



# **Measuring unwearable clothing from charitable reuse donations**

Benefiting disability employment and the environment

Good Sammy – in partnership with City of Vincent, City of Kwinana, To the Power of You, Stewart and Heaton Clothing Co and ThreadUp Australia

Supported by the Seamless Circular Clothing Textiles Fund

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# Executive Summary

Unwearable clothing can be a substantial operational and financial burden for charitable reuse organisations.

The Seamless Circular Clothing Textiles Fund provided support for Good Sammy and our partners to run a practical pilot to help understand the characteristics of unwearable clothing. Seamless is Australia's national clothing stewardship scheme and the Fund was part of a program which received grant funding from the Australian Government to support a coordinated national clothing collection, sorting, reuse and recycling system for Australia.

Our project involved an analysis of kerbside collected donations, store donations, community bin donations, and uniforms. The quality, garment type, fibre type and colour were all considered. The study also highlights some processing considerations for textile recycling, such as expected material loss and processing times for manual decommissioning.

Almost 11 tonnes (over 50,000 items) of donations were sorted during this project. Of this, over 5 tonnes underwent multiple rounds of sorting to characterise the properties of unwearable clothing.

## Key findings

Nearly 80% of community donations are wearable. Due to high volumes received the best quality is sold locally and other clothing is diverted to Charitable Reuse Accredited exporters.

A yellow/blue bag kerbside collection trial showed strong participation and good understanding of wearable versus unwearable items, though 'low wearable' items appeared equally in the yellow and blue bags reflecting the values based judgement for lower quality garments and their saleability.

The main characteristics that make garments unwearable is significant staining or elastic deterioration. Less than 1% is repairable. 3% are uniforms/ branded clothing, 4% is socks and underwear.

Compared to typical community donations, unwearables:

- include more children’s clothing, menswear, and undergarments—categories more prone to staining or end-of-life wear.
- they include fewer durable items like jeans, winter clothing, and lightly worn women’s apparel.
- fibre composition broadly aligns with general community donations, though unwearables have more unreadable labels and a slightly higher share of cotton due to how natural fibres age.
- The major brands and colour profiles are similar to the general donation mix.

Uniforms and branded workwear are predominantly cotton or polyester, and the degree of branding strongly affects reuse potential. Around 70% are in good condition. Most items feature one or two logos, but rising use of embroidery and personalised details makes de-branding difficult and reduces circularity.

Specific results and the methodology are detailed further in this report.

## **Discussion**

Unwearable clothing is generated from many sources across Australia. The broad characteristics identified (garment type, colour and fibres) are likely representative of household-generated unwearables across Australia.

The subjectivity of donation and sorting standards suggests an opportunity for common definitions or criteria, informed by the data in this study, to support more consistent classification across the sector.

Kerbside collection proved to be popular and effective; however, it is resource intensive. Collection of unwearables in separate bins at stores, or alongside community donation bins, is likely to be more resource-efficient and should be explored through future trials.

The uniform results are particularly relevant to procurement and design reforms. Logo placement, personalisation and embroidery significantly limit circularity and lifespan. Policymakers and uniform buyers can use these insights to improve de-branding potential and increase reuse.

Any national unwearables solution must address:

- current generation points,
- diverse collection and processing pathways,
- the important social and environmental value delivered by charitable reuse organisations.

Reducing textile consumption – and unwearables in particular - is critical. Given the volumes generated, recycling of unwearables is also essential. Australia has already seen multiple recycling streams collapse (e.g., soft plastics, glass, paper) where infrastructure was built on aspirational policy targets that were not backed by timely market levers or procurement requirements.

To avoid repeating this pattern, there is an opportunity for Seamless, the industry and Federal and State Governments to work together, to prioritise market development for insulation, fill, and other products made from high volume, mixed fibre, unwearable textiles.

Establishing robust end markets is essential. Once stable demand exists, collection and processing systems can scale and respond sustainably. It is hoped that this study will result in prioritisation and establishment of markets, rather than collection systems, as collection systems without local end markets will have perverse outcomes.

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# 1 Introduction

In August 2025, Seamless, Australia's clothing product stewardship scheme announced a new program to support a coordinated national clothing collection, sorting, reuse and recycling system for Australia. The program received grant funding from the Australian Government to enable Seamless to drive industry collaboration for clothing recirculation and ultimately stimulate next markets for clothing textiles.

The program primarily focused on the clothing Australians can no longer wear to address the critical challenges facing the clothing industry, with over 220,000 tonnes of clothing textiles waste ending up in Australian landfill in 2024. It included the delivery of the Seamless Circular Clothing Textiles Fund which delivered seven practical projects that collected, sorted, processed and recycled the clothes we no longer wear.

## 1.1 Objectives

The objectives of this project, which are closely aligned to the objectives of the fund, were to:

1. Divert unwearable clothing, including uniforms, using convenient and accessible methods that could be replicated throughout Australia.
2. Inform sorting and pre-processing of unwearables and provide insight into the volumes and impacts on existing collection systems.
3. & 4. Ensure local use pathways for all collected materials saleable and unwearable.
5. Provide pre-processed stock, volumes and quality information about unwearable clothing for next markets as rag, recycling for insulation, fill, fibre-board and recycling thread to thread.

## 2 Data collection method

The data collection process involved:

- Sample selection (kerbside bags, community donations, processed donations)
- Sorting
- Counting, weighing and noting observations
- Data entry

- Data analysis
- Report writing
- Review

Further explanation about each stage is provided below.

## 2.1 Sample selection & size

The sample size for each collection stream is shown in Table 1. Actual sample sizes exceeded these estimates for all streams except community donations. Notably the yellow and blue bag collection yielded 2000kg more material than anticipated.

*Table 1 Sample sizes*

Collection stream	Kg	Items	Sub samples
Yellow bag	4368	18495	2
Blue Bag	1309	6100	2
Unlabelled bags	285	1026	2
Community donations	2214	11119	11
Recycling	430	2228	8
Unwearables	655	3487	3
Uniforms/ workwear	503	1378	3
<b>Total</b>	<b>9764</b>	<b>43833</b>	<b>37</b>

### 2.1.1 Yellow and blue bag trial

One collection area of 1500 households was allocated in City of Kwinana (Bertram/ Wellard) and one in City of Vincent (Mt Hawthorn). Both areas were selected because they had previously participated in yellow-bag collections and were logistically suitable for the trial. The collection boundary was defined by a map overview to count the blocks and number of households in those areas.

*Image 1 Bag presentation and collection*



*Image 2 Sample collection*



### **2.1.2 Community donation sample selection**

Community donations were grouped into two sub-categories: store donations and community donation bin material. Surplus store donations occur during peak periods when stores do not have the capacity to sort all incoming items; these unprocessed donations are sent to the warehouse for processing. Community donation-bin material is collected from metal clothing-donation bins located in public spaces accessible 24/7, as well as from 240-litre donation bins placed in community centres, offices, schools and other organisations.

### **2.1.3 Unwearables and uniform samples**

Unwearables and uniforms were extracted from the community donations, export quality and kerbside collection service. The recycling samples, included in the unwearables, were from Good Sammy's washing and drying product, which was wet stock that would have gone to landfill if it hadn't been recovered for washing and drying.

## 2.2 Audit categories and definitions

The audit categories and definitions used in this study have been developed and refined by Good Sammy over the past three years informed by staff experience with material composition and donation stream characteristics. Experienced fashion and textile academics from Curtin University and South Metropolitan TAFE contributed to testing and refining these categories, which have also been used to generate the historical datasets compared in this study.

The definition and grading of materials is a key factor influencing the projected quantities and pathways for locally saleable, export and unwearable clothing.

Definitions for this study include:

- Unwearables: medium to heavy stains, elastic not working, repairs required, tears or damage, worn bras, socks or underwear.
- Low wearables: medium condition department store clothing or no tags; faded, pilled, light staining on underarms or neck, light wear around cuffs, minor repair required, washable clothing – i.e. animal hair, good condition bras, socks and swimwear.
- Rubbish (not suitable for recycling): heavily oil stained, unwearable polyurethane or PVC clothing, unwearable bras, noticeably contaminated with body fluids, unwearable feather filled jackets, significant embellishments with minimal recoverable fabric, high elastane/ spandex content e.g. swimwear in poor condition.
- Medium and high-grade clothing was considered locally saleable, but where medium grade clothing is surplus to store requirements, it is generally sent to Charitable Reuse Australia accredited exporters for resale in global markets.

These definitions are based on Good Sammy's manual sorting standards; more information is provided in Appendix A. Operationally grading is adjusted based on seasonality and market needs. For example, if local stores require a higher volume of menswear, or seasonal items such as jumpers then the grading standard for local store grade material may be temporarily refined to meet that demand. Each charity has differences in their definitions and sorting standards based on their operations and needs.

Seamless provided definitions to create a shared language for Australia's clothing and textiles sector: [Circular clothing definitions: commonly used terms for the Australian circular clothing economy - Seamless](#). Good Sammy contributed to the development of these definitions alongside other industry stakeholders. However, for the purposes of these audits, and daily operational use of charities, the Seamless definitions have not been leveraged as they don't make granular distinctions between low wearable, unwearable and rubbish clothing.

Additionally there is a need to recognise that clothing that is locally saleable for a manufacturer or brand is a different standard to clothing that is locally saleable for a charity. Out of season, unsaleable, stock for a manufacturer, is often premium grade stock for a charity.

## **2.3 Existing data**

Good Sammy has collected snapshot data over a three year period to help understand opportunities to expand local resale, recycling and ragging markets for clothing. This data was used to inform collection, separation, decommissioning, recycling and ragging systems for Good Sammy.

## **2.4 Optical sorter verification**

There are various optical sorter providers and equipment types on the market. Good Sammy used Matoha handheld optical sorters, as seen in Image 3. Two optical sorters were funded by the Seamless Circular Clothing Textiles Fund. These handheld optical sorters allow flexibility throughout the warehouse or field use to determine fibre types and purity. They are held to the fabric and scan results appear on the screen. If the garment is layered, or on top of another garment it may show a read error detecting the fabric underneath so each garment must be scanned separately.

*Image 3 Optical sorter and scanning method*



## **2.5 Quality assurance/ data integrity**

A consistent sorting team was used for this intense project period. Each of the auditors are university qualified students with a data, environmental science and/or project management background. All had previously volunteered with Good Sammy as interns and understood the rationale behind the textile recovery project.

Data entry was carried out by 2 of the 5 casual staff, creating some consistency to the data entry method. Data verification was then conducted against the raw data sheets, and check weights within the spreadsheet.

Data analysis was checked by the Resource Recovery Coordinator who has extensive waste auditing experience and was involved with the project preparation and oversight.

### 3 Results

#### 3.1 Kerbside collection results

Figure 1 shows that the composition within the yellow bags was similar between councils. There was slightly less low wearable, and more high wearable clothing in Mt Hawthorn which is expected due to the different socio-demographics.

The blue bag composition was also very similar between the two councils, and there was noticeably more unwearable clothing in the blue bags. The unlabelled bags contained a mixture of material which likely reflects that for some households they were intended as donation bags, and in others they were intended as unwearables.

Figure 1 Kerbside collection composition – All donations (% by weight)

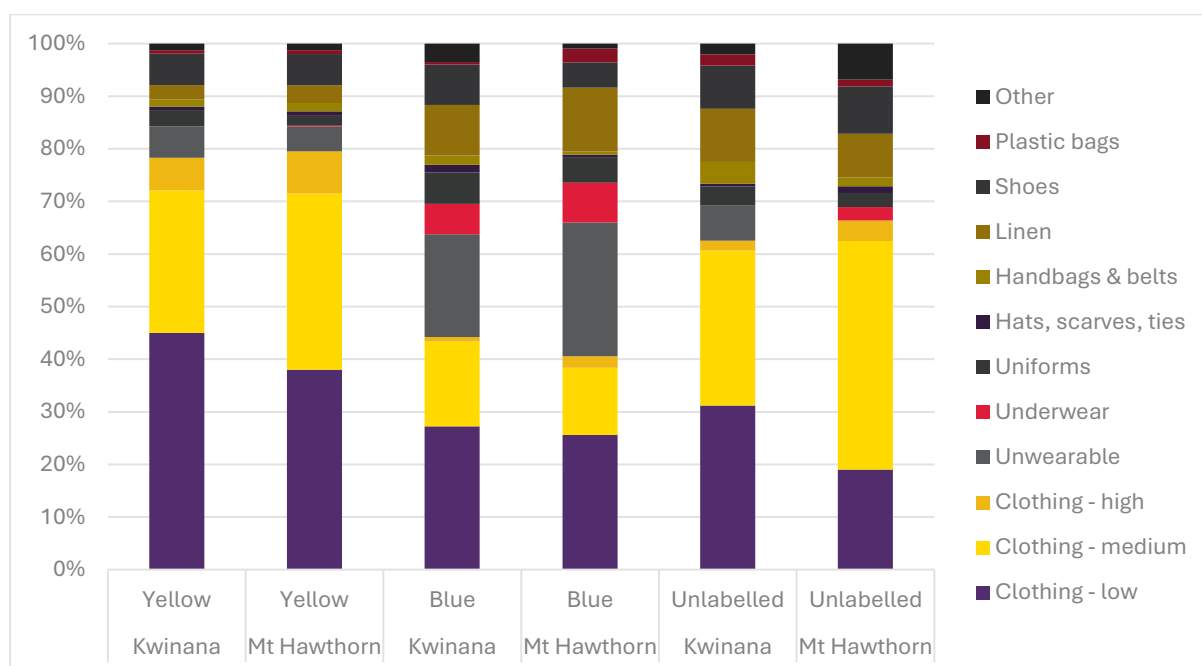
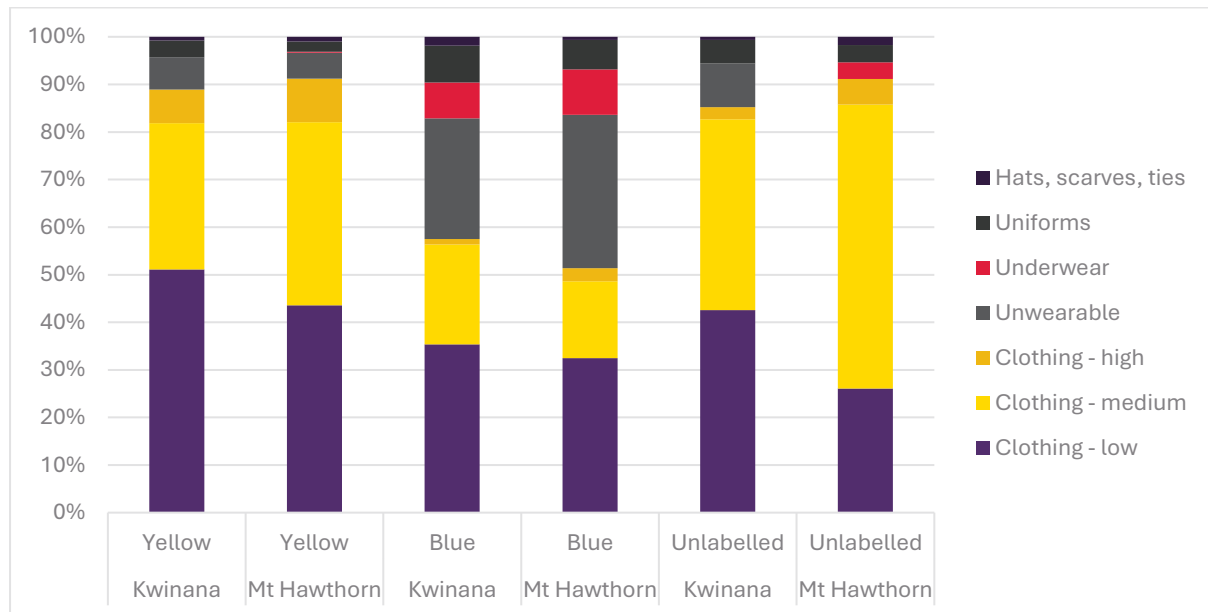


Figure 2 has been provided to highlight clothing donations and the differences between the two councils. Unwearables made up 18% in the yellow bags, which is similar to Good Sammy’s broader community donation stream. In contrast, unwearables accounted for around half the clothing in the blue donation bags.

This figure also illustrates that the category of ‘low wearable’ is highly subjective. Many donors interpret low wearable as still being of acceptable quality, while others believe

these items are not suitable for local sale. Similarly, the notion of donating items that are 'good enough to give to a friend' varies widely and is influenced by factors such as personal values and socio demographic background.

Figure 2 Kerbside collection composition – Clothing only (% by weight)



### 3.2 Community donations

Community donations were assessed across 11 samples, consisting of five store-based donations (186–223 kg each) and six donation-bin samples (100–234 kg each). The combined results are presented in Figure 3.

Overall, almost 80% of donated clothing is wearable. Of this:

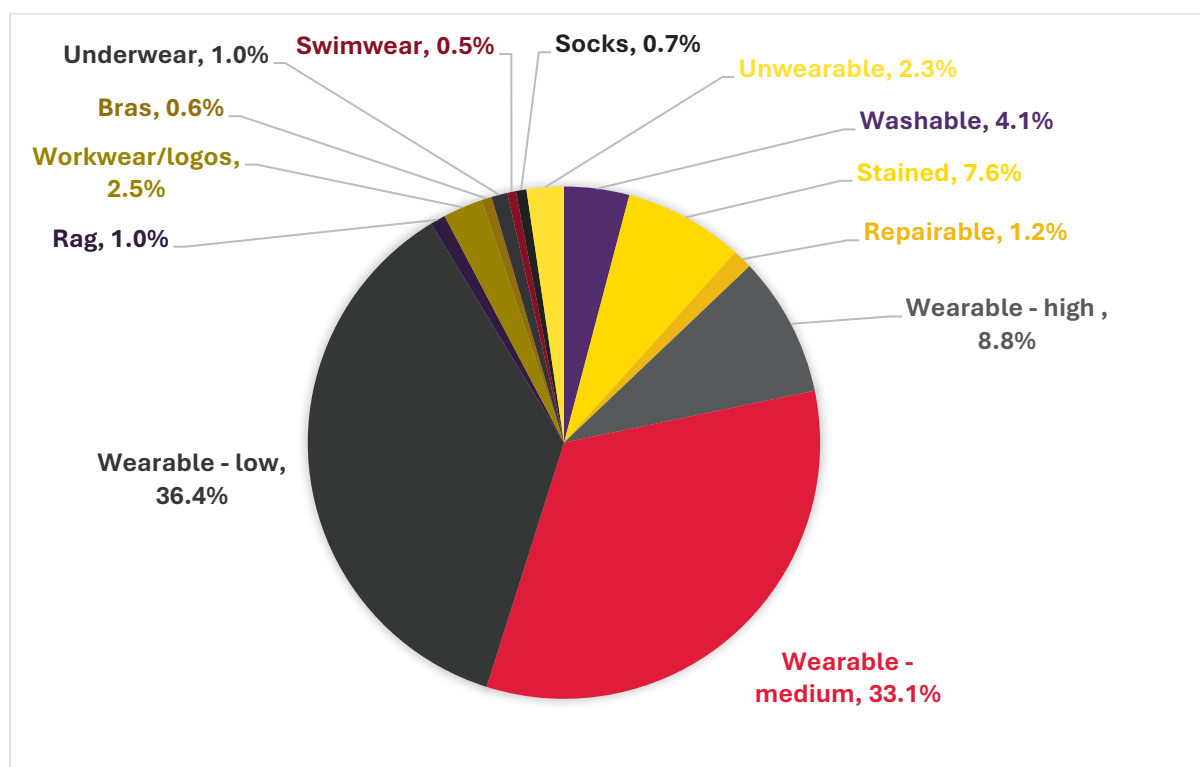
- 42% is considered *locally saleable* (high and medium quality).
- 36.4% is *wearable but not locally saleable* and is therefore directed to export markets due to limited local demand.

The remaining 21% of donations are unwearable, comprising:

- 14% recyclable textiles (e.g., stained items, unwearable clothing, socks, underwear, and workwear)
- 5% items that could be washed or repaired
- 1% suitable for rag
- 1% sent to landfill (e.g., unwearable bras or socks)

Note that other items and rubbish that were not clothing were excluded from the data for example linen, blankets, shoes, string and toys.

Figure 3 Community donation bin composition



The quality of donations from store and community donation bins was largely comparable with store-based donations being slightly lower quality overall (Table 2). This is likely because the stores appear to identify and retain some high-quality donations at the point of donation for instore sale. Although the donations received from stores were classified as 'unprocessed', it seems staff conducted a quick visual check as items arrived and set aside anything that was clearly high quality.

Table 2 Community donations – store & donation bins – composition by weight

Category	Store donations	Community	Combined
Wearable	76.0%	81.5%	78.3%
Wearable - high	6.9%	9.7%	8.8%
Wearable - medium	33.0%	35.3%	33.1%
Wearable - low	36.1%	36.5%	36.4%
Unwearable	23.8%	18.4%	21.5%
Washable	4.3%	3.7%	4.1%
Repairable	2.0%	0.4%	1.2%

Category	Store donations	Community	Combined
Rag	1.0%	0.8%	1.0%
Workwear/logos	2.1%	2.5%	2.5%
Unwearable	3.1%	1.7%	2.3%
Stained	9.4%	6.1%	7.6%
Socks	0.5%	0.7%	0.7%
Underwear	0.7%	1.1%	1.0%
Swimwear	0.3%	0.6%	0.5%
Bras	0.4%	0.8%	0.6%
Total	100.0%	100.0%	100.0%

### 3.3 Unwearables

The unwearables category was made up of several different data sets (Table 3). It includes:

- unwearables extracted from the community donation streams mentioned in the previous section;
- unwearables from Good Sammy's 'textile recycling' stream; and
- unwearables from the yellow and blue bag collection trials.

Aggregated results by quality, garment type, colour, fibre type, brand and decommissioning considerations have been presented in the following sections. Uniforms have been dealt with separately due to their different characteristics from general clothing.

Not all data sets were used across every grading category due to operational constraints. For example, all decommissioned unwearables were aggregated and processed through a single consolidated colour sort. Because the recycling samples were the first audit sorts completed, the initial batches were not included in the wardrobe and brand sort while the auditing system was still being refined for multiple sort types. In addition, the relatively small volume of unwearables in each kerbside collection stream meant the yellow- and blue-bag unwearables were consolidated by local government area to free up sorting cages.

Overall, the sorting team undertook detailed characterisation of 4 tonnes of unwearable clothing, approximately 20,000 items, excluding socks, underwear and bras.

Table 3 Source and sample size of unwearables included in each data set

Unwearables source	Sort type	Weight (kg)	Count
Community	Fabric Type	243	1132
Mt Hawthorn Y&B	Fabric Type	133	741
Kwinana Y&B	Fabric Type	305	1783
Community	Wardrobe	244	1134
Mt Hawthorn Y&B	Wardrobe	108	569
Kwinana Y&B	Wardrobe	304	1784
Community/ Recycling	Colour	1018	2654
Kwinana Y&B	Colour	295	1698
Recycling (4 samples)	Quality	429	2630
Recycling (4 samples, excludes some items removed for sale during quality sort)	Fabric Type	381	2086
Recycling (3 samples)	Wardrobe	279	1603
Recycling (2 samples)	Brand	201	1110
<b>Total sorting quantity</b>		<b>3940</b>	<b>18924</b>

### 3.3.1 Quality

The recycling sample is the unwearables from some of the wet community clothing donation stock that had been received over winter. Four samples of over 100kg that had been washed and dried.

The quality of the product is outlined in Table 4. As this stock was already washed it was assumed that it was not easily recoverable without comprehensive stain treatment or soaking these items, which Good Sammy currently does not do.

For this sort it is assumed that an export market is not available so low grade product that might otherwise go to export is sent for recycling.

Table 4 Recycling stock - quality

Category	Count	Weight	Count(%)	Weight (%)
Washable	14	2.65	0.5%	0.6%
Stained	466	87.25	17.7%	20.3%
Repairable	11	2.51	0.4%	0.6%
Wearable - high	6	2.75	0.2%	0.6%
Wearable - medium	95	19.7	3.6%	4.6%
Wearable - low	675	126.4	25.7%	29.4%
Rag	188	24.9	7.2%	5.8%
Logos/workwear	40	12.9	1.5%	3.0%
Underwear	187	12.2	7.1%	2.8%
Socks	149	6.22	5.7%	1.4%
Others	253	28.15	9.6%	6.6%
Unwearable	531	102.1	20.2%	23.8%
Rubbish	14	1.65	0.5%	0.4%
<b>Total</b>	<b>2630</b>	<b>429.38</b>	<b>100.0%</b>	<b>100.0%</b>

### 3.3.2 Garment type

The garment-type categories used in this study align with Good Sammy's sales categories (Table 5). Women's clothing remains the dominant category in both donations and sales. Seasonal clothing is categorised separately, as it is stored until demand increases. A small number of specialist, high-demand categories are also separated to manage the flow of limited stock between stores. Other includes bibs, raincoats and pieces of fabric.

When compared with Good Sammy's general clothing stock, the unwearable garments show several notable differences:

- A higher proportion of menswear — 35.6% of unwearables compared with 19.5% of general stock. This reflects typical use patterns: men are more likely to wear garments until they become unwearable, whereas women's clothing is more often passed on after relatively light wear.
- A lower proportion of jeans — 4.5% of unwearables compared with 6–7% of general stock, likely due to the high durability of denim.
- A higher proportion of baby and children's clothing — 22% in unwearables compared with 18% in general stock, largely due to staining, particularly in babywear.

- A lower proportion of women's wear, especially dresses — 2% in unwearables compared with 6% in general stock.

This data also highlights that lighter garments (such as tops and children's clothing) appear in higher numbers when counted individually, whereas heavier items (such as jeans and winter clothing) represent a lower item count relative to their weight.

*Table 5 Unwearables by garment type*

<b>Category</b>	<b>Count</b>	<b>Weight</b>	<b>Count(%)</b>	<b>Weight (%)</b>
Womens- tops- year round	548	87.9	15.7%	13.4%
Womens- bottoms- year round	250	56.5	7.2%	8.6%
Womens winter	98	43.95	2.8%	6.7%
Womens- dresses	55	14.95	1.6%	2.3%
Jeans	60	29.45	1.7%	4.5%
Mens- tops- year round	649	154.6	18.6%	23.6%
Mens- winter	166	79.5	4.8%	12.1%
Kids/ Babywear	1357	146.65	38.9%	22.4%
Swimwear	11	1.45	0.3%	0.2%
Formal wear/ Wedding Wear	18	6.65	0.5%	1.0%
Nightwear/ Underwear	126	24.75	3.6%	3.8%
Wetsuits	0	0	0.0%	0.0%
Workwear	11	1.75	0.3%	0.3%
Manchester/ Linen	4	0.65	0.1%	0.1%
Others	134	6.3	3.8%	1.0%
<b>Total</b>	<b>3487</b>	<b>655.05</b>	<b>100.0%</b>	<b>100.0%</b>

### 3.3.3 Colour

The colour of unwearable clothing is relevant for end-of-life options regarding thread to thread, decorative board, dye extraction and reducing the need to bleach and redye clothing, which can be one of the more environmentally intensive aspects of garment manufacturing. The colour type can help to inform optical sorter or manual sorting categories.

Table 6 shows that patterned fabrics (mixed) comprised 19%, followed by black clothing at 16%. Grey – which included black and white patterns – was 10%. Blue denim (6%) was separated out from blues & purples (14%) given the high demand and proportion of blue denim in its own right (predominantly cotton). All other colour categories were

approximately 6% of the stock and included a range of colours within each spectrum. See Appendix A for more details on the colour spectrum used.

*Table 6 Colour grading*

<b>Category</b>	<b>Count</b>	<b>Weight</b>	<b>Count (%)</b>	<b>Weight (%)</b>
Blue & Purple	722	181.05	16.5%	13.7%
Red	384	103.9	8.8%	7.8%
Brown	149	78.9	3.4%	6.0%
Green	211	87.5	4.8%	6.6%
Orange & Yellow	221	85.15	5.0%	6.4%
Grey	452	133.35	10.3%	10.1%
Black	735	215.4	16.8%	16.3%
White	358	106.85	8.2%	8.1%
Mixed	1064	252.1	24.3%	19.0%
Jeans/Denim	86	80.15	2.0%	6.1%
Other (not recyclable)	0	0	0.0%	0.0%
<b>Total</b>	<b>4382</b>	<b>1324.35</b>	<b>100.0%</b>	<b>100.0%</b>

These results are similar to the colour results of previous studies, with denim making up a lower portion in the unwearables due to its durability. Mixed/ patterned clothing can vary depending on whether it is placed into the dominant colour type for that pattern or placed in mixed. Black was lower proportionally in unwearables than in the general clothing category, but it's not clear why that would be the case.

### **3.3.4 Fibre type**

Fibre type was assessed using both garment labels and the optical sorter.

Table 7 presents the fibre types identified from garment labels. A substantial proportion of items (22.3%) were classified as "other" because labels were missing, faded, or listed fibre types outside the main categories. Approximately half of all garments were primarily cotton, while 18% were predominantly polyester. A further 1% consisted of other natural fibres, including wool, bamboo, hemp, silk, mohair, and linen.

Table 7 Fibre type by label

Category	Count	Weight	Count (%)	Weight (%)
Cotton 100%	1069	163	29.2%	24.0%
Cotton (96% +) Polyester (1-4%)	81	22	2.2%	3.2%
Cotton (80-95%) + polyester + elastane	207	36.35	5.7%	5.3%
Cotton (70-79%) + polyester + elastane	49	15	1.3%	2.2%
Cotton blend (50% +) + other	500	103.15	13.7%	15.2%
Natural Fibres (80%+)	2	0.5	0.1%	0.1%
Polyester (95% +)	285	58.8	7.8%	8.6%
Polyester (75% +)	46	7	1.3%	1.0%
Polyester (50% +)	255	57.8	7.0%	8.5%
Nylon (50% +)	31	6.75	0.8%	1.0%
Wool/ Cashmere 100%	12	3.8	0.3%	0.6%
Leather 100%	0	0	0.0%	0.0%
Natural Fibres other 100% (bamboo, hemp, silk, mohair, linen)	14	2.5	0.4%	0.4%
Viscose/ Rayon (10%)/ Lyocell/ Modal	198	44.15	5.4%	6.5%
Acrylic (100%)	16	5.85	0.4%	0.9%
Acrylic (80%)	1	0.4	0.0%	0.1%
Polyurethane/ PVC	4	1.25	0.1%	0.2%
Polypropylene	2	0.3	0.1%	0.0%
Other	884	151.85	24.2%	22.3%
<b>Total</b>	<b>3656</b>	<b>680.45</b>	<b>100.0%</b>	<b>100.0%</b>

These results closely align with Good Sammy’s historical fibre-type data. The main differences arise from the focus on unwearable stock in this study, which resulted in a higher proportion of unreadable or worn labels, and a slightly lower proportion of synthetic and semi-synthetic fibres—likely due to their greater durability.

Table 8 presents the overall fibre-type composition after redistributing the 22% previously classified as “other” into their correct categories using the optical sorter. Once adjusted, 58.6% of garments are primarily cotton, 24.4% are primarily polyester, and 1.3% are composed of other natural fibres.

Table 8 Fibre type with 'other' garments dispersed

Category	Count	Weight	Count (%)	Weight (%)
Cotton 100%	1245	187.35	34.1%	27.5%
Cotton (96% +) Polyester (1-4%)	81	22	2.2%	3.2%
Cotton (80-95%) + polyester + elastane	277	48.6	7.6%	7.1%
Cotton (70-79%) + polyester + elastane	85	22.25	2.3%	3.3%
Cotton blend (50% +) + other	592	119.25	16.2%	17.5%
Natural Fibres (80%+)	3	0.85	0.1%	0.1%
Polyester (95% +)	402	79.5	11.0%	11.7%
Polyester (75% +)	111	18.65	3.0%	2.7%
Polyester (50% +)	313	68.25	8.6%	10.0%
Nylon (50% +)	70	13.75	1.9%	2.0%
Wool/ Cashmere 100%	16	5.95	0.4%	0.9%
Leather 100%	0	0	0.0%	0.0%
Natural Fibres other 100% (bamboo, hemp, silk, mohair, linen)	18	2.95	0.5%	0.4%
Viscose/ Rayon (10%)/ Lyocell/ Modal	365	74.55	10.0%	11.0%
Acrylic (100%)	28	7.95	0.8%	1.2%
Acrylic (80%)	4	1.65	0.1%	0.2%
Polyurethane/ PVC	4	1.25	0.1%	0.2%
Polypropylene	2	0.3	0.1%	0.0%
Other	41	9.4	1.1%	1.4%
<b>Total</b>	<b>3657</b>	<b>684.45</b>	<b>100%</b>	<b>100%</b>

An additional consideration is the accuracy of the fibre-type information provided on garment labels. As shown in Table 9 of the more than 2,500 garments audited, 59% of labels accurately reflected the fibre type. A further 3.5% of garments could not be read by the optical sorter, while 37% were found to be inaccurate. These inaccuracies arise from several factors discussed later in this section. Not all inaccuracies are attributable to manufacturer labelling.

Table 9 Accuracy of labels compared to optical sorter output

Category	Count	Weight	Count (%)	Weight (%)
Accurate	1696	314	61.2%	59.3%
Inaccurate	998	197.55	36.0%	37.3%
Unknown	78	18.35	2.8%	3.5%
Total	2772	529.9	100%	100%

The accuracy of the optical sorter compared with label-reported fibre types is summarised below (Table 10). The results indicate that:

- Nylon, wool, and acrylic garments were identified with high accuracy, which is a positive outcome for effectively separating these fibres from blended materials.
- Polyurethane garments were not accurately identified by the optical sorter.
- Accuracy for garments made of 100% 'other' natural fibres was low.
- Accuracy was also low for garments labelled as 96%+ cotton. In many cases, the garment itself was 100% cotton, but contained non-cotton trims, threads, or fixings. The optical sorter detects the main fabric, whereas the manufacturer's label may reflect the entire garment construction, including minor polyester components not captured by the sorter.
- For cotton blends, the presence of additional fibre types reduced the accuracy of the optical reading, as these secondary fibres may influence the sorter's detection.

*Table 10 Accuracy of labelling by fibre type*

Fibre type	Count	Proportion
Cotton 100%	1069	67.2%
Cotton (96% +) Polyester (1-4%)	81	23.5%
Cotton (80-95%) + polyester + elastane	207	44.9%
Cotton (70-79%) + polyester + elastane	49	32.7%
Cotton blend (50% +) + other	500	50.4%
Natural Fibres (80%+)	2	0.0%
Polyester (95% +)	285	76.1%
Polyester (75% +)	46	54.3%
Polyester (50% +)	255	61.2%
Nylon/ polyamide (50% +)	31	83.9%
Wool/ Cashmere/ merino 100%	12	83.3%
Leather 100%	0	0.0%
Natural Fibres other 100% (bamboo, hemp, silk, mohair, linen)	14	14.3%
Viscose/ Rayon/ Lyocell/ Modal (10%)	198	72.7%
Acrylic (100%)	16	93.8%
Acrylic (80%)	1	100.0%
Polyurethane/ PVC	4	0.0%
Polypropylene	2	100.0%

*\*Note: this excludes the 'other' category as there was no label to compare the accuracy with.*

Optical sorter limitations:

- The optical sorter is limited to two fibre types on the display. Many garments have upwards of 3 fibre types, in that case it shows the dominant two fibre types.
- In many instances the optical sorter will show a dominant fibre type and 'cont?' where it can't distinguish or report on the additional fibre types.
- 96% cotton will sometimes read 100% cotton as the manufacturer is acknowledging the presence of some trims as being another fibre. The optical sorter is generally directed to read the body of the garment and therefore the garment looks 'pure' on the optical sorter. Equally a 100% cotton or polyester garment is likely to contain trims, labels and thread that is not the primary fibre type.

Common read errors:

- Cotton 100% shows 40-60% cotton; 60%- 40% viscose. It's likely that this is a read error of the optical sorter given the similarity in cotton and viscose.
  - A test was done on towels 35% of towels read as 59% cotton 41% viscose despite the majority of them being labelled 100% cotton.
  - The 59% cotton and 41% viscose was the most common clothing read 'error' for 100% cotton.
- Polyester jackets had a consistent 'unknown' read error.
- Optical sorter has difficulty identifying linen and often reads it as cotton.
- Other fibres not identified by the optical sorter included: modacrylic, meta aramid, polyarylate, lenzing, nomex which are mostly fire resistant fibres. Recycled fibres are also not differentiated as part of the fibre type identification.

### **3.3.5 Brand**

Unwearables were assessed by brand. Only brands that comprised more the 0.5% of the stock have been named in this report. The majority of clothing (62%) was from 'other' brands or did not have a readable logo. Kmart brands were highest at 10% of the stock and Target with 5% followed by Cotton On (3.9%) and Big W (3.3%). Noting that Big W and Best and Less sell a number of other brands that are not exclusive to their outlets, so this study focuses primarily on the brands they own. Gold Seal (top brands) - where the original product price would be over \$80 - comprised 13% of the sample. This data is very similar to the larger brand data set collected by Good Sammy for its general clothing stock.

Table 11 Clothing by brand

Category	Count	Weight	Count (%)	Weight (%)
Kmart (Anko, &co, Now)	130	20.7	11.7%	10.3%
Target	68	9.65	6.1%	4.8%
Cotton On	44	7.9	4.0%	3.9%
BigW (&me, Emmerson, Brilliant Basics, Dymples)	62	6.7	5.6%	3.3%
Best and Less (Baby Berry, Tilt Edited)	17	2.1	1.5%	1.0%
Bonds	22	1.95	2.0%	1.0%
Shein	6	1	0.5%	0.5%
Gold Seal (top brands)	93	26.85	8.4%	13.4%
Other	668	128	60.2%	61.8%
<b>Total</b>	<b>1110</b>	<b>201.1</b>	<b>100.0%</b>	<b>100.0%</b>

### 3.3.6 Decommissioning

To prepare garments for recycling, all hard fixings must be removed. For general clothing, 50–60% of items contain no hard fixings, which reduces the amount of manual work required. A manual pre-sort of unwearable garments was conducted before decommissioning so that only garments with hard fixings were separated for further processing.

Unwearables generated from this project were decommissioned in 14 batches of between 48kg – 108kg, and processing times and offcuts being measured. When just including garments with hard fixings 90-97% of the fibre was recovered for recycling, on average 95%. When including all garments, including those with no fixings, then on average 97% of the fibre was recovered.

Table 12 shows that 3.6% of decommissioned material was sent for recovery as zips, 0.3% as buttons and only 1.2% as rubbish. 92.2% was recovered as decommissioned fibres ready for recycling. A small amount of clothing was deemed saleable and not decommissioned.

Table 12 Decommissioning outputs

Product	Kg	Proportion
Decommissioned material - hard fixings only	663.4	92.2%
Store grade/ washable - not recycled	17.2	2.4%
Zips	25.9	3.6%
Buttons	2.3	0.3%
Rubbish	8.7	1.2%
Total sample	719.1	100%

Common hard fixings include buttons, zips, press studs, eyelets, sequins, beads, buckles and hooks. Common soft fixings include Velcro, lace, embossing, elastic, reflective strips, padding (such as shoulder pads), and embroidery. Depending on the end product and the level of fibre purity required, soft fixings may also need to be removed. This is because threads and other soft fixings are often made from fibre types different from the main garment—for example, polyester thread used in the hems of 100% cotton T-shirts.

Good Sammy, in collaboration with TAFE and Curtin University students, previously documented the types of fixings most commonly found on garments. Table 13 summarises these fixing types and accounts for multiple buttons, zips, sequins or other elements. This provides insight into both the potential material loss and the complexity involved in decommissioning garments.

The analysis showed that plastic buttons are more common than metal buttons, while metal zips occur more frequently than plastic zips. Most garments with buttons had six or more buttons. Elastic was identified as a very common soft fixing and can pose processing challenges depending on the recycling pathway.

*Table 13 Common fixing types*

Fixings	Count	Count	Count	Count	Total
	1	2+	3+	6+	
Buttons - plastic	31	30	53	82	196
Buttons - metal	25	11	11	5	52
Zip - plastic	28	8	2	0	38
Zip - metal	83	17	6	0	106
Buckle - plastic	1	2	0	0	3
Buckle - metal	2	3	3	1	9
Clips / hooks - plastic	3	2	1	0	6
Clips / hooks - metal	4	0	4	2	10
Magnetic closure	0	0	0	0	0
Studs / snaps / poppers / Aglets - plastic	1	2	8	7	18
Studs / snaps / poppers / Aglets - metal	17	7	20	13	57
Eyelets / hook & eye - plastic	1	3	1	0	5
Eyelets / hook & eye - metal	4	11	7	4	26
Laces / Ribbons / cords / drawstrings	101	17	2	2	122
Embossed print / puff ink / screen print	25	7	6	15	53
	<10	10-30	30-50	50+	
Sequins	0	1	0	7	8
Gems / stones / pearls or large raised embellishments	6	3	1	5	15
Elastic	179	8	7	1	195
Pins / Safety pins	2	0	0	0	2
Reflective strips	1	0	0	0	1

Fixings	Count	Count	Count	Count	Total
	1	2+	3+	6+	
Shoulder pads / Bra padding	1	2	0	0	3
Velcro	13	6	0	0	19
Lined Clothing (two different fabric types)	8	0	0	0	8
Embroidered	4	0	0	0	4
Other	35	3	0	0	38

Some other considerations when decommissioning garments for recycling include:

- Feather garments are problematic to decommission as it's difficult to contain the feathers.
- PVC/ Polyurethane – problematic to wash/ recycle. They flake and come apart in a washing process, and similar in a recycling process whether they'll contaminate the other fibres. They are generally not compatible to integrate in with other textile recycling due to its different melting point, composition which can include chlorine.

## 3.4 Uniforms/ Logos

There were multiple sources of uniforms included in the data. Not all data was collected for all data sets.

### 3.4.1 Quality

Quality/ condition was assessed on over 1000 uniforms or merchandise clothing with logos, including 855 items from the Mt Hawthorn, Kwinana and Community donations, and 316 items from the outlet. The condition was based on the wear and tear of the garment; the branding was not considered as part of the condition assessment. Some had staining (13.3%) but was still wearable. Only 5.2% was considered unwearable with cotton t-shirts considered suitable for rag. The majority of unwearable uniforms were received through the blue bag Mt Hawthorn and Kwinana collections.

Table 14 Uniform condition

Category	Count	Weight (%)
Washable	109	10.3%
Stained	130	13.3%
Repairable	8	0.8%
Wearable - high	225	24.2%
Wearable - medium	256	19.9%
Wearable - low	391	26.2%
Rag	22	1.1%
Unwearable	30	4.1%
<b>Total</b>	<b>1171</b>	<b>100.0%</b>

### 3.4.2 Uniform garment type

The table below shows that most of the workwear and uniforms are shirts (43%), jackets (28%) and pants (19%), with small quantities of overalls, shorts, safety vests and other items. Other items included hats, nursing scrubs and jumpers.

Table 15 Uniforms - clothing type

Category	Count	Weight	Count (%)	Weight (%)
Shirts	686	184.57	59.3%	43.3%
Pants	149	81.7	12.9%	19.2%
Overalls	12	11.05	1.0%	2.6%
Jackets	167	119.05	14.4%	27.9%
Shorts	55	11	4.8%	2.6%

Category	Count	Weight	Count (%)	Weight (%)
Skirt	12	1.45	1.0%	0.3%
Vest	40	6.5	3.5%	1.5%
Other (list)	36	11.15	3.1%	2.6%
<b>Total</b>	<b>1157</b>	<b>426.47</b>	<b>100.0%</b>	<b>100.0%</b>

### 3.4.3 Uniform colour

The colour categories used for uniforms was slightly different to the colour categories used for general clothing. That is because of the higher prevalence of yellow, orange and dark blue workwear. Because these samples included a much bigger range of uniforms that just high visibility or heavy duty workwear the other colours were more prevalent than some of Good Sammy's historical uniform data sets.

Table 16 Uniforms by colour

Category	Count	Weight	Count (%)	Weight (%)
Yellow	271	131.05	19.5%	31.5%
Orange	125	55.1	9.0%	13.2%
Dark blue	509	107	36.6%	25.7%
Black	161	50.2	11.6%	12.1%
Khaki	8	3.85	0.6%	0.9%
Light blue	45	9.55	3.2%	2.3%
Green	79	18.15	5.7%	4.4%
Blue grey	45	16.25	3.2%	3.9%
Pink	4	1.7	0.3%	0.4%
Red	95	21.15	6.8%	5.1%
Other	49	2.5	3.5%	0.6%
<b>Total</b>	<b>1391</b>	<b>416.5</b>	<b>100.0%</b>	<b>100.0%</b>

### 3.4.4 Uniform fabric type

Table 17 shows the fibre types for uniforms. Compared to general clothing stock it shows that uniforms are predominantly 100% cotton (43%) or 95%+ polyester (25.5%). That is partly because many sportswear, school uniforms, high vis vests and merchandise tops are 100% polyester. Most heavy-duty high visibility clothing and corporate wear is 100% cotton, other than the reflective strips and fixings on high vis clothing. Other included blends fire resistant fibres such as modacrylic, polyacrylate and aramids.

Table 17 Uniforms by fabric type

Category	Count	Weight	Count (%)	Weight (%)
Cotton 100%	210	103.65	40.6%	43.1%
Cotton (96% +) Polyester (1-4%)	14	7.4	2.7%	3.1%
Cotton (80-95%) + polyester + elastane	6	2.2	1.2%	0.9%
Cotton (70-79%) + polyester + elastane	0	0	0.0%	0.0%
Cotton blend (50% +) + other	20	6.9	3.9%	2.9%
Natural Fibres (80%+)	7	7.1	1.4%	2.9%
Polyester (95% +)	138	61.4	26.7%	25.5%
Polyester (75% +)	3	1.15	0.6%	0.5%
Polyester (50% +)	49	19.3	9.5%	8.0%
Nylon (50% +)	2	0.65	0.4%	0.3%
Wool/ Cashmere 100%	0	0	0.0%	0.0%
Leather 100%	0	0	0.0%	0.0%
Natural Fibres other 100% (bamboo, hemp, silk, mohair, linen)	0	0	0.0%	0.0%
Viscose/ Rayon (10%)/ Lyocell/ Modal	0	0	0.0%	0.0%
Acrylic (100%)	0	0	0.0%	0.0%
Acrylic (80%)	0	0	0.0%	0.0%
Polyurethane/ PVC	0	0	0.0%	0.0%
Polypropylene	0	0	0.0%	0.0%
Other	68	30.95	13.2%	12.9%
<b>Total</b>	<b>517</b>	<b>240.7</b>	<b>100.0%</b>	<b>100.0%</b>

Uniforms were subject to the same optical sorter read issues as the main clothing stock where for 100% cotton, in most cases it shows 40-60% of viscose and 40-50% of cotton blend. For polyester jackets, the optical sorter cannot detect the accurate fibre type and shown it as unknown. Some cotton samples read 80% viscose and some as polyester. It could be that some of the silicone, or other chemical coatings applied to clothing as protection affect the optical sorter reading.

### 3.4.5 Manufacturer of uniforms

Brands of uniform manufacturers with over 1% of clothing are shown in Table 18. The majority of uniforms were from numerous other manufacturers. Wesfarmers Workwear Group comprise 12% of the product (KingGee, Hard Yakka and Australian Workwear), followed by PIP's Bisley (9,3%) and Paramount Safety Products Workit (6%). Positively, the dominant brands are predominantly Australian owned companies.

Table 18 Uniforms by manufacturer

Brand	Parent Company	Count	Weight	Count(%)	Weight (%)
Bisley	Protective Industrial Products	86	46.8	6.2%	9.3%
King Gee	Wesfarmers/ Workwear Group	71	36.15	5.2%	7.2%
Workit	Paramount Safety Products	55	30.2	4.0%	6.0%
Hard Yakka	Wesfarmers/ Workwear Group	33	18.65	2.4%	3.7%
JB's Wear	JB's Wear	54	17.8	3.9%	3.5%
DNC	Comfort Uniforms	20	12.7	1.5%	2.5%
Biz Collection	Fashion Biz	39	11.95	2.8%	2.4%
Master Workwear	Master Workwear	14	11.65	1.0%	2.3%
Eleven Workwear	Eleven Workwear	16	7.6	1.2%	1.5%
Jackeroo	Kmart	20	6.4	1.5%	1.3%
Australian Workwear	Wesfarmers/ Workwear Group	13	5.5	0.9%	1.1%
Other		957	298.5	69.4%	59.2%
<b>Total</b>		<b>1378</b>	<b>503.9</b>	<b>100.0%</b>	<b>100.0%</b>

### 3.4.6 Uniform logo

Good Sammy receives at least 2.5% of general donation stock with logos.

Approximately one-third of uniforms are high visibility workwear. But a significant portion are school uniforms (13%), sports uniforms (11%), merchandise and other corporate wear (see Table 19).

The majority (70%+) of uniforms/ logoed clothing are in wearable condition. Charities have different viewpoints on whether they will sell, export or recycle/landfill logoed clothing. Seamless defined uniforms as unwearable – however for most charities there is the choice of treating them as a revenue or a cost. As its wearable clothing that has been donated to the charity, where there is a demand for the item in local stores or export it may be sold, rather than becoming a cost burden. High visibility workwear in good condition is in reasonable demand in charity stores.

The logos on each uniform item were noted. Companies with more than 5 garments with their logo have been named in the relevant category as examples.

Table 19 Uniforms donated by organisation type

Organisation type	Count	Proportion	Examples of logos
Corporate	114	13.0%	Any office based company that didn't fit into other categories e.g. recruitment, accounting, marketing. Telstra & Vodafone
School Uniform	114	13.0%	Churchlands, Peter Carnley Anglican School, The Kings College, Wellard Primary, Mount Hawthorn Primary, 8 primary schools, 12 secondary colleges & 10 tertiary institutions,
Mining	97	11.1%	Newmont, RioTinto, Alcoa, FMG, Mineral Resources, BHP
Sports Uniform	94	10.7%	WA Cricket, WACA Group, AusInd Cricket, Celtic Football Club, rugby, soccer, football, cricket, martial arts
Logistics	62	7.1%	Australia Post, Star Track Express, plus 20 other courier or freight services, 2 waste companies
Merchandise	61	7.0%	HBF Run for a reason, BAAWA, Cancer Council, marathon, and other competition shirts
Mining Support Services	35	4.0%	Drilling companies, mining labour supply, mining hire equipment
Construction	33	3.8%	
Manufacturer	28	3.2%	
Engineering	34	3.9%	
Trades	26	3.0%	
Health	21	2.4%	Homecare providers, radiology, private medic transport service, Fiona Stanley Hospital
Fast Food	19	2.2%	KFC, Subway and 2 other providers
Retail	19	2.2%	Coles, Woolworths, 2 other supermarket chains, 4 other retailers
Government	18	2.1%	9 government agencies
Oil & Gas	17	1.9%	Chevron (5+ garments) plus 8 other companies with 1+ garment
Community Group	14	1.6%	Environmental groups, Church groups, cultural groups
Hospitality	12	1.4%	Restaurants, bars, hotels, airlines and cruise providers'
Security	12	1.4%	
Energy	11	1.3%	
Automotive	9	1.0%	Car and automotive parts sales companies
Construction Support Services	9	1.0%	Traffic management, cement supplier, glass, door and ceramic suppliers
Maintenance and facility management services	7	0.8%	
Unknown	9	1.0%	
<b>Total</b>	<b>875</b>	<b>100.0%</b>	

The number and type of logos on a uniform directly influence how easily the garment can be de-branded and kept in circulation for longer. However, there is a growing trend toward embroidering logos onto workwear, which significantly reduces the economic viability of recovering these garments.

Good Sammy, in partnership with Fibre Economy, conducted a debranding assessment on quality workwear from a range of organisations. Even the smallest logos—some no larger than a 5-cent coin—were so densely embroidered that removing them without damaging the garment was nearly impossible. Many of these small, inconspicuous logos appear to exist primarily to meet tax requirements for uniform supply and laundering deductions, yet they still pose a major barrier to reuse.

Of the 875 garments assessed, 50% featured one logo, 35% had two, and a smaller proportion displayed between three and eight logos (Table 20). More than 100 garments (12%) included personalised names, further limiting their potential for internal reuse within organisations. Overall, 57% of logos were embroidered, 42% were printed, and only 1% were removable badges.

*Table 20 Number of logos*

Number of logos	Number of garments	Proportion
1	433	49.5%
2	303	34.6%
3	66	7.5%
4	45	5.1%
5	10	1.1%
6	15	1.7%
7	2	0.2%
8	1	0.1%
Total	875	100.0%

*Table 21 Number and size of logos on garments*

Number of logos	Small	Medium	Large
1	347	67	18
2	398	107	99
3	128	31	38
4	113	20	47
5	33	8	9
6	56	11	23

Number of logos	Small	Medium	Large
7	8	3	3
8	4	4	
Total	1087	251	237



## 4 Key findings

Below is a summary of key findings.

### 4.1 Unwearables

The main characteristics of unwearable clothing compared to the general donation stream are:

- Garment type. Unwearables tend to include a higher proportion of:
  - childrens/ baby clothing – largely due to staining
  - menswear – reflecting the tendency for items to be worn until end of life
  - socks and underwearUnwearables contain a lower proportion of:
  - womenswear – which is typically donated after light use (especially dresses)
  - heavy or winter clothing -which is more durable and often experiences less wear
  - jeans – due to their overall durability
- Condition:
  - 20% of unwearables are stained
  - 6% is suitable for use as rag
  - 4% consists of socks and underwear
  - 3% is uniforms/ logo branded clothing
  - less than 1% is repairable
  - remaining items are unwearable due to damage or general wear & tear.
- Fibre type:
  - is broadly consistent with Good Sammy's historical fibre-type data
  - higher prevalence of unreadable labels, due to wear
  - higher proportion of cotton-based garments, reflecting both the dominance of natural fibres in everyday clothing and the way natural fibres wear over time.
- Brands:
  - the major brands represented are similar across both unwearable and general donation streams.
- Colour:
  - colour profiles closely match the general donation mix
  - slightly lower amounts of blue denim reflecting its longer lifespan.

- Fixings:
  - Hard fixings - 50–60% of unwearable items contain no hard fixings, reducing manual processing. Common hard fixings include buttons, zips, press studs, eyelets, sequins, beads, buckles and hooks.
  - Soft-fixings - All garments contain labels often made from a different fibre. Common soft fixings include labels, velcro, lace, embossing, elastic, reflective strips, padding (e.g. shoulder pads), and embroidery. Depending on the recycling pathway and the level of fibre purity required, soft fixings may also need to be removed.

## 4.2 Uniforms

Characteristics of uniforms, workwear and branded merchandise were assessed across more than 1000 items.

- Condition – 70% of uniforms were immediately wearable, and further 10% required washing. The remainder were too stained or heavily worn to be considered wearable.
- Fibre type - uniforms are predominantly 100% cotton (43%) or 95%+ polyester (25.5%). Most heavy-duty high visibility clothing and corporate wear is 100% cotton, apart from the reflective strips and fixings on high vis clothing. Sportswear, school uniforms, high vis vests and merchandise tops are typically 100% polyester.
- Brands - the most common brands were largely from Australian owned companies showing strong potential to influence uniform design through improved procurement practices and policy settings.
- Logos & de-branding - The number and type of logos on a uniform directly influence how easily the garment can be de-branded and kept in circulation for longer. However, there is a growing trend toward embroidering logos onto workwear, which significantly reduces the economic viability of recovering these garments. Of the 875 garments assessed by logo:
  - 50% featured one logo, 35% had two, and a smaller proportion displayed between three and eight logos
  - More than 100 garments (12%) included personalised names
  - 57% of logos were embroidered, 42% were printed, and only 1% were removable badges

## 4.3 Donation quality

Community donations from community donation bins and stores:

- Almost 80% of donated clothing is wearable. Of this:
  - 42% is considered *locally saleable* (high and medium quality).
  - 36% is *wearable but not locally saleable* and is therefore directed to export markets due to limited local demand.
- The remaining 21% of donations are unwearable, comprising:
  - 14% recyclable textiles (e.g., stained items, unwearable clothing, socks, underwear, and workwear)
  - 5% items that could be washed or repaired
  - 1% suitable for rag
  - 1% sent to landfill (e.g., unwearable bras or socks)

Yellow (quality) and blue (unwearable) bag collection trial:

- There was a high participation rate (21.7%) in the yellow/blue bag collection trial indicated a community desire for this service.
- The quality differentiation between the yellow and blue bag contents showed an understanding of wearable vs unwearable.
- Low wearable is a values-based judgement. The high proportion of low wearable in both the yellow and blue bag indicates that the community are divided on whether it is locally store saleable or not.
- On average households put out 6.7kg for yellow bag donations and 2kg for blue bags.

## 5 Discussion

Textiles going to landfill, including some unwearables, come from a large range of sources across Australia including:

- Retailers with surplus and out of season stock
- Uniform manufacturers and embroiderers
- Aged care, community care and health organisations
- Offices, workplaces and minesites
- Schools, sports and community organisations
- Commercial clothing reuse operators
- Charitable reuse organisation
- Community donation bins
- Household landfill and recycling bins
- Bulk kerbside collections
- Removalists, junk collectors, deceased estates
- Ragging operators
- Offcuts from manufacturers and design houses – including TAFEs and universities

Each of these organisations will have different characteristics that apply to their unwearable outputs. There are different interventions required to reduce unwearables and collect unwearables from each of these sources.

This study focuses on the unwearables from Good Sammy. However, some of the learnings can be broadly applied to general unwearables generated in the community. Others can be applied specifically to the characteristics of donations received by charities.

### 5.1 Representativeness of Good Sammy data

Good Sammy recognises that there are differences in each charity's acceptance, collection, sorting and end market models. It is anticipated that assumptions could be made for some of the data sets to make them translatable to model national data. The following considerations apply to each data set.

Table 22 Relevance of data sets to other charities or clothing streams

<b>Data type</b>	<b>Description.</b>	<b>Data accuracy</b>
Fibre Identification	Should be highly representative of most pre-loved clothing streams. Reflects a higher proportion of cotton and natural fibres than new or surplus retail streams where a higher proportion of synthetic fibres are observed.	Robust
Fibre identification – optical sorter	Should be representative of most pre-loved clothing streams, limitations may be specific to the optical sorter brand used.	Moderate
Garment type	Should be representative of most pre-loved clothing streams. Different garment categories may need to be agreed on to apply to all charities and for end use markets	Moderate
Condition	Different acceptance criteria at different charity stores, Also subjective views on quality, brand and condition	Moderate
Colour	Should be representative of most pre-loved clothing streams	Moderate
Decommissioning	Should be representative of most pre-loved clothing streams manual decommissioning processes. Bulk quantities of uniforms may have specific characteristics.	Moderate
Timing	Varies according to methods used and skills of staff. Good Sammy data is representative of staff with a moderate disability and newly skilled decommissioning staff.	Moderate
Kerbside collection data	Large data set used over multiple demographics.	Robust
<b>Additional data sets available</b>		
Workwear	WA potentially has higher proportion of high vis workwear than most other states. More data needed.	Moderate
Brand	Large data set over 12 months	Robust
Landfill composition	Would vary according to collection & sorting practices in each charity and store.	Low
Repair data	More data needed, but would be representative of the sector if more data was available. Confident that between 0.5%-1% is viably repairable but nationally that is a big difference in tonnes & cost of repair.	Low
Country of origin	More data needed	Moderate
Average product weights	By garment type, collected over multiple samples over time with various data verification.	Robust

Data type	Description.	Data accuracy
Soft toys & Cushions – fibre types and whether they have fixings	To determine 95%+ polyester, contaminants and pre-processing required to establish whether the polyester from these items could be used for textile recycling	Moderate

## 5.2 Considerations for a national unwearables collection scheme

Any national solution for managing unwearables needs to factor in the existing generation points, collection streams and the significant social benefit that is delivered by charitable reuse organisations, generating for purpose funding through the sale of donated goods.

Community donation bins, accessible 24/7, are also one of the most cost-effective methods of diverting clothing from landfill, and providing an accessible and affordable, contained, donation points across Australia.

Placing wearable and unwearable donation bins at charitable reuse stores encourages people to buy second hand when they drop off pre-loved clothing. Charities with limited logistics or centralised operations would need additional support, via subsidised collections and offsetting handling costs, to manage unwearables that may currently be going to landfill. Unwearables could be collected in differentiated bags from the wearable clothing.

The prevalence of school uniforms, sports uniforms and merchandise clothing demonstrates the opportunity for those organisations to take more responsibility for encouraging reuse and appropriate end of life handling of their clothing, directly or via their uniform manufacturer.

Similarly corporate/ workwear providers could be more accountable for the uniforms they distribute to staff. Currently a tax incentive exists for branded workwear distribution and washing, which has a perverse outcome of shortening the life of

garments as logos change or staff leave and don't return uniforms. A tax rebate could be offered for workplaces that onshore recycle branded workwear.



### **5.3 Considerations for end of life markets**




There is strong national and state policy momentum toward low-carbon, circular, and locally manufactured products. However, the procurement settings and market signals required to support these outcomes are not yet in place. Current conditions—such as low landfill and Energy-from-Waste costs, import and export settings, and conservative planning frameworks—undermine the economic viability of local recycling.

Australia has already seen multiple recycling streams collapse (e.g., soft plastics, tyres, paper) where infrastructure was built on aspirational policy targets that were not backed by timely market levers or procurement requirements. To avoid repeating this pattern, there is an opportunity for Seamless, the industry and Federal and State Governments to work together, to prioritise market development for insulation, fill, and other products made from high volume, mixed fibre, unwearable textiles.

Establishing robust end markets is essential. Once stable demand exists, collection and processing systems can scale and respond sustainably. It is hoped that this study will result in prioritisation and establishment of markets, rather than collection systems, as collection systems without local end markets will have perverse outcomes.

## Appendix A - Definitions

<p><b>Unwearable</b></p>	<ul style="list-style-type: none"> <li>• Medium to heavy stains</li> <li>• Elastic not working</li> <li>• Requires repairs</li> <li>• Torn or damaged</li> <li>• Worn bras, socks</li> <li>• Worn underwear</li> </ul> 
<p><b>Low wearable</b> <b>(Export grade)</b></p>	<ul style="list-style-type: none"> <li>• Medium condition department store clothing or no tags (Kmart, Shien etc)</li> <li>• Any clothes that are wearable but faded, pilled, light staining on underarms or neck, light wear around cuffs.</li> <li>• Minor repair required but still wearable i.e. non essential button, or small hole</li> <li>• Washable clothing - including covered in animal hair</li> <li>• Good condition bras and socks</li> <li>• Good condition swimwear</li> </ul> 

<p><b>Medium Wearable</b></p> <p>(Store grade/ Export Grade)</p>	<ul style="list-style-type: none"> <li>• Excellent condition department store brands or no tags (Kmart, Target, Shein etc)</li> <li>• Good condition, medium brands</li> <li>• Low condition, top brands</li> <li>• Excellent condition bras</li> <li>• Excellent condition swimwear</li> </ul>	
<p><b>High wearable</b></p> <p>(Store grade)</p>	<ul style="list-style-type: none"> <li>• Excellent condition, medium brands (Department store brands i.e. (\$40+new – e.g. Sussan, Jacqui E, Sportsgirl, Just Jeans)</li> <li>• Good condition, top brands (i.e. items \$80+ new)</li> <li>• Brand new clothing</li> </ul>	
<p><b>Uniforms</b></p>	<ul style="list-style-type: none"> <li>• High vis/ heavy duty workwear</li> <li>• Office wear - branded</li> <li>• School uniforms</li> <li>• Sports clothing of local teams</li> <li>• <i>Excludes sports or brand merchandise of professional teams/bands</i></li> </ul>	
<p><b>Other</b></p>	<ul style="list-style-type: none"> <li>• Hats</li> <li>• Caps</li> <li>• Baby bibs</li> <li>• Baby wraps/ swaddles/ sleeping bags</li> </ul>	

	<ul style="list-style-type: none"><li>• Pillow cases</li><li>• Scarves</li><li>• Pouches</li><li>• Strings</li><li>• Fabric off cuts</li></ul>
<b>Rubbish</b>	<ul style="list-style-type: none"><li>• Heavily oil stained</li><li>• Polyurethane or PVC clothing unwearable</li><li>• Bras that are unwearable</li><li>• Textiles noticeably contaminated with body fluids – e.g. blood or faeces</li><li>• Feather filled Jackets or other clothing</li><li>• Items that are mostly embellishments or fixtures with minimal recoverable fabric</li><li>• Items that are primarily elastane – e.g. most swimwear in poor condition.</li></ul>

## Colours

Blue & Purple

983	681	486
503	910	230
638	713	576
864	524	186
499	101	995

Red

321	970	459
874	889	

Brown

976	123	624
-----	-----	-----

Green

515	751	483
431	425	903
725	508	817

Orange, cream & yellow

663	307
764	512

White

863
-----

Grey – including black & white mixed patterns

192
-----

Black

741
-----

Denim – blue

#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff
#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff
#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff
#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff
#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff
#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff
#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff	#1e90ff

Patterns & mixed colours

## **Appendix B - Zip Decommissioning Trial**

# Reclaimed Zip Project



SLOW FASHION HUB  
*To The Power Of You*

Prepared by:  
Anastasia Gazis

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# 1. Purpose and Context

This sub-report, documents the outcomes and learnings from the *Reclaimed Zip Project*, undertaken as part of Good Sammy's garment decommissioning and shredding preparation process, for ThreadUp Australia in Western Australia.

As part of this collaboration, *To the Power of You* receives zip off-cuts removed from garments prior to shredding. These zips form a distinct waste stream generated during the preparation of feedstock for ThreadUp's shredding machinery.

The purpose of this work has been to:

- Test the technical feasibility of reclaiming zips from decommissioned garments
- Assess recovery costs and system constraints
- Explore whether reclaimed zips could form a viable circular input back into garment manufacturing

This project was supported through Good Sammy's/Seamless Circular Clothing Textile Fund grant, with *To the Power of You* receiving AUD \$1,500 to contribute to transport, processing, labelling, and data collection.

## 2. Scope and Method

### 2.1 Scope

This assessment focuses on the **reclaiming intervention** only. The system boundary includes:

- Decommissioned zip waste generated in Australia
- Manual reclaiming processes (unpicking, cleaning, steaming, measuring, labelling)
- Transport required to enable reclaiming and reintegration

The following are **out of scope**:

- Original manufacture of zips prior to garment production
- Historical transport of zips through garment supply chains
- Downstream consumer use once zips are reintegrated

This boundary has been applied deliberately to avoid speculative lifecycle modelling and to keep analysis relevant to decisions within the project's control.

## 2.2 Methodological Approach

To ensure consistency across varied zip lengths and processing conditions:

- Recovery costs are calculated **per centimetre of zip**
- An **average zip length of 32 cm** is used as a reference unit for readability
- All figures represent **recovery costs only** (labour and transport), with **no markup, profit, overheads, or unpaid time** included

Materials and carbon impacts are addressed using **proxy metrics and scenario comparisons**, not full lifecycle assessment.

## 2.3 Process Images



*Image 1. Decommissioned zip waste*



*Image 2. Removal of zips for garment scraps*



*Image 3. Pressing, measuring, labelling*



*Image 4. Reclaimed zips*

## 3. Trial Outcomes and Cost Summary

### 3.1 Overview of Trials

Two processing trials have been completed to date, both undertaken with a trained team in Indonesia. A third scenario is presented as a **best-case projection** based on scaled volumes and improved logistics.

The trials were exploratory in nature and intended to surface technical, cost, and system-level constraints rather than to demonstrate commercial readiness.

### 3.2 Trial Summary (Comparable Costing Basis)

Trial	Input Weight	Reclaimed Zips	Estimated Total Length (cm)	Labour Cost (AUD)	Transport Cost (AUD)	Total Recovery Cost (AUD)	Recovery Cost per cm
Trial 1 (Actual)	7 kg	111	3,610 (measured)	380	100	480	~13.3 c/cm
Trial 2 (Actual)	5 kg	105	3,412.5 (estimated)	500	310	810	~23.7 c/cm
Trial 3 (Projected)	65 kg	~1,365	44,362.5 (estimated)	6,500	741.60	7,241.60	~16.3 c/cm

**Figure 1:** This table presents recovery costs on a **comparable per-centimetre basis** to account for variability in zip length and batch composition across trials. Trials 1 and 2 reflect **actual pilot conditions** with different transport arrangements and external disruptions, while Trial 3 represents a **best-case projected scenario** based on scaled volumes, consolidated freight, and improved logistics. Differences in recovery cost per centimetre are driven primarily by **transport conditions and scale**, rather than by reclaiming labour efficiency. Figures represent **recovery costs only** (labour and transport), with no allowance for overheads, profit, or unpaid time.

## 3.3 Key Trial Conditions

### Trial 1 - Proof of Concept

- Transport relied on personal travel and excess airline luggage
- All material sent offshore was returned to Australia, including fabric scraps
- Conditions are not commercially replicable but suitable for feasibility testing

### Trial 2 - Operational Refinement

- Transport relied on postal services and third-party travel
- Additional charges were applied on arrival in Indonesia, potentially due to misapplied duties/taxes on a low-value waste stream
- Return transport was affected by flight disruptions caused by a volcanic eruption.
- These conditions exposed transport volatility and regulatory risk

### Trial 3 - Best-Case Projection

- Based on 65 kg of decommissioned zip waste currently held
- Assumes consolidated freight, and correct documentation to confirm the imported goods have no monetary value. This will help to avoid duties/taxes
- Only reclaimed zips are returned; fabric scraps remain offshore
- This introduces ethical and potential future regulatory considerations

## 4. Key Findings and Constraints

### 4.1 Technical Feasibility

Across both completed trials, zips were successfully reclaimed to a standard suitable for reuse. The work requires **high manual dexterity**, not mechanisation, and was performed consistently by trained workers.

Trial 2 confirmed that additional steps (measuring and labelling) are required to prepare reclaimed zips for resale or reintegration into manufacturing.

## 4.2 Yield Efficiency

Pre-sorting of decommissioned zip waste improved yield efficiency. Trial 2 achieved:

- A higher number of usable zips per kilogram
- A consistent reclaimed zip weight ratio of approximately **22%**

Upstream quality control is therefore critical to reclaiming outcomes.

## 4.3 Cost Drivers

Labour costs increased between Trial 1 and Trial 2 due to expanded processing requirements but proved predictable once a resale-ready standard was established.

Transport emerged as the **dominant cost and risk driver**, influencing:

- Total recovery cost
- Cost per centimetre
- Overall viability

## 4.4 Environmental Logic vs Economic Reality

Reclaiming zips offshore to access affordable labour is currently the most economically viable option, but it carries a disproportionate environmental burden due to long-distance transport.

The most environmentally rational pathway—reclaiming components close to where waste arises or near manufacturing locations—exists but is not economically supported under current labour cost structures.

## 4.5 Labour as a Structural Constraint

In Australia, reclaiming zips locally is technically feasible but constrained by labour costs. Not-for-profit and social enterprise models with subsidised labour—such as organisations supporting workforce participation and skills development—are currently the most viable mechanisms for delivering best-practice environmental outcomes locally.

This demonstrates that labour economics, rather than technical feasibility, constrain circular best practice.

## 5. Sustainability Logic (High-Level)

Two system logics are compared to assess sustainability outcomes at a component level.

### System Logic A - Offshore Reclaiming (Current Approach)

- Australian zip waste transported offshore to access affordable labour
- Reclaimed zips transported back to Australia for storage and potential reintegration
- Environmental impact driven primarily by long-distance air freight
- Economically viable under current labour conditions, but environmentally sub-optimal

### System Logic B - Local Reclaiming Aligned with Manufacturing (Preferred Logic)

- Zip waste reclaimed close to the point of waste generation or near manufacturing locations
- Reclaimed components remain within local or regional production systems
- Transport requirements are minimal
- Environmental impact driven primarily by processing, not logistics

This comparison highlights a systemic misalignment between current economic drivers (labour availability and cost) and environmentally optimal circular pathways. The following section quantifies this difference using proxy materials and transport metrics.

## 6. Materials and Transport Metrics (Proxy Analysis)

Material impact figures are based on publicly available comparative data for polyester, nylon, and aluminium production (Selfless Clothes, n.d.; Capral Aluminium, 2023; Alumeco, n.d.). Due to variability across manufacturing methods, energy sources, and geographic contexts, midpoint or representative values from published ranges have been applied as proxy metrics. These figures are intended to support high-level comparison between reclaimed and newly manufactured zip components rather than to represent a full lifecycle assessment.

Transport emission factors used in this assessment are drawn from publicly available freight emissions guidance and calculators. To avoid over-precision, midpoint averages within commonly

cited ranges have been applied and clearly stated as proxy values rather than full lifecycle metrics (Climate Action Accelerator, n.d.; ECTA & Cefic, 2011; Freightos, n.d.).

## 6.1 Physical Baseline (Confirmed)

The following physical metrics are derived from measured trial data and are used consistently throughout the analysis:

- Average reclaimed zip mass: **~0.325 g per cm**
- Average reference zip length: **32 cm**
- Approximate mass per average zip: **~10.4 g**
- Indicative material composition (average):
  - **~90% polymer-based materials** (nylon/polyester tape and plastic teeth)
  - **~10% metal components** (slider and some teeth)

All calculations below use this average zip as the functional unit.

## 6.2 Materials Impact Metric - New Zip Made from Virgin Materials

Using proxy data for material production impacts, the manufacture of a **new zip made from virgin materials** (nylon tape with aluminium components) has been estimated at:

- **0.196 kg CO<sub>2</sub> per average 32 cm zip**

This value represents the embodied carbon associated with producing a new zip component from virgin materials, excluding garment assembly.

### Material savings from reclaiming:

- Each reclaimed zip that replaces a new zip avoids approximately **196 g CO<sub>2</sub>** associated with material production.
- For the 65 kg of decommissioned zip waste assessed in this report:
  - Approximate reclaimed zips produced: **1,365**
  - Avoided new zip material production emissions:  
**~267 kg CO<sub>2</sub>** ( $1,365 \times 0.196 \text{ kg CO}_2$ )

This demonstrates that the dominant sustainability benefit of the project lies in **displacing the manufacture of new zip components**, rather than in the reclaiming process itself.

## 6.3 Transport Impact Metrics - Average-Factor Method (65 kg Scenario)

Transport impacts have been assessed using **average emissions factors** derived from published ranges, explicitly adopting the midpoint of each range to provide a single indicative value rather than a band.

### Assumptions:

- Scenario assessed: **65 kg of decommissioned zip waste** (current stock held).
- Reclaimed zip return mass: **22%** of input weight (14.3 kg).
- Reclaimed zips produced: **~1,365 zips** (21 zips per kg input).
- Reclaimed zips are returned to the project holder (not onward to manufacturers).
- No additional transport legs beyond reclaiming and return are included.
- Emissions factors used are **averages of published ranges**, not worst-case values.

### Emissions Factors Used (Average Values):

- **Air freight:** 750 g CO<sub>2</sub> per tonne-km
- **Road freight:** 105 g CO<sub>2</sub> per tonne-km

### Distances:

- **Perth ↔ Bali (air):** 2,600 km one way
- **Local road transport:**
  - 20 km outbound (waste to reclaiming)
  - 20 km inbound (reclaimed zips returned)

### Transport Emissions - Offshore Reclaiming (Air Freight)

**Outbound leg (65 kg, Perth → Bali):**

- CO<sub>2</sub> emissions: **126.75 kg CO<sub>2</sub>**
- Per zip: **92.9 g CO<sub>2</sub>**

**Inbound leg (14.3 kg, Bali → Perth):**

- CO<sub>2</sub> emissions: **27.89 kg CO<sub>2</sub>**
- Per zip: **20.4 g CO<sub>2</sub>**

**Total transport emissions (offshore scenario):**

- **154.64 kg CO<sub>2</sub>**
- **113.3 g CO<sub>2</sub> per reclaimed zip**

## **Transport Emissions - Local Reclaiming (Road Transport)**

**Outbound leg (65 kg, 20 km):**

- CO<sub>2</sub> emissions: **0.1365 kg CO<sub>2</sub>**
- Per zip: **0.100 g CO<sub>2</sub>**

**Inbound leg (14.3 kg, 20 km):**

- CO<sub>2</sub> emissions: **0.0300 kg CO<sub>2</sub>**
- Per zip: **0.022 g CO<sub>2</sub>**

**Total transport emissions (local scenario):**

- **0.1665 kg CO<sub>2</sub>**
- **0.122 g CO<sub>2</sub> per reclaimed zip**

## **6.4 Comparative Interpretation**

When assessed on a per-zip basis:

- **Offshore reclaiming (air freight):**  
~113 g CO<sub>2</sub> per zip (transport only)
- **Local reclaiming (road transport):**  
~0.12 g CO<sub>2</sub> per zip (transport only)
- **Avoided new zip manufacture:**  
~196 g CO<sub>2</sub> per zip savings

This indicates that:

- The **largest climate benefit** comes from avoiding the manufacture of new zip components.
- Offshore air freight substantially erodes this benefit, consuming more than half of the avoided material emissions per zip.
- Local reclaiming preserves nearly the full material benefit by minimising transport emissions.

## 6.5 Summary Table - Materials and Transport Impact (Average Zip, 32 cm)

**Scenario basis:** 65 kg decommissioned zip waste → 14.3 kg reclaimed zips → ~1,365 reclaimed zips. All transport figures use **average emissions factors** (midpoints of published ranges).

Impact Category	Metric Basis	Offshore Reclaiming (Air Freight, Bali)	Local Reclaiming (Road Transport)	Notes
<b>Materials Impact</b>	New zip made from virgin materials	<b>0.196 kg CO<sub>2</sub> per zip avoided</b>	<b>0.196 kg CO<sub>2</sub> per zip avoided</b>	Same material benefit applies regardless of reclaiming location
<b>Transport – Outbound</b>	Decommissioned zip waste	<b>92.9 g CO<sub>2</sub> per zip</b>	<b>0.100 g CO<sub>2</sub> per zip</b>	Outbound leg allocated across reclaimed zips produced
<b>Transport – Inbound</b>	Reclaimed zips returned to project holder	<b>20.4 g CO<sub>2</sub> per zip</b>	<b>0.022 g CO<sub>2</sub> per zip</b>	Only reclaimed zips transported on return leg
<b>Total Transport Impact</b>	Outbound + inbound	<b>113.3 g CO<sub>2</sub> per zip</b>	<b>0.122 g CO<sub>2</sub> per zip</b>	Transport only; excludes any onward manufacturing leg
<b>Net Climate Logic</b>	Materials vs transport	Transport consumes <b>&gt;50%</b> of material benefit	Transport impact is <b>negligible</b>	Explains divergence between economic and environmental logic

**Figure 2:** The table shows that while reclaiming a zip avoids approximately **196 g CO<sub>2</sub>** from new material production, offshore air freight consumes more than half of this benefit through transport emissions alone. Local reclaiming preserves nearly the full material benefit by minimising transport impacts.

## 7. Implications and Learnings

This sub-project demonstrates that:

- component-level circularity is technically achievable,
- transport, not reclaiming, is the primary environmental and cost constraint,
- and labour economics play a decisive role in determining whether environmentally preferred pathways can be implemented.

The findings suggest that future circular initiatives would benefit from:

- aligning reclaiming activities with manufacturing locations,
- supporting subsidised labour pathways for local reclaiming,
- and embedding acceptance of reclaimed components within procurement frameworks.

These insights are offered as learnings rather than recommendations, reflecting the exploratory scope of this contribution.

## 8. Conclusion

The Reclaimed Zip Project has successfully tested the technical feasibility of reclaiming zips from decommissioned garments and has surfaced key system-level constraints affecting viability.

While reclaiming is achievable and yields usable components, current economic and logistical structures favour environmentally sub-optimal pathways. Addressing these misalignments will require coordinated interventions beyond the scope of this sub-project, particularly in labour models and procurement settings.

*To the Power of You* is pleased to have contributed this learning to Good Sammy's broader work on garment decommissioning and to the collective transition toward a more circular fashion system.

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