

Identifying effective strategies to reduce cigarette butt litter

Findings from the NSW EPA-led
Cigarette Butt Litter Prevention Trial



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1. Executive summary

In NSW, cigarette butts are consistently the most littered item. It is estimated that 1.32 billion cigarettes are littered in NSW each year. They have a range of adverse environmental consequences. The NSW Government has committed to implementing strategies that will reduce cigarette butt litter volume by 40% by 2020.

In response, the NSW Environment Protection Authority (EPA) has adopted a long-term approach, using rigorous empirical methods, to investigate relationships between smokers' thinking, perceptions, feelings and actions when disposing of cigarette butts.

In 2017, the EPA began working with 16 NSW councils to develop and lead a partnership program, guided by social scientists to identify ways to positively influence smokers' cigarette butt disposal behaviour.

In 2018, as a key part of this partnership program, the EPA led a practical quasi-experimental Trial to test strategies to reduce cigarette butt litter by influencing smokers' cigarette butt-littering behaviour in NSW.

The NSW EPA-led Cigarette Butt Litter Prevention Trial (the Trial) involved 16 local NSW councils (participants) working with the EPA. This was to test the practicality, feasibility and effectiveness of four cigarette butt litter prevention strategies. The strategies were delivered from March to June 2018.

This was the most comprehensive review done anywhere in the world of factors influencing smokers' disposal actions. It was the outcome of significant investment from the NSW Government in collaboration with local government partners to reduce cigarette butt litter in NSW.

This report outlines the process and findings of the Trial.

If the strategies from this Trial are replicated across NSW with similar outcomes achieved, it is possible to reduce 795 million cigarette butts from the litter stream in NSW each year.

Purpose and aims

The purpose of the Trial was to guide the EPA to develop an evidence-based program to support local land managers to prevent cigarette butt litter.

The Trial aimed to identify:

- the most effective strategies for reducing smokers' cigarette butt litter behaviour
- councils' experiences as project partners trained to use tools to co-deliver the interventions and assess impacts
- the features of the relationship between place managers and smokers for keeping locations free of butt littering.

Trial process

Strategies

The Trial was co-designed with participants to ensure practicality and relevance to local challenges and, at the same time, to enable conclusions to be drawn and guidance developed for the refinement of state-wide initiatives to reduce cigarette butt littering. In each location, participants from the 16 councils were involved in setting up, managing, delivering and assessing the Trial.

Trial participants applied strategies to smoking areas where butt littering was a problem. These were areas where smokers congregated, where a butt bin was installed, and where butt disposals (either using a butt bin or littering) would be visible to trained observers.

**If all the
cigarette butts saved from
the litter stream were lined up,
they would reach from Sydney
to London and beyond.**

Sydney



It is estimated that 1.32 billion cigarettes are littered in NSW each year.

The four strategies Trialled were:



Pathways – creating the best environment for smokers to correctly dispose of their butts by placing signs on butt bins and stencils on the ground to create pathways to the location of butt bins.



Pride and Ownership (P&O) – encouraging smokers to develop a sense of pride in, and ownership of, the area as a comfortable and welcoming place for smokers, thereby creating a commitment to bin their butts.



Positive Social Norming (PSN) – encouraging smokers to believe it is expected that smokers using the area will dispose of their cigarette butts in the bins provided; calling on smokers to act responsibly, reinforcing positive feelings they get from disposing correctly and meeting a target of zero butt litter for the location.



Enforcement – raising the risk attached to littering by drawing smokers' attention to fines; boosting patrols with rangers (enforcement officers) speaking to smokers in the locations to increase the rangers' visibility; and providing an incentive not to litter based on avoiding a penalty, with the option to move on to "hard enforcement" that involves issuing infringement notices to smokers who litter their butts.

Executive summary

Methodology

Trial participants used the EPA's Butt Litter Check (BLC) tool to gather information in each location. The BLC is a location-based methodology and tool to assess cigarette butt disposal behaviour by observing how smokers discard butts in response to a range of contextual factors. Along with behavioural measures, the BLC tracks information from the inspection and grading of a location's features, gathers insights from community conversations (smoker surveys) and counts of litter on the ground.

BLC information was compiled at three milestone points during the Trial, with participants collecting data at:

- **Benchmark:** Before any program activities (strategies) were put in place
- **Delivery:** During the active implementation of the strategies in a location
- **Follow-up:** Three months after the delivery ceased.

The effectiveness of the strategies was measured by observing changes in butt-binning behaviour at the milestones. More detailed examination of the effect of strategies was possible with the observation of smokers' disposal actions recorded each week during active delivery of strategies to identify peak impacts of interventions.

The BLC included other location-based measures that were used to identify the factors associated with changes in disposal behaviour. Outcomes on the Trial measures were compared to matched control locations where no intervention or changes were made to location features.

Note: The Trial did not endorse smoking as an activity. The Trial aimed to identify strategies to effectively prevent butt littering and influence smokers to be environmentally responsible in the disposal of butts.

How the Trial process worked:



Pathways
7 weeks

Pride and Ownership
8 weeks

Positive Social Norming
7 weeks

Enforcement
4-6 weeks



Key findings

Participants' review of the strategies

Following the delivery phase, a selection of Trial participants was interviewed to gain insight into the delivery of strategies. Their feedback indicated:

- Pathways was the easiest and most cost-effective strategy to set up
- P&O worked well in locations used regularly by smokers who appreciated the collateral (bins, signs and stickers), which created a defined smoking area with a reduced sense of being intruded on by disapproving non-smokers
- PSN provided an opportunity to gain local insights and to educate smokers once the reluctance to talk with people in the area was overcome
- Enforcement's enduring effect was questionable when no surveillance was present and when the motivation to use bins was not internalised
- the management of short timelines and challenges setting up strategies was made easier by clear EPA guidelines.

Impact of strategies on disposal behaviour

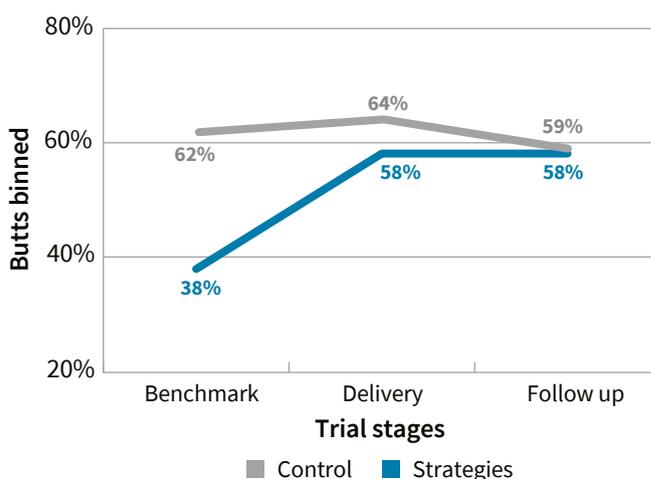
The observed binning rate, tracked by trained participants at each location, was used as the key metric to determine the effectiveness of each strategy. It is the most sensitive measure of the change in smoker disposal actions and provides an accurate, valid, and reliable assessment for determining outcomes from intervention strategies. Key observed binning rate results show:

- delivery of all strategies resulted in higher binning rates
- in control comparison locations with no interventions, little change occurred in bin use
- improvements in butt-binning behaviour were influenced by the degree of smoker engagement in the "social compact" – the implicit agreement among the members of a society to cooperate for social benefits.

- a. In this case, the social compact refers to internal rules or psychological processes that smokers engage in associated with littering or binning butts in response to different location features or contexts.
 - b. Local land managers can engage smokers in the social compact through the changes they make to location areas.
- improvements in binning rates varied in the time it took to establish and sustain a social compact across the four strategies.

During delivery, butt-binning rates increased from 38% to 58% combined for the four strategies – an overall 53% improvement in binning rates from benchmarks as a result of interventions.

Figure 1 Binning rates during Trial: Strategy vs Control sites



Separately, it was found that:

- building a sense of pride and ownership (P&O) had the biggest effect on butt-binning behaviour, achieving a 64% binning rate
- enforcement was the next most effective, with a 62% binning rate
- Pathways and PSN strategies were less effective (53% and 58% binning rates) than P&O.

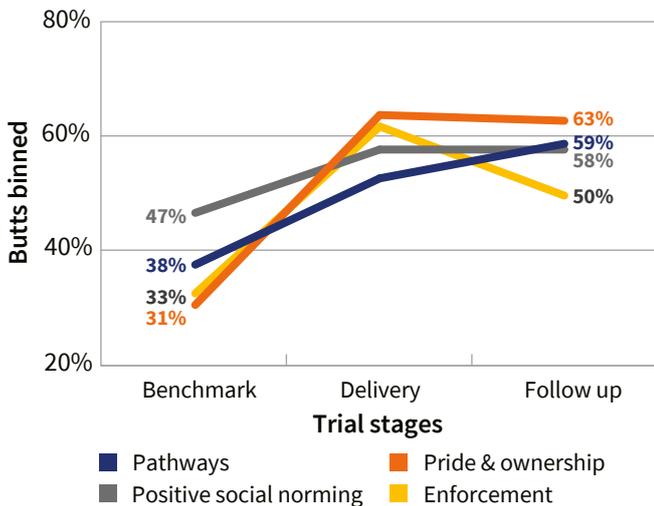
At follow-up, the impacts of strategies showed:

- improved binning rates were sustained for three strategies: P&O, PSN and Pathways

Executive summary

- binning rates fell from 62% to 50% in enforcement locations, where only half of the smokers observed were binning their butts.

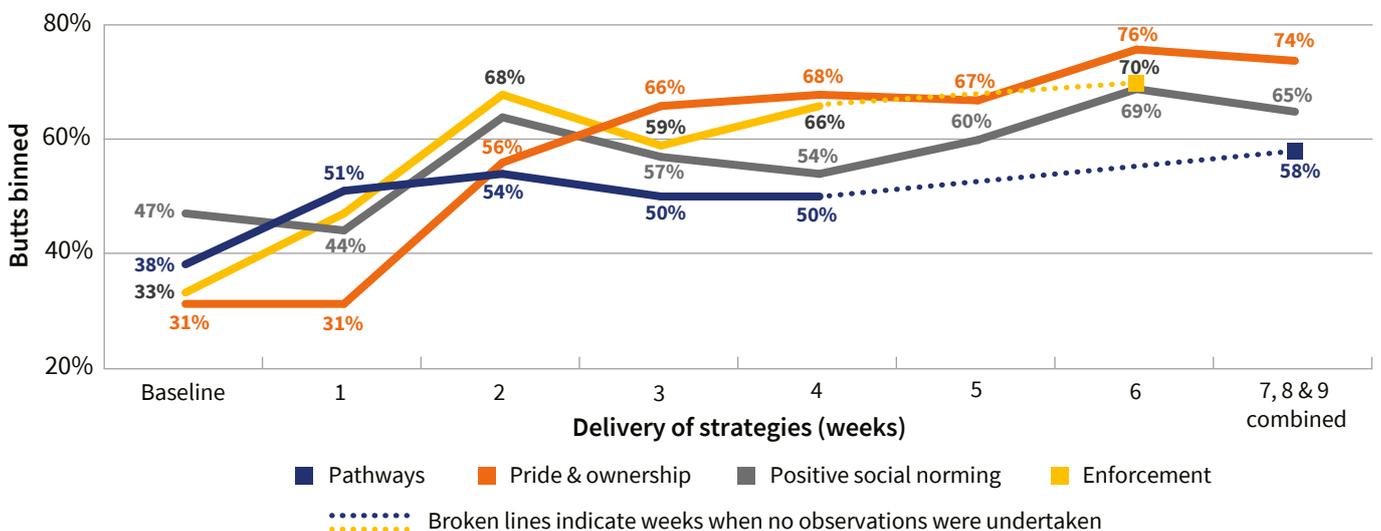
Figure 2 Binning rates during Trial: comparing strategies



Peak impacts on binning behaviour varied, with strategies taking different amounts of time for interventions to take effect over the delivery. Generally, after six to eight weeks of interventions, peak impacts were recorded that lifted binning rates across the four strategies to 67%, representing a 76% improvement from benchmark levels:

- P&O took time to build engagement, but once

Figure 3 Weekly observations of binning rates: comparing strategies



established, it showed continued improvements to become the most effective strategy

- P&O locations had the largest improvement in weekly binning rates that jumped in week 6 from 31% at benchmark to 76%, increasing the proportion of butts being binned by 144%.

The effectiveness of the P&O strategy for influencing butt-binning was shown at all site types. This included office blocks, where the biggest impact was recorded and 79% of smokers were binning butts. Outcomes in other site types were shops (69%) and transport (67%). Other strategies were not as effective as P&O in these site types.

Demographic features associated with smokers' disposal actions, including smoker gender, age, the composition of smoker groups, or the percentage of smokers in a location, did not affect strategy outcomes. Similarly, the distance smokers were from a bin when littering was similar for all locations and strategies, so the further away from a bin, the less likely the smoker was to use it.

The littering behaviour of smokers who continued to litter butts shifted during the Trial. It went from attempting to be more discreet during active delivery, to be more blatant at follow-up after the interventions were no longer active.

The BLC showed sharp decreases in butt litter during delivery of the four strategies. The reduction in butt litter was lost at follow-up when levels returned to benchmark. A similar pattern of changes in butt litter on the ground was found in control locations where no interventions were made.

It is important to note that counting butt litter is not a good indicator of actual smoker disposal behaviour. Reliance on butt litter count data to show impacts of interventions should be treated with caution and should be used only when other BLC measures are unavailable.

Location features influencing butt-binning measured by the BLC

Beyond the observed butt-binning rate outlined above, assessors also used the BLC to undertake area inspections (AI), smoker conversations (SC) and butt litter counts to confirm the behavioural results. This was done to increase confidence in achievements measured by observations of butt disposal acts.

Participant AI judgements about location features made before behavioural observations were a methodological strength with a strong relationship to butt-binning rate outcomes. AI scores tracked improvements to location features that mirrored the increases in butt-binning rates. AI scores, therefore, provide a useful alternative assessment of interventions when behavioural data is unavailable.

Conversations with smokers about the smoking area features produced results that reflected behavioural findings. These were, however, more variable when compared to location assessor (participants') AI ratings of features. Smokers' views of the smoking area and the impact of changes were more positive than assessors' ratings. Conversations with smokers did not simply endorse an assessor's view of a location.

Both assessors and smokers believed the signage associated with the strategies was a significant factor for explaining why smokers would be using bins and littering less during program delivery. AI and conversations with smoker, scores tended to agree about butt litter being the result of smokers ignoring appropriate signage and when smoking

locations were receiving attention from place managers.

Smoker surveys: After delivery of strategies

Smokers were also surveyed after delivery to understand whether the changes set up as part of the strategies were noticed and what their impact was.

Frequent users of the smoking areas were aware of the changes made, and generally agreed that they had achieved the intended aim of encouraging bin use.

One of the most appreciated impacts of the strategies was a sense that smokers were permitted to use the areas, and that some care had been taken to support the use of bins and to prevent butt litter. Smokers felt the interventions had increased their responsibility to use the facilities and follow the signage. Trial collateral was seen as effective in increasing awareness and encouraging binning.

There was less support for a sense of pride in smoking areas, with smokers indicating a broader sense of ownership and involvement would more likely encourage bin use.

Smokers were aware that littering butts was illegal, however, only knew the actual fine amount in enforcement locations. There was not a strong sense that smokers who littered butts were likely to be caught and fined.

Smokers were more likely to change their disposal behaviours in all strategies where they were engaged (i.e. spoken to, surveyed, engaged by rangers) in the smoking area. The detailed examination of the P&O strategy showed smokers whose ideas were sought and responded to, in delivering the intervention process, had the biggest reduction in littering.

The changes in both participants' and smokers' views provided insights into the workings of the social compact. In locations where butt bins, signage and other features were delivered, the beliefs about responsibility for litter prevention seemed to shift from the location managers to being shared more with individual smokers.



Executive summary

Conclusions and considerations for future interventions

Smokers' levels of comfort in designated areas encourages them to bin their butts.

Smokers were aware of changes that reinforced implied permission to smoke in areas with clear boundaries and signage and litter bins (collateral) indicating smoking was permitted. Consequently butt-binning was expected.

Strategies that engaged smokers delivered significant improvements in binning rates and helped build smokers' personal motivation.

Each strategy provided a foundation for establishing a sense of leadership for location managers (i.e. councils) for keeping the location clean and free of butt litter. Leadership includes, among other things, setting and maintaining a standard, and showing a commitment to a clean space. The installed collateral was important as a cue or prompt to remind smokers about the focus of their role which differed under each strategy.

The best results were consistently found with P&O strategies, though participants considered the Pathways approach to be the easiest and most cost-effective intervention. Consequently, a staged approach to change location features is recommended, where improvements in binning rates could be verified by observation.

The staged approach should build on the principle of engaging smokers in the social compact – through conversation, discussion of the positioning of prompts, talking to rangers, and collecting suggestions for improving butt-binning.

The BLC is convenient for guiding initial discussions and gaining insights into smokers' views about the location while engaging them in ownership of change initiatives.

Councils and other land managers need to show leadership in the social compact by completing the BLC to identify features that need improvement. The AI and SC parts of the BLC are particularly



Petersham NSW, Pride and ownership strategy

important as they provide both assessor and smoker perspective on location features. Councils and other land managers should consider implementing the following physical changes to the area:

- Clearly designated areas and boundaries where smoking is allowed
- Installing butt bins and appropriate signage (floor stencils in Pathways), butt bin stickers (Pathways and PSN), corflute signs and stencils that highlight that an area is suitable for smokers (P&O) and that smokers using the area are expected to bin their butts (PSN)
- Adopting the Pathway's approach to show smokers the bin position and guide them to nearby bins
- Where possible, improving comfort by providing seating, shade, and shelter from rain and wind



- Setting up the social compact by using the AI and SC in a more integrated fashion to engage with smokers:
 - a. Using AI total scores to identify locations where intervention could achieve the greatest improvements
 - b. Planning for ongoing ways for staff or volunteers (to save staff time and cost) to talk to smokers about the location
 - c. Identifying features to be improved
 - d. Effectively tracking modifications made to a location
 - e. Showing that improvements have been made and are sustained.

Participants indicated a commitment to deliver strategies at other locations, especially if:

- strategies could be shown to lead to lower cleaning costs to offset implementation costs
- the EPA continued to provide collateral
- there was support to get the necessary approvals and processes in place with engagement from management, as well as rangers, cleaners, and other parties involved in the areas
- there was support for a full-time officer dedicated to reducing litter in local government areas (LGAs) to sustain the strategies on a wider and continuing basis.



Byron Bay NSW, Positive social norming strategy

2. Project background and objectives

The NSW Government has committed to setting up strategies that will reduce cigarette butt litter in NSW. Cigarette butts are unsightly and expensive to clean up and are damaging to the environment and its ecosystems. Discarded butts pass easily into waterways and the oceans. They persist for a long time and leach toxins into the environment.

Cigarette butts are not only the most littered item in NSW, but across the world. The estimated number of cigarette butts littered each year ranges in the trillions. In Australia, current estimates suggest that between three to seven billion cigarettes are littered each year.

Research undertaken by the Australian tobacco industry, which compared cigarette sales, outdoor smoking rates and the EPA's observational research of littering rates, estimated that in Australia, 3.78 billion cigarettes are littered each year.

Based on NSW population and the EPA's recent observational research, this equates to 1.32 billion cigarettes littered in NSW each year.

As detailed in this report, if the strategy outcomes are applied across NSW it is possible to reduce 795 million cigarette butts from the litter stream in NSW each year.

The EPA has committed resources to a long-term strategic approach to reduce cigarette butt litter and littering behaviour. Actions to date include:

- desktop research of available knowledge about what influences smokers' cigarette butt disposal behaviour
- development of a place-based model, the Butt Litter Check (BLC) to assess smoker behaviour and the contextual factors influencing disposal actions
- detailed state-wide quantitative research into smokers' disposal behaviour, and the context in which littering and bin use occur. This research sample consisted of 2,700 observations and

1,097 smoker interviews, generating data from 41 "streamlined" and 46 "hotspot" locations.

- qualitative research with smokers to understand what influences their behaviour with butts, combined with observations of behavioural chains involved in the disposal of cigarette butts
- development of four intervention strategies designed to encourage smokers to bin their butts
- delivery of a behaviour change Trial in partnership with 16 NSW councils to test the effectiveness of the four intervention strategies in evaluation Trials.
- independent statistical analysis of Trial outcomes.

This report details the outcomes from the behaviour change Trial and the effectiveness of the four strategies to improve cigarette butt-binning rates. The Trial is the most comprehensive review of factors to effectively influence smokers' disposal behaviour undertaken anywhere in the world. It represents a significant investment from the NSW Government into collaboration and capacity building, with active participation from local government partners to integrate practical experience with good practice design methodology.

Findings of the previous desktop, quantitative and qualitative research

Reviews of relevant literature guided the quantitative and qualitative research. It identified some environmental influences and several beliefs among smokers that contribute to cigarette butt disposal behaviour. The features of smoking areas that influence disposal behaviour have been differentiated between locations with lower-butt littering ("Streamlined" locations) and areas with a higher butt litter burden and littering rates ("Hotspots"). Table 1 summarises the characteristics that distinguish locations with higher levels from those with lower levels of butt littering.

Participating Councils:

- | | |
|---------------------------------|----------------------------------|
| 1. Byron Shire | 9. Ku-ring-gai |
| 2. City of Canada Bay | 10. Port Stephens |
| 3. City of Canterbury-Bankstown | 11. Queanbeyan-Palerang Regional |
| 4. Cumberland | 12. City of Ryde |
| 5. Dubbo Regional | 13. Randwick City |
| 6. Eurobodalla Shire | 14. Waverley |
| 7. Parramatta | 15. Port Macquarie-Hastings |
| 8. Inner West | 16. Central Coast |

Table 1 Features differentiating locations with higher and lower levels of butt-littering

Feature	Hotspot locations	Streamlined locations
Quantity and age of butt litter	Older and degraded	Less and relatively new
Availability of bins, butt bins and ashtrays	No butt bin or fewer available	Bins available
Visibility of bins	Low, absent or hard to see	Visible and clear
Conditions of bins	Unclean, poorly-maintained, heavy graffiti	Clean, well-maintained, little or no graffiti
Ease of reaching bins	Absent or difficult	Present and easy to use
Signs pointing to bins	Absent, hard to see or unclear	Present, visible and clear
Signs explaining the use of bins	Absent, or hard to see or unclear	Present, visible, and clear
Information (signs) highlighting penalties	Absent, or hard to see or unclear	Present, easy to see, and clear
Ease of butts spilling or escaping from bins	Likely (holes, overflowing)	Unlikely, well contained
General condition and appearance of the location	Dilapidated, unattractive, not maintained	Attractive, well-maintained
Visibility of any new butt litter	Hard to see	Highly visible
Control of butt litter at the location	Poor	Good
Rangers patrolling the location	Low	High
Vandalism to vegetation, fixtures and fittings	High level and visibility of damage	Low level or no visible damage
Visibility of smokers disposing of butts properly or littering	Smokers visible littering butts	Smokers visible binning butts



Project background and objectives

The preliminary research also confirmed common, relevant smoker habits and beliefs about disposing of butts, including:

- it is difficult to find somewhere appropriate to smoke (smoking area)
- there is little chance of being caught and fined if cigarette butts are littered
- butts dropped on the ground and stepped on to extinguish (“drop and stomp“) have been disposed of safely and do little damage to the environment
- “dropped and stomped” butts will wash away and quickly decompose into environmentally benign material
- cigarette butt disposal often becomes automatic as an unconscious habit
- when attention is drawn to how they are disposing of butts, smokers are readily able to change actions and adopt appropriate behaviours (bin the butt)
- extinguishing a cigarette on a dirty, ash-covered ashtray or bin, or on a bin that is stained by other refuse, is highly unpleasant and potentially unhealthy
- picking up a stomped butt so it can be binned is difficult, unpleasant and unhealthy
- if a location has a high level of visible butt litter, dropping one more butt will make little or no difference.

How smokers dispose of their butts is influenced by the social compact, including:

- the appearance of a clean smoking area. This indicates a social norm of pride and care for the area, suggesting that dropping butts is socially inappropriate. In contrast, a poorly maintained and generally dirty smoking area indicates the social norm is not to care for or take pride in the appearance of the area and that it’s “okay” to litter. The social norm also relates to the perceived commitment of public space managers to create a clean smoking area. If the area is well presented and maintained, smokers are much more likely to play an active role in keeping the location clean and free of butt litter



- seeing how other smokers dispose of butts (indicating expected actions)
- the extent to which features of a location provide clear, visible reminders of the preferred behaviour (butt-binning rather than littering)
- making the preferred behaviour as easy as possible, providing clean, accessible, visible butt bins, and removing other contextual barriers to butt-binning
- The extent to which smokers believe the undesirable behaviour of littering will be detected and will result in unpleasant consequences, such as public detection, discussion of illegal action, and the potential for costly fines
- building on the foundation of community views that littering is undesirable and unacceptable, and making smokers understand that habitually discarding butts on to the ground, in drains or garden beds is littering.

These insights, which were reviewed and discussed with project participants, formed the basis for the development of the intervention strategies tested in the Cigarette Butt Litter Prevention Trial.



Designing intervention strategies for the Trial

The Trial was co-designed with participants to ensure practicality and relevance to local challenges. It was also to enable conclusions to be drawn and guidance developed for the refinement of state-wide initiatives to reduce cigarette butt littering.

The Trial was delivered in 2018 in collaboration with 16 local councils' participants and tested the feasibility and effectiveness of four behavioural science-based strategies aimed at reducing cigarette butt littering and encouraging smokers to "bin their butts."

In each location, participants from the 16 councils were involved in setting up, managing, delivering and assessing the Trial.

Program logic design to test strategies

The Trial used a program logic approach to integrate insights from prior research and practical experience. It also maintained sound evaluation methodology and used independent statistical analysis of achievements to extend results by identifying what works .

From the program logic, four intervention strategies were developed. These aimed to modify specific subsets of factors or key 'influencers' known to encourage smokers to bin their butts and discourage them from butt littering.

The Trial aimed to test which intervention strategies most effectively reduced cigarette butt littering behaviour in locations selected by participants.

All four strategies shared some common inputs and activities in preparation for the Trial, including:

- an action plan for the implementation of each strategy
- selection of smoking areas suitable for the selected strategy
- setting the Trial start and finish dates for each test location
- briefing program participants: internal (government and municipal officers) and external (location stakeholders – owners, managers and businesses)
- ordering and installing butt bin infrastructure before starting
- completing BLC training and recording of data in test locations
- an initial assessment of the smoking area to determine whether butt littering was likely and therefore, suitable for inclusion as a test location.

On completion of initial preparations, each location was then allocated to one of the four strategies:

- Pathways
- Pride and Ownership (P&O)
- Positive Social Norming (PSN)
- Enforcement.

All strategies were Trialled in locations where smokers congregated. Butt bins were installed where it was possible for trained participants to observe butt disposal (either using a butt bin or littering). The Trial design included steps to manage potential risks and guidelines for delivery and data gathering.

Project background and objectives

Pathways – strategy to create the best environment for butt bin use

Often smoking areas lack visible and clear “pathways” to guide smokers to use cigarette butt bins. The Pathways strategy sought to make it as easy as possible for smokers to find and use butt bins.

The intention was to make the bin and its location more prominent (removing a potential barrier to its use), together with visible signage to remind smokers to properly dispose of their butts.

The specific Pathways activities involved:

- ensuring a suitable (prominent and visible) butt bin was installed
- installing large and small “floor stencils” to direct smokers to a suitable bin. Stickers were also placed on the bin to highlight and link with floor stencils.

Risks to the Pathways strategy included:

- signage (stencils) might not be noticed or might not be understood
- stencils might be worn or damaged and then ignored
- butt bin use discouraged by damaged or overfilled bins
- lack of smoker concern about butt littering.



Port Stephens NSW, Pathways

How the Pathways strategy worked

A series of floor stencils provided a pathway which guide smokers to a prominent butt bin.

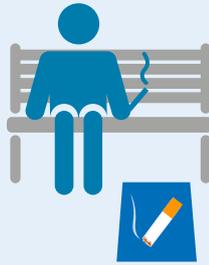
Stickers were placed on the bin that visually linked with the floor stencils.



How the Pride and Ownership strategy worked



1. Smokers were asked what they wanted in a smoking area



2. Sites were cleaned and upgraded – with stencils added to mark smoking areas



3. Smokers were surveyed for their positive reflections on the area



4. Smokers' reflections were displayed on site

Pride and Ownership – strategy to encourage a sense of pride and ownership

Some smokers believe they are not adequately catered for in terms of properly set up, pleasant and easy-to-use smoking areas with appropriate bins. Indeed, they might feel ostracised and even discouraged from responsible butt behaviour. The P&O strategy sought to overcome these influences and to encourage a sense of ownership in their smoking areas by consulting smokers about their butt disposal needs in the clearly signed and designated smoking areas.

The specific P&O activities involved:

- ensuring the location was clean and well maintained as a suitable place to smoke
- interviewing smokers in each location about suggested improvements to the area, and then following up with them after improvements were made during the Trial. Interviews explored what could be done to increase pride, ownership, and commitment to keeping the location clean, including (where feasible):
 - a. upgrading butt bin infrastructure
 - b. cleaning the location
 - c. providing seating

- placing a stencil on the ground to mark the location as a smoking area
- once a location was upgraded, interviewing another 10 smokers using the area
- displaying smokers' reflections about what they like, their pride in, and sense of ownership of the area.

Risks to the P&O strategy included:

- some smokers might be unaware that those using the location were consulted about the changes, while others might feel uninvolved because not every smoker was consulted
- there is no agreement on priorities for smokers about which changes were desirable
- some smokers might not notice the changes
- it might not be possible to implement the requested changes
- not implementing requested changes might produce a “backlash” of butt littering.

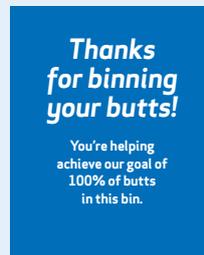


Project background and objectives

How the Pride and Ownership strategy worked



1. A goal poster was displayed and progress was updated



2. Thank you stickers were placed on or near butt bins



3. Prompt cards were provided for smokers to read and share

Positive Social Norming – strategy to encourage expectations of butt bin use

In some locations, the prevalence of “habitual littering of butts” can lead some smokers to perceive the behaviour as the “normal thing to do”.

In contrast, when smokers are helped to pay attention to how to correctly dispose of butts, there is a positive feeling about having “done the right thing”. Often smokers have little incentive to bin their butts and are unaware of the benefits of proper butt disposal.

The PSN strategy sought to provide cues to smokers to suggest disposal of butts in bins would be expected of most people, as it was “the right thing to do”. The aim was to support positive feelings or reinforcement for using butt bins.

The specific PSN activities involved:

- cleaning up the locations
- giving smokers an incentive by setting a social goal to bin butts, and creating “a butt-free space”
- placing signs at the selected parts of the smoking area to highlight the goal “To bin 100% of butts”, giving reasons to reduce cigarette litter (damage caused by butts) and including a call to action

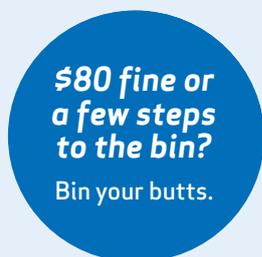
- updating signage to show progress towards the goal
- placing recognition stickers on or near bins “thanking smokers for using bins”
- sharing prompt cards among smokers that describe the goal and reasons for it. Then asking smokers to keep a card and give a second card to another smoker.

Risks to the PSN strategy included:

- changes in smoker-disposal behaviour, and the amount of visible butt litter not declining fast enough to signal a social norm of binning butts
- smokers might not consider the source of information about social norms as appropriate, and credible (“the right thing to do”)
- not enough smokers sharing information
- smokers might not be encouraged by rewards to change disposal behaviour or pursue the goal.



How the Enforcement strategy worked



1. Floor stencils were strategically displayed to highlight fines



2. Enforcement posters were displayed in known smoking areas



3. Uniformed rangers patrolled for at least 6 hours a week

Enforcement – strategy to raise the attention of illegal actions and the risk of fines

Some smokers claimed to be unaware that littering butts was illegal and attracted fines. Others, while being aware, had rarely seen any enforcement action nor heard about smokers being cautioned or fined.

The perceived probability of being caught for littering butts was low, and the probability of being subject to a penalty, if caught, was also low. Consequently, butt littering penalties had very little effect on disposal behaviour.

The Enforcement strategy intended to make smokers aware of penalties and to increase the perceived probability of being caught and punished.

The specific Enforcement activities involved:

- systematic and active policing of improper disposal of cigarette butts, with uniformed rangers patrolling for at least six hours per week
- strategic placement of stencils on the ground, highlighting fines associated with littered

butts, and pointing to nearby butt bins for legal disposal, including “Bin your butts or risk a fine” and “\$80 fine or a few steps to bin”

- use of photographs and signage highlighting littered butts and the associated fines, and including details of “Council is now targeting cigarette butt littering”, “Rangers patrolling this area”, and “Bin your butts”
- in the location, rangers speaking with smokers about litter fines and, where necessary, issuing Pollution Infringement Notices (PINs) to smokers littering butts.

Risks to the Enforcement strategy included:

- smokers might not see or hear about the messages from signage being supported by rangers being present, talking with, cautioning or fining smokers for littering
- smokers might only comply when a ranger is present, and consequently, littering rates won't change.



Project background and objectives

A location-based approach to gathering evidence

To understand butt litter behaviour, the EPA has adopted a place-based approach for gathering evidence to guide the development and delivery of intervention initiatives. Smoking areas are places where smokers congregate to smoke. Interventions are designed and adjusted based on the features of these places known to influence disposal actions.

The Butt Litter Check tool

In 2016, the EPA developed the Butt Litter Check (BLC), a location-based methodology and tool to assess cigarette butt disposal behaviour by observing how smokers discard butts in response to a range of contextual factors. Along with behavioural measures, the BLC tracks information from the inspection and grading of a location's features and gathers insights from community conversations (smoker surveys) and counts of litter on the ground.

Trial participants were trained to use the BLC methodology of collecting data.

In the Trial, information about each smoking area (location) was gathered in four ways:

- **Behavioural observation:** recording butt-disposal actions as they occur in the location, and noting key features of smokers associated with either using bins or littering butts. A butt-binning behaviour rate is calculated to represent the proportion of smokers in the area binning rather than littering butts.
- **Area Inspection (AI):** ratings of the features of the smoking area to provide insights into the context for encouraging smokers to use bins. The AI assessment grades contextual factors, specific attributes, and features that relate to known influences of littering behaviour. A location is scored against 20 statements that provide a total AI score out of 100 for those positively scored attributes in the area.

The 20 statements about location attributes are grouped into five sub-scales:

- a. Location cleanliness – lack or presence of butt litter in the smoking area
 - b. Provision of butt bins and other infrastructure – adequacy of butt bins and related infrastructure
 - c. The information provided at the location – communication (signs) about butt disposal expectations
 - d. The visibility/surveillance of smokers disposing of butts, and the likelihood of detection and sanctioning butt littering
 - e. Smoker involvement with the location and its appearance, including a sense of attachment or pride shown by users of an area.
- **Smoker Conversations (SC):** structured conversations to gain insights into smokers' views on the key features of the location and their disposal actions. These views are then converted into a smoker survey score out of 100 for those positively scored attributes in the area.
 - **Butt litter count:** a standardised measure of the number of butts and other litter in a 48 square metre section that is broadly representative of the location.

Guidelines for the BLC, including descriptions for helping community members use the tool to reduce cigarette litter in NSW, are at www.epa.nsw.gov.au/your-environment/litter-and-illegal-dumping/epa-work-prevent-litter/reducing-cigarette-butt-litter.



3. Evaluation methodology

Trial implementation

The effects of the four strategies on smokers’ butt-disposal behaviour were assessed by repeated location-based measures through the Trial. Each smoking location was the primary sampling unit for intervention data collection, with matched data collection in control comparison locations.

Trial outcomes overall and for each strategy were determined by comparing results for each location at project milestones with measurements obtained at the benchmark, delivery and follow-up.

Participating local councils were responsible for selecting locations, choosing the strategies for delivery and collection of the majority of BLC

and related data. Consequently, there was some variability in the sample sizes for total numbers of locations where each strategy was applied. After program participants selected the locations, they chose the intervention strategy believed to be most likely to meet local priorities and variations for butt litter prevention.

Comparison data was also collected from control locations where no changes were made to features nor were activities conducted. In the control locations, participants followed the same BLC data collection methodology.

Table 2 summarises the duration of program delivery, the profile for each strategy and the control locations.

Table 2 Locations, by strategy implemented

Strategy	Location profile						
	Duration (weeks)	Total locations	Metro	Regional	Bench mark	Post-program	Follow-up
Pathways	7	14	8	6	14	14	13
P&O	8	7	4	3	7	7	7
PSN	7	11	6	5	11	11	9
Enforcement		6	2	4	6	6	6
“Soft” (Warnings only)	4	4	1	3			
“Hard” (Warnings + fines)	6	2	1	1			
Control locations	6 to 8	6	6	0	6	6	6
TOTALS		44	26	18	44	44	41



The BLC – behavioural outcome measure

Rates of observed butt-binning using the BLC were the key metric used to evaluate the success of each strategy for influencing smoker disposal actions.

The previous research had shown that changes in a location take time to bed down and then to influence smokers' disposal behaviours. Consequently, weekly observations were recorded in each location for the four strategies to track the timing of any changes in disposal actions, and to help explore the effects over time of the strategic changes made to a location.

Trial participants were asked to collect a total of at least 20 observations of cigarette butt disposal each week in each location. The ambitious target for participants aimed to establish reliable and comparative weekly data to provide meaningful comparison information of the impacts for each strategy.

Weekly observations were grouped together to provide the most meaningful comparison of changes in behaviour associated with the implementation of the four strategies.

Smokers butt-binning behaviour was compared at the three Trial milestones, benchmark, delivery and follow-up. These were the key points in time for collection of all BLC measures that enabled analysis of results and validation of Trial outcomes.

BLC measures – Confirming behavioural outcomes

Changes in AI scores provided insight into the changes made to the location features known to have an influence on smoker disposal behaviour. An AI score was calculated to detect and reflect any perceived movements in features associated with changes thought to influence and encourage butt-binning at the three Trial milestones.



Comparison of changes in AI scores and butt-binning rates provides an understanding of how location features associated with the delivery of the four strategies may influence smoker disposal actions.

Conversations with smokers in a location were used to explore smokers' awareness of the changes to each location. Participants used the BLC survey guidelines as the basis for smoker conversations. Smokers' ratings of location features were used to calculate a summary score to reflect smoker views on the context and features associated with each strategy. Smoker conversations provided insights and were used to potentially contrast to the participant's perspective (AI) as measured by the summary score for the AI and for the SC.

Comparing the changes in smoker conversation scores and butt-binning rates provided an understanding of how a location's features from a smoker's viewpoint may influence butt disposal actions.

The **Butt litter counts** were used to track the number of butts on the ground during the key Trial milestone assessments. Butt litter counts have been used as a proxy measure of disposal actions when no behavioural data has been available. Importantly, the observed littering behaviour is a much stronger metric than litter counts.



Additional information gathered from participants and smokers

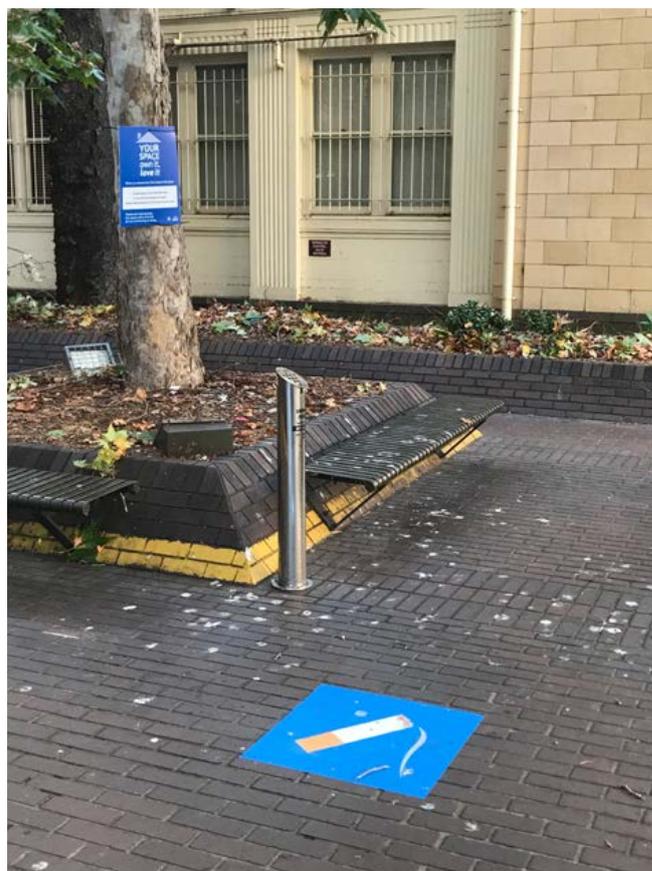
Participants were asked about their experiences delivering the strategies. This included a review of the Trial implementation processes, themes, issues, motivations for participating, and reasons for choosing to deliver specific strategies.

An EPA-commissioned interviewer then conducted supplementary smoker surveys at 20 of the 38 Trial locations. These were to establish opinions about the implementation of strategies and involved 20 smokers per location.

An extra survey was conducted at all P&O sites. This was to explore the social compact by gaining insights into smokers' opinions and priorities for how to improve butt litter prevention in the area. Pre-delivery interviews were obtained at six P&O locations. These asked for detailed information from smokers about suggested changes. Where possible, these changes were implemented. Midway through the delivery, a second similar survey was conducted.

Validation of outcomes

To show the impact of the strategies, this report provides a summary of findings from the detailed statistical review by independent consultants. Where an impact has been presented as effective, all of the outcomes and results have been verified by multiple analyses and appropriate tests for significant differences.



Parramatta NSW, Pride and Ownership strategy

4. Results

Participants review of the Trial strategies

In each location, participants from the 16 councils were involved in assessing the Trial. Participants also provided feedback through a follow-up telephone survey that explored reasons for involvement and experiences of delivering the strategies.

Participants wanted:

- to understand smokers' behavioural habits and choices when disposing of cigarette butts
- to understand the level of butt litter in local areas
- guidance on selection of strategies that would work locally to effectively reduce butt littering.

“I wanted to know what strategy would work well and to reduce cigarette butt litter in our LGA.”

“I wanted insight into how to implement programs and knowledge of what we have been missing.”

“Our area is a very unique area and I want to understand what strategy will hopefully give the best result.”

Participants managed a range of challenges when implementing the strategies, including:

- difficulties in gathering support from senior management and colleagues for involvement in the Trial, particularly regarding:
 - a. permission to implement particular strategies

- b. arranging logistics, and covering costs
 - c. having all relevant personnel (rangers, council, contract cleaners) on board
 - d. getting the locations cleaned, especially garden beds, because it added to the cleaners' regular workload
 - e. diverting staff from other tasks to gather data
- difficulties with short lead times for changing the mindset of all stakeholders, as well as limited time for changes to be embedded for smokers in P&O and PSN strategies
 - damage to butt bins and signage, mostly as a result of people scavenging smoked cigarettes.

Many participants described positive experiences from overcoming the challenges and delivering the strategies.

“I didn't have any issues, our cleaners were very good.”

“Getting approval was quite easy and my manager was very encouraging.”

“I liked talking to people and telling them about the program and people spread that word.”

“The EPA was very communicative, clear about what was trying to be achieved with clear plans that were easy to follow.”

Table 3 summarises the number of participants, time involved in delivery of the four strategies, including collaboration internally across council units, and externally with outside agencies, as well as community feedback received at council during the Trial.

Table 3 Summary of participant resources used in the Trial¹

Strategy	Hours	Council agencies	Community	
			Praise	Complaints
Pathways n=14	239	29	14	
P&O n=7	118	11	14	8
PSN n=11	224	23	13	
Enforcement n=6	72	16	6	
Trial n=38	653	79	47	8

- Overall participation in the Trial involved about eight hours of staff time with Pathways; nine hours using PSN; just under eight hours involving staff with P&O; and five hours per person to deliver and manage Enforcement.
- Collaboration across council units was least for P&O and Enforcement, with just over one unit per council on average involved, whereas the other strategies involved two units.
- Most of the formal community feedback about the Trial was favourable: one location in the P&O strategy was associated with eight unfavourable comments made to the council participant; there were also 14 favourable comments.

Participant interviews described in various ways the personal value of being in the field, including objectively assessing locations, observing exactly what smokers were doing and experiencing conversations that helped see the people behind the littering.

Many noted that their involvement in the Trial challenged their own preconceived ideas about smokers and improved their understanding of how to best bring about behaviour change, as shown by comments below.

“I thought smokers were terrible, ruining their health and polluting the environment with their littering. But at Benchmark after observing what disposal options they had and talking with them, I discovered that they were concerned and did not want to litter.”

“After Delivery and at Follow-up, I found the smokers to be appreciative of efforts made by the council and they were willing to go out of their way to use bins.”

After completing the participant interviews, the telephone interviewer, a highly experienced social researcher and analyst², suggested the following:

“The biggest value and outcome from the Trial was the experience for participants who had their eyes opened and said the more they learnt about smokers in a location the better able they were to do a good job of facilitating pro-social actions.”

After their involvement in the delivery of the four strategies, participants’ subjective reviews of the Trial were collated and are summarised below.

¹ Note: Resources for Control locations are not shown.

² personal communication with Don Porritt, 18 April 2019



Pathways strategy

Pathways strategy was seen as easy to implement, and particularly successful in transition points – high foot-traffic areas near a bus stop, outside a station, or shopping centre entrance. The key to an effective Pathway strategy was the positioning of the butt bin, signs that stood out from the background and clearly highlighted the bin position for people passing through the area.

Participants saw smokers follow the signs on the paths to the bin before lighting up, standing nearby, and then binning butts.

“It was fascinating to watch smokers almost subconsciously follow the arrows.”

“The stencil was clear, but in some cases they do get worn.”

Some smokers told participants they had a sense of permission to smoke in the location. Conversely, others misunderstood the pathways arrow and butted the cigarette on the sticker, which resulted in herd behaviour, with others following by example.



Parramatta NSW, Pathways strategy



Strathfield NSW, Pride and ownership strategy

Pride & Ownership strategy

Participants felt the P&O strategy worked well in locations used regularly by smokers. Participants noted smokers appreciated the collateral (bins, signs and stickers), which created a defined smoking area with a reduced sense of being intruded on by disapproving non-smokers.

“I thought that P&O would work, but I assumed that the area looked quite good as it was, and it didn't need that much jazzing up as a place to sit and have a smoke. That was a biased assumption.”

“P&O gave them a spot, and people liked that because it also told non-smokers that you can actually stay away from here as this is our space.”

“The message was contrary to the non-smoking signs smokers' usually encounter and provided a sense of ownership over the site.”

Some participants felt uncomfortable approaching smokers to talk. Depending on positive social interactions, it could be challenging for participants if smokers didn't appear to want to talk.



Positive Social Norming strategy

PSN was a popular approach expected to be effective. This was despite some participants' doubts about the willingness of smokers to accept, pass on cards, and speak to other smokers about using the butt bins.

“I thought that people will litter the cards, but what I heard was that people were happy to have a chat about the information.”

“Some smokers didn't like the idea of passing the card to another smoker.”

Participants felt that once they overcame their reluctance to talk with people in the area, the PSN approach provided an opportunity to gain local insights and to educate smokers.



Merrylands NSW, Positive social norming strategy with prompt card



Ryde NSW, Enforcement strategy

Enforcement strategy

The Enforcement strategy aimed to encourage smokers to use bins and to educate them about fines for butt littering. Some rangers also issued infringement notices. Participants described a positive response in some areas while others were characterised by an awkward confrontation, and in one instance, physical aggression towards a ranger.

“Our rangers are very proactive with litter and often report littering. The guidelines were realistic for them to break down time in locations into different chunks – that was a huge positive. It made rostering rangers realistic.”

Some rangers were uncomfortable and reluctant to talk to smokers, even for soft enforcement. When some smokers refused to identify themselves, no hard fines were issued. In one instance, ranger safety was almost compromised but members of the public (other smokers) provided support.

“Rangers had a script provided by the EPA and we asked them to follow it, covering potential littering fines if caught.”

“Rangers had smokers respond positively and negatively, which is an aspect they face when on patrol.”

Participants suggested that the Enforcement strategy's enduring effect was questionable when no surveillance was present and the motivation to use bins was not internalised.

Key findings: strategy impact on butt-binning behaviour

The observed binning rate, tracked by participants at each location using the BLC, was used as the key metric to determine the effectiveness of each strategy.

Behavioural outcomes from the BLC collected at the benchmark, delivery, and follow-up milestones were examined to contrast the overall impact of strategies against control locations. Assessing the effectiveness of the four strategies involved comparing the outcomes for each approach at those milestones.

Key findings

The binning rate increased during the delivery of all four strategies. Locations where strategies were applied had higher binning rates, while control sites showed no improvement in binning rates.

Benchmark to delivery

All four strategies produced increases in butt-binning from the benchmark to the delivery phase. During delivery, butt-binning rates increased from 38% to 58% combined for the four strategies – an overall 53% improvement in binning rates from benchmarks as a result of interventions.

- Pathways increased binning rates from 38% at benchmark to 53%
 - Pathways achieved a peak binning rate of 58%
 - Pathways peak impact corresponded to a 51% change from benchmark levels
- P&O had the best improvement, increasing binning rates from 31% at benchmark to 64%
 - P&O achieved a peak binning rate of 76%
 - P&O peak impact corresponded to a 144% change from benchmark levels
- PSN increased binning rates from 47% at benchmark to 58%
 - PSN achieved a peak binning rate of 69%
 - PSN peak impact corresponded to a 47% change from benchmark levels

- Enforcement increased binning rates from 33% at benchmark to 62%
 - Enforcement achieved a peak binning rate of 70%
 - Enforcement peak impact corresponded to a 114% change from benchmark levels

Three-month follow-up

At three-month follow-up, all locations had better butt-binning rates compared to benchmarks. However, not all the high-level butt-binning gains made during delivery were sustained. There were no noticeable changes at control locations.

- Pathways increased binning rates from 53% at delivery to 59%
 - Pathways binning rates at follow-up corresponded to a 52% increase over benchmark
- P&O binning rates fell from 64% at delivery to 63%
 - P&O binning rates at follow-up corresponded to a 102% increase over benchmark
- PSN binning rates remained stable at 58%
 - PSN binning rates at follow-up corresponded to a 24% increase over benchmark
- Enforcement binning rates fell from 62% at delivery to 50%
 - Enforcement binning rates at follow-up corresponded to a 54% increase over benchmark

Figure 1 shows the binning rate for the three Trial milestones (benchmark, delivery and follow-up) for all strategies combined, compared to control locations.

Figure 2 shows changes in butt-binning behaviour in smoking areas observed at the three Trial milestones during the project in locations where the four strategies were delivered.



Figure 1 Binning rates during Trial: Strategy vs Control sites

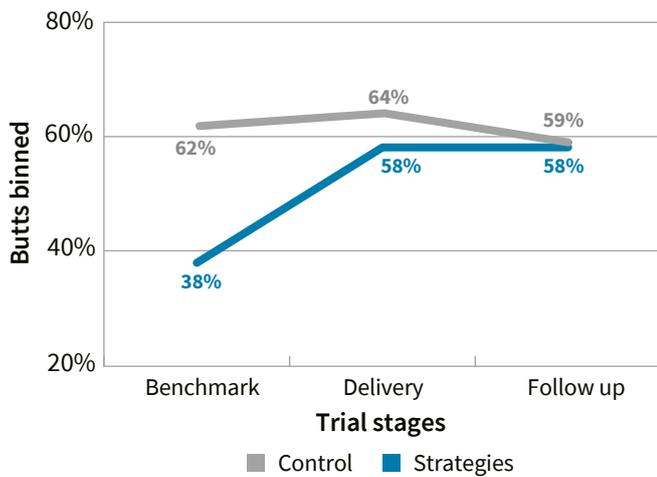


Figure 2 Binning rates during Trial: Comparing strategies

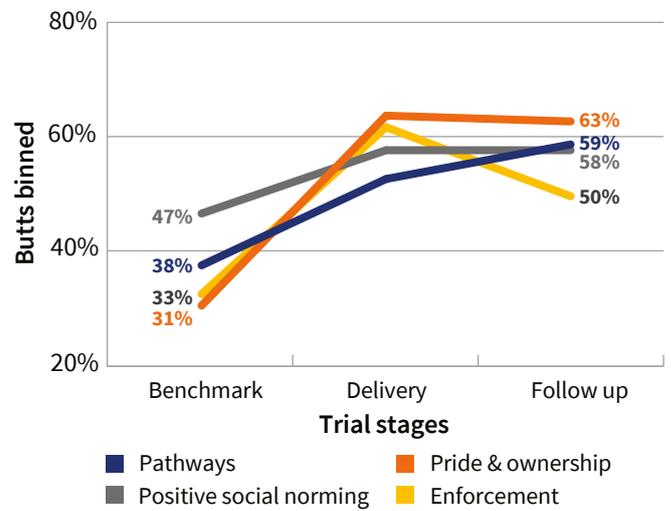


Figure 3 Weekly observations of binning rates: Comparing strategies

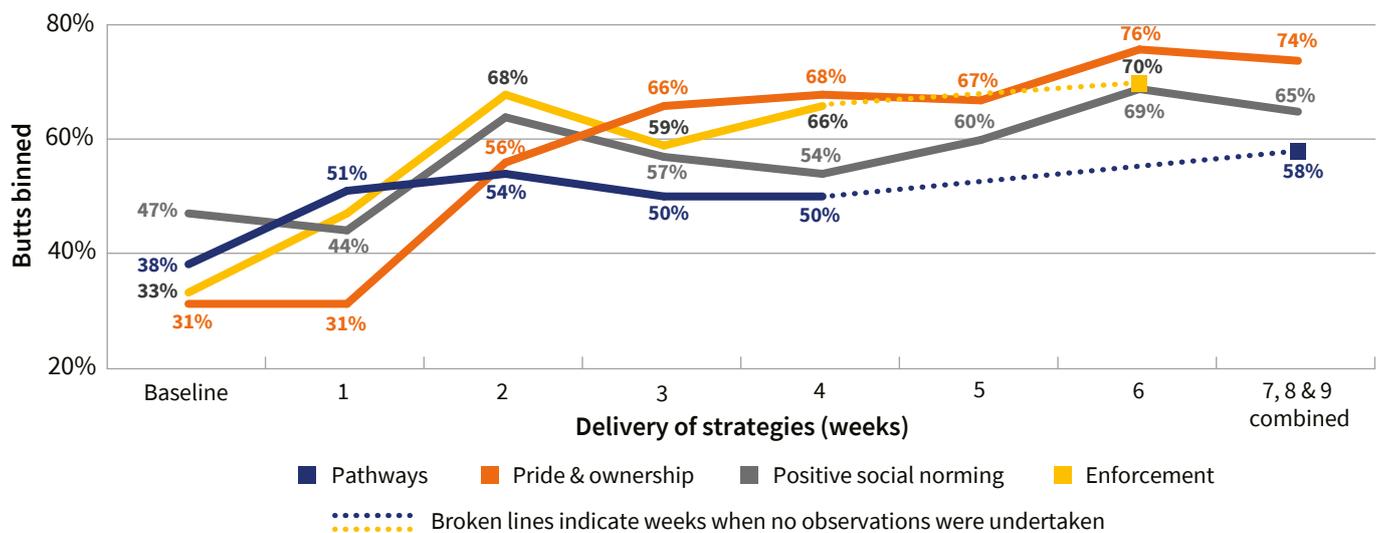


Figure 3 shows the trend and timing of changes to butt-binning rates for each strategy, from benchmark to the end of program delivery³.

3 Not all participants were able to collect behavioural observations every week during delivery of some strategies; consequently, there were gaps in weekly data in Figure 3.



Weekly change in behaviour during delivery phase

Over the seven weeks of delivery, all strategies showed a trend for progressive increases in butt-binning. Weeks 6 and 7 were the peak times for interventions and achieved a butt-binning rate of 67% across all strategies, which was 29% higher than the benchmark.

The speed and stability of changes in behaviour varied, with two strategies taking time to influence actions.

- Pathways increased binning rates immediately from week 1, and that remained relatively stable until late observations recorded at the peak when binning improved by 53% from benchmark.
- P&O took time to take effect but eventually had a trend for continued improvement. There was a significant jump in binning rates from week 1 to 2 during a period of smoker engagement with a trend towards increased binning behaviour to reach a peak binning rate of 76%.
- PSN had inconsistent improvements in binning rates from the initial weeks to later periods, with a peak improvement from benchmark to week 6 of 49%.
- Enforcement had an immediate and significant effect which led to a 107% increase in binning rates from benchmark to week 2. Results were inconsistent, with some weeks showing less dramatic improvements over benchmark. Peak impact had a 70% binning rate.

In contrast to the strategy outcomes, changes at control locations had smaller, inconsistent and non-significant variations in the weekly disposal behaviour results.

Confidence in behaviour results

Participants selected locations to Trial strategies in areas that had existing butt littering issues. On the other hand, the control locations seemed to be allocated by participants selecting areas where butt littering was less of an issue (as shown by the high benchmark binning rates for control locations). Locations selected by participants for intervention

had lower butt-binning rates compared to control locations at benchmark.

Given different starting points, butt disposal results were examined for “regression to the mean” with strategy locations improving as a statistical anomaly or for potential “ceiling” effects for control locations with less room to improve binning. Neither effect was found to have influenced outcomes: indeed, changes in the disposal of butts were related to the implementation of strategies.

Benchmark binning rates varied for the locations where strategies were tested. The results suggested the potential for strategies to be more effective in locations with lower benchmark binning rates where butt litter is a problem.

Butts on the ground as a measure of behaviour

Counts of butt litter are used as a proxy measure when behavioural data cannot be collected. Litter counts are inherently variable, and there are concerns about relying on them as an indicator of disposal actions reflecting behaviour.

The figures below, with data from the control locations excluded, show the changes over time for counts of butt litter on the ground in control and strategy locations at Trial milestones.

Figure 4 Butt litter counts during Trial: Strategy vs control sites

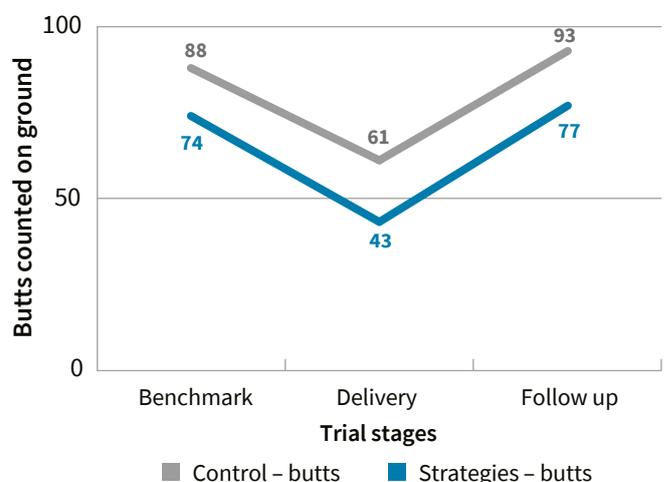
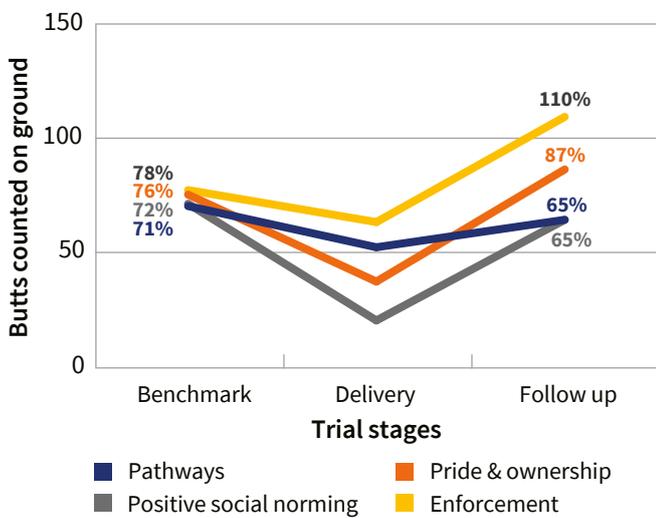


Figure 5 Butt litter counts: Comparing strategies



Overall butt litter counts were lower at the delivery stage compared to benchmark and follow-up, presumably indicating that strategic interventions were associated with less butt litter. However, the trend for less butt litter was also found in control locations.

- The sharp decrease in butt litter counts in strategy locations during delivery was matched by the control locations that had no interventions
- The trend for the butt counts to decrease at delivery was similar for each strategy, with no real difference in the results achieved by the different strategies.

At follow-up, reductions in butt litter counts during delivery were not maintained in locations implementing the four intervention strategies:

- Only during delivery was there a small weak correlation between butt-binning rates and counts of litter on the ground
- Counts of butt litter on the ground are not a reliable measure of actual butt littering.



Bondi Junction NSW, Pride and ownership strategy

Butt-binning behaviour in different site types

One reason that participants had given for their involvement in the Trial was to gain an insight into which strategy was more likely to be effective with which local site type near designated smoking areas (locations).

Participants chose to apply the strategies in a range of site types. Some site types were exposed to all four of the intervention strategies, while others were tested by some of the strategies chosen by participants. Site types were selected to match local conditions and to meet local capabilities and priorities for improved butt-binning behaviour. Site types adjacent to smoking areas in the sample included parks, office blocks and shopping strips, outside clubs and venues, as well as transport sites.

Table 4 summarises the outcomes for site types exposed to one or more strategy. It shows the effectiveness of the intervention by indicating the butt-binning rates during delivery and at follow-up as well as the percentage change in butt-binning at delivery compared to benchmark levels⁴.

⁴ Data for site types is preliminary because of the relatively small sample of site types and intervention strategy combinations tested during the Trial. Notably not all of the strategies were applied and tested in all site types so the samples for disposal behaviour are incomplete, providing indicative analysis and of outcomes and expected trends.



Table 4 Summary of butt-binning rates in site types adjacent to smoking areas

Site type	Butt binning at stage	Strategies			
		Enforcement	Pathways	PSN	P&O
Parks	Baseline	50%	9%	43%	43%
	Delivery	66%	27%	65%	74%
	Follow up	56%		58%	54%
Change at Delivery from Benchmark		32%	217%	53%	75%
Shops	Baseline	56%	45%	45%	45%
	Delivery	61%	51%	67%	69%
	Follow up	56%	52%	47%	66%
Change at Delivery from Benchmark		9%	12%	48%	53%
Transport	Baseline	55%	53%	60%	50%
	Delivery	57%	61%	72%	67%
	Follow up		61%	68%	33%
Change at Delivery from Benchmark		4%	15%	20%	33%
Office block	Baseline			48%	35%
	Delivery			59%	79%
	Follow up			61%	73%
Change at Delivery from Benchmark				23%	124%
Venue club pub	Baseline		53%		
	Delivery		68%		
	Follow up		83%		
Change at Delivery from Benchmark			30%		

Across all site types in locations around NSW, the P&O strategy was the most effective in the Trial. It was associated with increased butt-binning behaviour during delivery:

- around parks, with almost three-quarters of smokers (74%) binning butts
- around shopping strip sites, with over two-thirds of smokers (69%) binning butts

- around transport sites, with two-thirds of smokers (67%) binning butts
- around office block sites, with over three-quarters of smokers (79%) binning butts.

During delivery, the P&O strategy showed the biggest effect on butt-binning in smoking areas near office block sites where bin use improved by 124% from benchmark.



Strategies other than P&O were also effective in different site types, with:

- PSN strategies during delivery showing improved butt-binning near
 - parks sites with almost two-thirds of smokers (65%) binning butts
 - office block sites with over half of smokers (59%) binning butts
- Enforcement strategies showed improved butt-binning around shopping strip sites, with two-thirds of smokers (66%) binning butts during delivery
- Pathways was the only strategy used around venues, clubs and pubs sites and during delivery, it had over two-thirds of smokers (68%) binning butts.

Characteristics of smokers and associated actions

During the Trial, the demographic features of smokers were noted and examined for two reasons. These were to determine whether there was a relationship to butt-binning and littering and to better understand the potential influence of the four strategies.

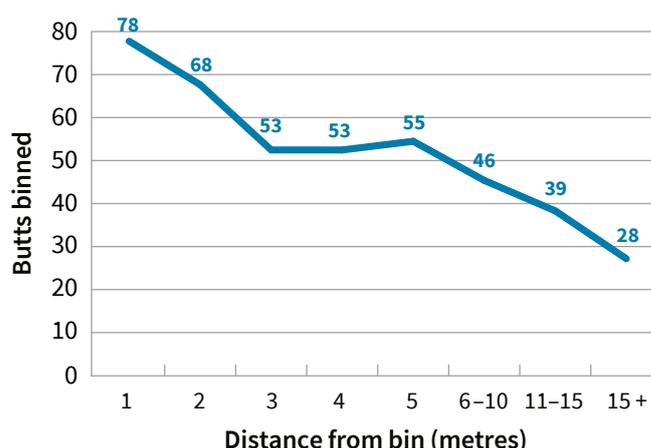
The following characteristics of observed smokers showed no real differences during the Trial or between the four strategies in the patterns of disposal behaviour and could not account for the strategy outcomes:

- Butt-binning rate was similar for males (49%) and females (55%)
- Butt-binning rate was similar for smokers aged under 34 years (50%), and over 34 years (52%)
- Butt-binning rate was similar for smokers in a group that was all male (42%), all female (46%), or mixed gender (46%)
- Butt-binning rates were unrelated to the number of people in the smoking area; locations with less than 20 people (50%), and with 20 or more (53%)
- Butt-binning rates were unrelated to the percentage of people in a location who were observed smoking cigarettes; locations with under 15% of users smoking (51%), and locations with 15% or more smoking (52%).

There was some consistency found across all strategies for some characteristics that were related to butt-binning rates, including:

- the bigger the group of smokers, the less likely they were to bin their butts than lone smokers (58%), a pair (46%), and in a group of three or more (39%)
- smokers closer to the bins were more likely to bin butts, as shown in the figure below. The average distance to a bin for smokers in control locations was seven metres. For Pathways, P&O and PSN locations, it was eight metres. In Enforcement locations, it was nine metres.

Figure 6 Binning rate by distance from nearest bin across all locations



- clearly, the closer a smoker was to a butt bin, the much higher the chance of them binning (78%)
- when a butt bin was more than five metres away, the chances of bin use dropped dramatically with only 28% of smokers likely to walk to it.

Differences in these characteristics were not related to the patterns of change to location features nor butt-binning rates across the strategies.

During the Trial, there was also little change in the proportions of the types of littering actions. Across all four strategies, there were relatively stable percentages of smokers who littered by wedging or flinging butts, brimming butts on the edge of the bin, or forgetting and leaving the butt behind. Similarly, the proportion of those who littered by placing butts in garden beds, in the gutter, on raised surfaces, or around bins did not vary.

Results

During the Trial, some elements of smokers' disposal behaviour showed systematic variations, with clear differences between delivery and follow-up milestones. The variation in visible littering acts for the place where butt litter was discarded, and the way butts were littered in locations across the four strategies are summarised in the figures below.

Figure 7 Change in how smokers littered during the Trial

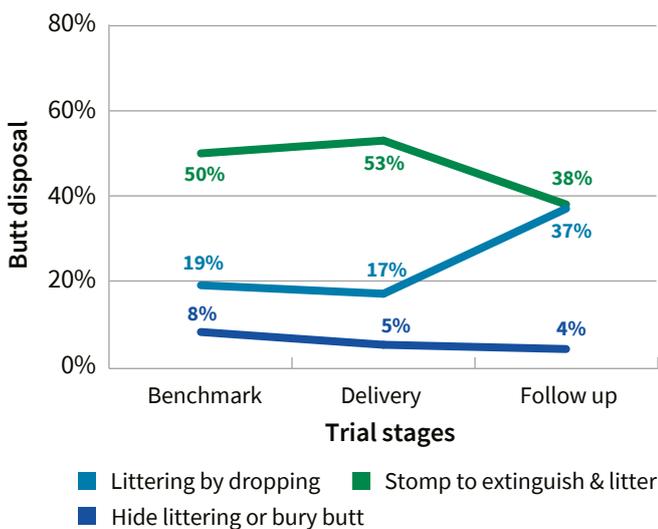
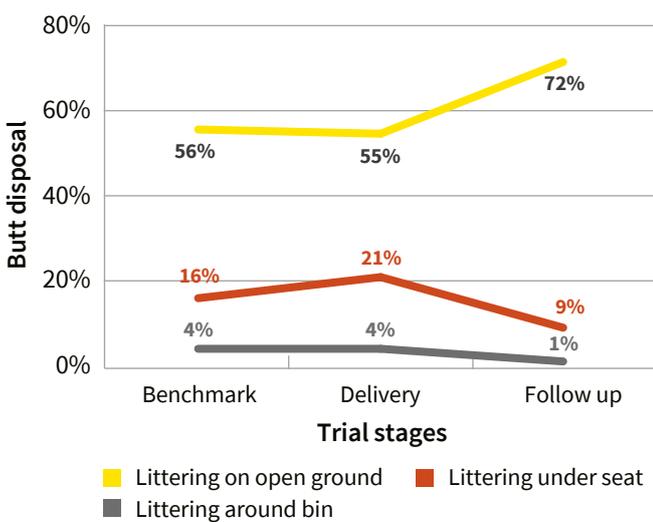


Figure 8 Change in where smokers littered during the Trial



- During the delivery, the percentage of butt-littering by dropping butts, stomping butts to extinguish them, and hiding butts was similar to benchmark levels.
- During the delivery, the proportion of places where littered butts were discarded on open ground, hidden under seats, or left around the bin remained relatively stable to benchmark levels.
- At follow-up, butts were littered more openly and visibly, with more smokers simply dropping butts on open ground. They were less likely to extinguish by stomping butts before littering, and a smaller proportion hid their butts.

Once the interventions were no longer being implemented across all four strategies, smokers who were littering seemed less focused on hiding the way they littered or where they discarded their butts. Potentially, smokers may have shown a slight backlash associated with less concern about appropriate disposal actions than during delivery, when participants were actively delivering the strategies.

Location features influencing butt-binning behaviour

AI scores

Area Inspections (AI) are a key part of the BLC to assess location context and features, i.e. cleanliness, infrastructure, signage, community involvement, and enforcement to test whether any alterations to location features could be detected.

Tracking the change in AI scores during the Trial provides a useful metric to track changes in a location and compare the changes to other BLC data, specifically binning rates.

Figure 9 summarises the AI scores determined by participants assessing the features of smoking areas. Figure 10 shows the changes in AI scores observed in locations where the four strategies were delivered.

Figure 9 Area Inspection scores during Trial: Strategy vs Control sites

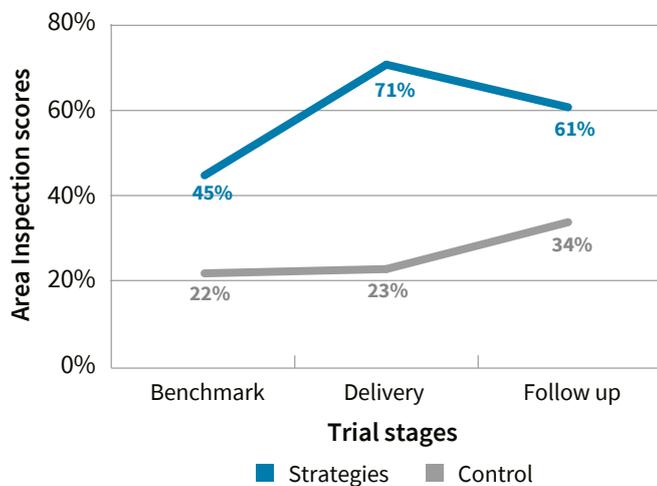
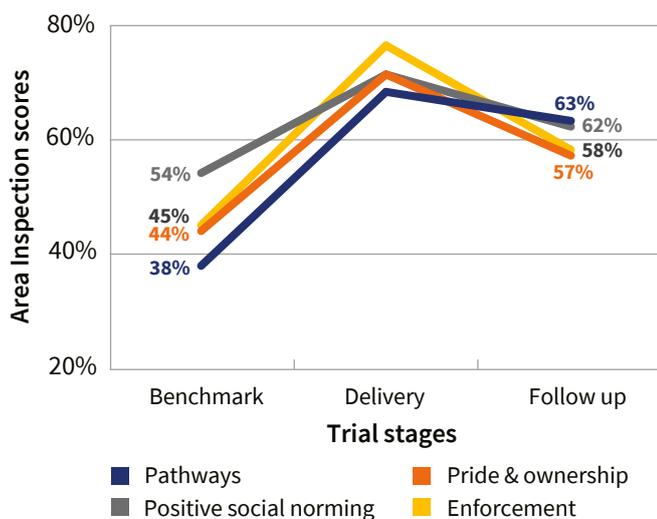


Figure 10 Area Inspection scores: Comparing strategies



- The delivery of strategies was associated with improvements in AI scores.
- No such improvements were found in control locations, with no change during delivery, and a small increase at follow-up.
- At follow-up, AI scores showed a small decline, falling from high levels achieved during the delivery of strategies.
- Strategy AI scores at follow-up were above benchmark levels.

The improvement in AI scores from benchmark to delivery is evidence that participants assessing the locations detected the changes to location features that had been implemented as planned.

- Changes in AI scores during the Trial closely mirrored the trend in butt-binning rates. Importantly, improvement in AI scores corresponded with increased binning rates.
- Therefore, where location features were improved, smokers' littering of butts reduced.

Benchmark to delivery

All four strategies showed improvements in AI scores from benchmark to delivery, with improvements varying across strategies.

- Pathways AI scores increased from 38% at benchmark to 68%
 - Pathways impact on AI scores corresponded to a 79% change from benchmark
- P&O AI scores increased from 44% at benchmark to 71%
 - P&O impact on AI scores corresponded to a 61% change from benchmark
- PSN AI scores increased from 54% at benchmark to 71%
 - PSN impact on AI scores corresponded to a 31% change from benchmark
- Enforcement AI scores increased from 45% at benchmark to 76%
 - Enforcement impact on AI scores corresponded to a 69% change from benchmark

Three-month follow-up

Three-months after interventions stopped, all strategies were associated with AI scores greater than benchmark levels. But the high level of gains made during delivery were not sustained at follow-up.

- Pathways AI scores dropped from 68% at delivery to 63%
 - Pathways impact on AI scores at follow-up corresponded to a 66% improvement from benchmark



Results

- P&O AI scores dropped from 71% at delivery to 57%
 - P&O impact on AI scores at follow-up corresponded to a 30% improvement from benchmark
- PSN AI scores dropped from 71% at delivery to 62%
 - PSN impact on AI scores at follow-up corresponded to a 15% improvement from benchmark
- Enforcement AI scores dropped from 76% at delivery to 58%
 - Enforcement impact on AI scores at follow-up corresponded to a 29% improvement from benchmark

There was a strong association between AI and butt-binning rates. When AI scores were high, butt-binning was also high, and vice versa; if the AI score was low, binning rates tended to be lower. The relationship between AI and butt litter counts was not strong, but an association was found between participant assessor’s AI scores which were in part reflecting the level of butt litter in the ratings of features. Generally, if the AI score was high, butt litter counts tended to be low and vice versa; if the AI score was low, the counts tended to be high.

Smoker conversations about changes to locations

Smokers’ rating of the features of the location, scored out of 100 and collected through smoker conversation (SC) scores, are summarised overall in Figure 11 for the Strategy and Control locations at the Trial project milestones. Figure 12 shows the changes in smoker conversation surveys scores recorded during the project for each of the four strategies.

Figure 11 Smoker survey scores during Trial

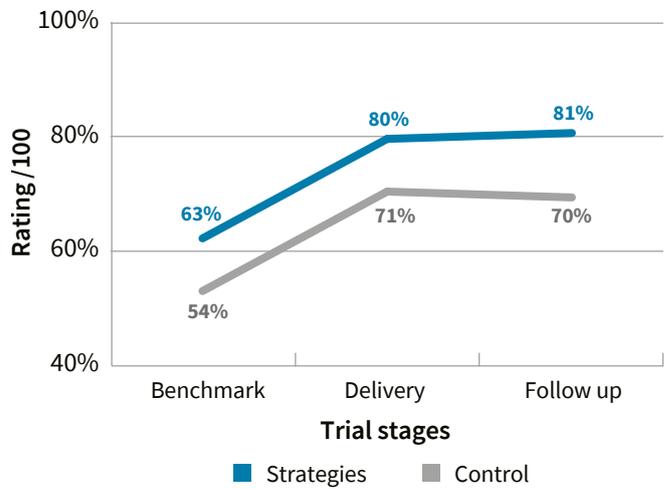
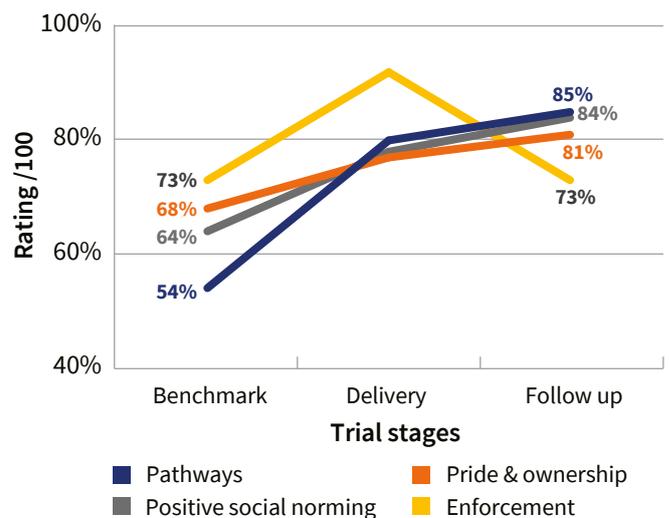


Figure 12 Smoker survey scores during the four strategies



Smokers were aware of changes in context and features in strategy locations with improved SC scores from benchmark to delivery.

- Improvement in SC scores corresponded to increased butt-binning rates and with increased AI scores.
- Locations where features were changed reduced smokers’ littering of butts and were noticed by smokers.



Overall, SC scores at follow-up showed a small but continued improvement, rising slightly from the high levels found during delivery.

- Across strategy locations, SC scores were well above benchmark levels at follow-up.
- The trend in SC scores differed from the trend for assessors' AI scores and for observed butt-binning rates, which both fell slightly at follow-up.
- SC scores provided insight into improvement in locations' features but were not significantly related to changes in butt-binning.

Surprisingly, in control locations where no changes were made, a similar pattern of more positive perception of locations was found in conversations with smokers. SC scores in control locations fell slightly at follow-up.

All four strategies showed improvements in SC scores from benchmark to delivery, with improvements varying across the four strategies:

- Pathways SC scores increased from 54% at benchmark to 80%
 - Pathways impact on SC scores corresponded to a 48% change from benchmark
- P&O SC scores increased from 68% at benchmark to 77%
 - P&O impact on SC scores corresponded to a 13% change from benchmark
- PSN SC scores increased from 64% at benchmark to 78%
 - PSN impact on SC scores corresponded to a 22% change from benchmark
- Enforcement SC scores increased from 73% at benchmark to 92%
 - Enforcement impact on SC scores corresponded to a 25% change from benchmark



Gordon NSW, Pathways strategy

Three-month follow-up

Three-months after interventions stopped, three strategies were associated with SC scores greater than gains made during delivery. The Enforcement SC score returned to benchmark levels at follow-up.

- Pathways SC scores improved from 80% at delivery to 85%
 - Pathways impact on SC scores at follow up corresponded to a 57% improvement from benchmark
- P&O SC scores improved from 77% at delivery to 81%
 - P&O impact on SC scores at follow up corresponded to a 19% improvement from benchmark
- PSN SC scores improved from 78% at delivery to 84%
 - PSN impact on SC scores at follow-up corresponded to a 31% improvement from benchmark
- Enforcement SC scores dropped from 92% at delivery to 73%
 - Enforcement impact on SC scores at follow-up corresponded to no change from benchmark



Smoker surveys after delivery of strategies

After delivery had been completed, in addition to the BLC conversations with smokers, in-depth interviews were also conducted at 20 locations (four per strategy). Smokers' awareness and comments about different aspects of the Trial strategies are summarised in the following tables:

- Many of the smokers surveyed visited the location (smoking areas) at least twice per week to smoke
- Most smokers were aware of at least one change to the location
- Most smokers felt the changes were effective encouragement for bin use
- Most smokers felt the changes helped them use butt bins correctly.

“The area looks a lot cleaner recently.”

“If an area is nice you’ll want to keep it that way; butts are like graffiti. If you see them, it’s like it’s saying it’s okay to put more.”

“I like that we now have a butt bin.”

“I don’t have to walk as far to the other bin to get rid of my cigarette; the stickers and signage do help.”

“Changes are great and effective, but some people will never change.”

“I tell people to use the bins. I am here every day and get sick and tired of seeing people litter their butts especially when we have bins here.”

“I didn't know the council and EPA had done this, It's great!”

Table 5 Smoker surveys after delivery

Post-strategy	Strategy			
	Pathways	P&O	PSN	Enforcement
Number of Interviews	93	85	86	89
Visited more than 2x/week	56%	49%	61%	42%
Noticed changes to location	84%	74%	78%	79%
Changes effect butt binning	91%	92%	83%	81%
Helps to use butt bins	84%	73%	79%	71%

Table 6 Smokers' views on features differentiating smoking areas

Post-strategy	Strategy			
	Pathways	P&O	PSN	Enforcement
Collateral confirms smoking area	90%	94%	87%	54%
Clear message to bin butt	90%	94%	76%	73%
Secure smoking here	77%	81%	84%	45%
Using location is enjoyable	64%	71%	79%	56%
Enjoyment helps bin butt	65%	66%	68%	46%



The Trial strategies aimed to build a sense of mutual involvement (social compact) in the areas where smoking was permitted. Table 6 summarises the extent to which the Trial collateral created a perception of a clearly designated smoking area.

- Most smokers felt the changes increased the awareness and confidence that the location was a designated smoking area
- Most (but not as many as in Enforcement areas) felt more secure or comfortable smoking in the location
- Many smokers enjoyed the location changes, which also helped them to bin their butts
- Smokers in Enforcement locations did not recall the same extent of positive boundaries and comfort in smoking areas as those in other strategies.

“The signage is why I stopped here.”

“I saw the stencil that it's okay to smoke here.”

“The stickers and signage make it clear.”

“Previously I wasn't sure it was a smoking area, now the signage makes me comfortable, as I know I can smoke here.”

“I feel more comfortable, less like a criminal.”

“People always smoke in this area so the stickers and signage are a reminder it's ok.”

“Everyone smokes in this area.”

“The sign says I can smoke here.”

While the overall changes associated with each strategy provided a sense of leadership for smokers to help keep the location free of butt litter, the collateral installed in smoking areas was a cue to remind smokers about the focus of their role, which differed under each strategy. Table 7 summarises the collateral that was provided in locations to integrate with butt bins.

Table 7 Features of collateral

Strategy	Collateral installed
Pathways	Floor stencil – Large arrow
	Floor stencil – Small circle
	Butt bin stickers
P&O	Floor stencil – Smoking sign
	Corflute sign – Pride reflection
PSN	Butt bin stickers – “Thank you”
	Corflute sign – Goal
	Prompt cards (handouts)
Enforcement	Floor stencil – Enforcement
	Corflute sign – Enforcement

The impact of the collateral on smoker awareness and willingness to acknowledge their responsibilities to prevent littering, as well as their recall of the changes associated with each location, is summarised in table 8.

Table 8 Post-strategy smokers' responsibility in relation to signs

Post-strategy	Strategy			
	Pathways	P&O	PSN	Enforcement
Smokers responsibility to use bins	95%	97%	94%	78%
Recalled signs, stencil or sticker	60%	29%	67%	49%
Recalled corflute	na	51%	57%	18%
Attention drawn by butt bin	33%	16%	6%	36%

Most smokers (but not as many as in Enforcement areas) indicated the changes reinforced their responsibility to use bins and not litter butts:

- Recall of the specific aspects of the collateral varied for smokers in the four strategies
- Two-thirds of smokers at the Pathways locations and the PSN locations noticed the floor stencils and the butt bin stickers
- Corflute signs were noticed by more than half the smokers in PSN locations and P&O locations, but only 18% at the Enforcement locations. No such signs were used in Pathways.
- Most smokers did not recall the butt bins as drawing their attention nor reminding them of their responsibility. It may be that these were seen as a basic requirement for positive action, and signage is needed to direct smokers' attention to the butt bins.

“Good having something to read regarding encouraging reducing butt litter.”

“Signage helps when I’m near the bin and I noticed the stickers have changed me a bit.”

“You can see the signage clearly if you are close enough to this area.”

“Maybe more signage at the other entry.”

“The signs could be better located.”

“There needs to be more signage.”

“The butt bins encourage me to keep the area clean.”

“Butt bins should be bright to stand out.”

“Maybe more signage to direct you to bin butts.”

“Changes in the area are good but the floor stencil is gone.”

Smokers’ recall of some of the specific elements targeted by all or some of the four strategies has been summarised as follows:

- Most smokers felt encouraged by the changes to do their part to keep the area clean and butt litter free
- Many (but not as many as in Enforcement areas) indicated that if they felt a sense of pride in the location, they would be more likely to use butt bins
- Few (and even fewer in Enforcement areas) felt a strong sense of pride in the smoking area
- Most PSN smokers and many smokers in Enforcement locations felt that working with participants to achieve a butt litter reduction target helped them use bins.

“If an area is nice, you'll want to keep it that way. Butts are like graffiti – if you see them, it's like saying it's okay put more.”

“It's not about pride, it's just being responsible.”

“They are good as other people cannot judge you for smoking here.”

“I’m proud of the area and I always bin butts.”

Table 9 Features encouraging butt-binning

Post-strategy	Strategy			
	Pathways	P&O	PSN	Enforcement
Encouraged to keep area clean	90%	83%	86%	87%
If proud I'm very likely to bin	79%	69%	67%	56%
Location has sense of pride	27%	20%	22%	11%
Goal awareness helps me bin	Na	Na	82%	55%



“I have no sense of pride when I’m smoking.”

“We love it here.”

“My sense of pride is not the same as it used to be.”

“Council should keep the area clean but I'm proud because this is my town.”

Smokers tended to interpret a sense of pride in broad ownership or connectedness to the area that was not directly linked to any of the strategies and was related to personal responsibility and involvement in the area generally. The encouragement from setting goals to keep the area butt free was strong for all strategies, but in Enforcement locations the sense of involvement, pride and ownership was not as sustained.

Smokers’ responses to the issues around the illegality of butt littering and the likelihood of fines having an impact are summarised below.

- Most smokers were aware that littering butts was illegal and attracted fines
- Most smokers in Enforcement locations correctly identified the cost of the fine for littering butts. Few smokers in other strategies knew the correct amount of the butt littering fine.
- Few smokers recalled any discussion about butt litter in their locations and fewer had seen rangers talking with smokers. In the Enforcement locations, awareness of discussions about litter fines was more common than in other strategies

- After delivery of the strategies, about one-third of smokers thought that butt litterers were likely to be caught and or fined.

“I have never heard of anyone being fined for littering a cigarette butt.”

“Probably get a warning at first.”

“They should always be fined but they won't be.”

“People still litter here and some I saw littered their butts while doing the survey. They probably wouldn't litter if a ranger was here but there is no action by rangers here.”

“Being fined depends on how serious they are about the butts.”

“Don't want a fine, I bin butts anyway.”

“The stickers are an incentive not to get fined.”

“I don't think they would actually fine them.”

“There is a sign about the fine.”

While smoker responses varied in relation to the changes that characterised each strategy, there were also some common features. These were associated with smoker awareness of changes to locations that encouraged greater responsibility and involvement in response to the efforts of location managers (leadership in the social compact).

Table 10 Smokers’ views on Enforcement

Post-strategy	Strategy			
	Pathways	P&O	PSN	Enforcement
Aware fines for butt littering	88%	91%	80%	75%
Aware and correct @ \$80	38%	9%	11%	81%
Aware of any talk of butt litter	4%	3%	11%	31%
Rangers talked to litterers	4%	8%	6%	18%
Litterers will be caught or fined	35%	31%	24%	33%

Smokers engaged in guiding the P&O strategy

In locations where P&O was implemented, there was an opportunity to explore the social compact by gaining insights into smokers' opinions and priorities for what might be done to improve butt litter prevention in the area. In P&O locations, smokers had direct involvement in guiding the development and delivery of the local intervention. All other approaches were based on research from reviews of studies nationally and internationally, combined with information collected from other NSW smokers, and local leadership from participants.

There were 47 pre-delivery interviews obtained at six P&O locations that asked for detailed information from smokers about suggested changes. Where possible, these changes were implemented, and midway through the delivery of interventions, a second similar survey was conducted (64 P&O interviews).

Figures 13 and 14 summarise the smokers' suggestions before any changes were made to the smoking area.

It was not possible to implement all these suggestions during Trial delivery. The following responses were collected from regular smokers at the location (63%). Half of the smokers (54%) had seen changes as improvements to the area, while 23% had noticed changes but thought they had made no difference to littering. After changes were delivered, the remainder of smokers in P&O locations (24%) had not noticed any changes. Despite almost half of the smokers indicating a lack of awareness of changes or that they had made no difference to the location, the disposal behaviour in P&O locations showed the most improvement and maintained gains in binning behaviour.

By exploring smokers' reasons for smoking in the area and the changes they felt were important, insights were gained into how the P&O strategy might have been effective in influencing more binning. These are summarised in figures 15 and 16.

Figure 13 What's needed to improve prevention – before changes

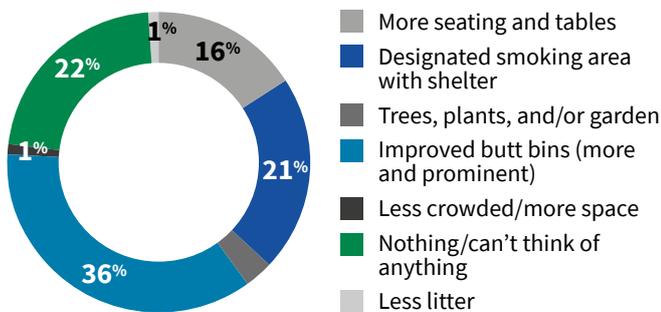


Figure 14 Suggestions for what to do in the area – before changes

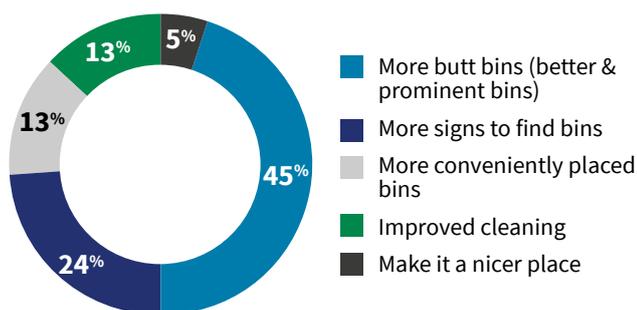


Figure 15 Characteristics after changes

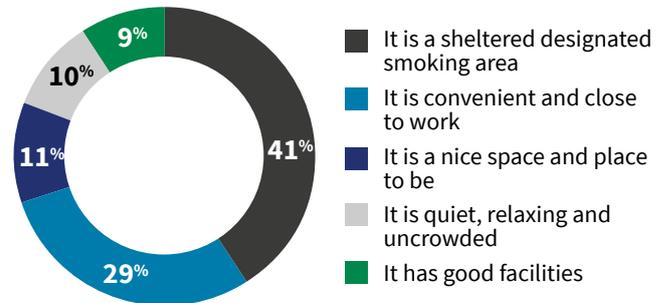
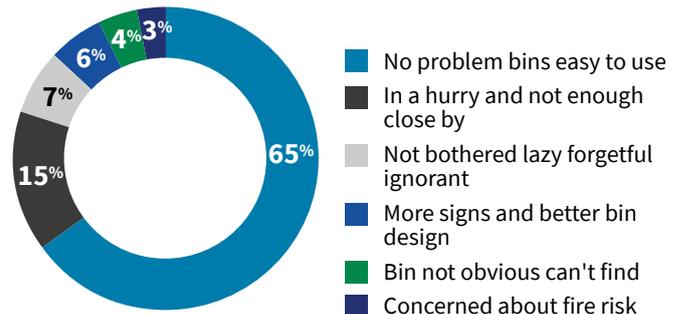


Figure 16 What's needed to improve prevention – after changes



- Reasons for choosing to smoke at the location were based on it having clear boundaries close to work and other activities, with particular features including seating, shelter from the weather, green spaces, and separation from non-smokers that encourages relaxation.

“It isn't bothering anyone away from non-smokers.”

“I'm not in anyone's way here.”

“I saw the stencil on the pavement that it is ok to smoke here.”

“Place allowed to smoke in an authorised spot.”

“Since the signage has gone in, I know that this is a safe space to smoke i.e. That it is ok.”

“It's a designated smoking area.”

“I don't like the stencil because it draws attention to smokers; not good for kids.”

“Convenient and confident it is a designated area so don't have to feel bad e.g. no kids.”

“Out of the way; don't get looked at.”

“Away from kids and food vendors, the sign has meant that families no longer sit here.”

- The location features were appreciated by some smokers who acknowledged that there were few problems (65%) because bins were easy to use and well located. Although some smokers (15%) suggested that to improve butt-binning, more bins closer to where they were smoking were needed as they were in often in a hurry and littered as a result.

“It's a nice clean area to be in and it's often cleaned.”

“Benches and seats so I'm able to sit down and have a break.”

“It feels like your own garden and it's nice to be outside.”

“Beautiful trees, open, good seating much nicer than smoking spaces that seem hidden.”

“There's a chair now and it's next to the ashtray (butt bins).”

- Other improvements to help smokers prevent butt-littering included clear signage reinforcing the location as a smoking area, prominent bins, and the need for strategies to manage laziness.

Strategies change smokers' views on responsibility for littering

Changes made to improve the features of P&O locations were valued by smokers who were not always aware of the effect that these changes had on their disposal actions. During the Trial when appropriate facilities were provided and place managers improved location features, there was a trend to increasingly view butt-littering as resulting from smokers in strategy locations not playing their part in the social compact.

Figures 17 and 18 illustrate the pattern of changes to both participants' (location assessors) and smokers' views on responsibility for butt litter prevention during the Trial and across the four strategies. This was after appropriate signage was provided, installed and maintained during delivery.

Figure 17 Assessors' and smokers' views on responsibility for littering during Trial

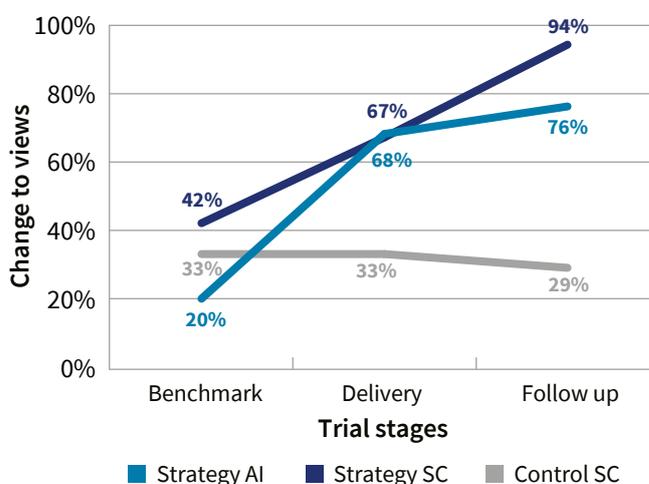
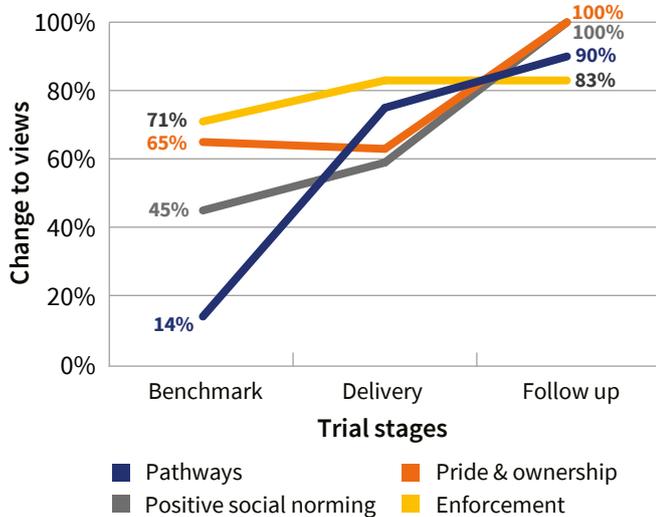


Figure 18 Smokers' views on responsibility for littering for each strategy



After delivery of interventions, as changes to features of the locations made it clear that smokers were expected to use butt bins, views about smokers ignoring signs and then littering shifted to place more responsibility with smokers, including:

- Participants' expectations rose by 48% from a very low benchmark when few signs were in place
- During delivery and at follow-up, smokers indicated an increased sense of individual responsibility. Almost all smokers in locations where strategies were applied indicated those who littered butts were ignoring signs
- Smokers in control locations where no changes to signage were made showed little change in beliefs about responsibility for littering.

The pattern of smokers' views on the increased expectations of smoker responsibility for preventing butt litter was different in locations where changes had been made by the four strategies:

- In Pathway locations, once signage was installed, there was a sharp increase in expectations of smoker responsibility compared to benchmark. These expectations continued to higher levels at follow-up

- Smokers in P&O locations at benchmark had a strong sense of responsibility that increased only at follow-up
- PSN smokers indicated an increase at delivery and follow-up to very high levels of support for smokers taking responsibility for littering after ignoring signs
- In Enforcement locations where smokers at benchmark had a high level of expected smoker responsibility, there was little change in smokers' beliefs about butt litterers ignoring signs at delivery and follow-up.

The changes in both the participants' and smokers' views provided some insights into the workings of the social compact. In locations where signage and other features were delivered, the beliefs about responsibility for litter prevention seemed to shift from the place managers to be shared with the individual smokers.

Scavenging and harvesting

Scavenging and harvesting of butts, including breaking into butt bins to obtain used cigarettes for smoking, is a significant issue that councils and land managers face. It must be considered when implementing strategies and installing bin infrastructure.

At several locations during the Trial, there was some damage to butt bins that appeared to be due to scavenging. Two locations were unable to complete the Trial due to damage to bins that appeared to result from scavenging. In one case, the bottom of the butt bin had been removed to enable binned butts to fall to the ground for easy collection.

Some councils have adopted strategies to reinforce butt bins, however, on occasions, people have continued to find ways to break into them.

5. Trial implications for the NSW environment

It is estimated that **1.32 billion cigarette butts are littered in NSW each year**. So, what implications might this Trial have for reducing cigarette butt litter in NSW?

Across all locations (both control and Trial sites) the benchmark binning rate was 40%.

The peak binning rate achieved, during the Pride and Ownership strategy, was 76%.

This equals a reduction in cigarette butt littering of 60%.

Taking this best-case scenario, if these results were repeated across NSW, **795 million cigarette butts could be saved from the NSW litter stream each year**.

If all these cigarette butts saved from the litter stream were lined up, they would reach from Sydney to London and beyond.

Table 11 explains in more detail a best case and conservative scenario for how these strategies could prevent cigarette butts entering the litter stream in NSW.

Table 11 Cigarette butt litter reduction scenarios for NSW

Cigarette butts littered in NSW per year	1,326,000,000
Benchmark binning rate at Trial outset	40%
Best case scenario: if strategies are replicated across NSW and peak results achieved	
Peak binning rate delivered during Trial – best case	76%
Reduction in littering rate	60%
Cigarette butts saved from NSW litter stream per year	795,600,000
Conservative scenario: if strategies are replicated across NSW and average results achieved	
Average binning rate achieved across delivery of all strategies – conservative case	58%
Reduction in littering rate	30%
Cigarette butts saved from NSW litter stream per year	397,800,000



6. Conclusions and future interventions

The primary conclusion from the Trial is that all the strategies were effective in increasing binning rates.

One potentially effective minimal strategy appears to be the provision of two things: appropriately strong and clearly visible bins; and clear and prominent signage to draw smokers' attention to the bins and to indicate that a site is suitable for smoking.

Smokers' level of comfort in designated areas encourages them to bin their butts.

Smokers were aware of changes that reinforced implied permission to smoke in areas with clear boundaries and collateral indicating smoking was allowed and consequently butt-binning was expected.

Strategies that engaged smokers delivered significant improvements in binning rates and helped build smokers' personal motivation.

Each strategy helped establish a sense of leadership for place managers (i.e. councils) for keeping the location clean and free of butt litter. Leadership includes, among other things, setting and maintaining a standard, and showing a commitment for a clean space. The installed collateral was important to engage smokers with signs as a cue or prompt to remind smokers about the focus of their role which differed under each strategy.

The best results were consistently found for P&O strategies, though participants considered the Pathways approach to be the easiest and most cost-effective intervention. Consequently, a staged approach to change location features is recommended whereby improvements in binning rates could be verified by observations.

The staged approach should build on the principle of engaging smokers in the social compact – through conversation, the discussion of the positioning of prompts, talking to rangers, and collecting suggestions for improving butt-binning. Strategies that engaged smokers delivered significant improvements in binning rates and helped build their personal motivation.

The BLC is convenient for guiding initial discussions and gaining insights into smokers' views about the location while engaging them in ownership of change initiatives.

Key recommendations

Councils and other land managers need to demonstrate leadership in the social compact by completing the BLC to identify features that need improvement, and then by implementing the physical changes to the area, including:

- Clearly designating areas and boundaries where smoking is allowed
- Installing butt bins and appropriate signage (floor stencils in Pathways), butt bin stickers (Pathways and PSN), and corflute signs and stencils that highlight an area suitable for smokers (P&O) and that smokers using the area are expected to bin their butts (PSN)
- Consider using the Pathways approach to show smokers the bin position, and to guide them to nearby bins
- Where possible, improving comfort by providing seating, shade, and shelter from rain and wind
- Establishing the social compact by using the AI and SC in a more integrated fashion to engage with smokers:
 - a. Using AI total scores to identify locations where intervention could achieve the greatest improvements
 - b. Planning for ongoing ways for staff or volunteers (to save staff time and cost) to talk to smokers about the location
 - c. Identifying features to be improved
 - d. Effectively tracking modifications made to a location
 - e. Showing that improvements have been made and are sustained.



7. Appendix 1: glossary and acronyms

Term	Acronym	Description
Area Inspection	AI	Step 1 of the Butt Litter Check which assesses a location's features
Butt Litter Check	BLC	The EPA developed the Butt Litter Check tool to gather information in each location. The BLC is a location-based methodology and tool to assess cigarette butt disposal behaviour by observing how smokers discard butts in response to a range of contextual factors
Butt Litter Count		Step 3 of the BLC involving a litter count within a smoking area.
Positive Social Norming	PSN	One of the four strategies delivered to encourage smokers to believe that it is expected that smokers using the area will dispose of their cigarette butts in the bins provided.
Pride and Ownership	P&O	One of the four strategies delivered to encourage smokers to develop a sense of pride in and ownership of the area as a comfortable and welcoming place for smokers, thereby creating a commitment to bin their butts.
Smoker Conversations	SC	Step 4 of the BLC which involves gaining insights from smokers on their perception of a smoking area
Social Compact		The implicit agreement among the members of a society to cooperate for social benefits.



8. Appendix 2: Designing the Trial

Program logic as a framework, both for program planning and evaluation, provided options when it was not possible to use a balanced random allocation of locations to strategies. A quasi-experimental research design was adopted that included multiple sources of data to provide cross-checking of the evidence for the conclusions reached.

Key features of the research design:

- The units for evaluation of strategies were outdoor locations where smokers congregated to smoke
- The limited number of locations meant the power to detect differences was somewhat limited
- Non-random allocation of locations for the four Trial strategies and control conditions
- Collection of observational data about each location at multiple points including:
 - a. Benchmark, before strategy delivery commenced
 - b. Weekly observations of the disposal of cigarette butts
 - c. BLCs including a conversation with at least one smoker in a location, and with BLCs carried out at 44 benchmark, 43 during delivery and 41 locations at follow-up three months after interventions stopped active implementation
 - d. Supplementary interviews with samples of smokers after delivery observations at 20 selected locations (n=353 achieved of a planned n=400)
- e. Interviews with smokers at locations allocated to the P&O strategy following the benchmark observations to set up changes that smokers wanted to see at the locations (47 completed), and extra interviews in weeks 3 to 4 about changes (n=64 achieved)
- f. Participant interviews with a sample of staff from local councils to review the implementation of changes, perceptions of the effectiveness of strategies, and indications of maintaining or extending prevention without continued support from the EPA.

Managing risks to the validity of conclusions

Adoption of a quasi-experimental design may include pre-existing differences between locations being allocated to the different strategies that produce differences that are then invalidly attributed to the Trial strategies. This risk was reduced by:

- Use of multiple measures of program impact
- Collection of data, for each location at the benchmark, on location characteristics that might affect the key outcome measures
- Exploration of pre-existing differences between the locations in the different strategy conditions to confirm sources of changes identified in outcome measures.

