SUSTAINABLE REMOTE CAMPING

DNB311 ID Studio 7: Capstone

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Semester 2 2026



ACADEMIC INTEGRITY

Authenticity Statement

This is to certify that to the best of my knowledge, the content of this report is my own work. This report has not been submitted for any subject or for other purposes. I certify that the intellectual content of this report is the product of my own work and that all the assistance received in preparing this report and sources have been acknowledged.

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EXECUTIVE SUMMARY

Remote camping is a growing form of outdoor recreation in Australia, providing people with opportunities to experience natural and remote environments. However, increased participation has places greater pressure on campsite environments, particularly where limited infrastructure requires campers to mange their own waste, water and other activities.

This project explored the environmental impacts of remote camping through secondary research, surveys and interviews with campers and park rangers. The findings identified waste management as the most significant concern, with issues surrounding storage, leaks, odour, transportation and wildlife access. Benchmarking of existing products further revealed a gap between the needs of remote campers and current waste management solutions, which largely focus on basic storage rather than the wider process of managing waste.

The research therefore establishes opportunity for industrial design to develop a practical and sustainable solution that supports responsible waste management and makes environmentally conscious behaviour more convenient for remote campers.



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SECTION ONE

Introduction

Remote camping in Australia has grown significantly in popularity (Camping and Caravan Tourism Is Booming in Australia In 2026, 2026), providing increasing opportunities for Australians to escape urban environments and connect with natural landscapes. The increase of camping, four-wheel driving (4WD) and outdoor recreation has resulted in more people visiting remote natural environment, exploring an 'off grid' experience with little to no facilities or infrastructure, (Payne & Lention-Williams, 2024). Unlike developed campgrounds, remote campsites require campers to be largely self-sufficient, meaning they are responsible for managing their own waste, water, food, cooking and other campsite activities.

While remote camping can encourage connection with nature and outdoor recreation, the activities undertaken within a campsite can also place pressure on surrounding environments. Waste left behind, inappropriate disposal of wastewater, campfire impacts and food attracting wildlife can contribute to environmental degradation. These impacts become particularly significant in remote locations where waste and other disturbances may remain for extending periods due to limited facilities and reduced management, (Davis & Anderson, 1986).

The campsite provides a particularly relevant context for investigating these impacts, as many environmental interactions occur within this concentrated area. Understanding what campers do, why they behave in certain ways, and where existing practices create environmental impacts can help identify opportunities for more sustainable camping practices.

Project Aim

The aim of this project is to investigate the significant environmental impacts associated with campsite practices during remote camping in Australia, with a focus on understanding the activities, behaviours and challenges that contributes to these impacts. This research will establish opportunities for industrial design to support more sustainable practices within the remote camping environment.

Project Structure

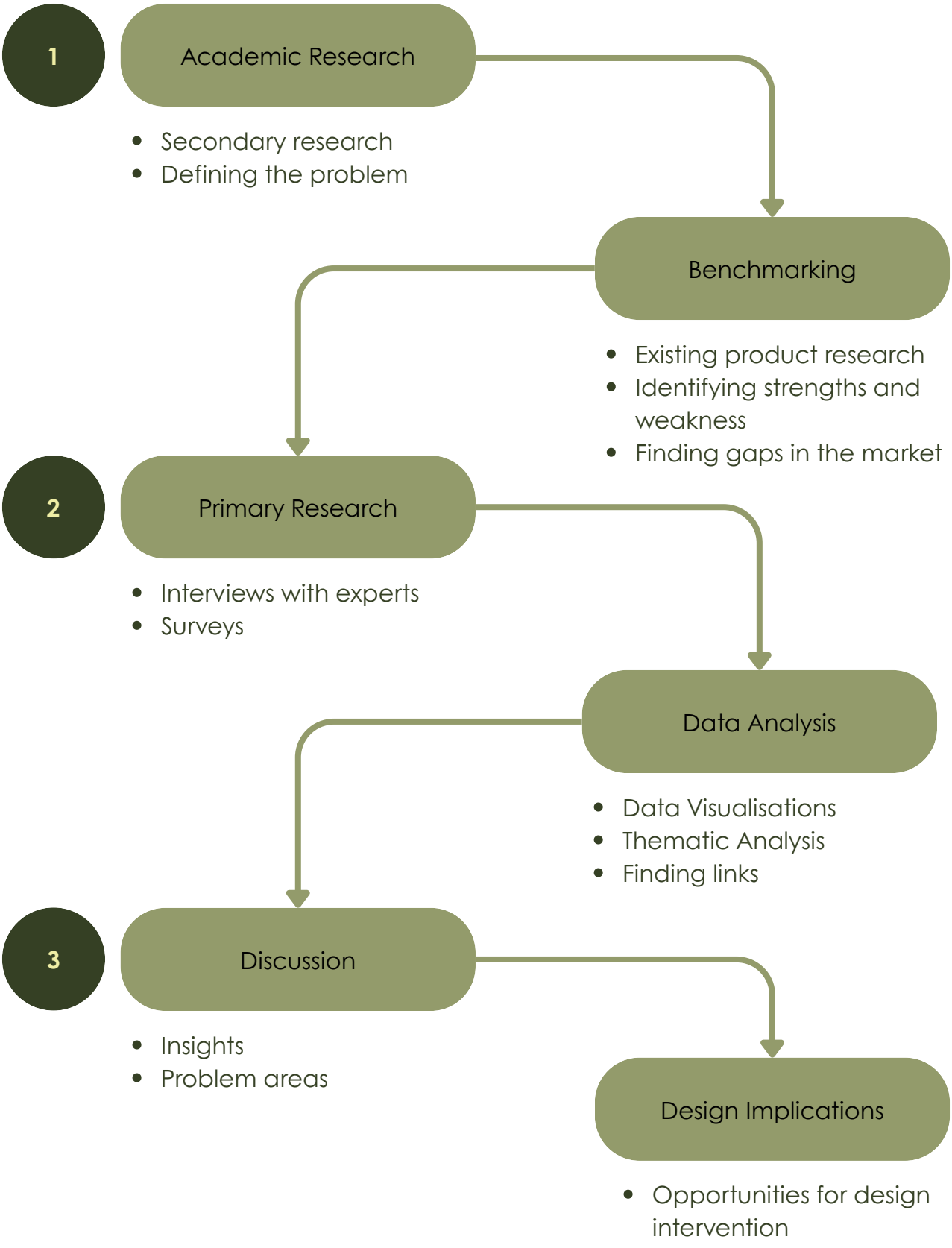


Figure 1: Graphic showing the project structure

Background

Australia's camping industry has experienced substantial growth, with 17.3 million trips recorded in 2025, representing a 14% increase compared to pre-COVID, (Caravan and Camping Data, 2024). With the industry contributing approximately $20 billion annually to the Australian economy, continued growth is increasing the number of people visiting Australia's natural environments, (Australia's Caravan & Camping Industry, 2025).

Due to this, understanding the environmental consequences of recreational camping becomes increasingly important. However, research examining these impact ins Australia remains comparatively limited. A report on Australian recreation and tourism found that, despite increasing recreational use, Australia had published fewer studies on environmental impacts than other countries such as the United States and United Kingdom, (Sun & Walsh, 1998).

Waste

Waste is a significant impact associated with camping, including litter, food waste and human waste. A recent Clean Up Australia (2025) report identifies that plastic as the most prevalent materials in reported litter, accounting for 80.8% of recorded items. Of the litter recorded, 24.5% was found along coastlines and 14.6% in rivers and creeks, highlighting the prevalence of waste within natural environments, (FY25 Litter Report - National, 2025). On K'gari, approximately 40 tonnes of waste was removed between January and August 2022 by a conservation team, where 80% was reported as ocean-derived and the remainder was left behind by visitors and campers, (K'gari Adventures, 2022).



Animal Interaction

Wildlife interaction is another concern, particularly where food and waste become accessible to animals. Research identifies that human-provided food is capable of altering wildlife foraging behaviour and food availability, (Martin, 2025). Furthermore, litter, waste and other activities can alter wildlife behaviour and contribute to habituation, (Buckley, 2004), (Martin, 2025). On K'gari food-based attraction has been implicated in the development of human directed aggression in dingoes, (Behrendorff et al., 2023).

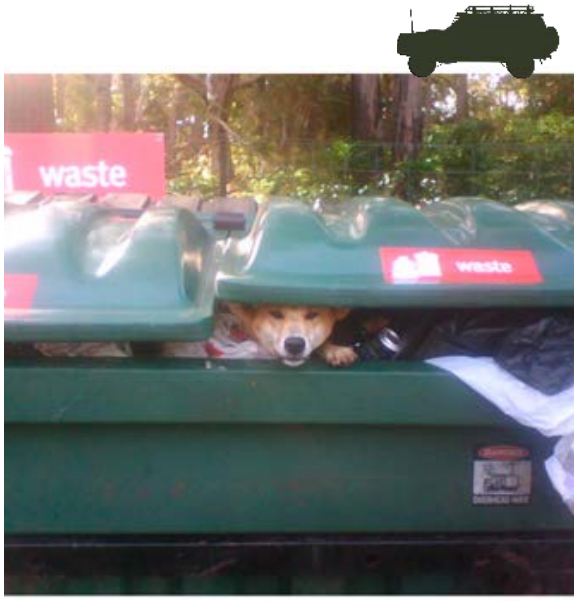


Figure 2: Dingo eating from the Eurong waste transfer station K'gari 2004 (Behrendorff et al., 2023)

Water

Water contamination can also result from campsite practices, particularly human waste and water disposal. Research on K'gari found enriched nutrient levels in groundwater and persistent faecal indicators in some beach flows within camping areas compared with non-camping areas, with evidence supporting a human contribution to contamination, (Carter et al., 2015). Some ground water samples from camping zones also exceeded Queensland water quality standards, highlighting the environmental and potential health impacts of campsite water practices, (Carter et al., 2015).

Summary

Overall, existing research demonstrates that campsite practices can produce interconnected impacts across waste, wildlife and water, while the growing use of natural areas highlights the need for further investigation into sustainable campsite practices.

Benchmarking

The camping industry offers a range of products designed to support outdoor recreation. However, through my own research into camping's environmental impacts, I identified water and waste management as areas for improvement. To explore these opportunities, I benchmarked existing products across both categories using criteria to rank them. This comparison revealed product limitations and potential opportunities for design improvement, informing my project direction.



Product	Cost	Portability	Quality	Aesthetics	Usability	Capacity	Score
Compainion Caravan Tidy Bin	10	10	8	2	6	10	**46**
PVC Pop Up Bin	9	10	6	4	8	6	**43**
Wanderer Collapsible Caravan Bin	9	8	7	4	8	9	**45**
Darche Offgrid Spare Wheel Bag	3	9	7	5	9	9	42
Trash Dry Bag	5	10	8	7	9	3	42
Awning Bin	4	7	7	2	8	9	37

Figure 3: Table benchmarking popular waste storage solutions for remote camping. (Criteria found in the Appendix, Benchmarking Critera, Page 28 & 29)

Waste Mangagement

Figure 3 compared six portable waste management products across several categories seen above. A clear trend across the products was the low consideration of aesthetics, with this category receiving the lowest scores overall. From this comparison, the three highest scoring products were selected for further analysis in Figure 4. The Companion Caravan Tidy Bin achieved the highest score of 46/60, followed by the Wanderer Collapsible Caravan Bin at 45/60 and the PCV Pop Up Bin at 43/60.

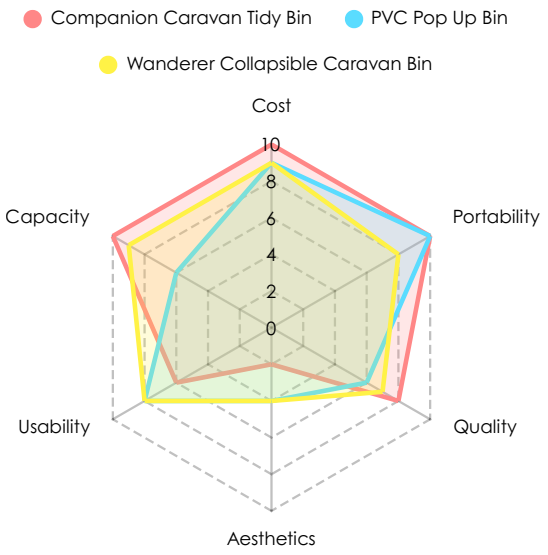


Figure 4: Radar graph comparing the top 3 scored benchmarking products

These bins display the importance of compatibility within camping products, as seen in Figure 5, either through flat-pack construction or collapsible materials, allowing equipment to be conveniently stored and transported. Compatibility is particularly important within camping, where similar design characteristics are commonly seen across cooking equipment, sleeping gear, shelters and tables. The Companion and Wanderer bins also provide a high capacity, around 60L, for their cost, while the PVC Pop Up Bin provides slightly lower capacity at a higher price

Despite these functional strengths, aesthetics were consistently the lowest scoring category across waste products clearly seen in both Figure 4 and 5. Many utilise inexpensive plastics and fabrics with limited variation in finish or colour, contributing to a utilitarian and under refined appearance. While aesthetics may initially appear less important than functionality, product appearance can influence users' willingness to purchase and engage with a product. Further investigation of existing products and user reviews also identified concerns surrounding durability, cleaning, leaks and odour.



Caravan Tidy Bin



PVC Pop Up Bin

Figure 5: Flat pack feature of top bins

More importantly, existing products often address the storage of waste rather than the wider process of managing it. The Caravan Tidy Bin and PVC Pop up Bin, the highest-scoring products are not specifically designed for rubbish, instead being marketed for uses such as laundry or wet storage. Products such as the Companion Caravan Tidy Bin can hold a rubbish bag at the campsite; however, once full, the exposed bag must still be removed and transported to a disposal point. This creates potential for tearing, leaking and wildlife interaction, particularly in remote environments where disposal facilities may be unavailable. Furthermore, many products lack lids or use unsecured closures, providing limited protection from wildlife or spills. These limitations suggest that existing products effectively contain waste but do not adequately consider its transportation and disposal.

Portable Sinks



Product	Cost	Portability	Quality	Aesthetics	Usability	Water Management	Score
Boxio Wash	2	7	10	8	9	10	**46**
Kings Collapsible Sink	10	9	8	6	9	9	**51**
Weisshorn Camping Portable Sink	4	1	7	2	4	9	27
Kitchen Sink Sea to Summit	8	10	8	8	9	8	**51**

Figure 6: Table benchmarking popular water management solutions for remote camping. (Criteria found in the Appendix, Benchmarking Critera, Page 28 & 29)

In comparison, fewer portable water management products were identified within the market. However, the existing products appeared relatively well resolved. Figure 5 compares four products, with most performing strongly across the assessed categories. Figure 6 demonstrates that both affordable and higher end options provide compact, durable and aesthetically considered solutions. Aside from the higher cost of the Boxio Wash, no significant weaknesses were identified. The indicates less opportunity for intervention within portable water management compared with waste management

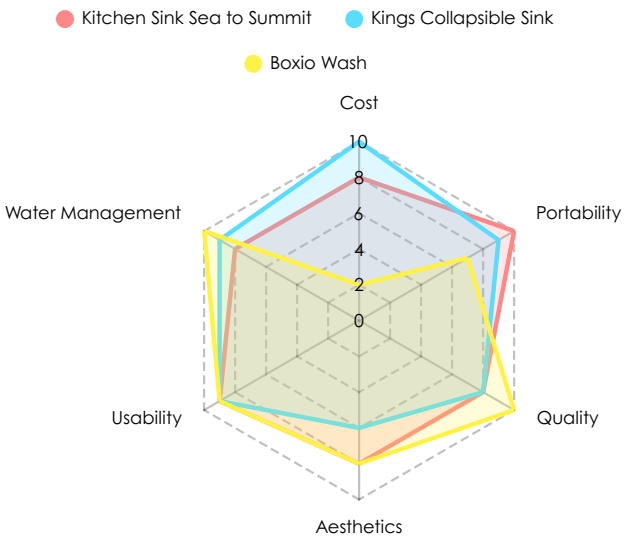


Figure 7: Rader graph comparing top 3 scoring benchmarking products.

Overall, benchmarking identifies waste management as the stronger opportunity for design intervention. While existing products provide basic storage and portability, recurring gaps remain in secure containment, transportation, wildlife protection, durability, cleaning and aesthetic consideration. This highlights an opportunity to address the wider waste management process rather than simply creating another portable bin.

SECTION TWO

Research

Methodology

Mixed research methods were used to develop a reliable and well-rounded understanding of the environmental impacts associated with remote camping. Following secondary research, both quantitative and qualitative primary research methods were conducted through an online survey and semi-structured interviews. Using multiple methods allowed the research to draw on different experiences and perspectives, while comparing findings across sources to identity consistent patterns and differences. Direct engagement with campers and park rangers provided a deeper understanding of the challenges experienced in remote environments, helping to identity user needs, behaviours and potential design requirements.

Secondary Research

Secondary research was initially conducted to establish a foundation of knowledge surrounding sustainable camping and its environmental impacts. This provided an understanding of existing research, identified what had already been investigated and helped reveal gaps within the current knowledge. Reviewing existing literature also informed the development of the primary research, allowing questions to be constructed around areas that were not sufficiently addressed by existing research.

This process helped shape the overall research direction by identifying key areas of concern, including waste management, water use, wildlife interactions, camper behaviour and the limitation of facilities withing remote environments. These findings provided a basis for investigating how these issues are experiences by campers and managed by professionals within these environments.

Surveys

An online survey was conducted to gather quantitative data from a sample of campers. Surveys provided an efficient way to reach a broad range of respondents and identity trends within camping practices and environmental management. The survey consisted of 14 questions, incorporating nominal, ordinal and text-based responses. The survey questions and raw responses are included in the appendix.

To maintain relevance to the research context, the survey was distributed specifically within Queensland camping communities rather than broader Australian or international group. This was intended to reduce variation caused by different environmental conditions, regulations and camping practices across other locations. The survey was posted across five Queensland camping Facebook groups, and through Instagram to reach the largest range of campers as possible.

The survey ran from the 19th to the 26th of August, recieving 27 responses. While a larger sample would have provided a greater representation, the responses captured a diverse range of camping experiences, including different levels of experience, camping types and waste management methods. This provided useful data for identifying trends and comparing the prevalence of difference challenges experienced by campers.

However, the survey was limited in the depth of information it could provide. Respondents could not be asked follow-up questions or prompted to clarify their answers, and responses to nominal and ordinal questions were restricted to the options provided. The questions were therefore carefully constructed to be clear, minimise bias and encourage honest responses. Despite this, the possibility of responses selecting socially acceptable answers could not be completely eliminated.



Figure 8: Triangulation method diagram.

Interviews

Four semi-structured phone interviews were conducted, ranging from 15 to 30 minutes, and consisting of two park rangers and two campers. This format provided a consistent set of questions while allowing follow-up questions and discussion to develop naturally throughout each conversation. This approach provided greater depth than the online survey and allowed participants to explain their experiences in their own words.

Interviews with campers provided a more detailed understanding of the practical challenged experienced when camping remotely, addressing some of the depth limitations of the survey. Interviewing park rangers provided an alternative professional perspective from those responsible for managing parks, campsites and wildlife. Their experiences provided insight into the environmental impacts they encounter most frequently and the behaviours they observe from campers.
Contact was initially made with Queensland Parks and Wildlife Service to seek professional participation. After three weeks without a response, a request for participants was included within the camping survey recruitment. This resulted in two ranger participants volunteering for interviews.

The interviews generated qualitative data from both user and expert perspectives. Comparing these experiences helped inform decisions about the direction of the project and provided a deeper understanding of the relationship between environmental impacts, camper behaviour and the challenges of managing remote environments. A limitation of interviews is the potential influence of individual participant characteristics and the interview environment. Factors such as nervousness and confidence may affect how openly participants respond, resulting in varying levels of detail between interviews. Individual experiences may also differ depending on camping habits and professional responsibilities.

Summary

The survey and interviews provided complementary insights into campers' practices and environmental challenges. Survey responses identified common trends, while interviews with campers and park rangers provided deeper insights into personal experiences and environmental management. Together, these findings helped identify key issues and inform potential design opportunities for more sustainable remote camping practices.

Analysis & Findings

Survey Data Analysis

Survey responses were analysed by exporting the raw data and organising according to question type: nominal, ordinal and text-based responses. All responses were reviewed to identity relevant insights and recurring patterns with findings presented according to their relevance to the research direction.

A key finding was the reliance on basic and unsecure methods of waste storage. As seen in figure 8, 96.4% of respondents reported using plastic bags to store their rubbish, while secure options such as hard-top bins and containers were used by significantly fewer participants. This becomes particularly significant when considered alongside the 71.4% of respondents who experienced wildlife accessing their rubbish, seen in figure 9. The high use of less secure storage methods may contribute to opportunities for wildlife to access waste, particularly when rubbish contains food scraps or other attractants.

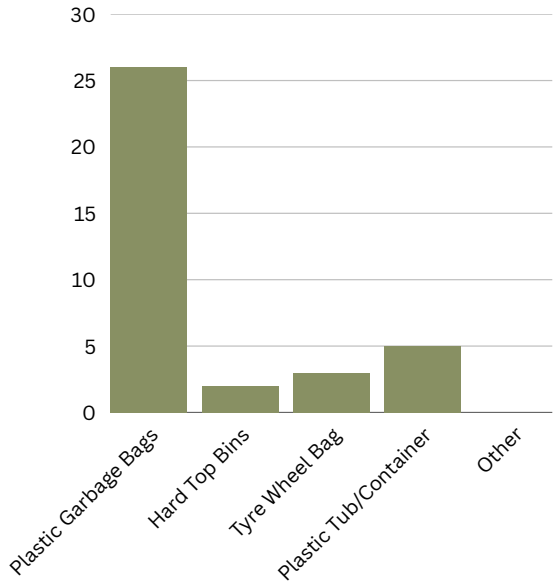


Figure 9: Bar chart compared most use waste storage methods among campers.

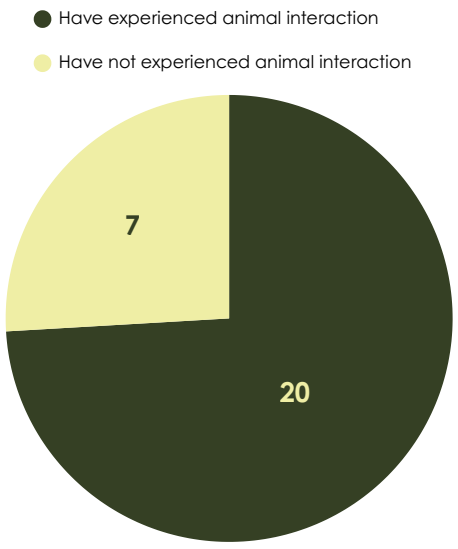


Figure 10: Pie chart comparing animal interaction among campers.

The most frequently reported difficulties with waste management was leaks and smells, experienced by 55.6% of respondents, seen in Figure 10, followed by limited storage capacity and difficulty accessing disposal facilities. This suggests that waste management extends beyond simply disposing of rubbish, with storage ana transportation creating difficulties for campers.

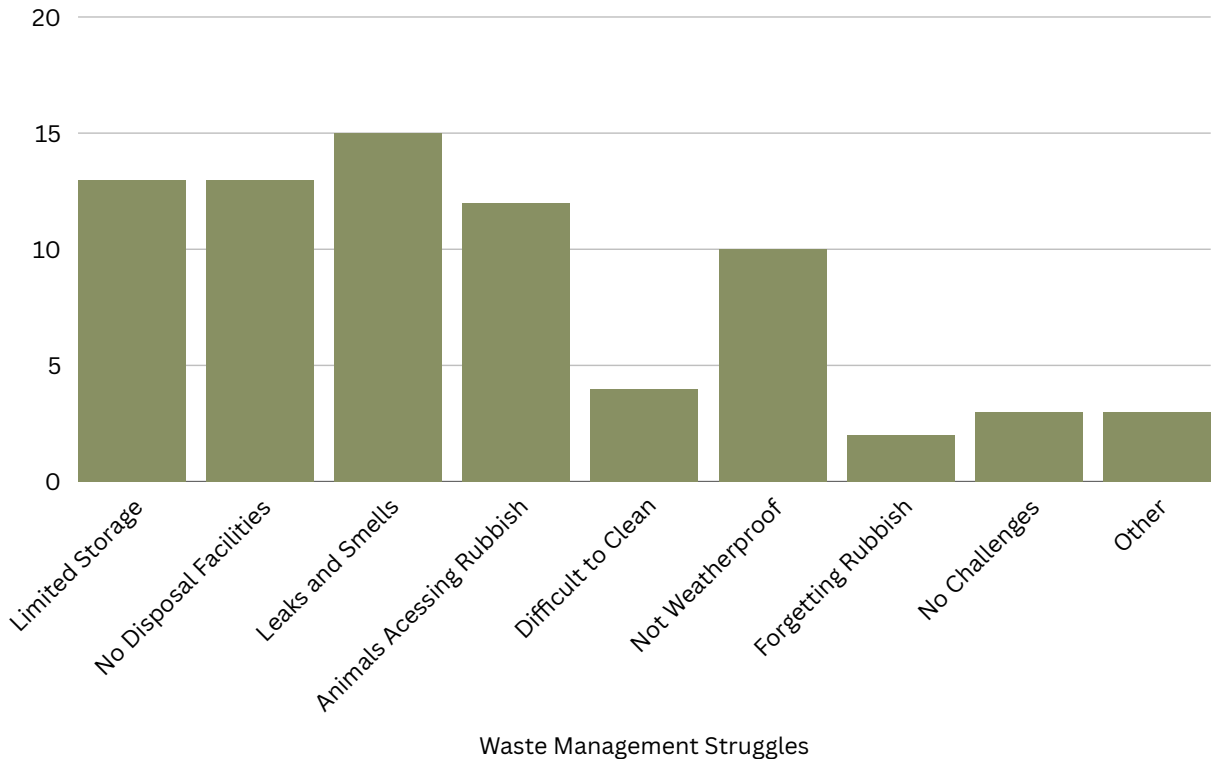


Figure 11: Bar graph comparing campers waste management struggles

The high use of plastic bags reported further supports this finding. Across the text based responses, 95.24% of respondents reported carrying their rubbish with them to a disposal location.

16 respondents specifically repor transporting their waste to the nearest public bin such as service stations while others bring it home with them.

This indicates that in remote environments where disposal facilities are limited, campers are required to store and transport accumulated waste themselves.

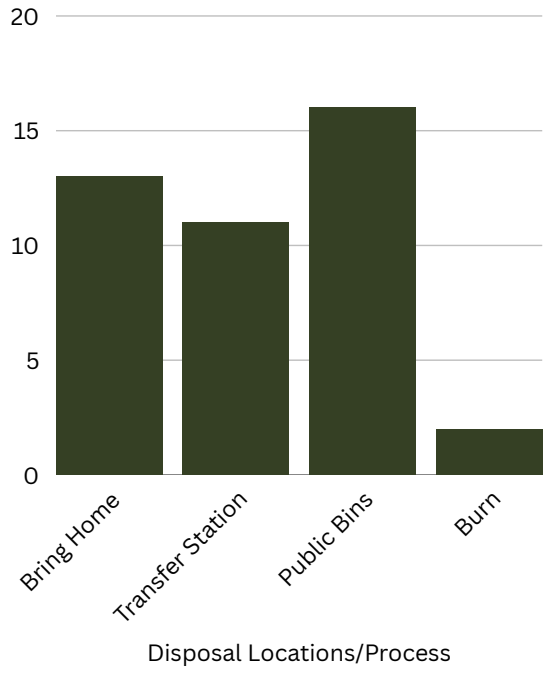


Figure 12: Bar graph comparing comming processes, locations for waste disposal

Overall, waste management emerges as the most significant concern within the survey. 50% identified waste impact as the most noticed environmental concern, while 63% identified waste management as the area they struggle with the most, compared with 25.9% for water management. Although some experienced difficulties managing greywater, the majority reported little to no difficulty with managing water and dishes. These results therefore indicated that waste management presented the strongest opportunity for further investigation.

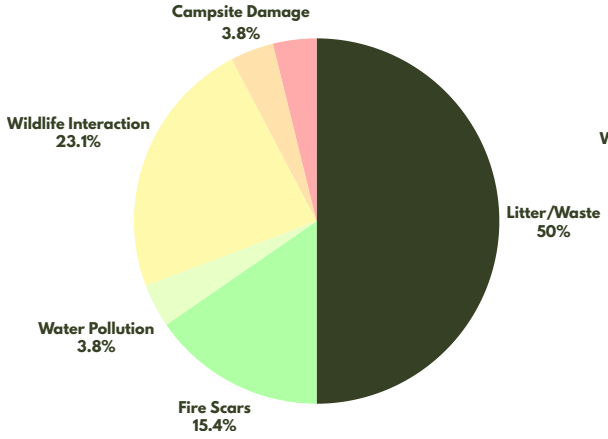


Figure 13: Pie chart comparing most commonly seen environmental impacts by campers

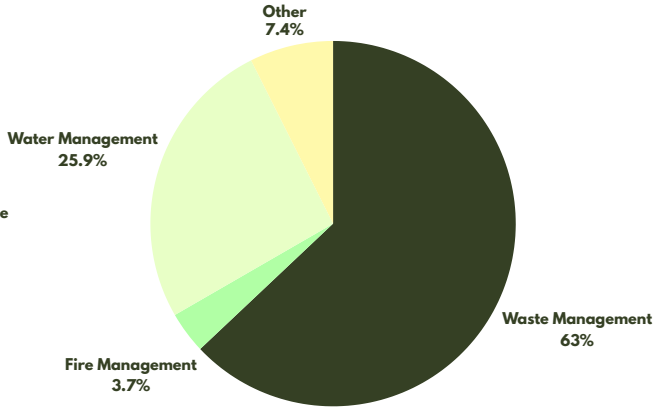


Figure 14: Pie chart comparing most commonly experienced challenges by campers

Interview Data Analysis

The four interviews were analysed using thematic analysis to identity reoccurring themes, patterns and insights across responses. Responses were broken into six themes seen in Figure 15, as well as codes within each theme. These were colour coded and the frequency of each code was then counted to identify the most prominent issues. The full thematic analysis can be found in the appendix.



Figure 15: Graphic showing thematic analysis themes and colour code

Waste management and camper behaviours were the most frequently discussed themes (Figure 16). Within camper behaviour, responsibility was the most frequently identified code, mention 22 times. While many of these references came from rangers discussing the expectations placed on camper, the camper interviews also demonstrated an awareness of personal responsibility. However, the interviews suggested that responsible behaviour is influenced not only by individual attitudes, but also by the facilities, systems and products available to campers.

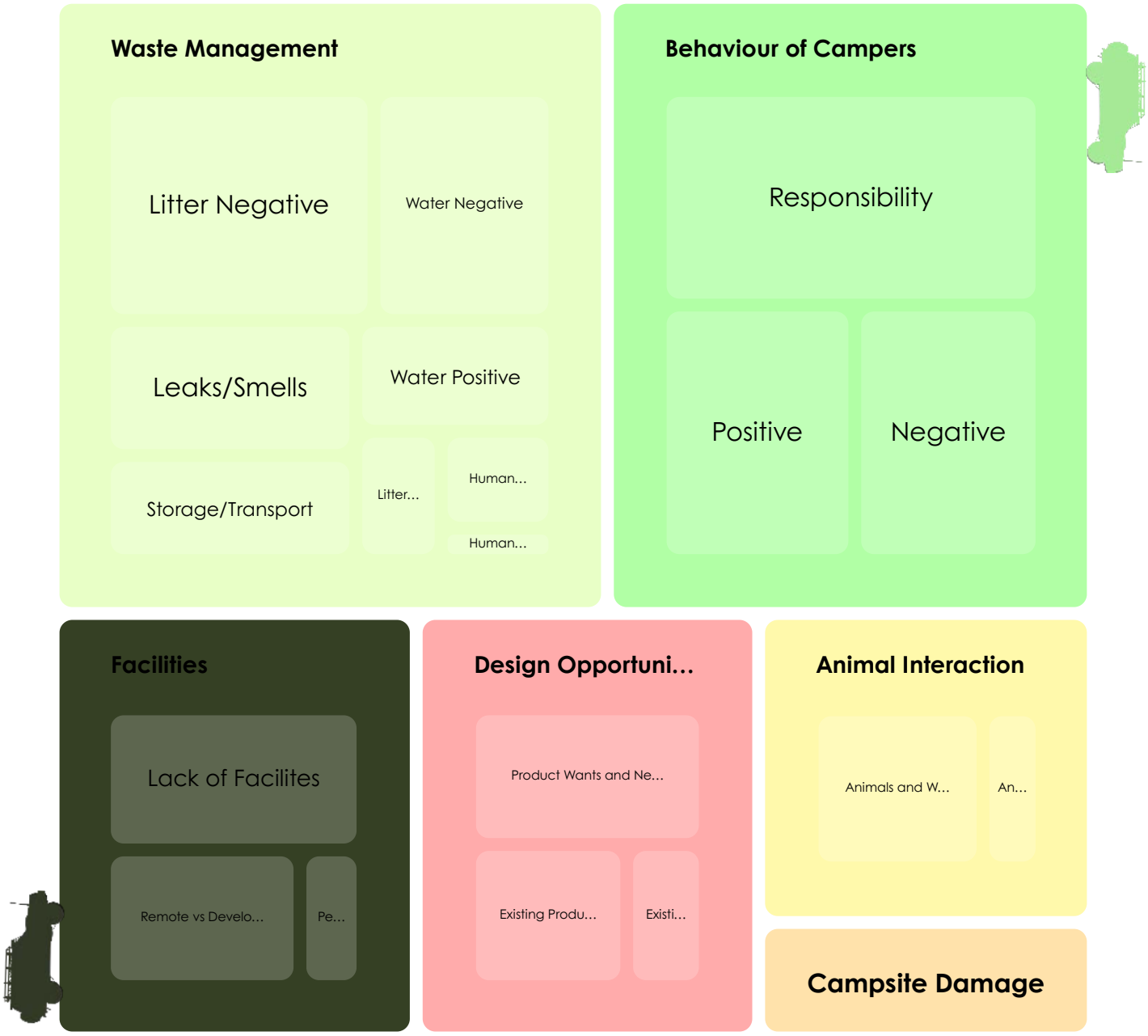


Figure 16: Thematic analysis tree diagram showing frequency of themes and code. Larger indepth table can be found in the appendix.

This relationship was highlight by one ranger when discussing the differences between remote and developed camping:

"…one of the biggest differences with remote camping is that there aren't the same facilities or services that you'd have in a developed campground.. So campers have a lot more responsibility for managing their own waste and equipment."

- Ranger 1

Themes: Facilities and Camper Behaviour

Codes: Remote vs Developed, Lack of Facilites, Responsibility

This response demonstrates how the lack of facilities in remote environments shifts greater responsibility onto the camper. Rather than having access to established waste infrastructure, campers are required to manage their own waste throughout their trip. This connects the facilities and infrastructure and camper behaviour themes, suggesting that the environmental responsibility placed on campers is partly shaped by the systems available to support them.

The interviews also indicated that responsibility alone does not necessarily result in sustainable behaviour. One participant explained:

"…the biggest limitation is that the current approach… often relies on the camper remembering the information and making the right decision themselves. If someone is motivated to do the right thing, the system generally works quite well. But if they're inexperienced, unprepared, or the environmentally responsible option is inconvenient, that's where we tend to see problems."

- Ranger 1

Themes: Design Opportunities/Product Needs and Camper Behaviour
Codes: Existing Product Weakenss, Negative (Camper Behaviour), Responsibility

This highlights a weakness within existing approaches to sustainable camping, where responsible behaviour relied heavily on individual decision making. The response suggest that inconvenience, lack of preparation and inexperience can create barriers to responsible behaviour, even when camper may understand what they should be doing. This links the camper behaviour theme with design opportunities, identifying an opportunity to make sustainable waste management practices more convenient and intuitive.

Waste management was also a prominent theme, with participants describing practical difficulties associated with storing and transporting rubbish. One camper identified several issues experienced during trips:

"The biggest thing is probably leaks and smells, especially if there's food waste in the bag. And…if you've got a few days' worth of rubbish, it can take u quite a bit of room in the car. You've also got to be careful when you're moving it around because bags can tear pretty easily."

- Camper 2

Themes: Waste Management

Codes: Litter Negative, Leaks/Smells, Storage/Transport

the response identifies leaks, smells, storage capacity and transportation as interconnected problems within the waste management process. Importantly, these issues occur before waste reaches a disposal point, demonstrating that the challenges for campers is not simply disposing of rubbish, but effectively containing, strong and transporting it throughout the camping trip

Waste management was also strongly connected to the animal interaction theme. A ranger described the environmental impacts that can occur when waste is not adequately secured:

"… rubbish and waste are probably the most obvious problems we encounter, particularly after busy periods. …then you get food and rubbish attracting wildlife. If food is left out or rubbish isn't secured properly, it can attract birds and other animals into the campsite…once animals start associating campsites with food, that can become a bigger problem because they can become quite persistent around campers."

- Ranger 1

Themes: Waste Management, Facilities and Animal Interaction

Codes: Peak Periods, Litter Negative, Animals and Waste, Animal Behaviour

This demonstrated that poor waste management can extend beyond litter and campsite cleanliness to influence interactions between campers and wildlife. It suggests that unsecured food and rubbish can encourage animals to associate campsites with accessible food sources, potentially creating ongoing behavioural changes and more frequent wildlife interactions. This strengthens the relationship between the waste management and animal interaction themes.

The design opportunities theme was further supported by camper experiences with existing waste storage products. One camper described the limitations of a product they had previously used:

"I had just a cheap wheel bag. It didn't hold up to the weather at all... with the weather and just cheap quality it ended up leaking and smelling so bad so I just threw it out... Also just exposed plastic bags aren't great if you have to chuck it in your car. No good."

- Camper 1

Themes: Design Opportunities/Product Needs, Waste Management
Codes: Existing Product Weakness, Leaks/Smells, Storage/Transport

This highlights how existing products may fail to meet the practical requirements of remote camping. The participants experience reinforces the issues identified throughout the interviews, particularly durability, leaks, odour and transportation. The decision to discard the product also suggest that poor product performance can contribute to repeated consumption and replacement, creating an additional design consideration.

Finally, the interviews reinforced that these challenges should not be attributed solely to irresponsible campers. One participant explained:

"... these problems aren't necessarily because people don't care about the environment. It's often that they haven't planned for the waste they're going to produce, or they don't have a convenient way of managing it. When you're tired, you're packing up, you've got a full vehicle and you've got rubbish or dirty water to deal with, the easiest option can sometimes win."

- Ranger 1

Themes: Camper Behaviour

Codes: Negative, Responsiblitiy

This response directly supports that camper behaviour themes while reinforcing the design opportunities theme. It suggests that environmental impacts can result from practical circumstances such as limited preparation, fatigue, vehicle spaces and inconvenience, rather than simply a lack of environmental concern.

Overall, the thematic analysis indicates that waste-management challenges are influenced by the interaction between camper behaviour, available facilities and waste-management products. The findings suggest that these factors can either support or hinder campers in managing waste responsibly.

SECTION THREE

Discussion

The research findings suggest that the environmental impacts associated with remote camping are not solely the results of campers choosing to behave irresponsibly, but influenced by systems, facilities and products available to support responsible behaviour. This is particularly evident within waste management, which consistently emerged as the strongest concern across the survey and interviews. The findings demonstrate that campers are often required to independently manage, store and transport their waste in environments with limited infrastructure. This creates practical challenges that can make environmentally responsible behaviour more difficult to achieve.

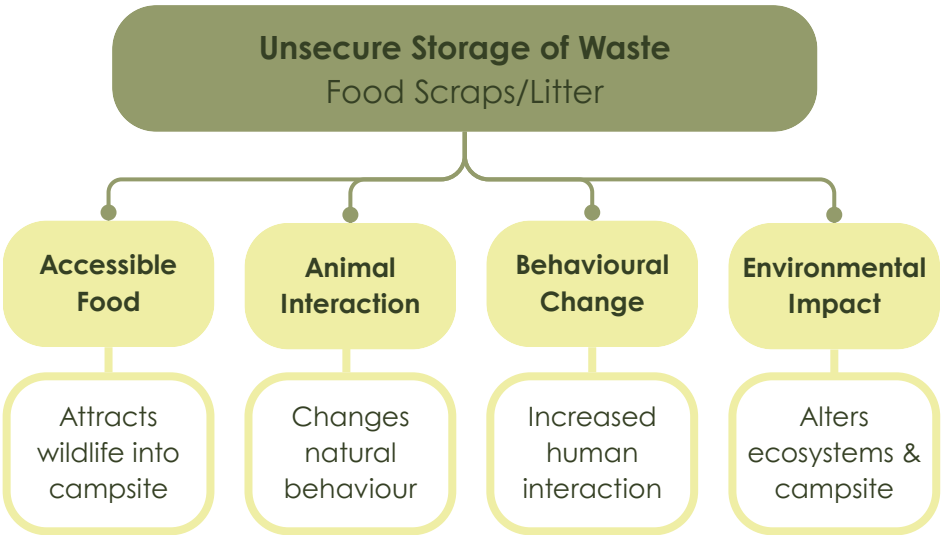


Figure 17: Graphic the impacts of unsecure waste storage

These findings support the existing secondary research conducted, which identifies waste, wildlife interaction and water contamination as significant environmental impacts associated with campsite activities. Existing research highlights that accessible food and waste can alter wildlife behaviour and contribute to habituation, while research on K'gari has demonstrated the potential for campsite activities to contribute to water contamination. (Buckley, 2004);(Carter et al., 2015.) The primary research reinforces these environmental concerns, particularly the relationship between unsecured waste and wildlife interaction. However, the research also provides a more user focused understanding of how these impacts can occur, identifying practical barriers such as inadequate storage, leaks, odour, durability and transportation.

A key finding is therefore the gap between environmental responsibility and the practical ability to act responsibly. Existing literature largely establishes the environmental consequences of camping activities, while the primary research demonstrates the difficulties campers experience in preventing these impacts. This is particularly important in remote environments, where campers have greater responsibility but fewer facilities to support them. The ranger interviews suggests that sustainable choice are inconvenient or campers are unprepared, the easiest option can become the preferred behaviour.

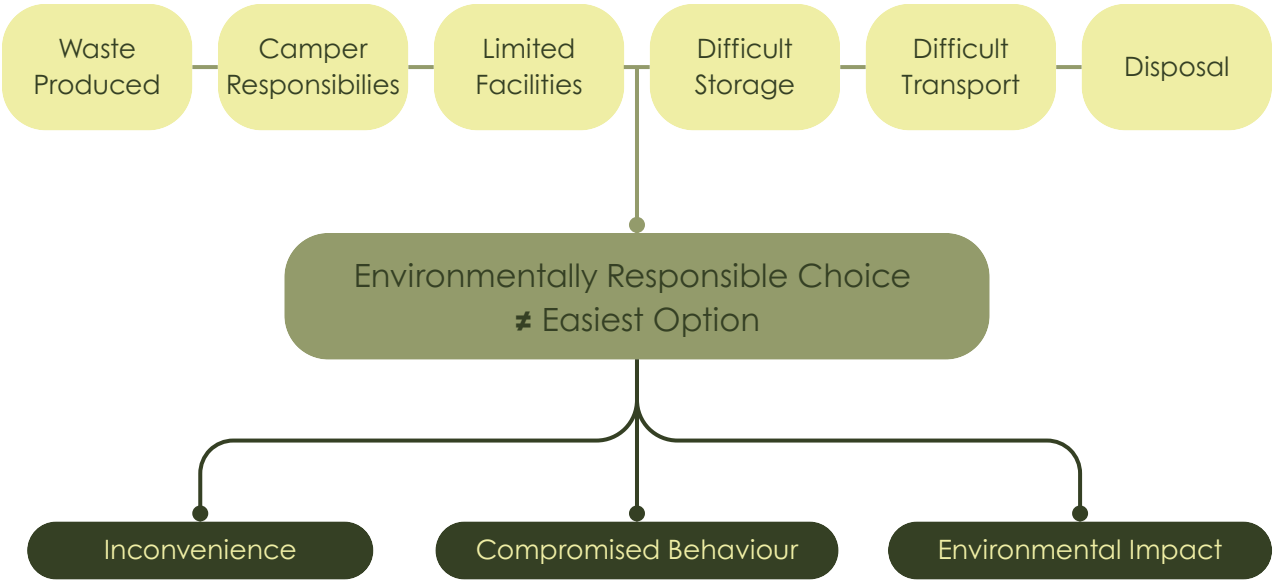


Figure 18: Graphic showing the gap between environmental responsibility and the practical ability to act responsibility

This gap is also reflected within the existing product market. Benchmarking identified that current products provide basic storage and portability but often fail to address the wider process of waste management. Several products rely on an exposed rubbish bag that must later be removed and transported, creating potential for leaks, tearing and wildlife interaction. This indicates that the opportunity is not simply to design another portable rubbish bin, but to consider the complete process of containing, storing and transporting waste within a remote camping context.

Therefore, the research identifies an opportunity for industrial design to reduce the practical barriers associated with responsible waste management. Rather than relying solely on education or camper responsibility, a product could make sustainable behaviour more convenient, secure and achievable. This establishes waste management as the primary design opportunity moving forward, with consideration of containment, transportation, durability, wildlife protection and ease of use.

Design Implications

The research findings establish several implications for the direction of the design. Most significantly, waste management emerges as the strongest opportunity for intervention, with challenges identified across the storage, containment and transportation of rubbish. Rather than addressing waste disposal alone, the design should consider the entire process a camper experiences from the moment waste is produced to its eventual disposal.

A key requirement identified through the research is secure containment. The survey found that plastic garbage bags were the dominant method of waste storage, while wildlife accessing rubbish was also frequently reported. This indicates a need for a solution that can securely contain waste and reduce exposure to wildlife, particularly food waste and other attractants. The products should also minimise the potential for spills, leaks and odour, which were identified as the most common waste management difficulties.

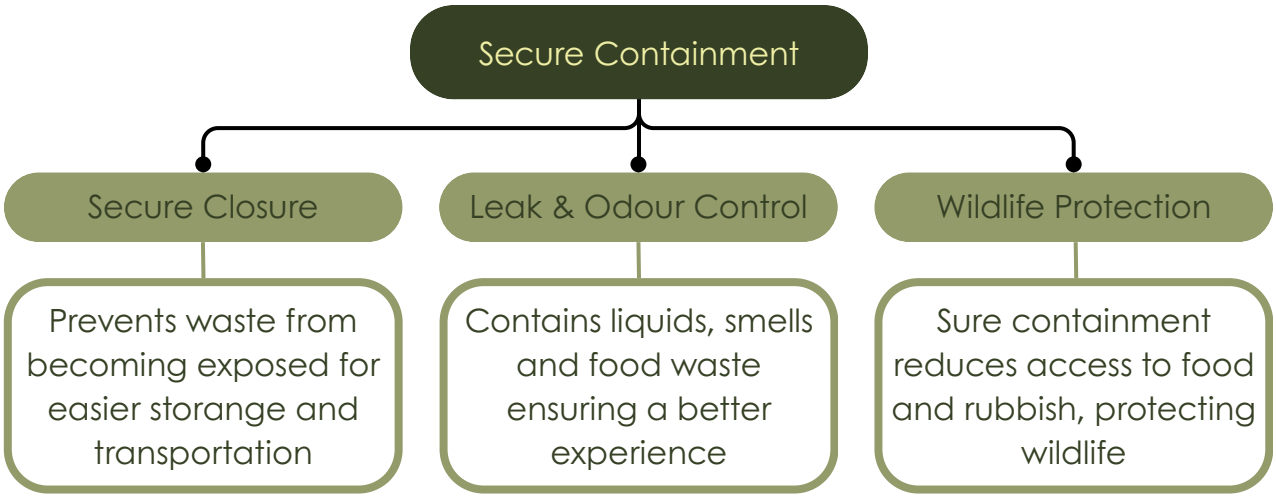


Figure 19: Graphic displaying the importance secure contaniment as a design requirement and the effects if implimented

Portability and transportation are also important design consideration. Remote campsites often provide limited or no disposal facilities, requiring campers to transport accumulated waste to another disposal location. The product should therefore be designed to remain secure while being moved between the campsite and vehicle, without relying on an exposed rubbish bag. Compactness and efficient use of space are also important, as storage and vehicle space were identified as practical limitations. Existing camping products demonstrate the value of collapsible or flat pack construction, suggesting that the product should minimise its footprint when not in use.

The research also highlights the importance of durability and ease of cleaning. Existing products and camper experiences identified problems with weather exposure, leaking, mould, smells and inexpensive materials. A purpose designed solution should therefore withstand outdoor conditions and repeated use while allowing waste related mess to be easily contained and cleaned.

Importantly, the design should support responsible behaviour rather than relying solely on education or camper motivation. Interview findings indicated that campers may understand their environmental responsibilities but struggle wen the sustainable option is inconvenient or they are unprepared. The product should therefore make the environmentally responsible choice the convenient choice through intuitive operation, simple setup and clear functionality

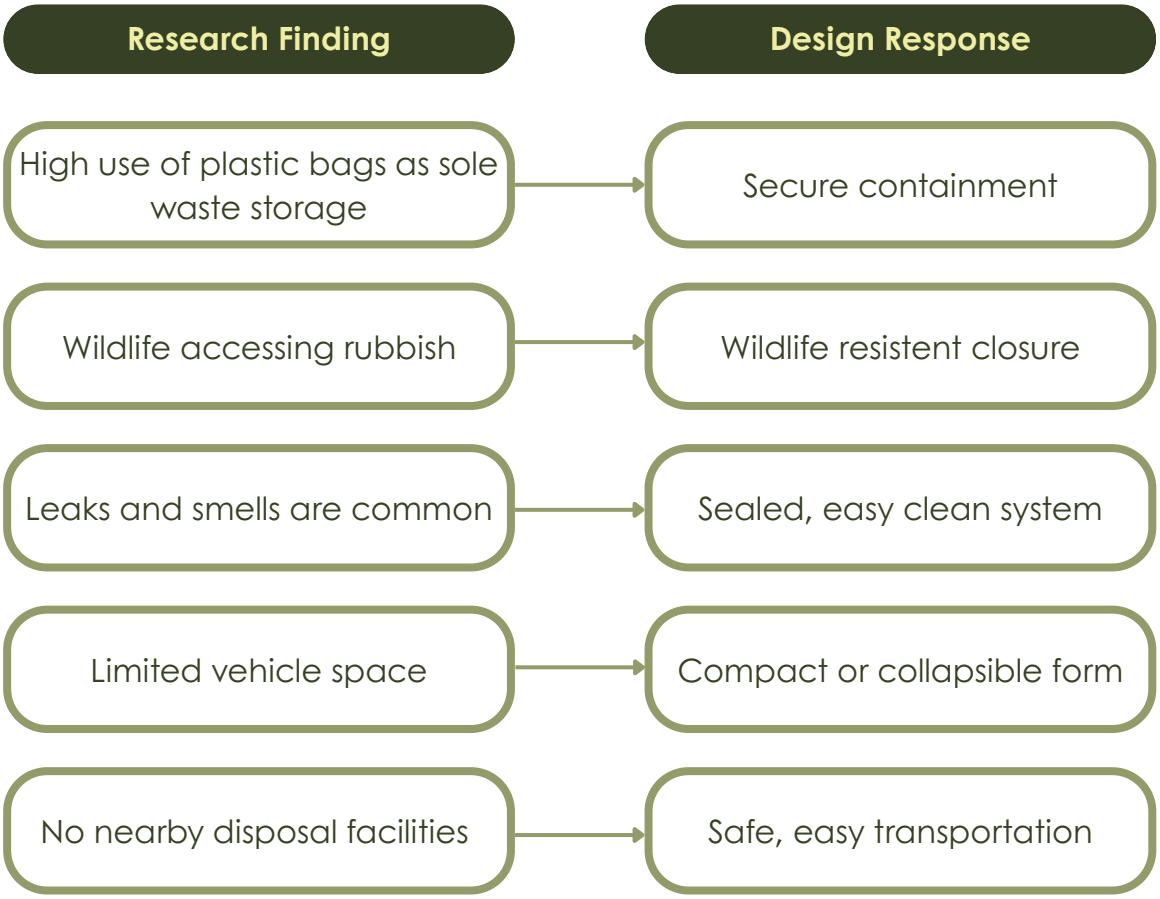


Figure 20: Graphic displaying research findings linked to the design response to each problem

Finally, benchmarking identified that existing products often address only individual aspects of waste storage rather than the wider waste management process. This creates an opportunity to develop a product specifically for remote camping, integrating secure containment, portability, transportation, durability an usability into one considered system. The design should ultimately reduce the practical barrier that currently make responsible waste management difficult, while remaining compatible with the existing behaviours and equipment of remote campers.

Conclusion

This research investigated the environmental impacts associated with remote camping in Australia, with a focus on understanding the activities, behaviours and challenges contributed to these impacts. Through secondary research, an online survey and semi structured interviews with campers and park rangers, the research developed an understanding of both the environmental consequences of campsite practices and the practical challenges experienced by those managing them.

Across the research, waste management emerges as the most significant area of concern. Waste management was identified as the area of most concern, reinforced by challenges of litter, wildlife interaction, leaks, smells, storage and transportation. It was also demonstrated that these impacts are interconnected with limited facilities and infrastructure within remote environments, placing greater responsibility on campers to manage their own waste.

Comparison with existing literature and product benchmarking identified a gap between understanding the environmental impacts of camping and providing practical systems to support campers in preventing them. Existing products largely address basic waste storage, with limitations identified in secure containment, transportation, durability and wildlife protection.

These findings therefore establish waste management as the strongest opportunity for industrial design intervention. Rather than relying solely on camper responsibility or education, the research supports the development of a purpose designed solution that makes responsible waste management more convenient, secure and practical throughout the remote camping experience.



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Benchmarking Criteria

A comparative benchmarking model was developed to evaluate existing water and waste management products for remote camping. Six criteria were selected to assess each product's practical performance and suitability for off-grid camping: cost, portability, quality, aesthetics, usability and capacity.

Each criterion was scored on a 1–10 scale, with 1 representing poor performance and 10 representing excellent performance relative to the intended camping context and comparable products. A score of 5 represents moderate performance, with noticeable strengths and limitations. Scores between these anchor points were assigned according to the extent to which a product met each criterion.

The rating anchors were used as reference points rather than rigid definitions. Intermediate scores were assigned based on the degree to which each product demonstrated the characteristics described. For example, a product with good portability but some storage limitations could receive a score of 7, while a bulky product with limited transport convenience could receive a score closer to 3.

Cost and capacity were assessed in relation to comparable products and their intended applications. Quality, aesthetics, portability and usability were evaluated using available product specifications, descriptions and visual evidence. Where information was limited, scores were based on observable characteristics and treated as indicative rather than definitive.

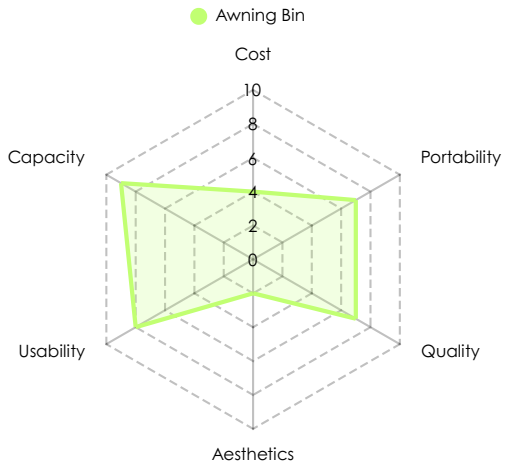
Each criterion was weighted equally, with a maximum score of 60 per product. The total score provided an overall comparison, while individual criterion scores highlighted specific strengths, weaknesses and opportunities for design improvement.

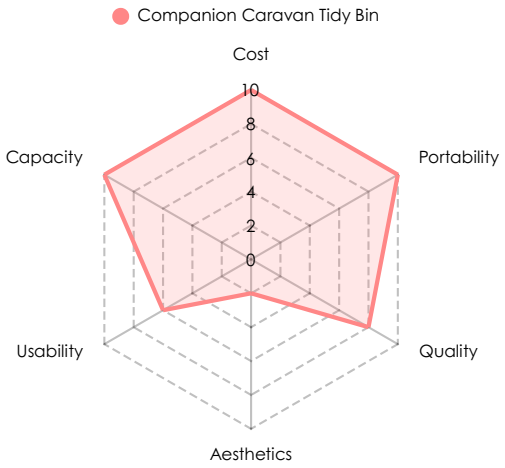
Criteria table is found on the following page.

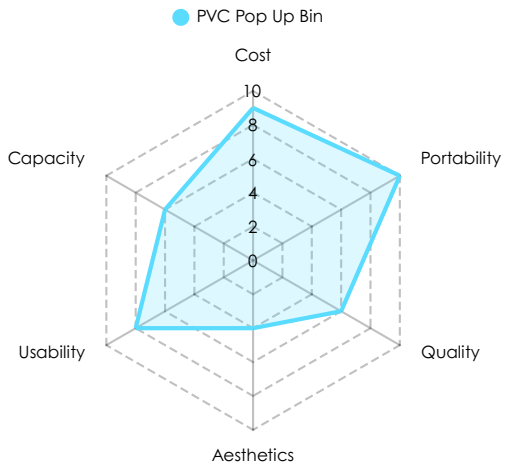
Benchmarking Criteria

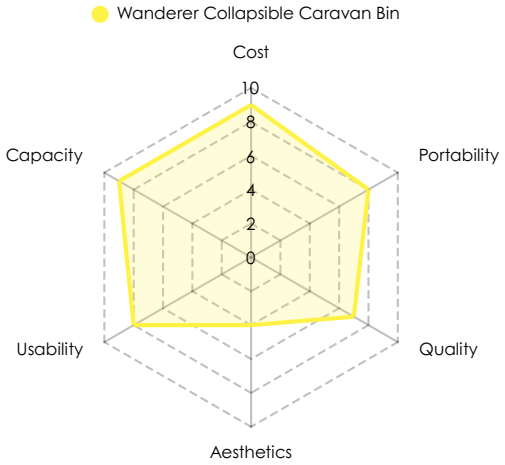
Criteria	1 - Poor	5 - Moderate	10 - Excellent
Cost	Very expensive relative to comparable products, with limited perceived value.	Moderately priced, with reasonable value for its features.	Highly affordable relative to comparable products, offering strong value.
Portability	Bulky, heavy or difficult to transport and store.	Manageable to transport, but has some storage or handling limitations	Lightweight, compact or collapsible, and easy to transport and store.
Quality	Materials or construction appear fragile and poorly suited to repeated outdoor use.	Adequate construction, but some concerns about durability or weather resistance.	Robust materials and construction suited to repeated use in outdoor conditions.
Aesthetics	Poor visual cohesion, with little consideration for form, finish or product integration.	Functional appearance with some consideration for form and finish.	Cohesive, considered appearance with high-quality finishes and strong visual integration.
Usability	Difficult to set up, access, operate or clean.	Generally functional, but some tasks involve inconvenience or unnecessary steps.	ntuitive to use, easy to access and clean, with minimal setup or effort.
Capacity	Insufficient usable capacity for the intended camping task.	Adequate capacity for typical use, but with some limitations.	Generous usable capacity that effectively supports the intended task without unnecessary bulk

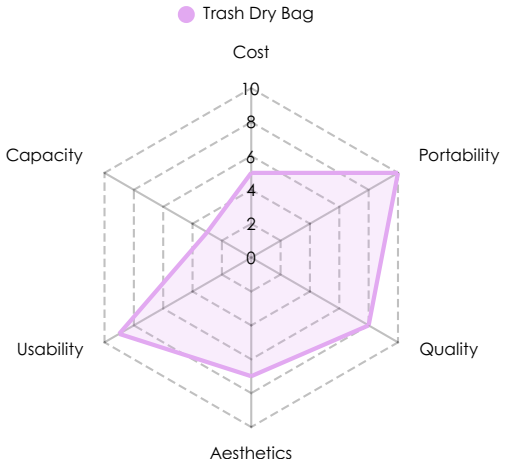
Extra Benchmarking Charts





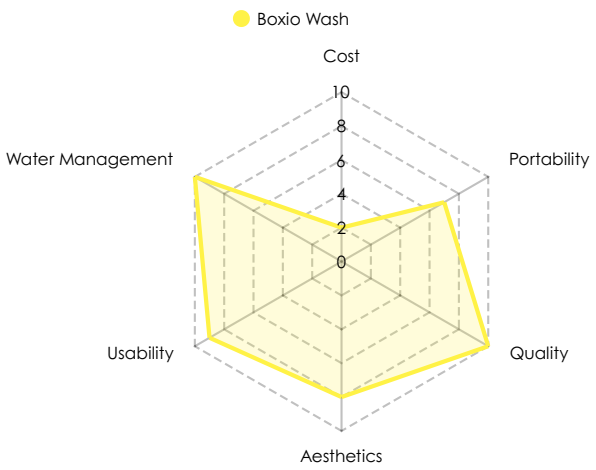


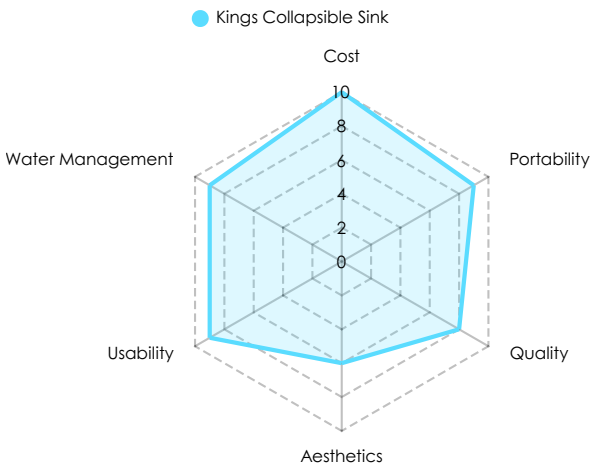


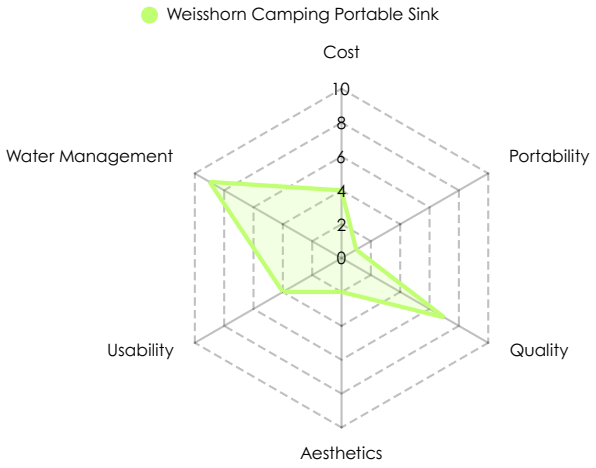


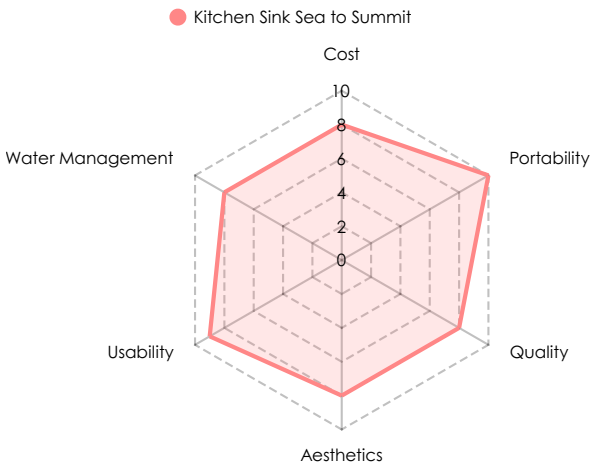


Extra Benchmarking Charts









Thematic Analysis Chart

Theme	Code	Frequency	Example
Facilities	Peak Period	3	"...high level of recreational use...during busy periods."
	Remote VS Developed	5	"...more issues around waste and general campsite disturbance."
	Lack of Facilities	13	"...no toilets..." or "nowhere for people to dispose of rubbish..."
Behaviour of Campers	Positive	14	"some people are extremely responsible...leave the site looking like nobody's been there..."
	Negative	13	"...leave rubbish behind or don't dispose of things properl."
	Responsibility	22	"...relies on the camper remembering the information and making the right decision themselves."
Waste Management	Litter Positive	3	"Waste can be easy to manage if you do it right..."
	Litter Negative	16	"...people leaving rubbish behind rather than taking them out with them."
	Leaks/Smells	9	"If they don't have a good way of containing it, the bag can become messy and smell."
	Storage/Transport	7	"With rubbish, the biggest issue is storagr and transport."
	Water Positive	6	"Water wise...bring most of what I need with me...use it pretty carefully."
	Water Negative	11	"People might wash dishes and just tip the water directly onto the ground."
	Human Waste Positive	1	"...most people have an appropriate way of managing it."
	Human Waste Negative	3	"...innapropriate disposal, particularly when people haven't researched the area or don't understand the requirements."
Animal Interaction	Animals And Waste	13	"...rubbish isn't secured properly, it can attract birds and other animals into the campsite."
	Animal Behaviour	4	"...animals start associating campsites with food.. can become quite persistent around campers."
Campsite Damage	Fire Impact	3	"...fire scars where fires have been repeatdly lit in the same place."
	Campsite Damage	3	"...damage to the ground from vehicles and people setting up in the same areas."
Design Opportunity / Product Needs	Existing Product Weakness	8	"....take up quite a bit of space." or "issues with leaks and smells"
	Existing Product Pros	4	"...keep everyting contained."
	Product Wants And Needs	12	"...easy to pack, easy to clean and doesn't take up much space..."