD and rural areas tended to provide a similar standard of features for preventing butt litter.

- Across NSW, streamlined smoking areas were more likely than hotspots to be associated with positive features to prevent butt littering.

The LI score measures a smoking area's effectiveness for preventing littering and consists of five sub-scales for grading features of a smoking area. LI sub-scales group information to provide details of strengths and weaknesses in a smoking area's features to help guide and target interventions.

The higher the LI sub-scale score, the more positive the aspects of those features. Figure 9 summarises the overall sub-scale scores for smoking areas sampled in NSW, as well as those classed as streamlined and hotspots.

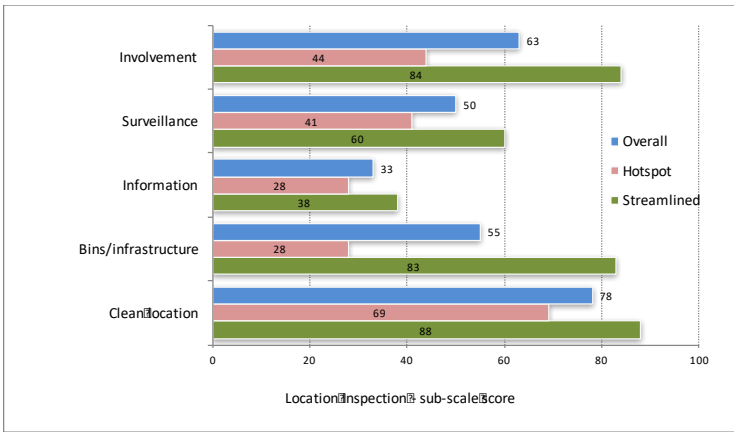

Figure 9 Location Inspection sub-scale assessment of smoking area contexts

Overall, smoking areas assessed in NSW were rated as a '**clean location**' by assessors, achieving the highest overall score, as well as high scores for both streamlined and hotspot smoking areas.

Streamlined smoking areas performed better on all sub-scales features than hotspots.

The second overall strength of smoking areas was the '**sense of smoker involvement or pride**' in the area. However, there were great differences in the sense of involvement for streamlined compared to hotspot smoking areas.

Streamlined smoking areas were graded highly for '**bins and Infrastructure**' indicating an adequate number and presentation of bins. Hotspot smoking areas were graded very low on this sub-scale indicating a major gap, with less adequate bins and butt bins. In some hotspots, bins were either completely lacking, or if present were seen as inadequate to meet smokers' needs due to being dirty, difficult to use or hard to find.

Another strength for streamlined smoking areas was the degree of '**surveillance or visibility of smokers**' when discarding butts. Streamlined smoking areas were more likely to have contexts where butt disposal could be seen, and social cues to use bins were more easily reinforced. Hotspot smoking areas tended to have areas where butt disposal actions were less visible and potentially more likely to be hidden from fellow smokers.

Overall, there was a gap or weakness in the provision of relevant information about butt disposal expectations in smoking areas. Both streamlined and hotspot smoking areas lacked '**signage**' related to correct disposal, and opportunities were frequently missed to inform smokers about use of bins close to the point of disposal.

The trend for streamlined smoking areas to have an overall higher grading for LI sub-scales compared to hotspots was found relatively consistently across population centres as shown in Table 6.

Table 6 Sub-scale scores for groups of location features in population centres

Location inspection feature sub-scale score	Population centres	Streamlined	Hotspot	Overall
Clean smoking area	CBD	91	81	87
	Urban	81	57	66
	Rural	90	81	85
Bins and infrastructure	CBD	85	36	68
	Urban	83	18	42
	Rural	70	44	54
Information	CBD	39	38	39
	Urban	29	22	24
	Rural	55	31	40
Surveillance	CBD	61	27	49
	Urban	60	47	51
	Rural	55	47	50
Involvement	CBD	80	30	60
	Urban	80	50	60
	Rural	90	60	70

Overall, in all population centres, the **clean location** sub-scale score was the most consistently positive of all five sub-scales. CBD and rural hotspot smoking areas were graded almost as clean as CBD and rural streamlined smoking areas, whereas urban hotspots were graded as less clean.

Given the high grading for **clean locations**, any potential differences in littering behaviour between streamlined and hotspot smoking areas might not be due to perceptions of an area as having been recently cleaned or littered.

Population centre hotspot smoking areas all had gaps in provision of **bins and infrastructure** when compared to streamlined sites. Urban hotspots were the least likely to be graded as having adequate bins.

Apart from rural streamlined smoking areas, there was a gap in both streamlined and hotspot smoking areas across all population centres in the grading of **information** provided to smokers at the point of disposal.

In all population centres, visibility of smokers disposing butts was better in streamlined compared to hotspot smoking areas. The **surveillance** sub-scale in CBD hotspots scored the lowest on the LI and had the biggest difference compared to streamlined smoking areas.

The scores for sense of **smoker involvement** in streamlined smoking areas were consistently high indicating strength of local attachment to smoking areas in all population centres. Urban and rural hotspots also had relatively high scores for sense of involvement for smokers, which were both substantially stronger than the sense of involvement in CBD hotspots.

Smoking area site types: Location Inspection scores

Four types of sites near smoking areas were prioritised for this study because of perceived potential for high butt-littering rates. The site types near smoking areas were graded for butt litter prevention. Figure 10 shows the results.

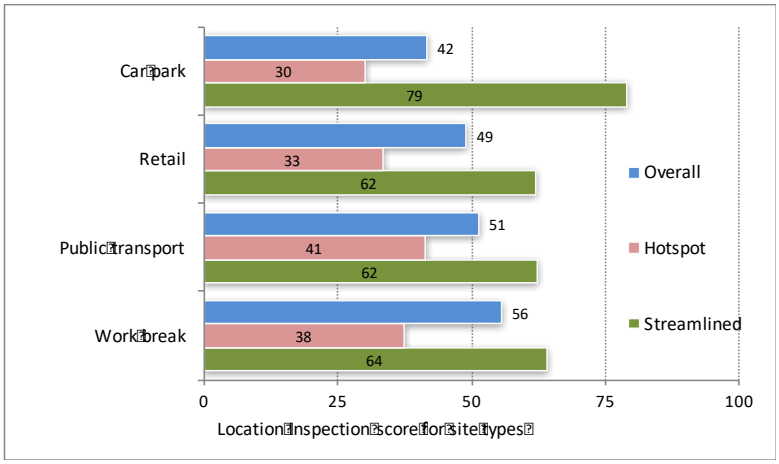

Figure 10 Location Inspection scores in smoking area site types

Key findings:

- Overall, office work break sites had the highest LI score, being most likely to have appropriate features for butt litter prevention, while car park sites were least likely.
- All four site types in streamlined smoking areas were graded as being better equipped for butt litter prevention than similar site types in hotspots.
- Public transport sites (second in overall LI scores) had the smallest gap between LI scores in streamlined and hotspot smoking areas, indicating a consistent approach in litter prevention features.
- Streamlined car park sites scored the highest of any site and therefore would be expected to have one of the lower rates of butt littering. Conversely hotspot car park sites had the lowest LI score and would be expected to have higher butt-littering rates.

Smokers perceptions: Location Inspection surveys

Community assessments of a location's environmental features were collected during structured conversations (surveys) with smokers. Survey questions addressed the LI grading checklist. In contrast to the LI score, the result of a single assessor's grading, the LI survey score reflects many smokers' views that were combined and averaged across all surveys in each smoking area.

Comparing LI assessor scores and LI surveys of smokers in situ provides insights into the perspective of smokers. Table 7 summarises smokers' views on butt litter prevention in smoking areas, the LI survey score, compared to the trained assessors' LI scores, shown in Table 4.

Table 7 Comparing Locations Inspections scores between assessors and smokers

Location Inspection score	Butt-litter prevention		
	Streamlined	Hotspot	Overall
	Mean	Mean	Mean
LI smoker survey score	77	67	72
LI trained assessors	65	35	49

Smokers viewed the overall features of smoking areas much more favourably than assessors.

Figure 11 shows that generally smokers were more positive about areas in which they smoked and tended to view both streamlined and hotspot smoking areas favourably and with less differentiation between the two. Smokers were also much less critical of hotspot smoking area features than independent assessors.

The smaller level of discrimination between smoker perceptions of streamlined and hotspot smoking areas should be further explored particularly if there are differences in smoker butt disposal actions associated with features of locations.

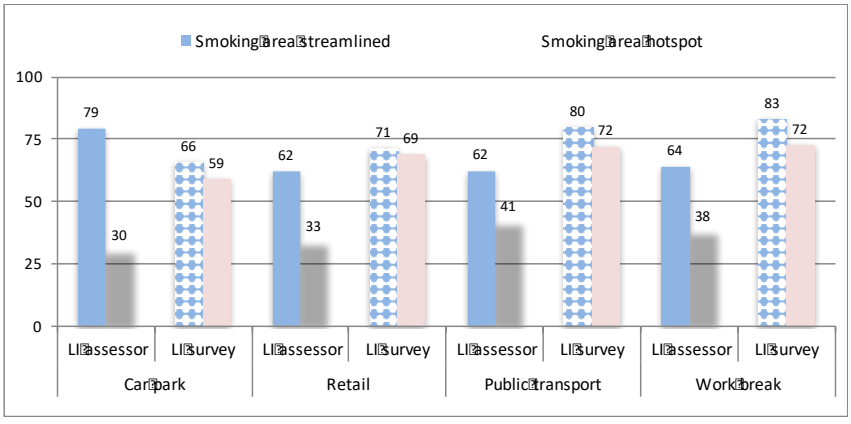

Figure 11 Comparison of assessor and smoker perceptions of location features across site types

- Generally, smokers' judgements of litter prevention (LI survey score) were at higher levels than LI assessors' scores for all streamlined and hotspot site types. The only exception was smokers' views of streamlined smoking areas near car park sites that were less positive about the locations features than assessors.
- Smokers' views on location features across all streamlined and hotspot smoking areas showed relatively small differences between grading.

Smokers were less discriminating about the features of areas where they habitually smoked. This may be due to them being more accepting of gaps in presentation of their local smoking area. Conversations with smokers were casual which may have led them to be less systematic and/or critical in their assessment of location features than assessors. Details of

conversations with smokers exploring their perspectives are summarised in the self-report section of the report.

Location Inspections for previous CLAS studies and NSW baseline

Data from previous CLAS studies was re-examined and results reclassified to provide comparison of outcomes with the BLC methodology used in this this report. Differences in the CLAS system for rating location features were adapted to suit the LI grading system and a similar methodology was used for observations of smoker behaviour, litter counts and user surveys. Figure 12 shows the LI grading scores and LI survey scores in NSW smoking areas compared to results from the CLAS approach integrated with the BLC.

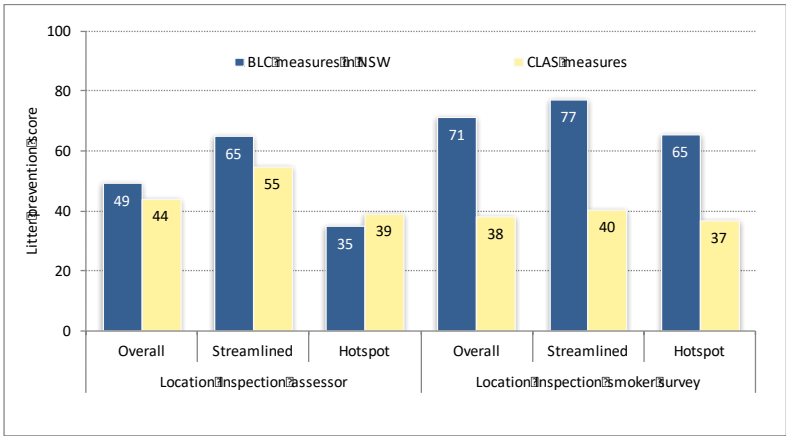

Figure 12 Comparison of NSW and CLAS Location Inspection scores and Location Inspection survey scores

Overall assessors using the adapted CLAS structure and the BLC approach in NSW demonstrated a high degree of correlation in assessment (LI) scores. Detailed findings were:

- The trend for a higher level of scores for streamlined compared to hotspot smoking areas was evident across both approaches.
- CLAS studies tended to have rated hotspots slightly higher than those graded by assessors in NSW.
- In the older CLAS studies streamlined smoking areas were graded slightly lower than those in NSW.

Location inspections through smoker surveys showed greater differences between approaches, with smokers from CLAS studies grading both streamlined and hotspot smoking areas lower than those in NSW.

Despite the differences in smoker perceptions, both the CLAS smoker surveys and NSW counterparts showed little differentiation in survey scores between streamlined and hotspot smoking areas.
Smokers surveyed in the CLAS studies were typically more negative (lower overall LI Survey score) and less discriminating than those smokers in NSW (smaller differentiation between hotspot and streamlined smoking areas).

A strength of the CLAS system was its five-point rating scale for differentiating location features and provided detail for guiding interventions. A concern in the development of the BLC, which uses a ‘true or false’ grading system, was whether it could reliably discriminate

the LI sub-scales to inform and guide interventions. Figure 13 contrasts the overall performance of LI sub-scales for CLAS studies compared to the BLC system of grading used in NSW.

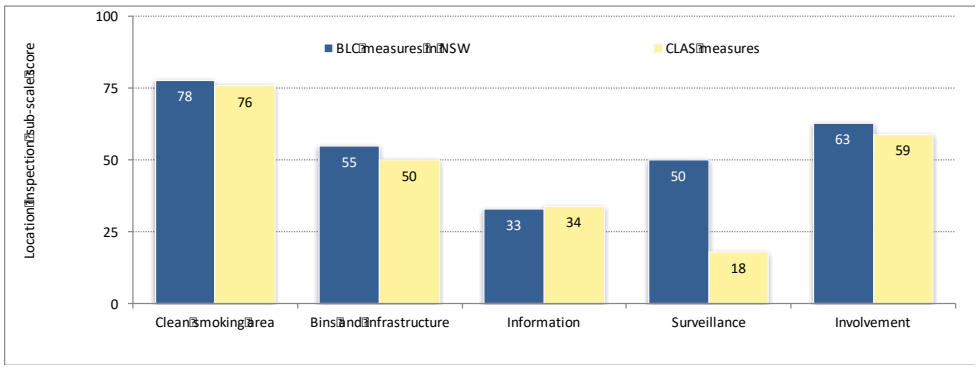

Figure 13 The relationship between Location Inspection sub-scale scores for BLC and CLAS studies

Key findings:

- There is a remarkably high level of association between the sub-scale scores from CLAS studies and the NSW baseline, reinforcing the view that the overall scores were based on similar assessor analysis.
- The only notable difference in sub-scale scores was for the surveillance sub-scale where CLAS locations were graded as less likely to provide clear views of smokers who were discarding cigarette butts. In NSW, the sub-scale grading indicates much greater visibility of disposal actions.

The BLC LI approach seems to be effective in assessing locations and is in line with expectations and results that were achieved by CLAS baseline assessments. Smokers' views about smoking area features were more positive than independent assessors' views for both previous studies and the NSW baseline (albeit that NSW smokers were more positive about their smoking areas than interstate smokers).

In NSW, the impact of the features of smoking areas on smokers' behaviour was to be established through the use of the BLC observational approach.

Observing cigarette butt littering in NSW

Overall litter rates – streamlined and hotspot smoking areas

In NSW half of the smokers observed disposing of cigarettes were seen littering, with a butt-littering rate of 52% of butts.

The butt-littering rate found in previous CLAS studies at baseline before interventions were applied was 55%.

Location Inspections scores and smoker disposal behaviour was compared for streamlined and hotspot smoking areas in NSW. This was also compared with CLAS studies as shown in Table 8.

Table 8 Relationship between Location Inspection scores and butt littering

BLC measures	Butt-litter prevention		
	Streamlined	Hotspot	Overall
	Mean	Mean	Mean
NSW Location Inspection Score	65	35	49
NSW Butt-littering rate (n=2,700)	38%	80%	52%
CLAS Location Inspection Score	54	38	42
CLAS Butt-littering rate (n=759)	37%	63%	55%
LI Survey Score NSW	77	65	71
LI Survey Score CLAS	40	37	38
BLC database Location Inspection Score	61	37	47
BLC database Butt-littering rate (n=3,459)	38%	74%	53%

Key findings:

- Smokers dispose of butts differently depending on the features of the environment in which they smoke.
- There is a strong association between the subjective classifying of smoking areas into streamlined and hotspots, and actual littering behaviour.
- The butt-littering rate for streamlined smoking areas was 38% while in hotspots it was 80%.
- The CLAS butt-littering rate for streamlined smoking areas was 37% and 63% in hotspots.
- Locations with higher LI scores were more likely to contain features appropriate for proper disposal of butts also had the lowest littering rates.
- Smokers' perceptions of differences in environmental features for locations (LI survey score) were also associated with a consistent pattern in littering rates. Lower littering rates were found in areas graded with higher LI survey scores by smokers.

Littering rates across population centres (CBD, urban and rural)

Butt-littering rates in population centres in NSW showed that around half the smokers in all sites were littering with rates of 51% in CBD, 53% in urban and 56% in rural centres (Figure 14). Overall, rural smokers were littering slightly more often than their CBD counterparts.

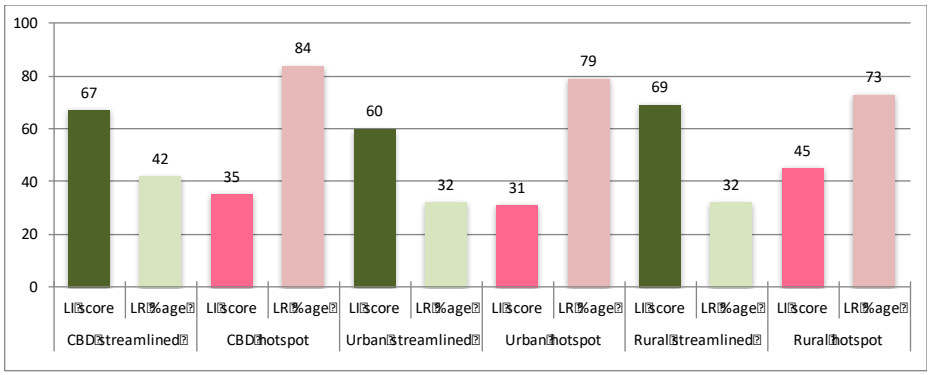

Figure 14 Location Inspection scores and butt-littering rates in population centres

Key findings:

- Higher LI scores and lower butt-littering rates were found across all population centres in NSW. Similarly, lower LI scores, indicating locations with fewer features for preventing butt litter, were found to have higher butt-littering rates in all population centres.
- Rural streamlined smoking areas with the highest LI litter prevention score of 69 points recorded one of the lowest observed littering rates at 32%.
- CBD and urban hotspot smoking areas had lower LI litter prevention scores (35 and 31 points respectively), which were associated with the highest butt-littering rates of 84% and 79% respectively.

Butt-littering rates across site types

Smokers butt-littering behaviours and use of bins in smoking areas near car parks, public transport, retail shops and office work break areas were measured. Cigarette butt disposal behaviours varied across each site type. The butt-littering rates observed for each site type were:

- car park – 79%
- retail – 55%
- public transport – 53%
- office work break – 40%.

Littering rates at each site type were compared to each site's respective LI scores as shown in Figure 15.

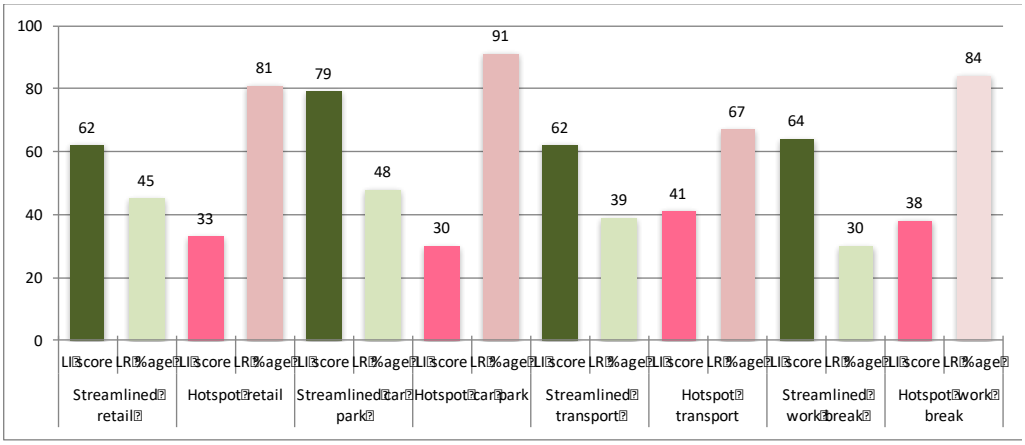

Figure 15 Location Inspection scores and butt-littering rates in smoking area site types

Key findings:

- Cigarette butt disposal behaviour varies between different site types. Furthermore, disposal actions differ within each site type depending on the environmental features for preventing butt littering.
- The pattern of variation in butt-littering rates was consistent across each site type, with less littering occurring in streamlined (higher LI scores) compared to hotspot (lower LI scores) smoking areas.
- Hotspot car park sites had the highest butt-littering rate associated with the lowest LI score.
- Streamlined car parks had the highest LI score and an associated mid-range butt-littering rate that was just over half the rate of littering in hotspot car park sites.
- Streamlined office work break sites had a higher LI score and the lowest level of butt littering. Butt litter prevention seems to be most effective in streamlined smoking areas where workers congregated for a break and the environmental amenity is looked after.
- Public transport sites demonstrated the relationship between streamlined smoking areas where the amenity was looked after, compared to areas where there was less concern for capturing butts (hotspots). Higher LI scores in streamlined transport sites were associated with lower littering rates while more littering occurred in hotspot transport sites that scored a low level on the LI grading.

Location-based assessment and littering rates

Littering behaviour was assessed across streamlined and hotspot smoking areas across the four site types in the different cities and towns in the population centres were recorded. These assessments could have potentially provided a reasonably comparable characteristic butt-littering rate for each of the towns included in the baseline.

However, it was not always possible to find both streamlined and hotspot smoking areas, let alone collect meaningful data across all targeted site types in all cities. Consequently, some cities had too few observations to calculate reliable overall, streamlined and hotspot butt-littering rates. Table 9 summarises the characteristic butt-littering rate for each city in the study with a valid sample size suitable for reasonable comparisons of outcomes.

Table 9 Butt-littering rates across each city location

City	Butt disposal littering-rate			
	Sample	Streamlined	Hotspot	Overall
		Mean	Mean	Mean
Chatswood	425	21%	91%	32%
Sydney	737	27%	89%	37%
Dubbo	51	41%		41%
Coffs Harbour	120	24%	71%	50%
Bankstown	42	37%	61%	50%
Hurstville	299	51%	62%	57%
North Sydney	300	58%		58%
Paramatta	348	67%	80%	74%
Queenbeyan	72		75%	75%
Liverpool	228	48%	92%	76%
Burwood	47		87%	87%
Unreliable comparison of observations as small samples below				
Strathfield	7	.	71%	71%
Northbridge	8	.	100%	100%
Blacktown	3	.	100%	100%
Manly	4	.	75%	75%
Cumberland	8	.	88%	88%

Key findings:

- Large samples of observations were collected in Sydney and Chatswood, while the smallest reliable sample was found in Burwood.
- The pattern of higher littering rates in hotspot compared to streamlined smoking areas was consistent across all cities where both types of environmental amenity were investigated.
- Chatswood (32%) and Sydney (37%) had the lower overall rates of butt littering.
- Liverpool (76%) and Burwood (87%) had the higher overall rates of butt littering.
- Often there were large differences between high and low littering rates in the same city especially when results for streamlined and hotspot smoking areas were compared. For example, the lowest butt-littering rates were found in streamlined smoking areas in Chatswood (21%), Coffs Harbour (24%) and Sydney (27%), yet hotspot smoking areas in the same towns had very high butt-littering rates of 91%, 71% and 89% respectively. It seemed smokers discarding cigarette butts in these cities behaved very differently depending on the location in which they were smoking.
- In Liverpool, smokers in hotspot smoking areas were almost twice as likely to be seen littering as in streamlined smoking areas.
- In two of the cities, samples only included smoking areas judged to be streamlined for butt disposal, and yet were associated with moderate to high butt-littering rates. For example, North Sydney (streamlined) had a relatively high butt-littering rate of 58% compared to Dubbo where 41% of smokers littered butts.
- Littering rates in Hurstville and Parramatta were not very different for hotspot and streamlined smoking areas.

In each city with a large enough sample of observations, the relationship between location features likely to influence disposal outcomes and butt-littering rates was investigated. Figure 16 summarises the association between LI scores for butt litter prevention and butt-littering rates.

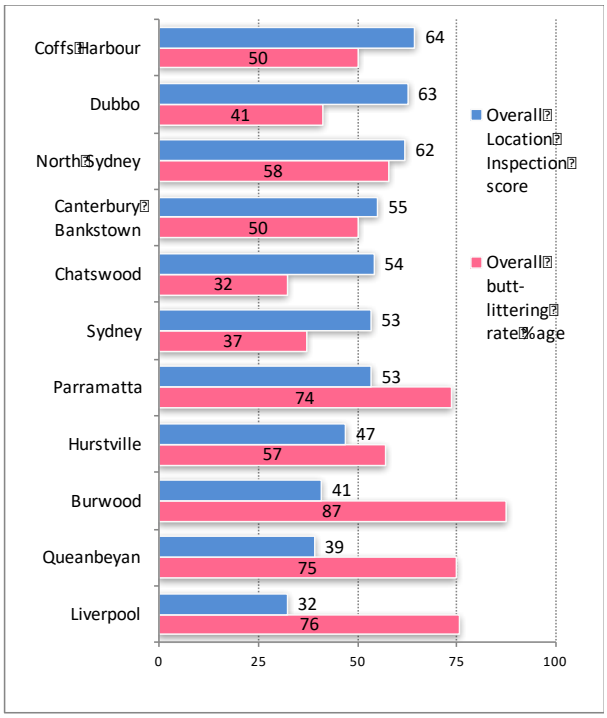

Figure 16 Relationship between LI litter prevention scores and butt-littering rate

Key findings:

- The pattern of higher LI scores and lower butt-littering rates generally held across the cities studied:
    - Coffs Harbour had the highest LI score of 64 and one of the lower overall butt-littering rates (50%).
    - Lower LI scores and higher rates of butt-littering rates were found in urban sites such as Burwood, in rural sites like Queanbeyan and in CBD sites like Parramatta.
    - Liverpool had the lowest LI score of 32 and one of the higher butt-littering rates, where 76% of people smoking littered butts.
- There were some inconsistencies in the patterns of findings:
    - Sydney and Chatswood had moderate LI scores, yet butt-littering rates were the lowest.
    - Both sets of CBD sites in Sydney and Parramatta obtained the same overall LI score but there was a big difference in butt-littering rates between them.

It seems that while features of a location influence disposal actions there is not always a direct correlation and other factors may well impact on smokers' disposal choices.

Litter counts

The BLC litter count method follows the standard practice in NSW of counting all littered items in a 48-square metre area within the area of focus. This research focused specifically on detailed counts of cigarette butts. The results for butt litter counts overall and differentiated by context (streamlined or hotspot smoking areas) are shown for population centres and site types in Figure 17.

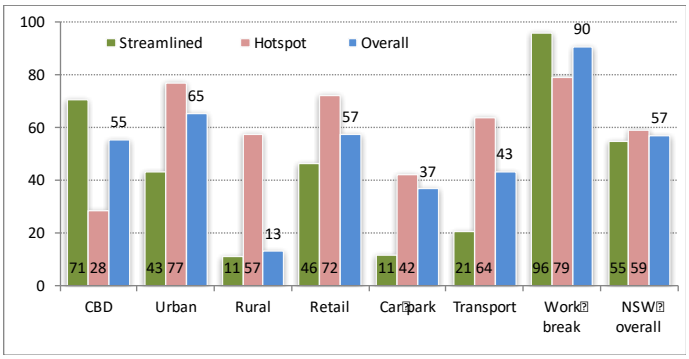

Figure 17 Litter counts in context for population centres and site types

On average, there were 57 butts counted in the 48-square metre litter count area in smoking areas across NSW, with 59 in hotspots and 55 in streamlined smoking areas.

The trend for hotspot smoking areas to have poorer results than streamlined smoking areas was generally confirmed in the butt litter counts where there were overall slightly higher amounts of butt litter.

Two results went against the established trend, with hotspot smoking areas having much lower butt litter counts than streamlined smoking areas in CBD areas and those where office workers were on work breaks.

Figure 18 shows the pattern of results for butt litter counts compared to the benchmark behaviour observation measures (butt-littering rates) in context across population centres.

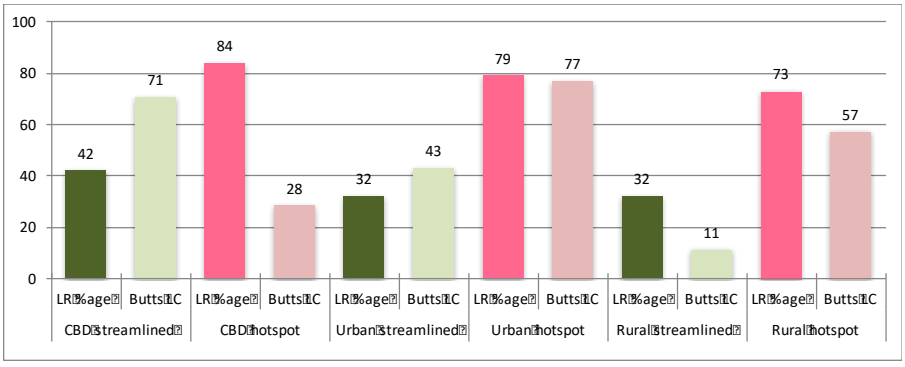

Figure 18 Butt litter counts and butt-littering rate in population centres

The relationship between the butt litter count data and butt-littering rates in population centres across NSW was inconsistent, and at times counter intuitive:

- CBD streamlined and hotspot smoking areas both had a high butt-littering rate compared to other population centres (42% and 84% respectively). The butt-litter count for streamlined smoking areas was correspondingly high (71) but the CBD hotspot smoking areas were surprisingly low (28). Perhaps there were more robust cleaning regimes to combat the high littering rate in hotspots.
- The butt-littering rates for streamlined urban and rural smoking areas were the same (32%), however the butt litter counts were very different. On average, there were 43 counted in urban population centres and 11 butts in rural.

- Results for rural locations were generally more in line with an expectation that low littering rates would be associated with low butt litter levels and higher butt litter levels would be found in locations with higher littering rates.
- Urban hotspot smoking areas had low littering rates.

The inconsistency between litter counts and observed butt-littering actions (percentage littering) was further explored across the different contexts (streamlined or hotspot) in the four site types shown in Figure 19.

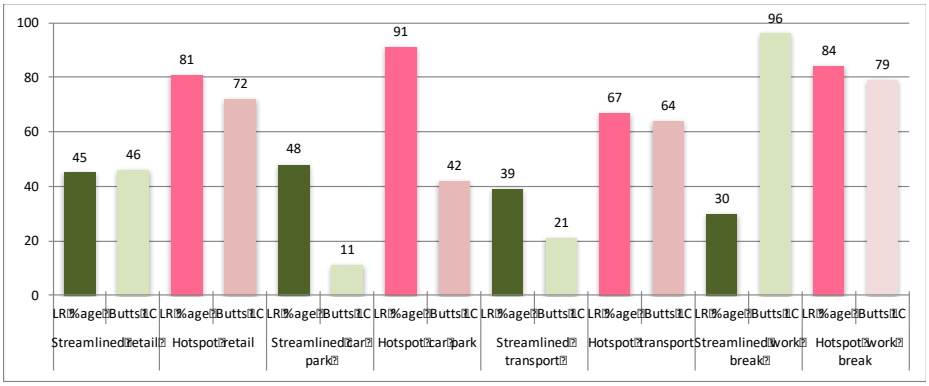

Figure 19 Butt litter counts and butt-littering rate in site types

Key findings:

- Inconsistencies and counter intuitive results were again found between litter counts and butt-littering rates across site types:
  - Littering rates at streamlined office work break sites were at very low levels however the butt litter count data was the highest for all site types.
  - Hotspot office work break sites had the highest butt-littering rates but had fewer butts found in litter counts than matched streamlined smoking areas.
  - More consistent relationships were evident between counts and littering behaviour for both streamlined and hotspot smoking areas near car parks, retail and transport site types. Generally lower littering of butts was associated with lower litter counts.

Litter count data rarely directly reflects the littering behaviour in a location. Litter count data is influenced by outside variables including cleaning routines, standard of cleaning, accumulation points that trap butt litter, as well as changing weather conditions. Where these external factors can be held relatively consistent and controlled then count data can provide an indicator for tracking the impact of litter prevention initiatives on butt litter.

Characteristics associated with butt disposal actions

Some of the features collected with the observational data were explored to determine influences on patterns of smoker disposal actions.

Items disposed

Overall the patterns of items disposed were similar across contexts, population centres and site types.

Most of the disposals involved cigarettes butts (89%) including smoking-related accessories like packets and matches (<1%) with 11% of observations identifying disposal of non-cigarette items.

Most disposals involved actions to extinguish the burning cigarettes while 15% of butts were disposed while still burning in both streamlined and hotspot smoking areas.

Methods of littering and bin use

Examination of the items littered showed that almost all (96%) involved the littering of butts, with only 4% of littering observations identifying non-cigarette items. Common actions for littering of butts involved dropping, grinding or stomping on the butt to extinguish, often doing so on open ground or in garden beds in both streamlined and hotspot smoking areas. Investigation of the patterns of littering in both contexts was undertaken to explore the notion that the pattern of butt-littering behaviour might be different. Table 10 summarises littering actions in context.

Table 10 Places and actions associated with butt littering in NSW

Littering	Streamlined	Hotspot	Overall
Open ground	46%	51%	47%
Garden	13%	10%	11%
Brimming on bin edge	17%	7%	11%
Flagrant flinger	7%	12%	9%
Hide	6%	8%	7%
Underseat	5%	4%	5%
Raised surface	3%	2%	2%
Gutter	2%	4%	3%
Next to bin (n=18)	1%	1%	1%

Key findings:

- Smokers who littered butts tended to follow very similar patterns of actions in both streamlined and hotspot contexts.
- In hotspot smoking areas there was a slightly higher occurrence of public displays of littering with flagrant flinging of butts and leaving them on open ground presumably in full visibility of other smokers.
- In streamlined smoking areas where bins where more likely to be provided, smokers were more likely to have left their butt brimmed on the edge of the bin.

Observations of non-littering actions consisted of 19% non-cigarette items and 81% binning cigarette butts. However, while 86% of disposals in streamlined smoking areas involved butts, only 50% of non-littering actions in hotspot smoking areas were cigarettes and the other half non-smoking related items.

Investigation of the patterns of bin use in the two site contexts was undertaken to explore differences in the patterns of binning behaviour.

Table 11 summarises the littering actions in context.

Table 11 Type of bins used for butts in NSW

Bin use – non-littering	Streamlined	Hotspot	Overall
Butt bin free standing, on a pole or wall	59%	7%	52%
Litter bin with or without a butt plate	6%	57%	13%
Butt bin to litter bin	32%	34%	33%
Ashtray	1%	0%	1%
Personal ashtray	2%	2%	2%
Recycling butt bin (n=3)	0%	0%	0%
Public place recycling bin (n=3)	0%	1%	0%

Key findings:

- The smoking area context (streamlined or hotspot) was associated with different patterns of bin use. In streamlined smoking areas, set up to encourage and support positive butt disposal actions, smokers were more likely to use free-standing butt bins compared to smokers in hotspot smoking areas.
- Smokers in hotspot smoking areas were more likely to use litter bins to dispose of non-cigarette items.
- Butt bins attached to litter bins attracted a third of the bin use in both contexts, which may indicate the value of attaching butt bins to litter bins.
- Only a small number disposals involved personal ashtrays to dispose of butts and there were no differences in their use between contexts. The use of personal ashtrays seems to be an individual commitment and it is unlikely that smokers take personal ashtrays in hotspots to compensate for the lack of adequate bins.

Differences in disposal behaviour were apparent when comparing the non-littering actions in streamlined and hotspot smoking areas, which may reflect differences in provision of bins to cue and support appropriate actions.

Activities prior to disposal

One potential explanation for differences between contexts could be the type of activities that smokers were engaged in prior to disposal of the butt. As shown earlier in Figure 7, there were not a lot of differences in the proportion of people doing various activities in hotspot or streamlined smoking areas.

Figure 20 summarises the disposal actions associated with the activities smokers were undertaking while smoking and immediately prior to disposal in both streamlined or hotspot smoking areas.

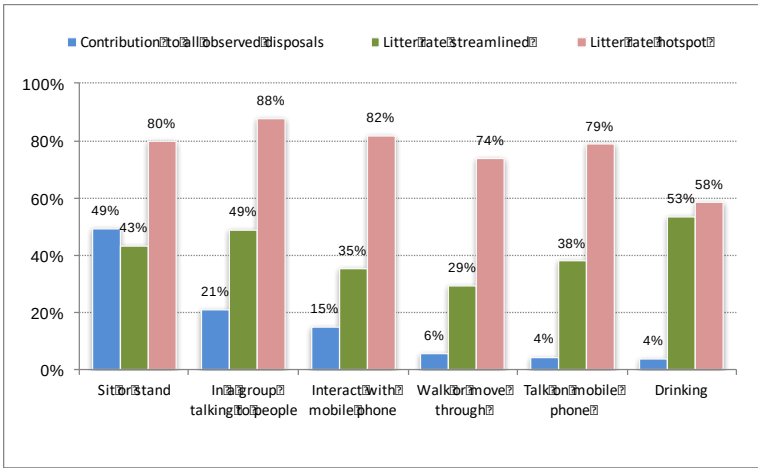

Figure 20 Activities prior to butt disposal in the sample with butt-littering rate in different contexts

Key findings:

- Littering of butts is more frequent in hotspots than streamlined smoking areas for most of the activities in which smokers were engaged in while smoking. The result seems to indicate that it is largely the context that influences butt littering rather than the activities prior to smoking.
- Smokers who were drinking in both streamlined and hotspot smoking areas showed little difference in the littering rates (53% and 58% respectively). This may indicate that context has less effect on the actions of smokers who are drinking while smoking.
- Higher butt-littering rates for both streamlined and hotspot smoking areas were associated with smokers interacting with peers (talking in groups) and standing or sitting while smoking.
- A similar pattern of butt-littering rates was found for smokers walking through locations or talking on the telephone.

Self-reports and butt disposal

For some time, the gap between environmentally responsible intentions or self-reports and actions has been well understood. To investigate the reliability of smokers' self-reports of disposal behaviour, two questions were included in this baseline study. Smokers were asked a general question about disposal behaviour, "*What do usually do with your butts?*" Typically, respondents tend to respond with the socially acceptable reply and underestimate their actual littering behaviour. Overall smokers in NSW indicated they littered butts about 23% of the time, which was half of the observed rate (52%).

When the second more targeted situation-specific question was asked about having ever littered in the actual smoking area, smokers provided a more behaviourally representative response with 51% saying they had littered.

Figure 21 shows the relationship between butt-littering rates in different site contexts and smokers' responses to the two questions asked in population centres across NSW.

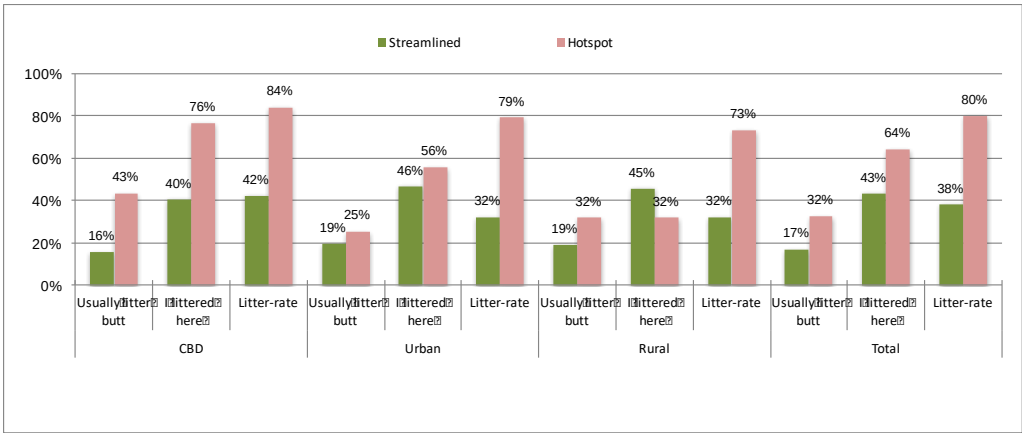

Figure 21 Self-reports and butt-littering rates for different contexts in population centres

Key findings:

- The response, "*I usually litter butts*" to the general question about how smokers disposed of butts was well below the observed butt-littering rate in both contexts and all population centres.
- The relationship between self-reports and actual behaviour is complex. In streamlined smoking areas, the percentage of smokers indicating they have littered in the smoking area was equal to or exceeded the actual observed butt-littering rate. Often these smokers would recall previous littering but indicated they "*no longer did that here*".
- The pattern of responses to survey questions from smokers in hotspots was different to those in streamlined smoking areas. Consistent with responses in streamlined locations, the proportion who indicated they usually littered butts was at least half of the observed littering rate, but the responses to the more targeted question never reached nor exceeded actual littering in population centres.

Figure 22 shows the relationship between butt-littering rates in different site contexts and smokers' responses to the two questions asked in site types.

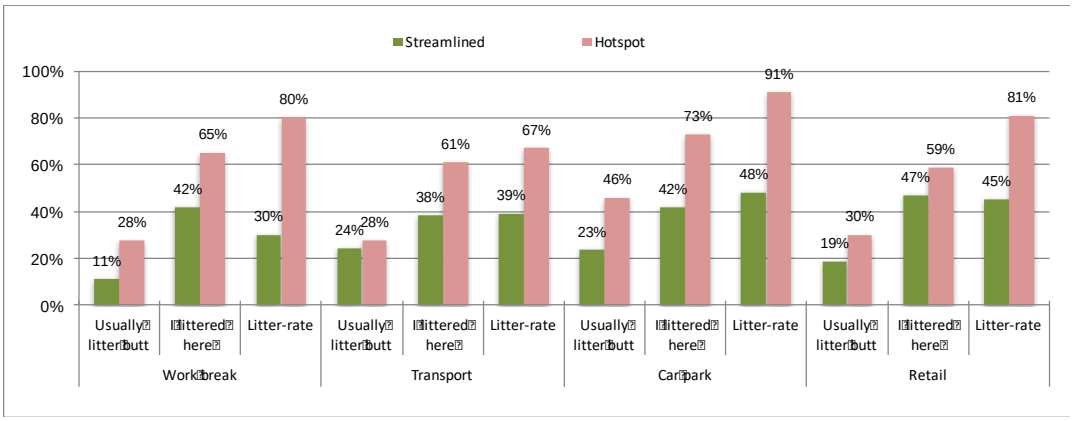

Figure 22 Self-reports and butt-littering rates for different contexts in site types

Key findings:

- The response, "*I usually litter butts*", to the general question about how smokers disposed of butts was well below the observed butt-littering rate in both contexts across all site types.
- In streamlined smoking areas the percentage of smokers indicating they had littered in the smoking area was equal to or exceeded the actual observed butt-littering rate for office work break, transport and retail site types.
- Smokers in hotspot site types, apart from those in transport sites, generally under-represented actual littering rates.

It seems smokers in hotspot smoking areas greatly underestimate or misrepresent their butt-littering levels, whereas those in streamlined smoking areas have more reliable insight into the butt-littering behaviour.

OVERVIEW AND CONCLUSIONS

In this research project the BLC has been used to provide the EPA with a current and detailed understanding of smokers' behaviour, attitudes and knowledge towards cigarette butt disposal in locations across NSW. The research included observations of smokers' actions as they occurred in public places, whether littering or using a bin, when discarding a cigarette butt.

Outcomes from this research will inform the next stage of program development exploring qualitative insights into the mindsets of smokers disposing of butts. Subsequently, interventions to influence smokers' actions will be developed and trialled in a variety of site types and locations. After verification of the intervention strategies, the EPA will roll out a program targeting cigarette butt litter and littering behaviour.

The key insights from the understanding cigarette disposal in context study are:

- Data collection generated 2,700 observations and 1,097 surveys from 41 streamlined and 46 hotspot smoking areas and found:
    - Two thirds of the observation and survey data was generated from male smokers aged 38 years (on average) present in streamlined smoking areas.
    - Despite over-sampling streamlined smoking areas, there were few differences in demographic characteristics of smokers across locations. For example, the average number of years smoked in streamlined smoking areas was 15 years and in hotspots was 16 years.
    - The size of the group of smokers observed across locations was reasonably stable and the mix of activities smokers were involved in before disposing of butts was similar between location contexts.

Conclusion 1

A viable baseline of butt-littering behaviour has been established based on a similar cohort of smokers and a large sample size. This allows robust comparisons to be made of the impact of location features (contexts) on butt disposal behaviour.

- In NSW half (52%) of smokers in public places were observed littering their butts.
    - The butt-littering rate in hotspot smoking areas was 80% which was more than twice the rate of littering in streamlined (32%) smoking areas.
    - Different butt-littering rates were found between hotspot and streamlined smoking areas in all CBD, urban and rural population centres. Urban and rural streamlined smoking areas had the lowest butt-littering rate (32%) while the highest rate for population centres was recorded in CBD hotspots with 84% of smokers littering butts.
    - Different butt-littering rates were found between hotspot and streamlined smoking areas in all site types (retail, car park, transport and office work break sites). Streamlined office work break sites have the lowest littering rate (30%) while hotspot car park sites have the highest butt-littering rate at 91%.

Conclusion 2

Smokers dispose of butts differently and the butt-littering rate varies in response to different environmental contexts associated with the different features of streamlined and hotspot smoking areas.

- The BLC effectively differentiates environmental amenity in streamlined and hotspot smoking areas. It provides:
    - A viable method for gathering location gradings, observational data, butt litter counts and survey responses to characterise the context. The BLC has been validated against other external measures.
    - A consistent pattern of results for Location Inspection (LI) and Location Inspection Survey (LIS) scores to differentiate between streamlined and hotspot smoking areas. Butt-littering rates drop as LI scores increase and indicate the location is better equipped to encourage appropriate disposal of butts. As Li scores fall, butt-littering rates increase.
    - A baseline for smoking areas in NSW, where the average LI score for locations that were streamlined smoking areas was 65 out of 100 while hotspot smoking areas scored 35 points.
    - The highest LI scores were recorded for CBD streamlined (67) and rural sites (69) while the lowest LI score was found in hotspot urban sites (31).
    - The BLC tool effectively differentiates hotspot and streamlined smoking areas across all of the four site types.
    - A method for guiding interventions based on variations in sub-scale performance by focusing attention on strengths and gaps in key pillars for supporting changes in butt-littering behaviour (location cleanliness, bins, information [signs], surveillance [visibility of disposal acts]) and involvement or sense of ownership.

Conclusion 3

The BLC provides an accessible citizen-science approach to gathering evidence of the factors influencing cigarette butt disposal that can guide actions to improve disposal behaviour and evaluate intervention programs.

- Conversations with smokers showed an awareness of the differences in features in locations, although smokers tended to be more positive in their assessments than trained assessors.
    - Smokers who use the location regularly may become more tolerant of less adequate facilities than outside assessors.
    - The activities smokers were engaged in prior to disposing of their butt were not likely to influence disposal actions and were generally less important than the context of the smoking area.
    - Smokers underestimated the extent of their butt littering in response to general questions. However, with more focussed awareness were more likely to accurately describe their littering behaviour. Smokers in hotspot smoking areas were less able to accurately reflect, and significantly underestimated, their actual littering behaviour.

Conclusion 4

Understanding the extent of smoker awareness about the factors underlying their habitual disposal of butts requires detailed exploration. This is particularly important in relation to the different perspectives in streamlined compared to hotspot sites.

Recommendations

Insights from the behavioural data should guide examination of the mindset of smokers in relation to their behavioural responses to environmental amenity (smoking area context). It is vital to know what configuration of features best encourage appropriate disposal behaviour.

In-depth surveys with detailed behaviour sequencing, particularly in relation to contradictions and anomalies in the observational database, will help to fully understand the mindset of smokers before, during and after disposal of butts.

Information could be gathered by well-targeted and selected in-depth surveys, grounded by analysis of smoker behaviour in hotspot and streamlined smoking areas. Data gathering could include:

- Methods for capturing and exploring details around key features and cues for smokers at the time of cigarette butt disposal.
- Identifying factors associated with extreme examples of butt littering and bin use in a broadened variety of smoking areas and site types.
- Exploring anomalies between what smokers say and do in relation to butt disposal in different contexts.

The assumptions underlying the ‘accepted wisdom’ of butt littering require further exploration in qualitative research and targeted intervention trials using the BLC to guide reductions in butt littering. These assumptions include:

- Smokers are unaware of contextual factors that influence their behaviour and understanding how to alter that awareness will positively affect disposal actions.
- Smokers will ‘always’ extinguish a butt and respond to an expectation of ‘putting-it-out’ before littering or using a bin.
- Providing litter or butt bins is ‘enough’ to reduce butt littering.
- Transition points with smokers walking between activities ‘should be a major focus’ for litter prevention compared to smokers sitting or standing in a smoking area.
- Converting a hotspot to a streamlined smoking area will always be associated with lower littering rates.
- A hotspot smoking area will always lead to more butt littering.