

QUEENSLAND

RETAIL END-OF-LIFE BATTERY RECOVERY PROGRAM

FINAL REPORT
APRIL 2026

This report has been prepared in accordance with the reporting requirements with the Queensland Government, Department of the Environment, Tourism, Science and Innovation (DETSI). It reflects the agreed scope of work for the Queensland Retail End-of-Life Battery Recovery Program and presents findings based on program activities, stakeholder engagement and observed system conditions.

The scope of this report is limited to retail-based battery collection pathways and associated system interactions. It does not assess broader household waste systems or kerbside collection programs, except where these intersect with or influence retail participation.

Funding acknowledgement

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Example of a retail environment selling battery-powered and battery-supported consumer products, highlighting the importance of accessible disposal pathways across diverse retail settings.

1. Executive summary

The Queensland Retail End-of-Life Battery Recovery Program tested whether retail environments could safely and practically support expanded battery collection and recovery in Queensland.

The program included two connected components:

- **Project A** tested retail-based collection models for end-of-life batteries through the retail collection pilot
- **Project B** delivered statewide retailer education and engagement to improve awareness of safe battery handling, disposal pathways and retailer support needs

Project A tested three pilot approaches:

- **Model A** – broad retail collection: a retailer accepting a wide range of battery types
- **Model B** – event-based collection: a controlled, time-limited battery collection event
- **Model C** – staged collection: a risk-based model where a retailer gradually accepted selected battery types within defined limits

The program found that retail can play a role in battery recovery, but it is not suitable as a universal collection point for all battery types.

The most significant barrier identified was insurance and liability. Even where retailers were interested and operational controls were developed, broader collection could not proceed where insurance coverage was unavailable, unclear or excluded high complex battery types.

Retail participation was also shaped by safety risk, internal approvals, site suitability, cost, consumer behaviour and downstream recovery pathways. These factors mean that adding more collection points alone will not solve battery recovery.

Retail is most suitable for low complex battery streams where collection is clearly defined and supported by existing schemes, safe storage, transport and downstream processing arrangements. High complex batteries, including damaged, unknown, e-mobility, vape, embedded and large-format lithium batteries, require specialist pathways.

Project B showed that retailers value clear, practical and consistent guidance. Statewide engagement also identified ongoing confusion among retailers and consumers about which batteries can be returned, where they should go, and what to do with batteries outside accepted pathways.

Overall, the program supports a three-tier approach to future retail battery collection, supported by insurance and liability resolution, sustainable funding, clear roles, improved data capture, specialist pathways and coordinated statewide education and engagement.

Key findings

Across the collection models tested and wider retailer engagement, a consistent pattern emerged: retail participation is shaped not just by willingness or operational capability, but by insurance, liability, safety risk, cost, system conditions and external constraints.

What the evidence shows

- retailers are willing to participate when risk is clearly defined and manageable
- structured collection models with defined acceptance criteria support safer implementation
- staff-mediated collection reduces the likelihood of inappropriate or higher complexity items being accepted
- clear roles and responsibilities across the system improve confidence and participation
- existing stewardship schemes and partnerships provide a foundation for future integration and expansion

What constrains the system

- insurance and liability considerations, including uncertainty or unavailability of coverage
- safety risks, particularly from damaged, unknown or high-energy batteries
- internal approvals and governance processes within retail organisations
- cost and funding pressures, particularly for infrastructure, transport and processing
- free-rider and non-compliant market issues that undermine system sustainability

What influences retail outcomes

- consumer behaviour and public messaging influence disposal patterns
- participation is not guaranteed even where pathways exist
- a risk-based approach is the most realistic pathway under current conditions

2. Introduction

Project name

The Queensland Retail End-of-Life Battery Recovery Program

Funded by

Queensland Government - Department of the Environment, Tourism, Science and Innovation (DETSI)

Timeframe

- September 2024 to March 2026 (Activity period)
- Final reporting completed by June 2026

Objectives

The objective of the Queensland Retail End-of-Life Battery Recovery Program was to explore whether retail environments could safely and practically support expanded battery collection under current system conditions.

The program aimed to:

- test different models for end-of-life battery collection through retail environments
- understand the operational, safety and system requirements associated with retail participation
- identify which battery types and processes could be managed within existing stewardship arrangements
- explore pathways for batteries that fall outside current schemes
- assess the role retail could realistically play within a broader battery recovery system

Program components

The program was delivered through two connected components:

→ Project A – Retail collection pilot

Project A tested whether retail environments could safely and practically support expanded end-of-life battery collection. This included testing different retail collection models, developing guidance and onboarding materials, assessing site suitability, exploring insurance and liability constraints, and identifying operational, cost, data, transport and downstream processing requirements.

→ Project B – Statewide education and engagement

Project B delivered retailer education and engagement across Queensland to improve awareness of safe battery handling, disposal pathways and retailer support needs. This included the development and distribution of education materials, face-to-face retail engagement, and broader industry engagement to understand awareness, behaviour and disposal barriers.

Together, Project A and Project B provided insight into both the operational feasibility of retail battery collection and the broader awareness, behaviour and messaging issues that influence battery recovery.

Project A progressed through three sequential collection models, broad retail collection, event-based collection and staged risk-based collection, while Project B delivered statewide education and engagement to test awareness, behaviour and support needs across the retail sector.

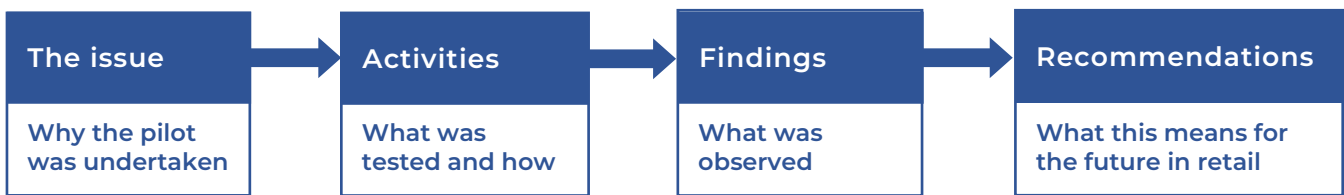
This report

This report presents the findings and recommendations for future pathways for end-of-life battery collection through the retail sector arising from the Queensland Retail End-of-Life Battery Recovery Program.

The report focuses on retail-based end-of-life battery recovery pathways and the conditions required for retail participation to be safe, practical and sustainable. It does not assess the performance of a single model or establish best-practice standards. Instead, it draws on program observations, stakeholder input, Project A testing and Project B engagement, to identify what is feasible under current system conditions, the key constraints observed, and the factors that would need to change to enable broader retail participation.

The program considered the broader collection and recovery chain, including retail collection, storage, transport, recycler requirements, cost, insurance, consumer behaviour and batteries outside current stewardship arrangements. It was not designed to establish a permanent statewide operating model or implement long-term funding, regulatory or infrastructure arrangements.

The report is structured around a clear progression:



Evidence informing this report includes:

- direct engagement with retailers
- discussions with recyclers, waste industry stakeholders and relevant system participants
- Project A design iterations and implementation outcomes
- observations from Project B education and engagement activities

Importantly, the program provides insight not only into what can be implemented, but also what prevents implementation. In several cases, models that appeared operationally feasible did not progress due to insurance, liability, internal approval and broader recovery-chain barriers. These factors are central to understanding the role retail can realistically play in battery recovery.

Limitations

The limitations outlined in this report relate to both the program itself and the interpretation of its findings.

Implementation was intentionally staged and risk-based, with participation constrained by safety, insurance, operational and approval requirements. As a result, the scale of collection activity and number of participating sites was limited. These constraints influenced both the volume of material collected and the extent to which different models could be tested in practice.

At a reporting level, findings are primarily qualitative and directional. While data was collected where possible, system and participation constraints limited the ability to generate large-scale quantitative results. Low volumes and constrained implementation are therefore not limitations of the analysis, but key findings that reflect current system conditions.



Example of large-scale battery recovery at an Australian recycling facility.

3. The issue

The program was undertaken in response to low battery recovery rates in Queensland, despite the presence of established collection infrastructure. While national stewardship programs such as B-cycle provide widespread access, with over 1,070 in Queensland alone, collection rates for Queensland are estimated to be around 15.8%.¹ This means an estimated 84.2% of batteries within the B-cycle collection estimate are not being collected through the scheme and may be going to landfill, being stockpiled or being disposed of through other pathways.

This figure does not capture all batteries recovered through other specialist, product-specific or commercial pathways.

This indicates that while infrastructure exists, it is not consistently translating into recovery outcomes at scale. The issue is not solely one of access, but of system design, consumer behaviour, and the complexity of battery types and disposal pathways.

Battery disposal presents both an environmental and safety challenge. Batteries are a growing waste stream and are increasingly present across a wide range of consumer products. At end-of-life, these products introduce varying levels of risk depending on battery type, condition and handling.

→ Increasing volume

Battery use continues to grow, driven by increasing demand for portable and battery-powered products across households and businesses. This growth is contributing to a rapidly expanding waste stream that is not matched by recovery system performance.

→ Increasing range and complexity

Batteries are becoming more diverse in type, size and chemical composition. This includes standard household batteries, button batteries, rechargeable batteries, lithium-ion batteries, lead-acid batteries, embedded batteries, vapes, e-bike and scooter batteries, and damaged or unknown batteries.

This diversity increases the complexity of safe handling, identification, storage, transport and disposal.

→ Landfill disposal behaviour

Low participation in formal collection pathways means that batteries are frequently disposed of through general waste streams, including household bins. Estimates suggesting that only around 15.8% of batteries are collected through B-cycle indicate that many batteries may still be disposed of incorrectly, sent to landfill or stored in households, despite the availability of collection infrastructure.

→ Environmental impacts

Batteries placed in landfill or kerbside waste streams can release hazardous chemicals into soil, water and drainage systems.² While a high proportion of battery materials are recoverable, low collection rates mean that significant volumes are lost to landfill or disposed of incorrectly.

This limits the recovery of valuable materials and reduces the effectiveness of circular economy outcomes.

→ Risk and safety incidents

There are increasing safety risks associated with end-of-life batteries, particularly lithium-based batteries, entering kerbside waste and recycling systems. These risks have been linked to fire incidents across collection vehicles, transfer stations and processing facilities³, highlighting the need for improved diversion pathways and clearer system design.

Large format, lithium-ion and embedded batteries have also been identified as escalating safety and environmental risks, particularly where batteries are damaged, incorrectly stored, or disposed of through general waste and recycling systems.

→ Poor recovery rates

While established collection pathways are in place, recovery rates remain low relative to the volume of batteries entering the market each year. This indicates that access alone is not sufficient to drive correct disposal behaviour.

Low recovery rates also suggest that consumers may not be sufficiently aware of available schemes, may not understand the risks associated with incorrect disposal, or may find the collection process too complex or inconvenient.

¹Battery Stewardship Council, *Positive Charge Report 2024–25*. Collection point and QLD collection rate data used to estimate scheme access and recovery.

²QLD Government, *Don't bin your batteries; B-cycle, Battery safety guidance*. These sources identify fire, safety and environmental risks associated with batteries.

³QLD Government, *Don't bin your batteries; QLD Government media statement, New strategy to boost the response to battery fires*. These sources identify battery-related fire risks in kerbside, waste and recycling systems.

→ **Limited consumer understanding**

Battery types, risks and disposal pathways are not well understood by many consumers and non-specialist retailers. Consumers are often required to identify the type of battery they have, understand how to handle it safely, and determine the correct collection pathway.

In practice, many consumers do not know that they may need to remove batteries from products, tape terminals, separate battery types, or avoid placing high complexity batteries in general collection bins.

→ **Limited education and awareness**

While education initiatives exist, there is no single, consistent source of information for consumers or retailers. Messaging varies across schemes, retailers and jurisdictions, contributing to confusion and inconsistent behaviour.

This creates a risk that consumers may either place batteries in general waste or present unsuitable batteries to collection points that are not designed to accept them.

→ **Limitations of current schemes**

Current battery collection systems operate across multiple schemes and pathways, with varying levels of coverage depending on battery type. While programs such as B-cycle provide a national framework for certain batteries, not all battery types are captured, particularly larger, embedded, damaged or high complex batteries.

This creates gaps in the system and requires consumers to navigate different schemes depending on the product or battery type.

→ **Valuable materials**

Batteries contain valuable and finite materials that can be recovered, reprocessed and recirculated in the economy. However, low collection rates mean that these materials are often lost to landfill or disposed of incorrectly.

Improving recovery pathways is therefore important not only for reducing safety and environmental risks, but also for supporting circular economy outcomes.

These samples represent materials recovered through the shredding and processing of end-of-life batteries, highlighting how battery waste can be transformed into reusable resource streams within a recovery system.



Current battery collection pathways

Current battery collection systems are fragmented, with different schemes and pathways accepting different battery types. While these schemes provide important recovery options, no single pathway currently provides a simple, consistent solution for all end-of-life batteries.

→ B-cycle⁴

B-cycle is the national battery stewardship scheme administered by the Battery Stewardship Council. It provides a network of collection points across Australia, including many retail drop-off points.

B-cycle generally provides pathways for common household batteries, including AA, AAA, C, D, 9V, button and easily removable rechargeable batteries.

However, B-cycle does not provide a catch-all pathway for all battery types. Larger format batteries, embedded batteries, damaged batteries, vapes, e-bike and scooter batteries, and other high complex batteries may fall outside the scope of standard collection points.

→ MobileMuster⁵

MobileMuster provides a national collection and recycling pathway for mobile phones and associated accessories. This includes mobile phone batteries where they are part of the mobile phone product stream.

Mobile phones and accessories can be recycled through MobileMuster drop-off points, including participating telecommunications retail stores, or through mail-back options.

While MobileMuster contributes to battery recovery, it is limited to a specific product category and does not provide a pathway for all consumer batteries or battery-powered products.

→ National Television and Computer Recycling Scheme⁶

The National Television and Computer Recycling Scheme provides recycling pathways for televisions, computers and related electronic products. This may capture some products with embedded batteries where they form part of accepted electronic waste.

The scheme provides access to recycling services for households and small businesses through approved collection services, including permanent drop-off sites, collection events and some mail-back options.

However, it is not a dedicated battery collection pathway and does not address all loose, embedded, or higher complexity batteries.

→ Other specialist or product-specific pathways

Some battery types are managed through specialist or product-specific pathways. For example, lead-acid batteries are often collected through automotive, hardware or specialist recycling channels.

These pathways are important, but they are not always obvious to consumers and may depend on battery type, product category, location and retailer capability.

→ System gap

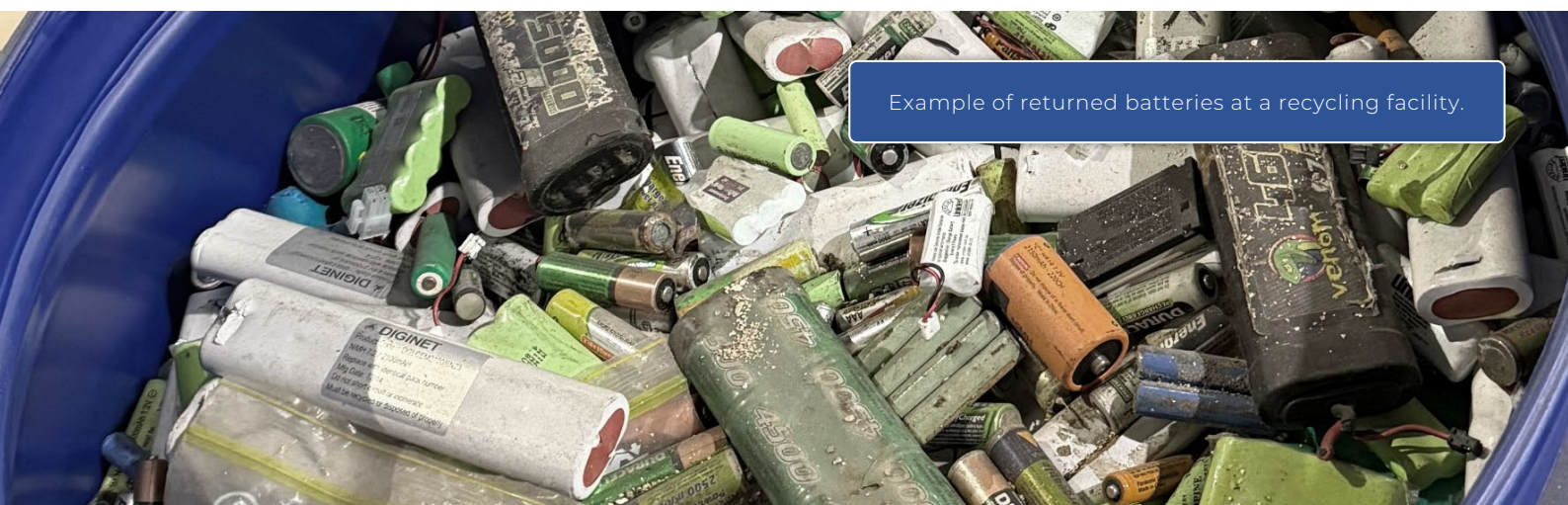
The current system requires consumers to identify what type of battery they have, understand how it should be handled, and locate the correct disposal pathway. This creates a complex and fragmented consumer experience.

Where the pathway is unclear, inconvenient or not available, batteries are more likely to be stored at home, placed in general waste, or presented to retailers that may not be equipped to safely accept them.

⁴B-cycle, Battery types accepted and Resource FAQs

⁵MobileMuster, Recycle a mobile and Annual Report 2025

⁶Australian Government, DCCEEW - NTCRS website



Example of returned batteries at a recycling facility.

Current battery collection pathways by battery type

The table below summarises how current collection pathways vary across battery types, highlighting where existing schemes operate effectively and where important system gaps remain.

BATTERY TYPES	MARKET PROPORTION	EXISTING SCHEMES	ACCESS	OUTCOME
Household batteries (AA, AAA, C, D, 9V, button)	High use across households and everyday products	B-cycle for common household batteries	High - broad retail and public drop-off network	Accessible, but B-cycle recovery remains low (15.8%), showing access alone does not drive return.
Small consumer lithium-ion (phones, small devices)	High and growing	B-cycle where removable and not damaged Mobile Muster for phones and accessories	Moderate - program-specific and subject to conditions	Dedicated pathways exist, but confusion remains around handling and acceptance. Mobile Muster recovery rate for available phones remains low (10.5%).
Power tool batteries	Moderate household and trade use	B-cycle where removable and within criteria; some brand/retailer programs	Moderate - available through some pathways, not all retailers	Pathways exist, but inconsistent access can lead to stockpiling or incorrect disposal
Lead-acid batteries	Established automotive and industrial stream	Specialist recyclers, automotive retailers and scrap metal pathways	Moderate - mainly through specialist channels	Strong recovery pathway with commercial value, recycling rates are very high (99%).
E-mobility batteries (e.g. e-bikes, scooters)	Rapidly growing	Limited specialist or retailer-specific pathways	Low - not standard retail/stewardship collection	Higher complexity with limited pathways, increasing storage and disposal risk.
Embedded batteries (in products)	Growing across consumer products	E-waste/product pathways , including some NTCRS-covered products	Low - often requires whole-product return or dismantling	Batteries may be separated downstream, but battery-specific pathways remain unclear
Damaged batteries	Low volume , high complexity	Generally excluded from standard schemes	Very low - specialist handling required	Major system gap where unsafe storage or disposal can occur
Unknown / mixed batteries	Common in customer returns	Not clearly defined	Unclear - often depends on site judgement and ability to identify risk	May be stored at home, rejected, taken to unsuitable return points or disposed of incorrectly
Grey-market / imported batteries	Growing through online purchasing	Not consistently captured by stewardship schemes	Unclear / inconsistent	Creates cost, safety and responsibility gaps across retailers, recyclers and consumers

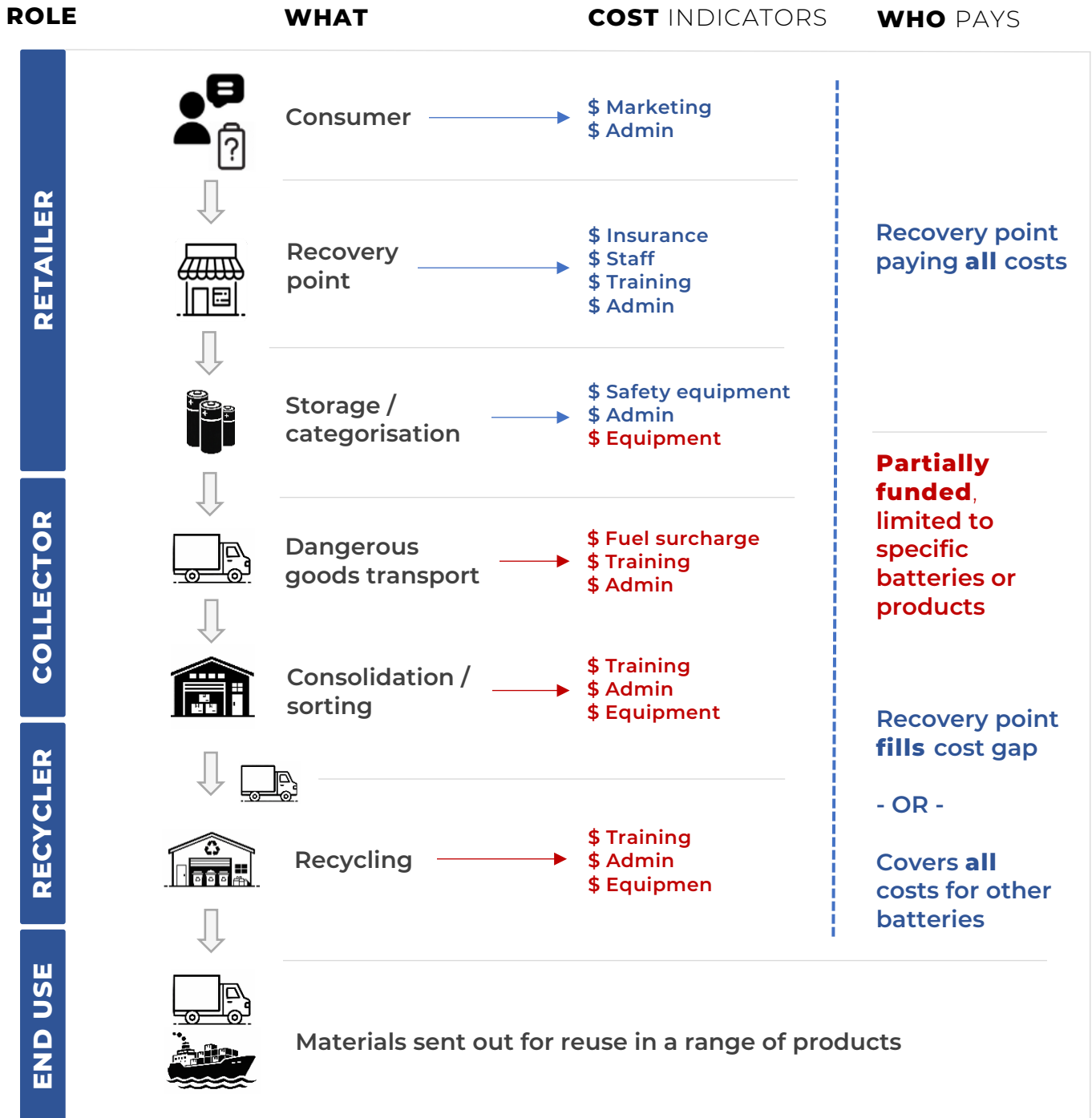
This fragmentation means consumers may be required to identify battery type, condition and pathway before disposal, which reduces confidence and increases the likelihood of incorrect return or disposal.

Sources: B-cycle, MobileMuster, NTCRS, CSIRO/National Battery Strategy, program analysis and stakeholder engagement.

Life of battery recovery

Battery recovery involves multiple stages beyond the point of collection, with each stage introducing additional cost, handling and risk considerations.

Illustrative system flow and cost distribution



The cost of battery recovery extends beyond the point of return, spanning collection, storage, transport, sorting and downstream processing.

Note: This is an illustrative system flow based on program observations and stakeholder engagement. Cost responsibility may vary depending on battery type, scheme coverage, commercial arrangements and service model.

Consumer experience

From a consumer perspective, batteries and battery-powered products are often viewed as a single, simple item. Operationally, however, battery systems are highly complex, with different chemistries, sizes and conditions requiring different handling, transport and recovery pathways.

Consumers are often not aware of these differences and may:

- assume all batteries can be disposed of in the same way
- be uncertain where to take different battery types
- prioritise convenience over correct disposal
- be unaware some products contain embedded batteries
- be unclear on all the safety risks of incorrect disposal
- be unfamiliar with the value of battery material recovery

It is not realistic to assume that most consumers will correctly identify, separate and return different types of batteries to different collection points without clear, simple and accessible guidance.

Where disposal pathways are unclear, inconvenient or difficult to access, batteries are more likely to be placed in general waste streams.

This creates a mismatch between simple consumer expectations and complex system requirements. What appears to be a simple disposal action for consumers becomes a risk-sensitive handling, storage, transport and recovery process for retailers, recyclers and waste operators.

SUMMARY OF THE ISSUE

To increase participation, recycling batteries needs to be made simpler and easier for consumers. Existing collection infrastructure is already available for some battery types, but recovery rates remain low and system coverage remains uneven.

The key issue is that battery recovery currently relies on consumers navigating a complex and fragmented system. This creates confusion, reduces participation and increases the likelihood that batteries will be disposed of incorrectly.

Retail offers a potentially accessible pathway because it is familiar, visible and already connected to the sale of batteries and battery-powered products. However, retail environments are not designed to manage all battery types, particularly damaged, embedded, high complex or unknown batteries.

This is the central challenge the pilot was designed to test: whether retail can play a broader role in battery recovery, and under what conditions this can be done safely, practically and sustainably.

Sources used through section 3. **The issue** include:

- *Figures regarding B-cycle collection points and estimated collection rates are based on the B-cycle Positive Charge 2024–25 report*
- *MobileMuster's 2025 annual report states that program collections reached 171 tonnes total, including mobile phones and accessories, and an annual collection rate for available phones of 10.5% nationally*
- *Lead-acid. CSIRO and the National Battery Strategy cite 99% of lead-acid battery waste recycled in 2021 throughout Australia*
- *Direct engagement with other stakeholders*

Example of a damaged battery secured in specialist packaging for safe transport.



4. Retail as a potential solution

Retail as a one-stop battery collection point

Retail environments are already a visible interface for consumer battery return, with many existing battery collection points located in retail or public-facing settings. Operationally, this means retail is already functioning as the most visible and commonly used pathway for battery disposal to consumers, regardless of whether it is formally designed to perform this role.

Retail is also directly connected to the sale of batteries and battery-powered products, creating a logical opportunity to support end-of-life collection at or near the point of purchase.

Opportunities presented by retail

Retail environments offer several characteristics that make them a potential pathway for battery collection:

- existing national network of accessible locations
- established point of sale for batteries and battery-powered products
- frequent point of contact for consumer advice and interaction
- observed informal return behaviour in-store
- existing participation in collection for certain battery types
- convenience for consumers through regular visitation
- ability to provide education at point of sale
- alignment with increasing public, industry and regulatory expectations for retailers to support product stewardship

Retail return also provides an opportunity to reframe end-of-life batteries as recoverable resources rather than waste. Where consumers are purchasing a replacement battery or battery-powered product, retail settings can help connect the purchase of a new item with the safe return of the end-of-life item.

Challenges presented by retail

While retail offers accessibility and visibility, it is not designed to operate as a hazardous materials handling environment. A few key challenges influence the ability for retail to safely and effectively collect batteries:

- safety risks associated with high complexity batteries
- limitations in space for safe storage, segregation and containment
- reliance on non-specialist staff, including casual and junior employees
- difficulty controlling what customers present for disposal
- variability in battery type, condition and origin
- insurance and liability considerations, particularly for higher complex batteries
- operational constraints within retail environments, including tenancy and layout
- cost and financial viability of collection, storage and transport
- unclear roles and responsibilities across the system

Prior to this project, these opportunities and challenges had not been tested in a structured or controlled way within retail environments.

Concept to test:

Is it feasible, safe and sustainable for retailers to collect all types of batteries?

5. Project A - Retail collection pilot

Objectives

Project A aimed to test whether retail environments could safely and practically accept all, or more, types of batteries under retail conditions.

Approach

Project A was designed to test the operational feasibility of collecting battery types beyond current accepted pathways within retail environments. It focused on understanding how safety, operational, behavioural and system-level factors influence what can be implemented in practice.

Project A explored multiple potential pathways for retail collection and identified where these were viable, and where constraints such as safety, insurance, cost and operational limitations prevented implementation.

Project A focused on understanding the practical limits of retail collection, including:

- what battery types retailers are realistically asked to accept
- what risks emerge in retail environments
- where operational feasibility breaks down (e.g. approvals, insurance, safety thresholds)
- what conditions would need to change to support broader retail participation

What was done

Project A delivered a targeted program of work to test whether retail environments could safely and practically support expanded end-of-life battery collection.

This section summarises the work undertaken through Project A. The following phase sections provide more detail on how the collection models evolved and what was learned.

The work included:

→ Retailer engagement and participation

Retailer engagement under Project A focused on identifying suitable retail participants, testing collection model feasibility and understanding the conditions required for safe retail participation.

This included targeted engagement with approximately 54 stakeholders across retailers, recyclers, stewardship schemes, insurers, government, shopping centre operators and industry bodies. This engagement represented approximately 1,600 retail locations in Queensland directly, with broader industry reach through peak bodies and associations.

Project A engagement included:

- identifying and engaging potential retail pilot participants
- repeated engagement with priority retailers to test feasibility and progress participation
- discussions with store-level, operational and senior decision-making representatives
- site visits and feasibility assessments to understand storage, handling and operational constraints
- engagement with insurers and brokers to understand liability and coverage limitations
- consultation with recyclers and downstream operators on handling, storage, transport and processing requirements
- development and refinement of pilot models in response to retailer and stakeholder feedback

Engagement assessed:

- retailer willingness to participate
- site suitability and storage capacity
- accepted and excluded battery types
- insurance and liability requirements
- internal approval and governance processes
- operational requirements for intake, storage, collection and escalation
- downstream collection, transport and processing pathways

This process showed that while some retailers were interested in supporting battery collection, willingness at store or operational level did not always progress through internal approval, insurer or senior decision-making processes.

Project A engagement also helped identify the practical controls required for retail participation, including clear acceptance criteria, staff guidance, storage arrangements, escalation pathways and defined collection processes.

Project B, the broader statewide retailer education and engagement stream, also helped inform and validate Project A findings. Engagement with 920 retail stores across 145 retail precincts and shopping centres provided broader evidence of retailer awareness levels, customer behaviour, disposal confusion, common questions from retailers, and the need for clear, practical guidance. These insights helped confirm that issues identified through Project A were not isolated to a single retailer or pilot site but reflected broader retail conditions. Project B is addressed in more detail as a standalone education and engagement stream later in this report.

→ Project A design and model development

Project A involved the development, testing and refinement of multiple collection models, rather than a single fixed design.

Model development was iterative and informed continuously by retailer engagement, stakeholder input, risk assessment and approval outcomes.

This included:

- development of multiple pilot models ranging from broad, consumer-facing “all battery” concepts through to tightly controlled, risk-based collection approaches
- refinement of models to align with retail constraints, including space limitations, staffing capability, customer interaction and tenancy restrictions
- repeated redesign of pilot approaches in response to retailer feedback, insurer requirements and organisational approvals
- identification of key failure points where proposed models could not progress due to risk, cost or governance constraints

Several models progressed through advanced stages of engagement and design, including detailed discussions with retailers and system stakeholders, but did not proceed to implementation due to system-level constraints, particularly insurance, liability and internal approval barriers.

This iterative process was critical in identifying not only what could work, but what could not be implemented within a retail context.

This process involved multiple iterations of model development and refinement, rather than a single design pathway.

→ Safety, risk and operational planning

A detailed and practical focus was placed on safety, risk and operational feasibility across the full battery handling pathway.

This work extended beyond high-level guidance and involved development of detailed operational frameworks to support safe participation.

This included:

- risk assessments across battery intake, handling, storage, segregation and fire scenarios within retail environments
- development of comprehensive operational resources, including:
 - standard operating procedures (SOPs) for intake, rejection and incident response
 - battery identification guides
 - staff training materials and induction tools
 - visual signage and handling guidance
 - site-specific checklists and risk registers
- establishment of clearly defined acceptance and rejection criteria for batteries, including identification of high complexity categories
- development of handling, storage and escalation protocols aligned to retail conditions

This work was informed through extensive engagement with system stakeholders, including:

- recyclers to understand downstream sorting, processing and risk management requirements
- site visits to sorting and processing facilities to understand downstream handling, sorting and risk management processes
- insurers to understand risk exposure, liability considerations and approval constraints
- Queensland Fire and Emergency Services (QFES) to align with fire risk and emergency response considerations
- industry bodies and associations to understand existing schemes, system interactions and limitations
- government stakeholders to align with regulatory expectations and program objectives

This process confirmed that safe participation requires clearly defined boundaries, controlled intake conditions and alignment with insurance and risk frameworks and cannot be achieved through open or uncontrolled collection models.

Retailer onboarding was undertaken to support safe and consistent participation in the pilot. This included providing site-specific guidance on the agreed collection scope, accepted and excluded battery types, intake processes, storage expectations, escalation pathways and customer referral options.

Training and onboarding covered:

- what battery types could be accepted
- what battery types could not be accepted
- visible risk indicators, including damage, swelling, leakage or tampering
- safe handling practices for low complex batteries
- storage and segregation requirements
- what to do if a customer presented an unsuitable battery
- referral options where batteries could not be accepted
- incident escalation processes
- use of supporting signage, guidance materials and intake criteria

This onboarding was intended to support baseline awareness and consistent application of Project A controls. It did not replace the need for defined insurance coverage, safe storage, appropriate infrastructure or downstream collection pathways.

→ Pilot implementation

Pilot implementation involved testing within active retail environments, supported by ongoing monitoring, site visits and iterative refinement.

This included:

- staged pilot activity with a retailer (see page 25 for more details), acting as the primary trial site
- assessment and preparation of an additional regional pilot site, intended as a secondary testing location following initial implementation at the primary pilot site; this did not proceed due to time constraints and the extended duration required to establish and refine the primary pilot site
- multiple site visits to pilot locations to assess readiness, implement processes, observe operations and refine approaches
- repeated site visits to the primary regional pilot site across multiple stages of implementation to establish, observe and refine operational processes
- practical testing of operational resources, including SOPs, training materials and safety controls
- direct observation of customer behaviour, including presentation of unsuitable, mixed, damaged and unknown battery types
- staged introduction of battery types, beginning with low complex streams and progressing based on demonstrated capability and approvals
- identification that even controlled implementation at a single site required significant time, coordination and iterative refinement

These engagements were not one-off consultations, but ongoing discussions across the life of the pilot to inform design, test feasibility and validate findings.

Implementation was directly shaped by insurance requirements, which defined:

- acceptable battery types
- storage and handling conditions
- exclusion of high complex batteries such as damaged batteries, vapes and e-mobility devices

These constraints required ongoing adjustment of Project A scope and sequencing, reinforcing the need for a staged, risk-based approach to implementation.

→ Site implementation support

Implementation support included site-level engagement, operational guidance, review of suitable storage areas, discussion of accepted and excluded battery types, and practical support for how staff should respond to customer enquiries or batteries presented outside the agreed scope.

This support was particularly important because the pilot relied on staff applying clear boundaries at the point of intake, rather than attempting to assess battery chemistry or technical risk.

→ Stakeholder, system and research inputs

Project A incorporated extensive engagement across the broader battery recovery system to ensure a whole-of-system understanding.

This included engagement with:

- recyclers and processing organisations
- stewardship schemes and programs
- industry bodies and associations
- government and regulatory stakeholders, including Queensland Fire and Emergency Services
- manufacturers and supply chain stakeholders
- local government and waste sector organisations

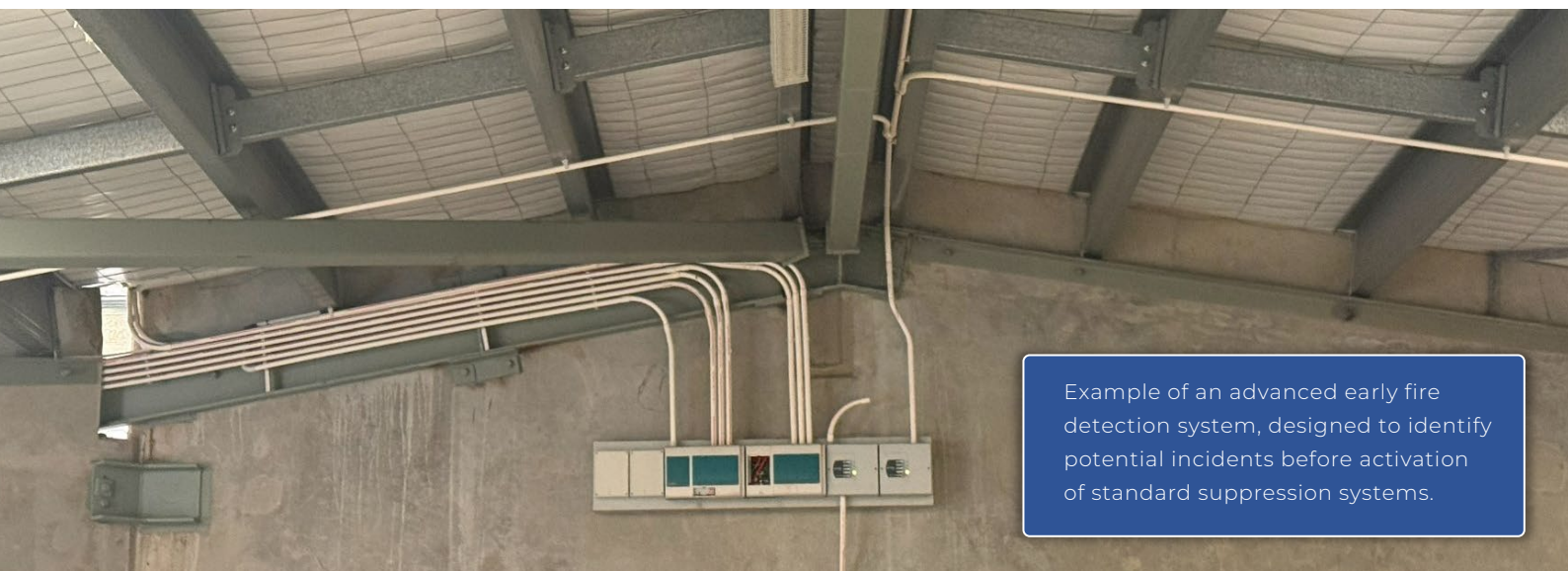
These engagements included formal meetings, site visits, ongoing coordination and information sharing, as well as alignment discussions to ensure the pilot complemented existing systems rather than duplicating or conflicting with them.

The pilot also incorporated learnings from the Battery Awareness Education Campaign, including:

- direct insights from retailer engagement on awareness, behaviour and information gaps
- testing and refinement of education materials through retail interactions
- assessment of consumer behaviour, including low awareness, low motivation and preference for simple, convenient return pathways

This ensured that Project A design and findings were informed not only by operational testing, but also by behaviour and system dynamics.

This level of engagement, iteration and testing reflects the complexity of integrating battery collection into retail environments and reinforces that implementation is not a simple or single-step process.

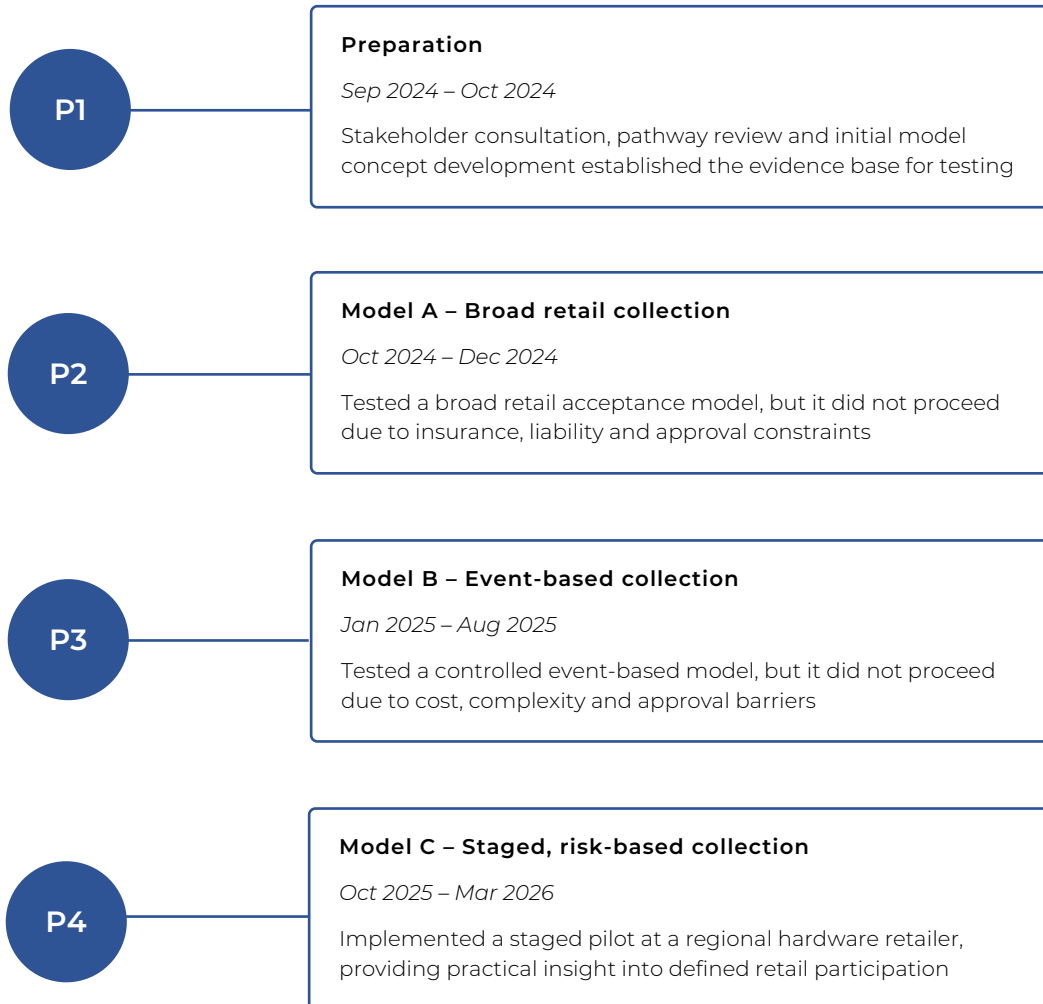


Example of an advanced early fire detection system, designed to identify potential incidents before activation of standard suppression systems.

Project A phases

Project A did not progress as a single linear trial. Instead, it evolved over time in response to stakeholder feedback, operational feasibility, safety risk and internal approval thresholds.

Rather than implementing a single model, Project A progressed through a series of proposed and tested approaches, each exploring different levels of battery acceptance, control and operational complexity.



Initial concepts focused on broad retail accessibility and simplicity for consumers, with the intention of providing a single, consistent collection approach.

As Project A progressed, limitations emerged in applying a single model across different battery types and retail environments. Safety risks, insurance constraints and internal approval requirements required a more controlled and differentiated approach.

Rather than implementing a single design, Project A evolved through a series of proposed approaches, each testing different levels of risk, control and operational complexity. This staged progression reflects how feasibility reduces as battery types, risk and operational requirements increase.

Note: Models A, B and C were not presented to all stakeholders as a fixed menu of options. The models evolved sequentially as earlier approaches were tested against retailer willingness, insurance, liability, cost, operational feasibility and internal approval requirements.

As a result, stakeholder engagement tested feasibility and constraints at each stage, rather than collecting equal preference data across all three models. Some retailers were more open to discussing batteries or products they sold or understood, but did not support broader acceptance of unknown, unrelated or higher-complexity batteries. This informed the later staged, risk-based approach used in Model C.

Phase 1: Preparation

Phase 1 focused on establishing the foundational understanding required to support retail battery collection, including system conditions, stakeholder perspectives and the initial design of a retail-based collection model.

What was done

This phase involved early engagement, research and concept development to understand the battery recovery landscape and identify potential pathways for retail participation.

This included:

- consultation with a wide range of stakeholders and experts across retail, recycling, industry and government, involving approximately 54 stakeholders across the life of the program, with multiple meetings held with some stakeholders
- engagement with stewardship schemes, peak bodies and system stakeholders to understand existing roles, coverage and limitations
- review of existing battery collection schemes and recovery pathways
- research and analysis of battery types, including differences in chemistry, risk profile, handling and recovery requirements
- early analysis of the battery recovery chain, including collection, storage, transport and processing requirements
- identification of what batteries existing schemes could and could not accept, and where gaps existed in current recovery pathways
- identification of potential retail participants and suitable retail formats
- development of an initial broad retail collection concept ("Model A"), designed as a simple, consumer-facing approach where participating retailers would act as accessible drop-off points for a wide range of battery types; this included outlining proposed battery scope, indicative handling and storage approach, retailer roles and responsibilities, and how the model would interact with existing recovery pathways
- targeted promotion of the Model A concept to retailers through direct engagement, including one-on-one meetings, site visits and participation in retailer forums to explain the proposed model and test feasibility
- structured recruitment of potential pilot participants, including identification of suitable retailers based on format, capability and customer profile, followed by ongoing discussions to assess willingness, operational constraints and internal approval requirements
- initial discussions with retailers to understand willingness to participate, perceived risks and operational considerations

What this phase showed

- there was strong initial interest from retailers in supporting battery collection, particularly where it aligned with customer expectations and existing product categories
- the concept of a simple, broad retail collection model was appealing from a consumer perspective
- retailers had varying levels of understanding of battery types, risks and disposal pathways
- early engagement highlighted potential operational, safety and approval considerations that would require further investigation
- further detailed work was required to test whether a broad model could be implemented safely and practically in retail environments

Phase 2: Model A – Broad retail collection

Retailer to accept all types of batteries

Strategy

The initial model explored a broad, simplified approach to retail battery collection, designed to reduce consumer confusion and maximise accessibility.

Under this model, customers could return a wide range of battery types to a retail location with minimal upfront screening or restriction. The model was based on a “one-stop-shop” concept, aligning with how consumers typically view batteries and battery-powered products.

Participant

Retailer A - a specialist battery retailer with a national store network and established expertise in battery products, advice and replacement.

Model advantages

- strong alignment with consumer expectations for simple, accessible “one-stop” return pathways
- established retail network with broad geographic coverage
- significant footprint across Queensland, enabling scalable access
- recognised customer-facing offer in batteries and battery-related products
- existing customer base already engaging with battery purchase and replacement
- existing informal battery return behaviour observed in-store
- staff familiarity with battery products, terminology and basic handling requirements
- existing safety awareness and some handling protocols already in place
- ability to provide point-of-sale education and influence customer behaviour
- alignment with product stewardship expectations (collecting products sold)

Key activities

- participant recruitment and engagement with the Retailer A network
- site-level engagement with store managers to understand operational feasibility
- engagement through Retailer A network forums and leadership discussions
- initial site selection and feasibility discussions
- site risk assessments, including handling, storage and customer interaction considerations
- engagement with internal stakeholders regarding approvals, insurance and risk requirements
- iterative refinement of the Model A concept based on stakeholder feedback
- identification of operational feasibility and emerging constraints

Findings and barrier analysis

From early engagement through to detailed discussions with site and operational representatives, Retailer A indicated strong support for the pilot and the proposed Model A approach.

This support was reinforced through direct engagement at retailer network forums attended by store managers, where the model received strong endorsement. At a site level, the model was considered workable, with retailers indicating confidence in their ability to manage customer interactions and basic handling requirements.

Initial engagement with Retailer A demonstrated that, at a store and operational level, there was confidence that a wide range of battery types could be accepted and managed within existing retail environments.

However, when progressed to executive-level approval, participation was withdrawn.

Key concerns at this stage related to risk, liability and organisational approval requirements. Retailer A indicated that internal risk considerations and previous battery-related incident history had heightened organisational risk sensitivity.

At a senior decision-making level, there was a clear view that introducing broader battery collection without consistent controls across all store formats would expose both the business and leadership to unacceptable risk.

This highlighted a clear distinction between operational feasibility and organisational approval requirements, with the model considered workable in practice but not acceptable from a corporate risk perspective.

Key barriers to participation

- insurance coverage and liability exposure associated with accepting a broad range of battery types
- liability risks linked to high complex battery categories, particularly lithium-ion batteries
- reputational risk across a national retail network in the event of an incident
- leadership exposure to safety incidents and associated consequences
- cost of collection, storage and downstream processing, with no defined cost recovery mechanism
- previous battery-related incident history increasing internal risk sensitivity
- risk of fire incidents associated with damaged, defective or unknown batteries
- uncontrolled accumulation and storage of batteries within retail environments
- variability in store formats limiting the ability to apply consistent safety controls
- limitations of retail environments to safely manage high complex battery types
- lack of clear system-wide controls, standards and escalation pathways to support safe participation

While the model was considered operationally feasible at a store level, senior-level representatives withdrew support due to risk, liability and cost considerations.



Example of shredded materials on conveyance belt

Phase 3: Model B – Event-based collection

Retailer to accept all types of batteries but in a singular test event

Strategy

In response to the barriers identified in Model A, a more controlled approach to retail battery collection was explored.

This model aimed to reduce risk exposure by introducing structured, time-limited collection events, while still enabling acceptance of a broad range of battery types.

Model design

The Model B approach was based on a controlled event format, with additional safeguards introduced to manage risk.

→ Run test event to manage risk

- Scheduled, time-limited collection events to minimise on-site accumulation
- Rapid removal and consolidation to reduce time on-site
- Defined escalation pathways in place for high complex batteries or unidentified batteries
- Clear entry/exit control to manage customer flow during events

→ Specialist support and coordination

- On-site trained personnel to manage intake and processes
- Stakeholder involvement with industry experts including:
 - ✓ Recyclers and downstream operators
 - ✓ Queensland Fire and Emergency Services (QFES)
 - ✓ first-aid support (e.g. St John)

→ On-site handling and control measures

- Controlled intake, inspection, and triage of battery drop-offs
- Specialised containers and storage to isolate batteries by type
- Secure segregation of battery types and conditions
- Active coordination of customer drop-off interactions
- Increased supervision beyond standard retail
- Additional measures required to operate this model

This also included promotional or engagement activities planned to support participation e.g. giveaways, competitions, discounted products, promotion savings.

Participant

Retailer B - a national large-format retailer with Queensland stores, selected because its standalone store format, product mix and customer base made it suitable for assessing an event-based battery collection model.

Model advantages

- maintained consumer convenience through a one-stop return model, while limiting exposure through event-based delivery
- reduced accumulation risk by restricting collection to defined time periods, limiting the volume and duration of battery storage at retail sites
- enabled more controlled intake conditions, including inspection, triage and segregation of batteries at the point of drop-off
- aligned more closely with insurer and risk management expectations by introducing defined controls over timing, handling, supervision and escalation pathways, rather than relying on open, continuous collection
- reduced uncertainty in handling high complex batteries through the presence of trained personnel and specialist support
- enabled involvement of downstream stakeholders (e.g. recyclers) at the point of collection, improving visibility of handling and transfer requirements
- provided greater control over customer interaction, reducing the likelihood of inappropriate or unsafe battery drop-offs
- allowed for structured testing of high complex battery scenarios that were not feasible under Model A

Key activities

- development of the Model B pilot design
- participant recruitment and engagement, including exploration with multiple retailers
- site selection and feasibility assessment
- site risk assessments and operational planning
- event planning, logistics and coordination
- engagement with specialist stakeholders (e.g. recyclers, QFES, support services)
- refinement of model based on risk, feasibility and stakeholder input
- identification of operational constraints and approval requirements
- progression through senior internal approval processes

Findings and barrier analysis

Initial engagement under Model B demonstrated strong interest from retailers in progressing a more controlled approach to battery collection.

There was recognition that the event-based model addressed several of the key risks identified in Model A, and discussions progressed further, including preliminary consideration through senior internal approval processes to investigate participation under a more structured and controlled format.

The introduction of time-limited events, specialist support and defined handling processes increased confidence that high complex batteries could be managed more safely under controlled conditions.

However, despite this increased confidence, the model did not progress beyond concept stage.

While the additional controls reduced operational risk at a site level, similar concerns remained at an organisational level, particularly in relation to liability, consistency of controls across locations and potential consequences of an incident.

This stage of Project A also coincided with increased public and media attention on battery-related fire incidents. Stakeholders indicated that this heightened awareness contributed to more cautious decision-making, particularly where potential consequences extended beyond individual store locations to broader brand and network exposure.

As a result, even with additional controls in place, participation did not proceed due to ongoing organisational and senior-level risk considerations.

Key barriers to participation

- high coordination requirements across multiple stakeholders
- significant cost per event, including specialist personnel and equipment
- reliance on availability of external experts and partners
- uncertainty in volume and type of batteries presented by the public, with no reliable mechanism to predict if events would receive minimal or very high volumes
- limited scalability as a routine or ongoing collection solution

As the model progressed through senior internal approval processes, similar concerns to those identified in Model A remained unresolved. These included:

- liability associated with accepting high complexity or unknown batteries
- inability to fully control what batteries would be presented by the public
- reputational and precedent risks associated with expanding battery acceptance
- ongoing uncertainty regarding cost, funding and return on investment

Additional concerns with Model B:

- event-based collection may encourage consumers to store batteries for extended periods prior to return, potentially transferring risk to the home environment

What this phase showed

- introducing control measures can reduce some operational risks but does not eliminate broader system constraints
- even with structured, supervised collection, organisational approval remains a key barrier
- higher levels of control significantly increase cost and complexity
- event-based models are difficult to scale as an ongoing solution
- risk perception, particularly in relation to fire incidents, continues to influence decision-making at senior levels

However, similar approval constraints remained at senior internal approval level, preventing progression beyond concept stage.

As a result, the pilot transitioned to a more conservative, staged approach to retail battery collection, focusing on site-based operations, low complex battery categories, clearly defined intake criteria and controlled storage and handling processes.



Example of a designated storage area for returned lead-acid batteries during Model C

Phase 4: Model C – Staged, risk-based collection

Retailer gradually accepts more types of batteries over time

Strategy

In response to the constraints identified in earlier models, the pilot adopted a more conservative, staged approach to testing retail battery collection. This model focused on incremental progression, with clear operating limits around battery types, handling requirements and structured processes.

Rather than attempting to accommodate a broad range of battery types from the outset, this approach began with simpler, well-understood battery formats and progressively expanded where appropriate. This allowed retailers to build familiarity, capability and confidence over time within a controlled and clearly defined scope.

Model design

- Staged implementation approach
 - staged introduction of battery types based on observed risk
 - initial focus on simpler and more familiar battery formats
- Controlled intake and storage
 - clearly defined acceptance and rejection criteria
 - staff-supported intake processes with retailer oversight
 - segregation and controlled storage of accepted batteries
- Defined pathways and escalation
 - defined collection and removal pathways aligned to downstream processing
 - escalation pathways for high complex batteries, such as damaged or unidentified batteries

Staged model – increasing collection complexity and control requirements

The staged model was developed to test retail collection progressively, beginning with battery types that were better understood, more commonly accepted through existing pathways, and more practical for retail environments to manage.

The progression shown below is not a formal product safety ranking. It reflects relative collection complexity based on factors observed through the pilot, including battery size, condition, ease of identification, storage and safe handling requirements, insurance considerations, and availability of downstream collection or recycling pathways.

Under this approach, additional battery types were only considered where safety controls, staff guidance, storage arrangements, insurance coverage and downstream pathways could be confirmed.

More established / lower complexity pathways		Higher complexity / specialist pathways		
BASICS	LEAD-ACID	LITHIUM-ION	LARGER PRODUCTS	EXCLUDED / SPECIALIST PATHWAY
B-cycle and MobileMuster	Established collection pathway	Handheld and small embedded batteries	Larger battery products	Excluded from concept due to insurance and risk constraints
<ul style="list-style-type: none"> • AA • AAA • C • D • 9V • Coin • Button • Mobile phone 	<ul style="list-style-type: none"> • Car • Motorcycle • UPS • Caravans • Boats • Truck • Forklifts • Lighting 	<ul style="list-style-type: none"> • Laptops • Tablets • Toys • Headphones • Toothbrushes • Greeting cards • Remotes • Cameras 	<ul style="list-style-type: none"> • Large toys • Large appliances • Deep cycle camping batteries 	<ul style="list-style-type: none"> • Home energy storage • Damaged batteries • Vapes • e-Mobility

Note: This table is not a formal hazard classification. It reflects relative collection complexity for retail settings, including handling, storage, insurance and downstream pathway requirements. Batteries are generally safe when used as intended; collection risks increase where batteries are damaged, tampered with, unknown, high-energy, incorrectly stored or outside established recovery pathways.

Participant

Retailer C - a regional hardware and trade retailer with an established local customer base and experience handling a broad range of household and trade products.

Model advantages

- enabled testing within an active retail environment
- allowed controlled implementation under defined conditions
- supported staged expansion of battery types based on demonstrated capability
- reduced risk exposure by limiting initial scope to low complex batteries
- provided practical insight into operational, safety and customer interaction challenges
- aligned with insurer and approval requirements through clearly defined controls
- enabled iterative refinement through ongoing site engagement and monitoring

Key activities

- development and refinement of Model C pilot approach
- participant recruitment and onboarding with Retailer C
- site selection and approval processes
- site engagement, risk assessment and staff training
- implementation of staged household battery collection
- integration with existing schemes (e.g. B-cycle, MobileMuster)
- preparation for lead-acid battery collection (subject to approvals)
- ongoing site visits, monitoring and troubleshooting
- observation of customer behaviour and battery presentation
- promotional and engagement activity
- results and findings analysis

Results

→ Volumes collected

Battery volumes collected during Model C were limited, approximately 70 kg, and reflect the staged and controlled approach adopted. This reflects the small number of participating sites, the staged and risk-based approach adopted, and the time required to establish onboarding, safety controls and internal approvals. Volumes were also influenced by the time required to identify suitable participants and progress concepts through operational and senior internal approval processes.

As a result, the data presented in this section should be interpreted as indicative only. It does not represent broader system performance or the potential scale of retail battery collection.

Low collection volumes should not be interpreted as a lack of consumer demand or engagement. Instead, they reflect:

- constrained participation due to insurance, internal approvals and safety considerations
- limited number of active collection sites
- controlled intake processes and defined exclusion criteria
- time required to establish safe and approved operating conditions
- limited promotional effort and budget
- limited time operating the pilot
- purposeful staged promotion to ensure not overwhelmed
- limited regional audience and reach

→ Types of batteries collected

Batteries collected during the pilot were primarily low complex consumer types, consistent with the staged approach adopted. These included:

- general household batteries (e.g. AA, AAA)
- mobile phones
- small consumer batteries associated with handheld devices e.g. handheld power tools

Collection and downstream pathway

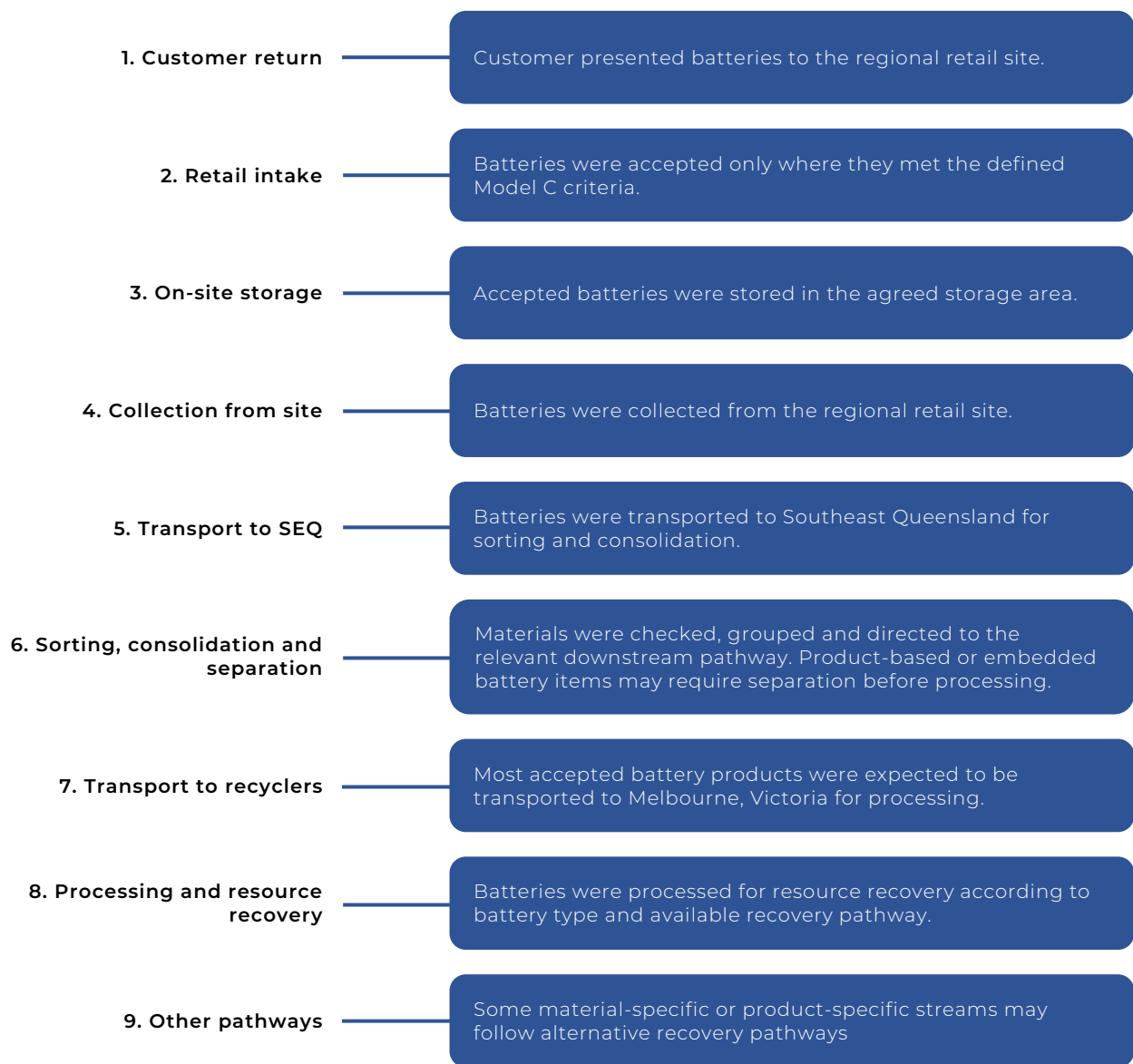
Under Model C, accepted batteries were stored on site in the agreed storage area and managed within the defined acceptance criteria.

For the regional pilot pathway, accepted materials were collected from the retail site and transported to Southeast Queensland for sorting and consolidation. This step allowed materials to be checked, grouped and directed to the relevant downstream pathway. For product-based items, such as toys or other products with embedded batteries, sorting may include separating the battery component from the product before further transport.

Following sorting and consolidation, most accepted battery products were expected to be transported to Melbourne, Victoria for processing. A smaller number of items may follow different material-specific or product-specific pathways depending on battery type, recycler requirements and available recovery options.

Lead-acid batteries were added to the Model C collection scope later in implementation; however, no lead-acid batteries were received during the live testing period. Collection frequency was not representative of a scaled operating model due to the limited volume collected and staged implementation period.

→ **Process of collection**



Note: This pathway reflects the regional Model C pilot context and recycler advice received during the program. Actual pathways may vary by battery type, product type, collector, transporter, recycler, location and commercial arrangement. Some material-specific or product-specific streams may follow alternative recovery pathways. Lead-acid batteries were later included in the Model C collection scope, but none were received during the live testing period.

Findings and barrier analysis

The staged Model C approach enabled practical testing of retail battery collection under controlled retail conditions.

At a site level, the model was successfully implemented within defined boundaries, demonstrating that retailers can safely manage battery collection when supported by clear controls, limited scope and structured processes.

However, as the pilot progressed, limitations became evident. While low complex batteries could be managed effectively, expansion into high complex battery types remained constrained by safety, insurance and operational capability requirements.

This reinforced that while retail participation is achievable, it is inherently limited in scope and must operate within clearly defined boundaries.

What can be collected and how

- Types they collected:
 - general household batteries (e.g. AA, AAA)
 - small consumer batteries
 - mobile phones
- Types they may collect if pilot runs longer:
 - Lead acid (only introduced at a later stage following changes in site capability and staffing, which required reassessment of operational readiness and delayed implementation)
- Types they may collect if funded
 - lithium-ion batteries and small embedded batteries. (e.g. laptops, Toothbrushes, Toys)
 - larger battery products (e.g. larger toys, deep cycle camping batteries)
- Conditions required:
 - clearly defined intake and rejection criteria
 - controlled storage and segregation
 - staff training and operational guidance
 - alignment with downstream processing capability

What can't be collected and why

- Damaged, swollen or tampered batteries - due to increased risk of thermal events and inability to safely stabilise or contain potential failures
- e-Mobility batteries (e.g. e-bikes and e-scooters), due to energy density and risk of internal damage from knocks
- Vapes - due to challenges in identifying battery type and the prevalence of non-compliant or illegal products without Australian standards

These exclusions were informed through engagement with both the retailer's insurance broker and an independent insurance provider, who confirmed that acceptance of high complex battery types would significantly increase liability exposure and limit insurance coverage.

This reinforced that certain battery categories cannot be safely or practically managed within retail environments under current insurance and risk frameworks.

Barriers

While this model was able to be implemented in retail settings, it remained constrained in scope. Retailers were able to participate within defined boundaries; however, this did not extend to all battery types or conditions, primarily due to external factors including insurance requirements, cost considerations and risk tolerance.

- **Insurance restrictions** → certain battery types directly triggered limitations in coverage
- **Risk exposure** → specific conditions increased both perceived and actual risk
- **Cost pressures** → handling, storage and processing introduced significant cost drivers
- **Operational limits** → retail environments inherently constrain safe battery management
- **Limited duration of the pilot** → time constrained the extent to which the model could be tested

This model provided a pathway to test retail participation under controlled and limited conditions, but not as a universal or comprehensive solution. Successful participation is dependent on clearly defined boundaries and a clear understanding of how system constraints apply across different battery types and scenarios. Participation was achievable within defined limits but did not extend across all battery types or conditions under current system settings.

Additional regional testing was identified but did not proceed due to time constraints and prioritisation of the primary trial site.

Customer behaviour at return

Direct observations from the Retailer C pilot site were limited due to the controlled nature of the trial and staged implementation.

However, stakeholder engagement and broader insights from the program indicate that consumers may present batteries outside defined acceptance criteria, which informed the need for clear exclusions and referral pathways.

These insights, drawn from the pilot as well as retailer engagement and education activities delivered through the wider project, reinforce that:

- consumers will present a wide range of battery types, regardless of retailer capability
- clearly defined intake criteria are necessary to manage risk
- retail collection cannot be assumed to align with the full range of batteries in circulation

Customers seek advice on battery disposal and, in many cases, may otherwise dispose of batteries through kerbside waste streams if no clear alternative is available.

The program therefore supports the view that retail can play a role in diverting batteries from high complex disposal pathways, but only within defined limits and as part of a broader system.

Project A model outcomes at a glance

The table below summarises the outcome of each Project A model, including whether it progressed to live collection and the battery volume collected.

Model	What was tested	Implementation outcome	Battery volume collected
Model A Broad retail collection	A broad retail acceptance model where a retailer would accept a wide range of battery types through a simple consumer-facing return pathway.	Did not proceed to live collection due to insurance, liability, cost and internal approval constraints.	0 kg
Model B Event-based collection	A controlled, time-limited collection event with additional supervision, specialist support and defined handling processes.	Did not proceed to live collection due to cost, complexity, liability and approval constraints.	0 kg
Model C Staged, risk-based collection	A staged retail collection model beginning with lower-complexity battery streams and defined acceptance criteria.	Implemented at one regional Queensland retail site under controlled conditions.	Approx. 70 kg

Note: Models A and B provided important feasibility findings even though they did not proceed to live collection. Model C progressed to limited implementation, with volumes reflecting the staged scope, limited operating period, regional location and defined acceptance criteria.

6. Project B – Statewide education and engagement

Strategy

This phase focused on delivering a large-scale retailer engagement and education program to improve awareness, understanding and behaviour related to battery disposal.

The approach aimed to complement Project A activities by building broader system understanding across retailers and identifying common behaviours, barriers and opportunities at scale.

Participants

Engagement was undertaken across a wide range of retail types, reflecting the diversity of battery sales and customer interaction points.

This included:

- electronics and mobile phone retailers
- hardware and home improvement stores
- automotive and battery specialist retailers
- discount and variety retailers
- supermarkets and general retail
- specialty retailers (e.g. toys, gaming, photography, jewellery, tools)
- service-based retailers (e.g. repair stores, telco providers, post offices)

The program engaged:

- 920 individual retail stores
- across more than 145 retail precincts and shopping centres
- metropolitan and selected regional locations across Queensland

Key activities

- delivery of face-to-face engagement, enabling direct conversations, tailored guidance and immediate feedback from retailers
- in-store conversations with retailers to understand awareness, behaviour and challenges
- development and distribution of educational materials, including:
 - o retailer factsheets
 - o customer handouts
 - o in-store posters
- provision of practical guidance to retailers on safe battery handling and disposal pathways
- testing and refinement of materials based on retailer feedback prior to broader rollout
- capturing insights on retailer knowledge, behaviours and system interactions
- capturing insights on consumer behaviour through retailer interactions
- alignment with existing tools and platforms (e.g. Recycle Mate)
- statewide engagement to identify consistent themes, barriers and opportunities
- consolidation and analysis of engagement findings

Examples of the resources developed for the statewide education engagement.

Retail factsheet, customer handout and the A4 customer facing poster on the following page.



DEAD or OLD BATTERIES



Keep batteries
out of kerbside bins

Scan to find your nearest
battery collection point for safe disposal



Recyclemate.com.au or download via App Store or Google Play

Results

The engagement program delivered extensive, face-to-face interaction with retailers across a diverse range of locations and store types, providing a strong evidence base for understanding retailer behaviour, awareness and system interaction.

Retailers responded very positively to in-store engagement, with many valuing the direct, practical support provided.

Key outcomes included:

- strong retailer engagement, with high willingness to participate in conversations and provide feedback
- positive response to face-to-face visits, with retailers valuing direct interaction over passive communication methods
- strong uptake and appreciation of practical resources, including factsheets, customer handouts and posters
- retailers valuing clear, simple guidance on how to assist customers, rather than regulatory or compliance-based messaging
- personal engagement improved retailer understanding and confidence in discussing battery disposal
- some retailers recognised the project delivery team from previous engagement activities, which supported initial trust and receptiveness during visits

The engagement approach enabled retailers to ask questions, clarify uncertainties and better understand their role in battery recovery.

For many retailers, this was the first time they had received clear, practical guidance on battery disposal, highlighting a gap in existing system support.

This phase also demonstrated that face-to-face engagement is significantly more effective than passive communication in driving awareness, understanding and behaviour change within retail environments.

Insights

Retail engagement demonstrated strong willingness from retailers to support battery recovery, particularly where it aligned with their product range and customer interactions.

Retailers consistently indicated that:

- they were willing to assist customers with battery disposal when provided with clear guidance and practical tools
- retailers showed a clear preference for practical tools and guidance over regulatory or compliance-based messaging
- there is uncertainty around how to formally participate, with retailers seeking clear pathways to become collection points
- there is limited awareness of existing schemes and pathways (e.g. B-cycle, MobileMuster)
- inconsistent advice is often provided to customers, with retailers directing customers to a range of different locations (e.g. councils, supermarkets or other retailers), reflecting a lack of clear and consistent system guidance

Engagement also identified a shift from general willingness to support battery recovery, to more practical questions around how participation would work in practice.

Observations from engagement activities also identified that:

- informal battery recovery is already occurring in-store, typically limited to batteries or products that retailers sell or recognise
 - in some cases, retailers are managing collected batteries by transferring them to other collection points (e.g. supermarkets), avoiding direct disposal costs but shifting responsibility within the system
 - retailer understanding of battery types and associated risks varies significantly
 - retailers showed limited awareness regarding which products contain batteries
 - confusion exists across the system due to inconsistent messaging from different stakeholders (e.g. councils, schemes, industry)
 - retailers are cautious of accepting products they do not recognise, particularly imported or unknown battery types
-

Retailers also provided insights into customer behaviour, indicating that:


- customers expect retailers to act as a default return point for batteries
- customer returns are primarily driven by convenience, product replacement and environmental motivation
- there is limited consumer understanding of battery types or correct disposal pathways
- customers often seek advice at the point of sale due to lack of clear alternative disposal options

Broader system influences were also identified, including:

- increased media attention on battery-related fire incidents, contributing to caution among retailers and consumers
- inconsistent council messaging directing customers to different disposal pathways, which can lead to customers being redirected between locations and reduce confidence in where batteries should be taken
- low awareness but strong interest in tools such as Recycle Mate

These insights, drawn from retailer feedback and engagement observations, indicate that consumer awareness and behaviour do not consistently align with existing system design.

Findings also indicate that retailer behaviour is influenced by broader system conditions, rather than isolated at a store level, reinforcing the need for clear guidance, consistent messaging and defined participation pathways.



Example of a disposable camera identified during face-to-face retail engagement, showing where hidden batteries may be found in consumer products.

7. Findings

Project A and Project B confirmed that barriers to retail battery collection are closely linked to battery type, risk profile, site conditions, insurance requirements and the limits of retail environments.

Findings were not uniform across all batteries or retail formats. Low complex battery types could be managed under defined conditions, while high complex batteries (damaged, unknown or larger batteries) introduced risks and operational requirements that are not suitable for general retail collection.

A consistent finding across the program was that retail can play a role in battery recovery, but only within clear boundaries and as part of a broader system that supports safe handling, storage, transport, insurance and downstream processing.

Note: Technical risk descriptions are informed by program stakeholder engagement, recycler input, QFES discussions and publicly available battery safety guidance.

System constraints and risk in retail battery collection

a. Different battery types create different levels of risk and cannot be managed through one collection model

Battery-related risk is not uniform. The program confirmed that different battery types create different levels of safety, handling, storage, transport and insurance risk.

Key risk factors identified through the program included:

- thermal runaway and fire risk, particularly for lithium-based batteries
- increased risk associated with damaged, swollen or compromised batteries
- leakage and corrosion (particularly for older battery types)
- unknown chemistry or construction, particularly for imported or non-compliant batteries
- accumulation risk, where storage time and volume increase the likelihood and consequence of incidents

This means that battery collection cannot be managed as a single uniform activity. The controls required for common household batteries are different from those required for damaged lithium batteries, e-mobility batteries, vapes, lead-acid batteries or embedded batteries.

Low complex battery types can be managed in retail environments where clear intake criteria, storage controls and collection pathways are in place. High complex batteries require more specialised controls, clearer escalation pathways and infrastructure beyond what many retail settings can reasonably provide.

b. Battery recovery requires an end-to-end system, not just a retail collection point

The program demonstrated that battery collection is only one part of a broader recovery pathway.

A battery may move through multiple stages, including sale, use, disposal or return, intake, handling, storage, transport, aggregation, sorting, disassembly, recycling and residual disposal.

At each stage, responsibility, risk and cost can shift between consumers, retailers, transporters, recyclers and other system participants.

Retail collection cannot be considered in isolation. A retailer may be able to accept a battery at the counter, but the model still requires safe and viable arrangements for:

- identifying battery type and condition
- safely storing batteries on-site
- packaging batteries for transport
- moving batteries to an appropriate processor
- sorting and separating batteries by chemistry, type and risk
- recycling recoverable materials
- managing batteries or components that cannot be recycled

Existing recovery pathways can support some battery types, particularly where schemes and processors already have defined processes. However, not all batteries have a clear, accessible or commercially viable pathway once they enter the system.

This is particularly important for batteries that fall outside established schemes, require specialist handling or do not have a straightforward downstream processing pathway.

c. Most retail environments are not designed to safely manage hazardous or unknown battery collection

Retail environments are designed for sales and customer service, not hazardous materials handling.

The program identified consistent constraints that limit the ability of retail settings to safely manage battery collection, particularly for high complex battery types.

These constraints included:

- limited space for safe storage and segregation of batteries
- tenancy restrictions, particularly within shopping centres and shared environments
- high levels of customer interaction and public access
- reliance on non-specialist staff, including casual and junior employees
- limited ability to control how, when and what batteries are presented by customers
- shared risk across neighbouring stores and common areas
- limited capacity to manage storage duration and accumulation volumes

Retailers also reported that customers frequently bring batteries that were not purchased from the store, including unknown, damaged or imported batteries. This creates less controlled intake conditions and increases safety, liability and insurance exposure.

Suitability for battery collection varies significantly across retail formats. Standalone and warehouse-style environments generally provide greater capacity to manage storage, segregation and structured processes.

In contrast, shopping centre and shared tenancy environments introduce additional constraints, including:

- restricted storage space
- centre management approvals
- shared risk across neighbouring tenancies
- public access and high pedestrian traffic
- limited ability to isolate collection or storage areas

These differences influence both feasibility and the types of batteries that can be safely managed. Retailers were generally more comfortable with participation in standalone or warehouse-style environments and less comfortable in smaller or shared tenancy settings.

Site format, tenancy arrangements, storage capacity and operating conditions directly influence whether battery collection is feasible.

d. Battery incidents in retail can affect customers, neighbouring businesses and shared sites

Battery incidents in retail settings carry risks beyond the immediate collection point.

Retail locations are public-facing environments. They often involve high customer traffic, neighbouring stores, shared services, common areas and public access points. Retail centres and precincts also operate as community hubs, not simply locations where people briefly shop and leave.

This increases the potential consequences of a fire, smoke event, thermal incident, spill or emergency response.

Potential impacts include:

- risk to staff and customers
- disruption to neighbouring businesses
- evacuation or closure of retail centres or precincts
- damage to shared services or common areas
- reputational impacts for retailers, landlords and collection schemes
- liability uncertainty across retailers, landlords, insurers and service providers

This helps explain why insurers, boards and senior decision-makers focused heavily on worst-case scenarios, even where store-level staff considered collection operationally manageable.

Risks can be reduced through careful site selection, defined intake criteria, controlled storage and appropriate response pathways. However, the consequence of an incident in retail can extend beyond the participating store, making approval thresholds higher than for controlled industrial or specialist recovery settings.

Insurance was a threshold issue, not simply an additional cost

Insurance and liability considerations directly shaped participation decisions throughout the program.

Insurance was not simply one consideration among many. It emerged as a threshold issue that determined what could be trialled, what battery types could be considered, and whether proposed models could progress through internal approval processes at all.

Retail battery collection introduces a range of potential liability exposures that are typically not present in standard retail operations. These include potential property damage, public liability risks associated with customer interaction, staff safety risks, business interruption, and broader impacts to neighbouring tenants, shared facilities and retail networks.

As a result, retailers require confirmation that battery collection activities are covered under insurance for:

- property damage (including fire, smoke or contamination impacts to the site)
- public liability (including impacts to customers or members of the public)
- staff safety and workplace liability
- business interruption and broader operational impacts
- potential impacts to neighbouring tenants and shared facilities

Without confirmed coverage across these areas, battery collection cannot be treated as an acceptable business activity.

At the Retailer C trial site, confirmation of insurance coverage was required before progressing participation. The retailer engaged their insurer and provided detailed information on the proposed staged collection model, including battery types, handling processes and risk controls.

Following review, the insurer identified specific exclusions for certain battery types and scenarios, particularly high complex categories such as damaged batteries, e-mobility batteries and vapes.

Further discussions confirmed that these exclusions were not related to premium levels or pricing. In this case, the insurer advised that these battery types would not be covered under any standard or extended policy arrangement due to the nature of the risk.

To validate whether this was specific to a single insurer or reflective of broader market conditions, additional discussions were undertaken with an independent insurance broker. Based on their engagement with multiple insurers, it was confirmed that comprehensive coverage for all battery types in a retail environment was not available due to the risk profile of these products.

As a result, participation was constrained not by cost, but by the availability of insurance coverage itself. Retailers could not proceed with broader battery collection unless activities were clearly within insured scope.

No insurer was identified that was willing to support collection of all battery types within retail environments. This reflects the range of risks that insurance would need to cover across retail settings, including impacts to sites, staff, customers and broader business operations.

Insurance limitations directly influenced:

- the scope of batteries that could be considered for acceptance
- whether broader collection concepts could progress beyond operational support
- senior decision-maker confidence in approving participation
- perceived liability exposure across staff, sites, leadership and the broader retail network
- the need for clear exclusions, controls and defined operating conditions

Operationally, this meant that concepts appearing manageable at store level could still fail at organisational approval level.

Insurance requirements helped define the boundaries of safe participation but also prevented broader collection models from progressing where coverage was not available.

**INSURANCE IS A KEY FACTOR INFLUENCING
WHETHER RETAIL PARTICIPATION CAN OCCUR,
NOT JUST HOW IT OPERATES**

Battery handling, storage and system requirements

a. Different batteries require different storage, segregation and handling controls

The program confirmed that batteries cannot be safely managed through a single handling or storage process.

Different battery types require different controls, including:

- taping terminals where required
- segregation by chemistry, condition or risk profile
- separation of damaged or unknown batteries
- fire-resistant or appropriate storage containers
- limits on accumulation and storage duration
- clear labelling and isolation procedures
- safe packaging requirements for transport

Storage itself also creates risk. Retail stores may be unattended when closed, while during operating hours they may experience high customer traffic and limited staff availability.

This creates a tension between accessibility and control. Retail collection needs to be convenient enough for consumers to use but controlled enough to avoid unsafe accumulation or unsuitable battery presentation.

Low complex batteries can be stored safely where quantities are controlled, and collection pathways are clear. High complex batteries require more specialised storage, segregation and response capability than standard retail environments usually provide.

b. Battery collection depends on specialist transport and downstream processing pathways

Battery collection requires more than a bin or drop-off point. Batteries must be safely packaged, transported, sorted, separated where required, and processed through an appropriate downstream pathway.

Transport and downstream constraints identified through the program included:

- specific handling and packaging requirements for safe transport
- difficulty establishing hazardous transport rules and responsibilities
- increased costs for specialist transport or dedicated collection runs
- inability to simply backload batteries with general retail stock
- limited recycling, sorting and disassembly locations
- long transport distances from regional locations to suitable processors
- minimum pallet or weight thresholds affecting collection viability
- downstream requirements set by recyclers and transport providers
- inefficiency where whole products or embedded-battery items must be transported before safe battery separation or sorting can occur

These requirements create cost and logistical barriers, particularly for regional retailers, lower-volume collection sites and battery types outside existing scheme pathways.

The issue is more complex where batteries are embedded in products (e.g. toys, e-bike). In these cases, the recoverable battery may be only one small component of a larger item. Where the battery cannot be safely or practically separated closer to the point of collection, the whole product may need to be transported, sorted or dismantled before the battery can enter the appropriate recovery pathway. This can increase transport volume, handling requirements and cost, particularly where materials move long distances before processing.

Existing recyclers and processors can support some battery streams where material is sorted, packaged and presented appropriately. However, low volumes, long distances, limited sorting or disassembly options, and specialist transport requirements can make collection difficult or costly. This reinforces that future recovery models need to consider not only where batteries are collected, but where sorting, separation, consolidation and processing should occur across the recovery chain.

c. Battery chemistry and type are important but difficult to identify

Battery chemistry, condition and risk profile are important to safe collection, but difficult to identify reliably at the point of intake.

Recyclers and industry stakeholders advised that even experienced professionals are unable to confidently identify some battery types based on visual inspection alone. This is particularly relevant for:

- unlabelled or worn batteries
- aftermarket or repackaged products
- imported or grey-market batteries
- embedded batteries within products
- modified, damaged or tampered batteries

Retail staff are not equipped to perform technical assessment of battery chemistry or internal condition. As a result, battery collection models cannot rely on chemistry-based decision-making at the point of return.

Instead, safe participation requires:

- clear intake criteria
- observable condition checks, such as visible damage, swelling or leakage
- clear rejection pathways
- escalation processes for batteries that cannot be accepted
- simple staff guidance based on visible indicators rather than technical classification

Staff can be trained to apply simple, observable criteria. However, reliable identification of battery chemistry or hidden damage is not realistic in busy retail environments.

d. Unmanned collection increases risk

The program identified that collection approaches without clearly defined intake controls can introduce additional risks within retail environments.

Approaches that rely on open or unattended drop-off points, or generalised consumer messaging, may result in:

- presentation of batteries outside the intended scope of collection
- limited visibility over battery condition at the point of drop-off
- accumulation of batteries beyond preferred storage limits
- increased pressure on staff to manage unexpected or unsuitable items

This does not mean that all existing collection bins are unsafe. Established schemes that operate with defined controls, clear acceptance criteria and appropriate infrastructure can effectively manage some risks.

However, for broader or high complex battery collection, the program confirmed that a staff-mediated intake model provides greater control. This allows staff to apply intake criteria, redirect unsuitable items and reduce the likelihood that damaged, unknown or excluded batteries enter the collection stream.

The trade-off is that staffed intake increases time, cost and operational effort for retailers.

This was observed through stakeholder feedback and alignment with existing scheme practices, where controlled intake processes are used to manage risk and avoid unsuitable items entering the collection stream.

Safety, guidance, onboarding and capability

a. Retailer guidance and onboarding improve consistency but cannot remove system risk

Retailer guidance and onboarding were critical to participation because retailers needed clear, practical information before they could safely collect batteries.

This finding was drawn from pilot onboarding, retailer engagement and feedback from stores asked to consider or implement battery collection. Retailers did not simply need a general instruction to "collect batteries"; they needed clear, practical direction that could be applied in a retail setting by staff with different levels of experience.

The program confirmed that retailers needed guidance on:

- which batteries could be accepted
- which batteries should be rejected
- visible indicators of high complexity batteries, such as damage, swelling or leakage
- storage and segregation requirements
- escalation pathways for batteries that may pose a risk
- referral options for customers where batteries could not be accepted
- alignment with internal approvals and insurance requirements

This was identified through retailer and site engagement and direct feedback during program discussions. Retailers frequently sought clarification on what could be accepted, how to respond to unsuitable items and how to manage risk within their store environment.

Without this level of clarity, retailers indicated they would be unwilling to participate or would apply inconsistent approaches, increasing both safety risk and customer confusion.

This was also reflected in broader retailer engagement. Retailers commonly asked practical questions about how to participate, what to tell customers and what to do when a battery or product could not be accepted. They showed a strong preference for simple tools, customer resources and clear guidance rather than regulatory messaging.

Retailers consistently indicated that clarity around what not to accept and what to do was as important as guidance on accepted batteries.

In retail settings, guidance needs to be simple, visual and easily applied at the point of interaction with customers. Overly technical or chemistry-based guidance was not practical in busy, customer-facing environments.

Effective guidance therefore needed to focus on:

- clear, observable indicators rather than technical classification
- simple decision pathways, such as accept, reject or refer
- consistent application across staff regardless of experience level
- alignment with how customers present batteries in retail settings

Practical guidance and onboarding improved retailer confidence and supported more consistent application of safe practices.

However, guidance alone cannot remove system-level risks. It must sit alongside defined boundaries, appropriate infrastructure, insurance alignment and downstream pathways.

b. Staff training supports safe participation but does not make retail staff technical specialists

Training was provided to support baseline awareness and consistent application of guidance.

This included training and guidance on:

- understanding of battery-related risks
- identification of visible high complexity indicators
- application of defined intake criteria
- safe handling practices for lower risk batteries
- awareness of escalation pathways
- communication with customers about what can and cannot be accepted

Training helped support safer participation by giving staff a clearer understanding of the agreed collection scope and what to do when batteries were outside that scope.

However, the program confirmed that training alone does not address key safety risks.

Training does not enable retail staff to:

- reliably identify all battery chemistries or formats
- assess internal battery condition
- manage thermal events or fires
- safely stabilise damaged or modified batteries
- replace the need for appropriate infrastructure, containment and equipment
- overcome insurance, liability or regulatory constraints

Retail staff are not technical specialists and should not be expected to perform technical assessment or hazardous materials management.

Training is necessary, but it is not sufficient on its own. It supports participation within operating limits but does not remove the underlying system risks that determine whether broader collection is feasible.

This reflects the inherent limitation of relying on training in retail environments, where staff are not specialists and cannot be expected to manage technical or high complex scenarios beyond clearly defined and supported processes.

c. Retail staff are not technical specialists

Retail staff are not battery specialists and are not equipped to:

- reliably identify battery chemistry
- assess internal battery condition
- manage high complex or unstable batteries
- intervene in or stabilise high complex batteries
- determine whether imported, modified or damaged batteries are safe

Retail environments are designed for customer service, sales and product support, not hazardous materials assessment.

This finding is important because some collection models assume that retail staff can identify and manage a broad range of batteries at the point of return. The program indicated that this is not a realistic or appropriate expectation.

This was consistently reflected in engagement with retailers, where staff expressed low confidence in identifying unfamiliar battery types or assessing risk beyond visible indicators.

Retail staff can support safe collection where the task is simple, bounded and supported by practical tools. They cannot be relied on as the primary control for high complex batteries.

d. Retail is high turnover, casual and fast-paced – increases difficulty

Retail environments are often characterised by:

- high staff turnover
- reliance on casual and junior employees
- limited time for complex decision-making at the point of customer interaction
- competing operational priorities
- variation in training retention and staff confidence

These factors make consistency difficult, particularly where the model relies on staff judgement or technical decision-making.

Safe battery collection cannot rely on training alone as the primary control. Collection models need to be simple, repeatable and supported by clear visual guidance, defined acceptance boundaries and escalation pathways.

Simple models can be implemented in retail environments. Complex models requiring technical judgement, specialist knowledge or high staff discretion are unlikely to be consistently applied across retail settings.

e. Some risk is out of retailer control


The program highlighted that some risks cannot be fully controlled by retailers, even where staff are trained and guidance is provided.

These include:

- battery condition at the point of drop-off, which may not be fully visible
- accumulation over time, increasing both likelihood and consequence of incidents
- variability in customer behaviour, including unattended or unsuitable drop-offs
- presence of imported unknown or non-compliant batteries
- batteries purchased elsewhere but presented to the retailer for disposal
- media attention and public concern influencing customer and retailer behaviour

These factors mean that even well-prepared retailers cannot fully manage risk without broader system controls.

Retailers can reduce risk through controlled intake, clear referral pathways and defined exclusions. However, not all risk sits within the retailer's control, which directly affects insurance, liability and willingness to participate.



Example of a swollen battery received at a recovery centre found in the middle of mixed batteries with no protection. This battery was isolated immediately upon finding.

Costs and funding

a. Multiple costs

Battery collection involves multiple cost components across the recovery process.

These include:

- supply of appropriate collection infrastructure (e.g. containers, storage systems)
- staff time associated with intake, handling and customer interaction
- storage, segregation and risk management requirements
- transport and logistics
- downstream sorting, processing and recycling
- supply and maintenance of safety equipment and response materials (e.g. fire extinguisher, spill kits, personal protective equipment)
- staff training, induction and refresher time
- administration, signage and documentation
- site checks, housekeeping and cleaning requirements
- additional oversight or spot-checking to maintain safe operation

These costs increase where:

- high complex battery types
- mixed or unknown battery streams are presented
- storage duration increases
- additional handling or processing is required

Retailers consistently indicated that they are not currently structured or resourced to absorb these costs as part of normal operations. Some stakeholders also expressed the view that disposal and recovery costs are already expected to be addressed elsewhere in the system, including through existing rates, schemes or broader waste arrangements.

b. Retailers incur costs across multiple stages of the recovery process

Retailers do not only incur costs at the point of collection.

Costs arise across:

- intake and customer interaction
- sorting and segregation
- storage and accumulation
- preparation for transport
- coordination with collectors and recyclers
- compliance with safety, insurance and operational requirements

In current system settings, this can result in retailers absorbing costs associated with products that have not contributed to end-of-life recovery arrangements.

This creates a situation where the retailer carries a significant proportion of operational cost and risk, particularly in the absence of consistent funding mechanisms.

c. Cost relates to the model of collection

The cost profile of each model tested influenced its feasibility.

- Broad retail collection models increase cost exposure due to less controlled or unpredictable intake conditions and the potential inclusion of high complex batteries
- Event-based models introduce significant upfront and coordination costs, limiting scalability and reducing convenience.
- Staged, risk-based models reduce cost exposure but also limit collection scope and volume

This indicates that cost is closely linked to risk and control. Models that attempt to accommodate all battery types require significantly greater investment and introduce higher financial and operational burden.

d. There is limited evidence of direct commercial benefit to retailers

The program and stakeholder engagement did not identify clear commercial incentives for retailers to participate in battery collection.

Findings included:

- no consistent evidence that battery collection drives increased customer traffic
- no clear link between battery returns and immediate purchasing behaviour
- limited ability for retailers to recover costs through existing arrangements
- variability in commercial agreements between retailers, collectors and recyclers

In some cases, rebates may be available for certain battery types. However, these are typically received by recyclers or collectors and are not directly passed through to retailers, instead forming part of broader commercial arrangements.

Some retailers and brands may experience indirect benefits, including:

- improved customer perception
- alignment with sustainability commitments
- demonstration of social responsibility

However, these benefits are difficult to quantify and do not offset the direct operational costs of participation.

e. Cost implications across participation roles

Findings and observations from the program indicate that battery collection requires dedicated funding to operate safely and effectively.

This includes costs associated with:

- collection infrastructure
- safety equipment and risk controls
- staff time and training
- storage and handling
- transport and logistics
- downstream processing

Cost recovery cannot rely on material value alone. Across all models tested, the cost of safe collection, handling, transport and processing exceeded the recoverable value of the batteries themselves.

Cost increases as participation moves from simple retail involvement to more active collection and specialist handling roles. Broader battery scope, high complex battery types and increased control requirements all increase financial and operational burden.

These cost dynamics reflect broader system conditions, including:

- the range and complexity of battery types in circulation
- safety and risk management requirements
- the absence of consistent funding mechanisms across the system

In current system settings, retailers may absorb costs associated with products that have not contributed to end-of-life recovery arrangements, particularly imported and non-compliant batteries.

In the absence of clear funding, cost-sharing or system-level support, retail battery collection is likely to remain limited in scope and scale.

f. Cost variability and indicative examples

The program confirmed that costs vary significantly depending on battery type, volume, location and commercial arrangements. While pricing is typically negotiated between retailers, collectors and recyclers, indicative cost discussions provide useful insight into the scale of cost exposure.

While indicative cost examples can be developed, the program did not support the development of a fully standardised or scalable cost model.

This reflects the constraints of the program, including:

- a limited number of active trial sites
- staged and controlled implementation of battery types
- safety considerations that limited the range of batteries that could be accepted
- variability in retailer capability, site conditions and collection models
- reliance on indicative quotes and commercial discussions rather than fully operational, scaled collection systems

As a result, cost insights are based on observed data, stakeholder input and indicative pricing, rather than a consistent, system-wide cost model.

Transport and processing costs also vary depending on how collection is structured. Different service models were observed, including direct pickup models, where recyclers operate their own fleet, and palletised freight models, where transport is arranged through third-party logistics providers. These models result in different cost structures and levels of variability depending on site conditions, location and service arrangements.

Lithium deep cycle batteries

Lithium deep cycle batteries (e.g. camping batteries) provide a useful example due to their weight, risk profile and handling requirements.

Typical product weights for these batteries range from approximately 10–12.5 kg per unit, depending on brand and capacity.

Indicative processing costs provided during the program varied between recyclers, with lithium battery processing quoted in the range of approximately \$2.50 to \$4.50 per kilogram. This equates to an approximate processing cost of \$25–\$56 per battery.

Transport costs further increase this burden. Indicative quotes provided during the program included:

- direct pickup models (provider-owned fleet) at approximately \$695 per collection (including fuel levy)
- palletised freight models at approximately \$860 per pallet (~250 kg), depending on site conditions

At full pallet capacity (~250 kg), this equates to approximately:

- 20–25 batteries per pallet
- transport cost in the order of ~\$30–\$45 per battery, depending on model and efficiency.



Indicative cost comparison – 1 pallet scenario

Assumptions:

- 250 kg per pallet (20–25 batteries)
- 10–12.5 kg per battery
- Lithium deep cycle batteries (e.g. 100Ah capacity) are commonly sold at retail prices in the range of approximately \$300–\$700 per unit, depending on brand and specifications

Prices quoted are exclusive of GST, Recycler A and Recycler B represent a anonymised indicative quotes from two providers and are included to show how processing and transport costs can vary by provider, service model and commercial arrangement.

Cost Component	Recycler A	Recycler B
Processing Rate	\$2.50/kg	\$4.50/kg
Processing Cost	\$625	\$1,125
Transport Model	Direct pickup (own fleet)	Palletised freight (3 rd party fleet)
Transport Cost <i>without tail gate</i>	\$695	\$860
Total Cost (Pallet)	\$1,320	\$1,985
Cost Per Battery	\$55–\$65	\$80–\$100

Combined indicative costs therefore suggest total costs per battery in the order of ~\$60–\$100+ (processing and transport only), depending on battery type, volume and service model.

This does not include:

- staff time for intake and handling
- storage and segregation requirements
- safety equipment and infrastructure
- training and administration
- risk, insurance and compliance requirements

These additional costs further increase the total cost of participation.

Per-unit costs are highly dependent on achieving full pallet capacity. Where volumes are lower or collections are less frequent, per-battery costs increase further.

Although increasing volume can reduce transport cost per unit, this requires longer storage durations and greater accumulation of batteries on-site, which introduces additional safety and operational risks.

While some battery types (e.g. lead-acid) may attract rebates, these do not apply to lithium batteries and are typically captured within downstream commercial arrangements rather than returned directly to retailers.

This example illustrates why higher complexity, higher-weight batteries present a significant barrier to retail collection under current system conditions.

Even under relatively efficient transport assumptions, the cost of collection, handling and processing substantially exceeds any recoverable value, requiring either retailer cost absorption or external funding support.

As a result, these battery types were consistently identified as unlikely to be viable within retail-led collection models without significant system changes.

Note: Cost figures are indicative only and reflect quotes and discussions obtained during pilot planning for the regional trial context as at August 2025. Figures are **exclusive of GST** unless otherwise stated. They are not fixed market prices and may vary by location, volume, battery type, transport distance, service model and commercial arrangement. Updated pricing should be sought before future implementation.

By May 2026, one recycler’s transport cost for the regional location had increased to **\$924 excluding GST and excluding tailgate service**. Comparable transport pricing for Southeast Queensland was quoted at approximately **50% lower**, depending on location and agreement. A tailgate service may add approximately **\$100 excluding GST**, depending on the service agreement.

Comparison example – Small-format batteries (AA batteries)

Small-format battery collection bins commonly used in retail settings (e.g. hardware stores and supermarkets) are typically serviced at relatively low weights per collection. Retailer engagement and stakeholder discussions during the program indicated that these collections often occur in the range of approximately 70–100+ kg, depending on site activity and servicing frequency.

For comparison, small-format batteries such as AA batteries have a significantly lower weight and risk profile.

Typical AA batteries weigh approximately 20–25 grams per unit, meaning that:

- a 70–100 kg collection bin may contain approximately 2,800–5,000+ individual batteries

Using an indicative collection and processing cost of approximately \$1 per kilogram for low complex battery streams, this equates to:

- approximately \$70–\$100+ per collection
- less than \$0.05 per battery

This reflects:

- lower handling and processing requirements
- established collection and recycling pathways
- reduced transport and safety complexity

This comparison highlights the difference in cost dynamics between battery types. While small-format batteries can be collected and processed at relatively low cost per unit, larger and high complex batteries such as lithium deep cycle batteries create significantly higher cost exposure.



g. System funding and cost allocation influence participation

The program highlighted the importance of clear and sustainable funding mechanisms to support battery recovery.

Without defined funding:

- retailers are unlikely to participate at scale
- high complex battery categories remain without viable pathways
- cost burden is shifted inconsistently across the system

In addition, the presence of imported and non-compliant batteries that are not captured by existing stewardship arrangements contributes to what stakeholders described as a “free-rider” effect, where some products enter the market without contributing to end-of-life recovery costs. Stakeholder input consistently identified imported and non-compliant batteries as a major system gap. These products may enter the market without contributing to end-of-life recovery costs, while still creating handling, safety and disposal burdens for retailers, recyclers and the wider system. The free-rider issue may undermine both cost recovery and confidence in participation.

This can undermine both system sustainability and retailer confidence in participation.

Data, audit and tracking considerations

The program included testing of audit approaches and data and tracking systems to understand what information could be captured within retail environments. This was undertaken to support the development of an audit programme that could provide insight into volumes, risks and reporting.

However, testing was undertaken within live retail environments and was subject to operational and safety constraints. As a result, the program focused on identifying what level of data capture and audit could be reasonably achieved in practice, rather than implementing a fully developed or standardised audit and tracking system.

a. Audit, risk and data considerations

The program tested approaches to data collection and audit to understand what information could reasonably be captured within retail environments without introducing additional safety risk or operational burden. The primary objective of audit and data collection was to support learning and risk understanding, rather than compliance or enforcement.

These considerations reflect the constraints observed during program implementation, including retailer capability, variability in battery types and the practical limitations of handling batteries within retail settings.

b. Data capture in retail environments

Data capture was influenced by the limited number of pilot sites, the staged nature of implementation and the types of batteries presented by customers.

A key finding was that detailed, unit-based tracking of batteries is generally not practical in retail environments under current conditions.

Tracking batteries at a unit level would require:

- additional handling and sorting of mixed battery streams
- increased time at the point of intake or storage
- greater staff intervention in what is otherwise a controlled, low-touch process
- increased likelihood of incorrect identification of battery type at site level, particularly where labelling is unclear, missing or in different languages

These activities introduce additional safety considerations, as increased handling of batteries, particularly where condition or chemistry is uncertain, can elevate risk.

This limitation becomes more pronounced as collection expands across multiple sites, where differences in staff experience, training and site conditions increase variability in identification and handling decisions.

Weight-based tracking was the most practical option under current system conditions. More detailed unit-level tracking is not generally used across mixed battery collection settings because it would require additional handling, time and sorting, and would still be limited by unclear labelling, unknown battery types, imported products and embedded batteries that cannot be readily identified at intake. However, this approach limits the level of detail available for reporting.

Feedback indicated that data collection requirements must remain simple and proportionate. Introducing more complex tracking processes would increase:

- staff time and operational burden
- likelihood of inconsistent or incomplete data
- exposure to safety risks through additional handling

c. Cost, risk and data trade-offs

The program identified a clear trade-off between the level of data collected and the cost and risk involved in obtaining it.

More detailed data collection would require:

- additional processes for sorting and categorisation
- increased staff time and training
- more frequent handling of batteries
- potential changes to storage and workflow design

These requirements introduce both direct costs and increased safety exposure.

In addition, more complex audit systems increase the risk of:

- inconsistent application across sites
- data gaps or inaccuracies due to manual processes
- potential misuse or misreporting where systems are not tightly controlled

The program highlighted that the benefit of more detailed data needs to be considered alongside the cost, complexity and safety implications of collecting it.

d. System limitations and data gaps

The program also highlighted broader system limitations in relation to data and reporting.

These include:

- lack of consistent data standards across collection pathways
- variation in recycler reporting requirements
- limited visibility of battery flows outside formal schemes
- absence of a clearly defined entity responsible for end-to-end data ownership
- inconsistent, unclear or missing labelling on batteries, including imported products and different languages, limiting reliable identification and classification

Operationally, this means that a complete and consistent picture of battery movement across the system is not currently available, particularly for batteries that fall outside formal schemes or are handled through mixed or informal pathways. This is further compounded by inconsistent or unclear battery labelling, making it difficult to reliably identify battery type, chemistry or origin in mixed collection environments.

e. Implications for future data approaches

Findings from the program indicate that any future data and audit framework should prioritise simple, consistent and achievable data capture at retail level.

- minimise additional handling of batteries for the purpose of reporting
- align reporting requirements across schemes, recyclers and stakeholders where possible
- focus on data that supports decision-making, rather than completeness

More detailed tracking is more feasible where battery types are known, separate and consistently presented, such as lead-acid batteries or clearly identifiable product-specific streams. It is less feasible for mixed household batteries, embedded batteries, damaged batteries or products with unclear labelling.

f. Lack of detailed incident data limits risk understanding and decision-making

The program identified a lack of consistent, detailed data on battery-related incidents, including limited visibility on specific battery types, brands and usage scenarios associated with fires or safety events.

Stakeholder engagement indicated that while battery-related incidents are increasing in visibility, available data does not clearly distinguish:

- battery chemistry or type
- product category or use case
- brand, origin or compliance status
- condition of the battery prior to the incident

Discussions with stakeholders, including Queensland Fire and Emergency Services (QFES), indicated that detailed, standardised data on battery incidents is not consistently captured or available at a level that supports system-wide risk assessment.

While work is being undertaken across parts of the system to improve incident reporting, data capture and transparency, this was not observed to be consistently implemented or available at a level that supports practical decision-making within retail environments.

As a result, risk is often interpreted broadly across “batteries” as a category, rather than being differentiated by battery type or context.

This was reflected in stakeholder discussions, where retailers, insurers and other system participants indicated that:

- decision-making was influenced by generalised risk perception rather than specific evidence
- high complex battery types could not be clearly distinguished at the point of collection
- uncertainty contributed to more cautious or conservative participation decisions

These limitations reduce the ability to:

- target risk management strategies effectively
- design appropriate collection and handling pathways
- distinguish between low complexity and high complexity battery streams
- support informed decision-making by retailers, insurers and policymakers

This contributes to more cautious or conservative decision-making, particularly where uncertainty exists around the likelihood and consequences of incidents.

This indicates that while audit and tracking approaches can be tested within retail environments, the development of a comprehensive, standardised system requires broader system design, alignment across stakeholders and consideration of safety, cost and operational constraints.



Media coverage and inconsistent messaging increase perceived risk and influence behaviour

Media coverage of battery-related incidents has increased awareness of battery risks and influenced how both consumers and retailers interpret battery disposal and collection.

Stakeholders indicated that heightened media attention has:

- increased consumer concern about battery safety
- encouraged faster disposal of batteries from households
- increased the likelihood of batteries being placed in kerbside waste where clear alternatives are not available

At the same time, inconsistent public messaging across councils, retailers, schemes and other sources has created confusion about where batteries can be taken and what should be done with batteries that fall outside existing pathways.

This can result in:

- consumers being directed to locations that cannot accept certain battery types
- reduced confidence in disposal pathways
- frustration at the point of return
- increased likelihood of incorrect disposal

Media attention was also identified as influencing retailer decision-making. Stakeholders indicated that recent battery-related incidents and associated media coverage contributed to increased caution, particularly where risks extended beyond individual stores to broader brand, network and leadership exposure.

This was reflected in stakeholder engagement, where some retailers became more cautious or withdrew from participation following high-profile incidents.

These findings highlight the importance of public messaging that is both risk-aware and pathway-specific, ensuring that consumers are provided with clear, accurate and actionable guidance.

Customer behaviour and retailer insights

a. Customers present a wide range of battery types outside defined acceptance criteria

Across Project A site interactions and retailer feedback, retail settings regularly received batteries that fell outside defined acceptance criteria. These included batteries that:

- were not purchased from the store
- are damaged, degraded or poorly stored
- are of unknown origin or chemistry
- fall outside defined acceptance criteria

This creates less controlled or unpredictable intake conditions, where staff are required to make practical decisions about safety and suitability.

These observations were not consistent across all stakeholders but highlight the types of challenges that can arise in retail environments. They were identified through retailer feedback and Project A site interactions, where mixed and unsuitable batteries were commonly presented at the point of return.

b. Customer behaviour is driven by convenience and product replacement rather than defined disposal pathways

Feedback from retailers indicated that customer behaviour at return is primarily influenced by convenience and product replacement, rather than adherence to defined disposal pathways.

Behaviour was observed to be influenced by:

- convenience and proximity of disposal options
- product replacement (e.g. returning batteries when purchasing new ones)
- limited understanding of battery types and disposal pathways
- expectation that retail will accept all batteries

Convenience was identified as a key driver of behaviour, with responses indicating that customers are unlikely to make a separate effort to dispose of batteries safely where pathways are unclear or require additional effort.

Retailers reported that customers may:

- assume all batteries can be returned to retail
- leave batteries unattended if collection points are visible
- prioritise convenience over safety considerations

Unattended or minimally supervised collection systems may increase the likelihood of unsuitable items being deposited, particularly where the scope of accepted batteries is unclear.

These behaviours increase operational burden and can elevate risk exposure within retail environments.

c. Customer understanding of battery types and disposal pathways is limited

Engagement with retailers and observations during Project A implementation indicated that customer understanding of battery types, associated risks and disposal pathways is generally limited.

This includes:

- limited understanding of battery chemistry and risk differences
- uncertainty about where different battery types can be taken
- expectations that retail locations will accept all battery types

This lack of understanding contributes to:

- presentation of unsuitable or high complex batteries
- confusion at the point of return
- increased reliance on staff to assess and manage risk

d. Retailers are cautiously willing to collect batteries within clearly defined limits

Retailers broadly recognised that customers expect them to provide guidance on battery disposal, particularly where batteries are purchased in-store or where no clear alternative pathway exists.

However, participation was not viewed as a default or universal responsibility. Feedback indicated that willingness to participate is shaped not by intent alone, but by the ability to manage risk, operate within clearly defined limits, and align with internal approvals, insurance requirements and organisational risk tolerance.

Participation decisions were consistently linked to:

- liability exposure
- insurance limitations
- internal governance and approval processes
- operational fit within retail environments
- cost allocation and funding arrangements
- uncertainty regarding return on investment

Willingness to participate was generally higher where retailers could accept battery types they already sold or understood, and lower where products were unknown, damaged, imported or outside existing pathways.

Retailers indicated that they are more likely to support battery collection where:

- the types of batteries accepted are clearly defined
- risks are understood and manageable
- processes are simple and operationally practical
- responsibilities and liabilities are clearly allocated
- participation is financially viable or supported
- a level playing field exists (i.e. retailers are not absorbing the cost of products they do not sell)
- customers are well-informed about what can and cannot be returned
- clear and reliable downstream collection and processing pathways are in place

Where these conditions were met, retailers were more open to participation. Where they could not be met, participation was limited or not supported.

e. Premature expansion of collection locations increases risk and oversight requirements

Expanding battery collection across a larger number of retail locations increases both risk exposure and the complexity of managing safe and consistent operations.

While increasing the number of sites may improve accessibility and convenience for consumers, it also introduces additional challenges, including:

- increased variability in site conditions, layouts and storage capacity
- differences in staff capability, training and experience across locations
- reduced ability to maintain consistent application of intake criteria and safety controls
- greater reliance on decentralised decision-making at the store level
- increased oversight, monitoring and support requirements

These factors increase the likelihood of:

- inconsistent handling practices
- acceptance of unsuitable or high complex batteries
- accumulation of batteries beyond preferred storage limits
- gaps in compliance with defined processes

This was observed through Project A implementation and stakeholder engagement, where elements even limited expansion required significant coordination, site-specific adjustments and ongoing support to maintain safe operations.

As a result, expanding collection without clearly defined controls, support systems and oversight mechanisms can increase overall system risk, rather than reduce it.

This highlights the importance of a staged and controlled approach to expansion, where participation grows in line with demonstrated capability, clear operating limits and supporting system infrastructure.

8. Conclusion

The program showed that retail can play a meaningful role in battery recovery, but only where participation is clearly defined, risk-based and supported by the broader collection and recovery chain.

Across Project A testing, Project B engagement, stakeholder consultation and pathway analysis, there was consistent evidence that retailers are willing to support battery recovery where the task is practical, risks are understood and the system around them is clear. However, retail cannot operate as a universal collection pathway for all battery types.

The key conclusions below inform the recommendations for future pathways for end-of-life battery collection through the retail sector in the following section.

Key findings informing recommendations for retail recovery pathways

a. Insurance and liability are threshold barriers

Insurance and liability were major constraints on broader retail participation. Some models that appeared workable at store level could not proceed because coverage was unclear, unavailable or excluded specific battery types or scenarios.

b. Retail participation is feasible, but not universal

Retail participation is possible where battery types, site conditions, staff processes, insurance coverage and downstream pathways are clearly defined. A tiered, risk-based model is more practical than an “all batteries, all retailers” approach.

c. Clear acceptance, exclusion and referral pathways are essential

Retailers need clear boundaries on what can be accepted, what must be excluded and where customers should be directed. Retail staff are not technical battery specialists and should not be expected to assess battery chemistry, internal condition or high complex scenarios.

d. Battery recovery depends on the whole recovery system

Battery recovery is more than placing a collection point in store. Once batteries are accepted, the system must manage storage, collection, transport, sorting, processing, residual disposal, data and cost allocation.

e. Cost and funding affect participation and equity

Recoverable material value does not offset the full cost of safe collection, storage, transport, sorting and processing. Without sustainable funding and fair cost allocation, retail participation is likely to remain limited.

f. Data collection needs to be simple and proportionate

Detailed unit-level tracking is difficult in retail settings and can increase handling, complexity and risk. Future data collection should support decision-making without creating unrealistic burden for retailers.

g. Education and communication must align with practical pathways

Education is important, but messaging must match what the system can accept. Communication needs to be practical, consistent and pathway-specific so consumers understand what can be returned, what cannot, and where specialist pathways are required.

Context for interpreting the findings

The program produced important feasibility and system-design insights but limited large-scale collection data. This reflected the implementation conditions affecting delivery, not simply a lack of delivery.

Models progressed through design, engagement, feasibility review and approval testing, with only one model proceeding to live collection under controlled conditions. Low collection volumes and limited live testing should therefore be interpreted in the context of insurance barriers, approval processes, cost, site suitability, staffing continuity, regional logistics and downstream pathway requirements.

These factors are important because they show what can prevent retail collection from scaling, even where retailer willingness exists.

9. Recommendations for retail recovery pathways

The following recommendations for future pathways for end-of-life battery collection through the retail sector are informed by the findings of the Retail End-of-Life Battery Recovery Program, including observed battery risk profiles, retailer constraints, insurance limitations, cost considerations, data constraints and broader recovery system gaps.

These recommendations are intended to inform future pathway design for retail-based end-of-life battery collection. They do not establish compliance standards or prescribe retailer acceptance rules.

The recommendations for future retail collection draw on Project A pilot testing, Project B retailer education and engagement, and stakeholder insights gathered across the broader collection and recovery chain.

Summary

Key recommendations for the retail sector

The program identified the following priority recommendations for future pathways for end-of-life battery collection through the retail sector to enable safe and scalable retail battery collection:

- a. address insurance and liability coverage barriers
- b. use a tiered, risk-based retail participation model
- c. establish clear acceptance and exclusion criteria, with referral pathways to specialist collectors
- d. coordinate roles and responsibilities across the recovery system, including retailers, recyclers, stewardship schemes, waste operators and government
- e. establish sustainable funding so collection, transport and recycling costs do not create inequity or unaffordable products
- f. keep data collection simple and proportionate, without increasing risk or complexity for retail staff
- g. strengthen consistent, practical consumer and retailer education and communication on safe battery disposal

a. Address insurance and liability coverage barriers

Future retail battery recovery models should address insurance and liability coverage barriers before broader expansion is considered.

Insurance was a threshold issue throughout the program. Retail collection could not proceed where insurance coverage was unavailable, unclear or excluded specific battery types or collection scenarios. This was particularly relevant for damaged, unknown, e-mobility, vape and higher-energy batteries.

Before broader retail collection is expanded, future models should confirm:

- whether proposed collection activities are within insured scope
- which battery types, conditions or scenarios are excluded from coverage
- how liability is allocated between retailers, landlords, recyclers, transport providers, stewardship schemes and government
- whether additional controls, training or infrastructure change the insurance position
- whether retailers can participate without accepting unacceptable liability exposure

Insurance should not be treated only as an operational cost. The program found that coverage may not be available for certain battery types or scenarios regardless of premium level. This means insurance feasibility should be assessed early in pathway design or uptake, and not after retailers have already started any works.

Broader retail collection will remain limited unless insurance coverage, liability allocation and risk ownership are clearly understood.

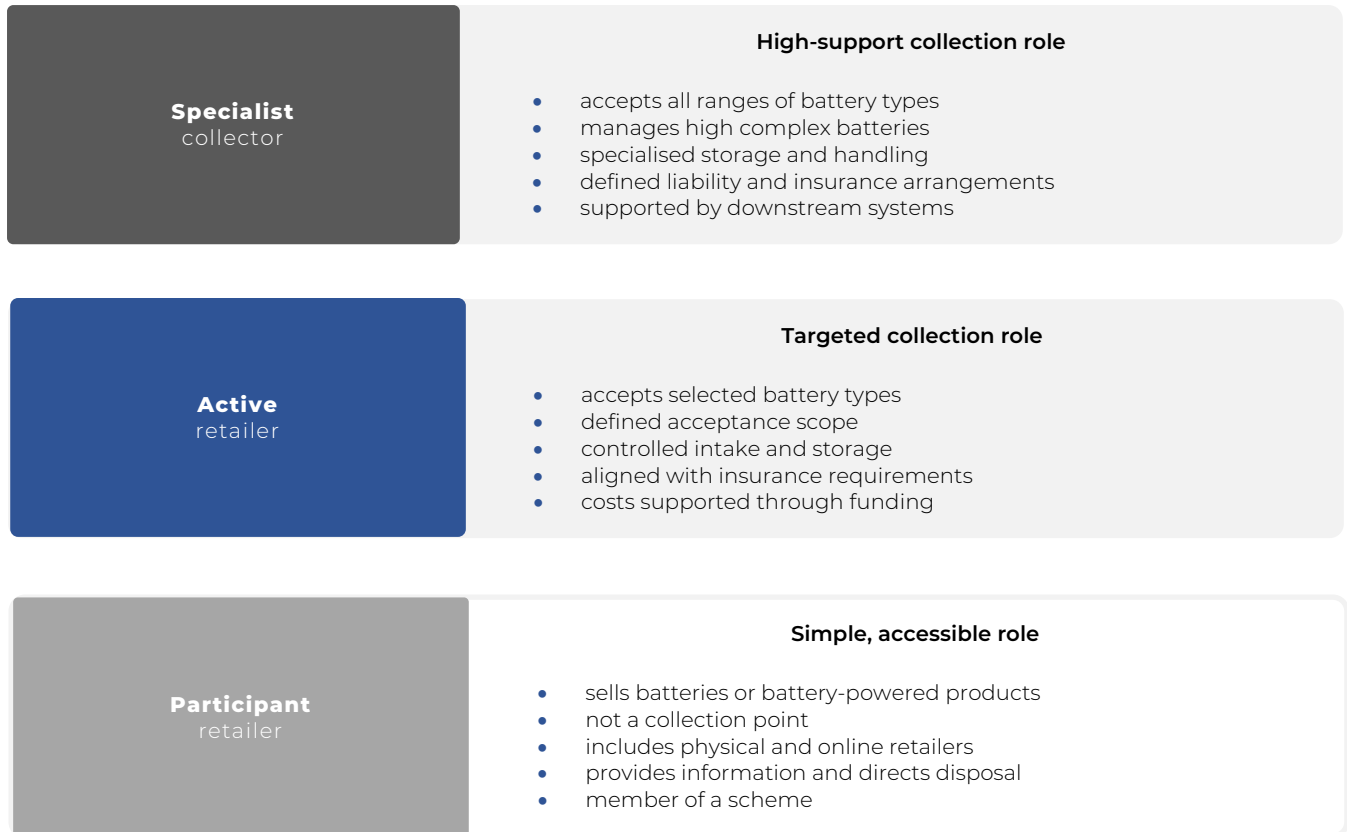
b. Use a tiered, risk-based retail participation model

Future retail battery recovery models should use a tiered, risk-based approach rather than assume that all retailers can collect batteries.

Not all retail participation needs to operate at the same level. Retailer roles should vary based on battery type, site capability, storage arrangements, staff capacity, insurance coverage, cost support and downstream recovery pathways.

Tiered retail model

A tiered model would allow retailers to participate in different ways, including:



This approach recognises that retail can support battery recovery without becoming the default collection point for all battery types.

Future models should:

- prioritise battery categories already supported by existing or clearly identified recovery pathways
- expand collection scope incrementally based on demonstrated capability and system support
- avoid models that attempt to accommodate all battery types at once
- reflect differences across retail formats, including standalone stores, shopping centres, small tenancies and warehouse-style sites
- ensure higher complexity or specialist battery streams are managed through appropriate pathways

A tiered, risk-based model allows risk to be managed while building retailer confidence and system capability over time.

Risk-based collection pathway

The table below illustrates how retail participation may be staged according to collection complexity, existing pathways and the level of control required. It is intended to show how future models could start with more established or lower-complexity battery streams and only expand where site capability, insurance coverage, funding and downstream pathways are confirmed.

This approach supports a tiered retail model, where some retailers provide information and referral only, others collect selected battery types within defined limits, and specialist collectors manage higher complexity or excluded battery streams.

More established / lower complexity pathways			Higher complexity / specialist pathways	
BASICS	LEAD-ACID	LITHIUM-ION	LARGER PRODUCTS	EXCLUDED / SPECIALIST PATHWAY
B-cycle and MobileMuster	Established collection pathway	Handheld and small embedded batteries	Larger battery products	Excluded from concept due to insurance and risk constraints
<ul style="list-style-type: none"> AA AAA C D 9V Coin Button Mobile phone 	<ul style="list-style-type: none"> Car Motorcycle UPS Caravans Boats Truck Forklifts Lighting 	<ul style="list-style-type: none"> Laptops Tablets Toys Headphones Toothbrushes Greeting cards Remotes Cameras 	<ul style="list-style-type: none"> Large toys Large appliances Deep cycle camping batteries 	<ul style="list-style-type: none"> Home energy storage Damaged batteries Vapes e-Mobility

Note: This table is not a formal hazard classification. It reflects relative collection complexity for retail settings, including handling, storage, insurance and downstream pathway requirements. Batteries are generally safe when used as intended; collection risks increase where batteries are damaged, tampered with, unknown, high-energy, incorrectly stored or outside established recovery pathways.

c. Establish clear acceptance and exclusion criteria, with referral pathways to specialist collectors

Future retail collection models should be based on clear acceptance and exclusion criteria, supported by practical referral pathways for batteries that cannot be accepted through general retail collection.

Retailers need to know what can be accepted, what must not be accepted, and where customers should be directed when batteries fall outside the agreed collection scope.

Clear acceptance and exclusion criteria are particularly important for:

- damaged, swollen, leaking or unstable batteries
- large-format or high-energy batteries
- e-mobility batteries
- vapes
- batteries of unknown origin or chemistry
- embedded batteries or battery-powered products that require separation
- mixed or uncontrolled battery streams
- imported or non-compliant products outside existing stewardship arrangements

Clear boundaries are required to:

- support safe decision-making at the point of intake
- reduce uncertainty for retail staff
- prevent unsuitable batteries entering retail collection streams
- limit exposure to unacceptable safety, insurance and liability risks
- provide consumers with clear alternative pathways where retail collection is not appropriate

Controlled, staff-mediated intake should be used where battery type, condition or collection scope requires active checking. This does not mean every battery pathway must be staff-managed, but broader or higher complexity collection should not rely on open or unattended drop-off where unsuitable items may be presented.

Future models should include simple decision pathways for retail staff, such as:

- accept
- reject
- refer
- isolate and escalate

Referral pathways are as important as acceptance pathways. If a retailer cannot accept a battery, staff need clear, practical advice on what to tell the customer and where the battery should go.

d. Coordinate roles and responsibilities across the recovery system, including retailers, recyclers, stewardship schemes, waste operators and government

Retail battery collection should be positioned as one part of a broader recovery system, not as a standalone retail responsibility.

Future models should coordinate roles and responsibilities across:

- Retailers
- Recyclers and processors
- Transport and logistics
- Waste operators
- Stewardship schemes
- Landlords and shopping centre operators
- Insurers
- Government
- Consumers

The program found that battery recovery depends on more than the collection point. Once a battery is accepted, the system still needs to manage storage, transport, sorting, consolidation, processing, residual disposal, data and cost allocation.

This includes considering where sorting, consolidation and battery separation should occur, so whole products or embedded-battery items are not transported further than necessary where safe and practical separation can occur earlier in the recovery chain.

Future approaches should integrate retail, waste, stewardship and recycling pathways into a coordinated recovery system. This would help reduce duplication, improve consistency and ensure that retailers are not expected to manage risks, costs or decisions that sit outside their capability or role.

Retail participation should be supported by proportionate onboarding, guidance, acceptance boundaries and site capability requirements aligned to the role being performed.

Key enabling components

A tiered model would need to be supported by two enabling components:

- **Business support for participating retailers'** practical guidance, onboarding, staff training, safe handling information, customer referral pathways and ongoing support to help retailers apply their role consistently and operate within defined limits.
- **Consumer awareness and pathway guidance** clear public messaging on battery risks, accepted battery types and correct disposal pathways, avoiding messaging that implies all batteries can be returned to any retail location.

Together, these components would help align retailer capability with consumer behaviour and ensure retail is not expected to manage battery recovery in isolation.

e. Establish sustainable funding so the high-cost burden of collection, transport and recycling does not create inequity or unaffordable products

Battery recovery requires dedicated and sustainable funding.

The program found that material value does not offset the full cost of safe collection, storage, transport, sorting and processing. Costs increase where battery types are heavier, highly complex, mixed, embedded, damaged, unknown or located further from processing pathways.

Future funding models should:

- account for the full cost of collection, storage, transport, sorting and processing
- address cost gaps created by imported, online, free-rider or non-compliant products
- recognise that recoverable material value is not enough to fund the system
- ensure costs are not left with individual retailers alone
- consider cost impacts across regional and metropolitan locations
- support retailers where participation creates additional operational, staff, storage or safety costs
- avoid cost allocation models that create inequity between businesses, regions or product categories
- avoid placing costs on consumers in ways that make safe disposal or compliant products unaffordable
- consider infrastructure, sorting and processing capacity needed to reduce avoidable transport, handling and cost across the recovery chain

Funding models should be developed across the recovery system, rather than relying on individual retailers or manufacturers to absorb costs in isolation.

Without sustainable funding and fair cost allocation, retail participation is likely to remain limited in scope and scale. Poorly designed cost allocation could also create inequity between retailers, increase product prices to consumers, or make compliant recovery pathways less accessible.

f. Keep data collection simple and proportionate, without increasing risk or complexity for retail staff

Future audit, reporting and data collection requirements should be simple, proportionate and safe for retail settings.

The program found that detailed, unit-level tracking is generally not practical in retail environments where batteries may be mixed, poorly labelled, embedded in products, damaged, imported or difficult to identify. More detailed tracking may also require additional handling, sorting and staff intervention, which can increase safety risk and operational burden.

Future data approaches should:

- minimise additional handling of batteries for reporting purposes
- use weight-based or low-touch data capture where appropriate
- focus on information that supports decision-making, rather than complete item-level tracking
- align reporting expectations with retailer capability
- avoid placing technical identification requirements on non-specialist retail staff
- support consistency across retailers, recyclers, schemes and government where possible

More detailed tracking may be suitable for known, separated or specialist streams, such as lead-acid batteries or clearly defined product-specific pathways. It is less suitable for mixed household batteries, embedded batteries, damaged batteries or products with unclear labelling.

Data collection should support system improvement without increasing risk, complexity or unrealistic burden for retail staff.

g. Strengthen consistent, practical consumer and retailer education and communication on safe battery disposal

Future battery recovery models should include coordinated ongoing education and communication for consumers, retailers and other public-facing organisations.

The program found that consumer behaviour and public messaging influence disposal outcomes. Consumers may assume all batteries can be returned through the same pathway, may not understand differences between battery types, and may prioritise convenience where disposal options are unclear.

Future communication should:

- provide clear and consistent information on where different battery types can be taken
- avoid generalised messaging that implies all batteries can be returned to any retail location
- explain what should not be placed in general retail collection points
- support referral pathways for batteries that cannot be accepted at retail
- align public messaging with the actual capability of collection pathways
- provide practical guidance for retailers responding to customer questions
- leverage retail staff as a large-scale consumer educational channel
- support simple tools that help consumers identify appropriate return options

Education should not focus only on increasing awareness of risk. It should also provide simple, practical and pathway-specific guidance so consumers know what action to take.

Coordinated education and communication should continue alongside broader system design work, so public messaging supports safe disposal behaviour and does not unintentionally shift unsuitable batteries into retail settings.



Example of materials left post shredding of batteries –
Copper and plastics

Battery types need different solutions

A key implication of the program is that different battery types require different recovery pathways. Future models should not assume that all batteries can be managed through the same retail collection approach.

The table below summarises how different battery types may align with retail collection, specialist collection or alternative recovery pathways, based on the program findings. This should be read as a pathway design guide rather than a compliance standard or formal hazard classification.

BATTERY TYPE	COMMON SOURCES	KEY RISKS	SUITABILITY FOR RETAIL COLLECTION	RECOMMENDED PATHWAY
Button cells	Watches, toys, remotes	Short-circuiting, ingestion risk	Yes – with controls	Sealed collection systems via retail, child safe bins through existing collection programs
AA / AAA alkaline	General retail	Leakage over time	Yes	Existing collection programs
Small consumer lithium-ion	Phones, small devices	Thermal runaway if damaged	Limited / conditional	Retail collection with defined controls via existing programs
Power tool batteries	Hardware retailers	Fire risk, damaged packs	Limited / conditional	Retail collection with defined controls via existing programs
Lead-acid batteries	Automotive	Acid leakage, weight	Yes – specialist retail	Existing specialist collection pathways
E-mobility batteries	E-bikes, scooters	High energy, fire risk	Not suitable for general retail	Specialist collection pathways
Damaged lithium batteries	Any source	Extreme fire risk	Not suitable for retail collection	Immediate referral to specialist handlers
Unknown / mixed batteries	Customer drop-off	Unknown risk profile	Not suitable for retail collection	Do not accept; refer to alternative pathways
Grey-market / imported batteries	Online purchases	Unknown chemistry, non-compliant	Not suitable for retail collection	Highlights limitations in current system settings

Note: This table is a practical pathway summary based on program findings, stakeholder engagement and available recovery pathways. It is not a formal hazard classification or safety standard.

10. Appendices

External source links

The following external sources were used to support background context, scheme descriptions, public guidance and quantitative figures referenced in this report:

- Battery Stewardship Council / B-cycle: Positive Charge Report 2024–25; battery types accepted; resource FAQs; battery safety guidance
 - <https://bcycle.com.au/wp-content/uploads/2023/05/B-cycle-Positive-Charge-Report-20251212-web.pdf>
 - <https://bcycle.com.au/how-you-can-b-cycle/battery-types-accepted/>
 - <https://bcycle.com.au/how-you-can-b-cycle/battery-safety>

- Queensland Government: Don't bin your batteries; battery fire response media statement; safe battery disposal guidance
 - <https://www.qld.gov.au/environment/waste-reduction-recycling/reduction/dont-bin-your-batteries>
 - <https://www.detsi.qld.gov.au/our-department/news-media/down-to-earth/how-to-dispose-of-batteries-in-queensland>
 - <https://statements.qld.gov.au/statements/102013>

- Queensland Fire Department: Lithium-ion battery safety guidance
 - <https://www.fire.qld.gov.au/safety-education/battery-and-charging-safety/lithium-ion-battery-safety>

- MobileMuster: Recycle a mobile; Annual Report 2025
 - <https://www.mobilemuster.com.au/recycle-a-mobile/>

- Australian Government Department of Climate Change, Energy, the Environment and Water: National Television and Computer Recycling Scheme
 - <https://www.dcccew.gov.au/environment/protection/waste/product-stewardship/products-schemes/television-computer-recycling-scheme>

- CSIRO / Australian Government: Battery recycling and National Battery Strategy information relating to lead-acid and lithium-ion battery recovery
 - <https://www.csiro.au/en/research/technology-space/energy/decarbonising-industry-transport/energy-in-the-circular-economy/battery-recycling>

Stakeholder acknowledgement

The Queensland Retail End-of-Life Battery Recovery Program was informed by engagement with a broad range of retailers, recyclers, stewardship schemes, government agencies, industry bodies, insurers, retail precinct operators and other system stakeholders.

The Australian Retail Council acknowledges and thanks all stakeholders who contributed their time, insights and expertise throughout the project. Their input helped inform pilot design, test practical feasibility, identify operational and risk constraints, and support a clearer understanding of the roles different organisations may play in future battery recovery pathways.

Organisations and individuals have not been individually listed to maintain confidentiality and avoid identifying specific participants, pilot sites or commercially sensitive engagement details.

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