

NATIONAL NETWORK ASSESSMENT REPORT: E-PRODUCT AND E-WASTE MANAGEMENT SERVICES IN AOTEAROA NEW ZEALAND

FEBRUARY 2021

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EXECUTIVE SUMMARY

On 29 July 2020, pursuant to section 9 (1) of the Waste Minimisation Act 2008 (the Act), the Honourable Eugenie Sage, Associate Minister for the Environment, acting under delegated authority, scheduled 'Electrical and Electronic Products' (e-products) as one of six priority products for the purposes of the Act.

A priority product declaration under the Act means:

- a product stewardship scheme must be developed and accredited for a priority product as soon as practicable; and
- 2. regulations can be made allowing sale of priority products only in accordance with an accredited scheme.

The New Zealand Government is using a co-design process to develop suitable scheme design options for e-products, ensuring that key stakeholders are actively engaged and involved throughout the co-design process.

Alongside the priority product declaration was an announcement of grant funding awarded to TechCollect NZ, under New Zealand's Waste Minimisation Fund (WMF) administered by the Ministry for the Environment (the Ministry), to coordinate the co-design process and work in a collaborative way with key stakeholders to recommend the best options for a local scheme. TechCollect NZ is a member-based, not-for-profit organisation established to support the development of an effective regulatory product stewardship system for e-products in Aotearoa New Zealand.

As a first step in the co-design process, TechCollect NZ convened a Circular E-Stewards Network (CEN) of key stakeholders across government, industry and community with the goal of developing, refining and recommending regulated scheme options for e-products that are fit-for-purpose in Aotearoa New Zealand. New Zealand government agencies and authorities, member-based and private organisations represented in the CEN include Abilities Group, Australia and New Zealand Recycling Platform Limited, Consumer NZ, eDay Trust, Ernst & Young (as independent chair), Fire and Emergency New Zealand, Para Kore, Remarkit Solutions Limited, Retail NZ, TES-AMM Australia and New Zealand, Territorial Authorities Officers Forum, WasteMINZ, The WEEE Forum, WorkSafe New Zealand and Zero Waste Network. Ministry officials were also involved as observers.

One of the key deliverables in the co-design process includes undertaking a national assessment of e-product and e-waste (unwanted or end-of-life e-products) management services, reviewing Aotearoa New Zealand's e-product repair and reuse market and all e-waste collection sites, recycling facilities and available logistics networks.

TechCollect NZ has collaborated with members of the CEN to undertake this assessment including:

- A desktop audit of available e-product and e-waste management services nationally;
- Geographic information system (GIS) drive time and population mapping;
- Data analysis and development of summary report capturing all key findings.

The assessment summary report will be used to assist the CEN in developing suitable scheme design options recommended for a regulated e-product stewardship system in Aotearoa New Zealand and inform scheme design elements, such as reasonable or convenient scheme access to available logistics networks.

Waste Minimisation Fund disclaimer

The co-design project that this research is part of is supported by co-funding from the WMF administered by the Ministry. However, this report does not reflect the views of the Ministry and the Ministry does not support the content of the publication in any way.



KEY FINDINGS

The key findings of this assessment are summarised below:

- Overall, there is an active national network of e-product and e-waste life cycle management services available across Aotearoa New Zealand; however, service access and capabilities differ greatly by region and e-product category.
- Across all e-waste collection points mapped through this assessment, 95.8% of the Aotearoa New Zealand population have access to an e-waste collection point within a drive time of up to 30 minutes. (Note, population access by e-product category is assessed further in the Analysis by Service Type section 11.)
- Across all direct reuse services for e-products mapped through this assessment, 83.2% of the Aotearoa New Zealand population have access to direct reuse services within a drive time of up to 30 minutes. (Note, population access by e-product category is assessed further in the Analysis by Service Type section 11.)
- Across all e-product repair and refurbishment services mapped through this assessment, 63.5% of the Aotearoa New Zealand population have access to e-product repair and refurbishment services within a drive time of up to 30 minutes. (Note, population access by e-product category is assessed further the Analysis by Service Type section 11.)
- Across all e-waste recycling facilities mapped through this assessment, 85.6% of the Aotearoa New Zealand population have access to an e-waste recycling facility within a drive time of up to 30 minutes. (Note, population access by e-product category is assessed further in the Analysis by Service Type section 11.)
- All e-product categories are widely accepted across the available services assessed; however, coverage for Category 3 (Lamps) is limited with only one recycler providing treatment services nationally.

- The main population centres in Aotearoa New Zealand are generally not well serviced for direct access to recycling services for most e-product categories. Categories 4 (Large equipment) and 6 (Small IT and telecommunication equipment) have the greatest coverage in the main centres.
- E-product repair and refurbishment is limited in terms of the e-product categories accepted, the location coverage and population access. Categories 3 (Lamps) and 7 (Batteries) are not accepted for repair services anywhere in Aotearoa New Zealand at present. The South Island has severely limited access to e-product repair and refurbishment services with no coverage for Category 1 (Temperature exchange equipment), only two sites (Nelson and Wanaka) for Categories 2 (Screens and monitors), 4 (Large equipment) and 6 (Small IT and telecommunication equipment) and one site (Nelson) for Category 5 (Small equipment).
- E-product direct reuse has greater coverage in the main centres than for repair and refurbishment. The best coverage is for Categories 2 (Screens and monitors), 4 (Large equipment), 5 (Small equipment), 6 (Small IT and telecommunication equipment) and 7 (Batteries). Coverage for Category 1 (Temperature exchange equipment) and 3 (Lamps) is poor.
- Many rural areas, with a population under 10 people per square kilometre, have limited access to all services.
- There is a wide range of charges made for the services. The charges for recycling are the highest. These higher costs are reflected in the charges made at collection, direct reuse, and repair and refurbishment sites when the product is likely to be recycled. Categories 2 (Screens and monitors) and 4 (Large equipment) have the highest charges for the recycling of Cathode Ray Tube (CRT) televisions and large printer equipment. These charges reflect the costs set by recyclers. Some products have a greater resale/resource value such as IT equipment, mobile phones or whiteware (due to the high ferrous metal content) and are more likely to be accepted at no cost.



1.0 INTRODUCTION

TechCollect NZ has collaborated with members of the CEN to perform a desktop audit of e-product and e-waste management services available in Aotearoa New Zealand, including e-product repair and reuse services, e-waste collection sites and recycling facilities. The assessment included geographical information systems (GIS) drive time and population mapping, and data analysis.

This network assessment and the accompanying summary report is one of the key deliverables in the co-design process and will help stakeholders and the working group to co-design scheme options proposed for a national scheme in Aotearoa New Zealand.

The scope of the assessment and the summary report was developed by TechCollect NZ.

NATIONAL ASSESSMENT OF E-PRODUCT AND E-WASTE MANAGEMENT SERVICES AVAILABLE TO THE PUBLIC IN AOTEAROA NEW ZEALAND

2.0 ASSESSMENT METHODOLOGY

TechCollect NZ has collaborated with members of the CEN to undertake a national assessment of e-product and e-waste management services available to the public in Aotearoa New Zealand. The assessment scope was developed by TechCollect NZ and includes the following stages:

Stage 1 – Desktop audit of available e-product and e-waste management services nationally.

Stage 2 – Geographic information system (GIS) drive time and population mapping.

Stage 3 – Data analysis and development of summary report capturing all key findings.



2.1 DESKTOP AUDIT

The methodology used for the desktop audit phase of the assessment involved defining the format of the database, and the process used to perform the desktop audit.

Database format

The data gathered through the desktop audit created a dataset that was used by Mappazzo in Stage 2 of the assessment to perform GIS mapping and drive time analysis. The formatting and content of the key data fields needed by Mappazzo was critical.

The data provided in the dataset includes:

- 1. Facility name
- 2. Public/Private owned
- 3. Organisation name
- 4. Website URL
- 5. Type of site (including retail)
- 6. Physical address
- 7. Territorial Authority/Region
- 8. Contact details
- 9. Location coordinates
 - 9.1 Type of e-waste collected (types 1 to 6 of European WEEE Directive categories plus an extra category for batteries).
- 10. Charges for accepting e-waste items
- 11. Services provided:
 - 11.1 E-waste collection
 - 11.2 Participation in voluntary e-product stewardship schemes
 - 11.3 E-product reuse
 - 11.4 E-product repair
 - 11.5 E-waste recycling

The websites of the following organisations/networks, etc. were accessed to perform the audit:

- 1. All Regional and Territorial Authorities listed in the Local Government New Zealand (LGNZ) website
- Private organisations known through previous experience, referenced through Territorial Authority websites, Google searches, etc
- Community enterprise and not for profit groups including Zero Waste Network and Environment Hubs Aotearoa members
- Op shops Red Cross, Habitat for Humanity and any others referenced by Territorial Authority websites
- Services provided through existing e-waste related voluntary product stewardship schemes – Fuji Xerox, Sharp, RE:MOBILE and Refrigerant recovery scheme
- 6. Brother New Zealand the drop-off locations that recycle Brother products
- 7. Other national community networks such as Rotary/ Lions etc
- Major retailers of electronic goods such as Harvey Norman, Smith City, Noel Leeming, Warehouse Stationery, and Farmers
- 9. Search of local electronic/electrical/TV repair and service businesses
- 10. Aotearoa New Zealand's main internet based service providers
- 11. Service providers that were referenced by the other organisations audited

2.2 GIS MAPPING AND DRIVE TIME ANALYSIS METHODOLOGY

Population Access Model

Zero Waste Network (ZWN) engaged Mappazzo Limited to undertake the GIS mapping, and the drive time and population mapping component of this assessment. Mappazzo is a New Zealand owned and operated business providing on-site services and consultation to clients across Aotearoa New Zealand. They provide local access to mapping, spatial/data analysis and professional engineering advice.

The spatial analysis of service availability and associated population coverage is based on the desktop analysis dataset produced by ZWN. The spatial analysis provides an understanding of the service availability and the percentage of our population that can access e-waste services (collection, servicing, repair and reuse).

Mappazzo Limited provided the technical analysis, including completion of the advanced spatial analysis to provide maps and calculate population coverage statistics.

The summary below provides details of the technical analysis completed by Mappazzo.

Mappazzo developed a custom software application (the Population Access Model) that takes one or more site locations and completes spatial calculations to produce map data and statistics describing the population which can access those sites.

The preparation of the Population Access Model as a custom software application was essential to ensure consistent repeatable results, to avoid errors in data processing and to allow detailed assessment of the dataset for multiple scenarios (groups / subsets of sites).

The model has three main calculation steps which take a set of locations (a scenario) and generate the required maps and data outputs.

Drive time analysis (1)

The first step is to analyse the road network to determine locations which are accessible from mapped locations.

This part of the model was completed using Targomo (targomo. com). Targomo uses road network data from Open Street Map (openstreetmap.org), calculating drive times by applying different speeds to different road types, accounting for intersection wait times and network features, such as turning restrictions, one-way roads and speed limits.

This analysis was completed for each location to generate isochrones for 10 min, 20 min and 30 min drive times.

Property coverage (2)

The second calculation step is to extend/ intersect and merge the isochrones generated by (1) with adjacent property boundaries (cadastral parcels).

This calculation uses spatial property data from Land Information New Zealand (LINZ) and identifies those properties which are in close proximity (within 50m) of the drive time isochrone. Those property boundaries are then merged with the drive time isochrones for each site in the scenario.

This step provides a spatial representation of properties which are accessible (within 10, 20, 30 min drive times) for the scenario.

Census intersection (3)

The final calculation step is to intersect census statistical areas with property coverage areas.

The census intersection uses 2018 census data from Stats NZ, applying population using "usually resident population count" for the smallest statistical areas (Statistical Area 1). To do this the model completes a spatial intersection to identify statistical areas which are covered by stage 2 (on previous page) and analyses statistical properties of those areas (population and density).

This step provides a final dataset suitable for map population coverage and total population covered by the scenario.

2.3

DATA ANALYSIS AND SUMMARY REPORT METHODOLOGY

The analysis of the profiles of the sites contained within the dataset, and the service gaps, has been performed using the raw dataset data, Trakk Assets tool, Population Coverage Stats and the following maps, all available in Appendix A:

- 1. Drop-off cover North 2020_11_30
- 2. Drop-off cover South 2020_11_30
- 3. Population North 2020_11_30
- 4. Population South 2020_11_30

The Trakk Assets tool includes additional maps showing the coverage of services for each e-product category. These maps have been used in the analysis.

Microsoft Pivot tables were used to calculate, summarise, and analyse the raw dataset to provide detailed comparisons, patterns, and trends. The Trakk Assets tool provides online access to the Dropoff (Collection), Repair, Recycle and Reuse maps. The tool combines the North and South offline maps into one map. The tool allows layers to be selected to the map, as appropriate, to add or suppress drive time and/or population data. The default black and white street map was used as the background layer. The additional maps that show the sites that provide services for categories 1 to 7 were also accessed.

Population Coverage Statistics were used to quantify the percentage of the population that has access to the services and sites in 10, 20 and 30 minute drive time intervals. The category coverage statistics were used to quantify the percentage of the population that has access to the sites for each e-product category.



Figure 1 — Trakk Assets tool national overview of available sites and services and legend



3.0 STAKEHOLDER GROUPINGS AND DEFINITIONS

The following stakeholder groupings and definitions have been used as the basis of classification of sites captured in the desktop audit. Stakeholder groupings and definitions have been informed by the Australian and New Zealand standards for collection, storage, transport and treatment of e-waste, i.e., AS/NZS 5377: 2013.

E-waste collection site:

- A place temporarily or permanently designated for receiving electrical and electronic equipment from the public in order to sort, aggregate or transport that equipment to storage or treatment facilities. Note:
 - 1. The collection site may be co-located with storage or treatment facilities.

Direct reuse:

• Using again fully functional electrical and electronic equipment that is not waste, for the same purpose for which it was conceived, without the necessity of repair or refurbishment.

Repair and refurbishment:

- Fixing a specified fault in used electrical and electronic equipment that is waste and/or replacing defective components of equipment in order to make the equipment a fully functional product to be used for its originally intended purpose.
- Modification of used electrical and electronic equipment to increase or restore its performance and/or functionality or to meet applicable treatment standards, with the result of making it a fully functioning product to be used for a purpose that is at least one for which it was originally intended, including through such activities as cleaning and data sanitisation.

Recycler:

- An organisation that undertakes operations by which electrical and electronic equipment and materials are processed into useable materials, commodities or substances, whether for the original or other purposes, and thus changes the physical state from its original form. Note:
 - 1. Recycling operations in some cases can be performed by a third party, i.e., sent offshore for processing, components sent to a NZ-based recycler for processing etc.
 - 2. Recycling operations may be co-located with collection sites.
 - 3. Operations include dismantling activities.
 - 4. Recycling operations do not include energy recovery or reprocessing into materials that are used as fuels or for backfilling operations.



4.0

E-PRODUCT CATEGORISATION OVERVIEW

Following the New Zealand Government's priority product declaration for electrical and electronic products (e-products), e-product categories used to inform this assessment are derived from the e-product category definitions and examples specified in Annex III and IV of European WEEE Directive 2012/19/EU. An additional category has been included for batteries as per Category 7 below.

It is important to note that there is no consistent definition for e-product or e-waste categories in Aotearoa New Zealand. At present, those providing collection, recycling, reuse and repair services to the New Zealand market define e-product and e-waste categories in different ways.

Category	Description
1	Temperature exchange equipment: E.g., Refrigerators, Freezers, Equipment which automatically delivers cold products, Air conditioning equipment, Dehumidifying equipment, Heat pumps, Radiators containing oil and other temperature exchange equipment using fluids other than water for the temperature exchange.
2	Screens, monitors, and equipment containing screens having a surface greater than 100 cm ² : E.g., Screens, Televisions, LCD photo frames, Monitors, Laptops, Notebooks.
3	Lamps: E.g., Straight fluorescent lamps, Compact fluorescent lamps, Fluorescent lamps, High intensity discharge lamps — including pressure sodium lamps and metal halide lamps, Low pressure sodium lamps, LED.
4	Large equipment: E.g., Washing machines, Clothes dryers, Dishwashers, Cookers, Electric stoves, Electric hot plates, Luminaires, Equipment reproducing sound or images, Musical equipment (excluding pipe organs installed in churches), Appliances for knitting and weaving, Large computer-mainframes, Large printing machines, Copying equipment, Large coin slot machines, Large medical devices, Large monitoring and control instruments, Large appliances which automatically deliver products and money, Photovoltaic panels.
5	Small equipment: E.g., Vacuum cleaners, Carpet sweepers, Appliances for sewing, Luminaires, Microwaves, Ventilation equipment, Irons, Toasters, Electric knives, Electric kettles, Clocks and Watches, Electric shavers, Scales, Appliances for hair and body care, Calculators, Radio sets, Video cameras, Video recorders, Hi-fi equipment, Musical instruments, Equipment reproducing sound or images, Electrical and electronic toys, Sports equipment, Computers for biking, diving, running, rowing, etc., Smoke detectors, Heating regulators, Thermostats, Small Electrical and electronic tools, Small medical devices, Small Monitoring and control instruments, Small Appliances which automatically deliver products, Small equipment with integrated photovoltaic panels.
6	Small IT and telecommunication equipment (no external dimension more than 50 cm): E.g., Mobile phones, GPS, Pocket calculators, Routers, Personal computers, Printers, Telephones.
7	Batteries ¹ : E.g., Non-rechargeable batteries (e.g., AA, AAA) and rechargeable batteries excluding batteries designed for use in electric vehicles, or household-scales and industrial renewable energy power systems ² .
1. Not part of Anr	nex III of the 2019 recast of the European WEEE Directive 2012/19/EU.

Table 1 — Electrical and electronic e-product categories as per Annex III and IV of the European WEEE Directive 2012/19/EU

2. It is noted that the Battery Industry Group (B.I.G.) has developed a large battery stewardship scheme for these batteries. All batteries not covered by the

 It is noted that the Battery industry Group (B.I.G.) has developed a large battery ste large battery scheme are being investigated through this co-design process.

85.6% OF THE AOTEAROA NEW ZEALAND POPULATION HAVE ACCESS TO AN E-WASTE RECYCLING FACILITY WITHIN A DRIVE TIME OF UP TO 30 MINUTES 5.0 SUMMARY OF KEY OBSERVATIONS FROM DESKTOP ANALYSIS AND GIS MAPPING

The desktop audit documented 377 facilities that offer services to the public to collect, recycle, repair, or reuse e-waste throughout Aotearoa New Zealand. The services cover all e-product categories and are a mixture of drop-off/collection and pickup, recycle, repair and reuse.

The key observations from the analysis of the desktop audit data and GIS mapping are:

- Overall, there is an active national network of e-product and e-waste life-cycle management service available across Aotearoa New Zealand; however, service access and capabilities differ greatly by region and e-product category.
- Across all e-waste collection points mapped through this assessment, 95.8% of the Aotearoa New Zealand population have access to an e-waste collection point within a drive time of up to 30 minutes. (Note, population access by e-product category is assessed further in the Analysis by service type section 11.)
- Across all direct reuse services for e-products mapped through this assessment, 83.2% of the Aotearoa New Zealand population have access to direct reuse services within a drive time of up to 30 minutes. (Note, population access by e-product category is assessed further in the Analysis by service type section 11.)
- Across all e-product repair and refurbishment services mapped through this assessment, 63.5% of the Aotearoa New Zealand population have access to e-product repair and refurbishment services within a drive time of up to 30 minutes. (Note, population access by e-product category is assessed further in the Analysis by service type section 11.)
- Across all e-waste recycling facilities mapped through this assessment, 85.6% of the Aotearoa New Zealand population have access to an e-waste recycling facility within a drive time of up to 30 minutes. (Note, population access by e-product category is assessed further in the Analysis by service type section 11.)
- All e-product categories are widely accepted across the available services assessed; however, coverage for Category 3 (Lamps) is limited with only one recycler providing treatment services nationally.

- The main population centres in Aotearoa New Zealand are generally not well serviced for direct access to recycling services for most e-product categories. Categories 4 (Large equipment) and 6 (Small IT and telecommunication equipment) have the greatest coverage in the main centres.
- E-product repair and refurbishment is limited in terms of the e-product categories accepted, the location coverage and population access. Categories 3 (Lamps) and 7 (Batteries) are not accepted for repair services anywhere in Aotearoa New Zealand at present. The South Island has severely limited access to e-product repair and refurbishment services with no coverage for Category 1 (Temperature exchange equipment), only two sites (Nelson and Wanaka) for Categories 2 (Screens and monitors), 4 (Large equipment) and 6 (Small IT and telecommunication equipment) and one site (Nelson) for Category 5 (Small equipment).
- E-product direct reuse has greater coverage in the main centres than for repair and refurbishment. The best coverage is for Categories 2 (Screens and monitors), 4 (Large equipment), 5 (Small equipment), 6 (Small IT and telecommunication equipment) and 7 (Batteries). Coverage for Categories 1 (Temperature exchange equipment) and 3 (Lamps) is poor.
- Many rural areas, with a population under 10 people per square kilometre, have limited access to all services.
- There is a wide range of charges made for the services. The charges for recycling are the highest. These higher costs are reflected in the charges made at collection, direct reuse, and repair and refurbishment sites when the product is likely to be recycled. Categories 2 (Screens and monitors) and 4 (Large equipment) have the highest charges for the recycling of Cathode Ray Tube (CRT) televisions and large printer equipment. These charges reflect the costs set by recyclers. Some products have a greater resale/resource value such as IT equipment, mobile phones or whiteware (due to the high ferrous metal content) and are more likely to be accepted at no cost.

6.0

LIMITATIONS OF DESKTOP AUDIT AND ASSESSMENT FINDINGS

The limitations of the desktop audit data gathered to inform this assessment are detailed below:

- The data for the desktop audit was a snapshot in time taken from the source websites in October and November 2020.
- 2. The desktop audit is not a full audit of all the services that are provided. Acknowledgment of this limitation is an important factor in understanding and acting on the findings documented in this report. In particular if the dataset was to be updated to cover a more representative number of op shops, repair shops and private businesses, the service gaps may be significantly different.
- The lack of sufficiently detailed information on websites for the following organisations which prevented their data being included in the audit:
 - a. St John New Zealand and St Vincent de Paul opportunity shops.
 - b. Sharp NZ.
 - Rotary No central information on the activities of each Rotary club. It is not expected that many of their groups provide services for e-waste.
 - d Fisher & Paykel.
 - Major retailers (Harvey Norman, Smith City, Noel Leeming, Warehouse Stationery, and Farmers) do not list any return options for recycling electronic or electrical goods.
 - f. Refrigerant recovery scheme Their website is not specific on which of their 11 Trust partners offer recovery services and how those services are accessed.
 - g. Lions Their website provides limited information about services offered by their members.
 - h. SPCA and Salvation Army op shops The limited information on products accepted and the large number of Salvation Army op shops (Family Stores), precluded the information being captured.

- Sharp NZ's website provides a site to search for the nearest Sharp service centre up to 100km from the location entered. Sharp was contacted for a list of sites; however, the requested information was not provided.
- j. Electrical/TV repair and service local businesses — Some repair agents were referenced by Territorial Authorities and are included in the dataset. However, there is no national register of such services and that has precluded the information on all other such agents from being captured in the dataset.
- k. Scrap metal merchants Some merchants were referenced by Territorial Authorities and are included in the dataset. These agents included Sims Pacific Metals, Ingot Metals, Global Metal Solutions, and Macaulay Metals. However, there is no national register of such merchants and that has precluded the information on all other such merchants being captured in the dataset.
- 4. The number of individual companies and/or outlets and the format of that data for the following organisations is too large to be collected manually within the timescale of the desktop audit:
 - RE:MOBILE offers e-waste recycling for mobile phones and accessories (Category 6 – Small IT and telecommunication equipment).
 - b. Print/copier consumable reuse/recycling companies — Those companies referenced by other audited sites have been included in the dataset. In addition, many retailers of printers or photocopiers provide drop-off locations for the consumables. However, there is no national register of such companies and services and that has precluded the information being captured.
 - c. Privately run op shops Those op shops referenced by Territorial Authorities have been included in the dataset. However, there is no national register of op shops and that has precluded the information on all such shops being captured.

- 5. E-waste product categorisation:
 - a. Descriptions of e-waste products accepted have been recorded as accurately as possible. Many websites were not clear on the items accepted or only list some examples of accepted products. Some websites also listed certain e-waste streams under hazardous waste categories (Category 3 – Lamps, i.e, fluorescent bulbs and CFL's) and some batteries (Category 7 – Batteries) separate to e-waste that is accepted for recycling. Data on the facilities providing takeback of commercial sized products, such as refrigeration and freezing units for cold stores, was not readily accessible.
 - b. The dataset records which categories are accepted for each site. Where that site provides more than one service (i.e., recycle and direct reuse), it is not recorded which categories are accepted for each type of service. Therefore, in the example of a site providing recycling and direct reuse services, we cannot be sure which categories are only recycled and which are considered for direct reuse.

- c. Terminology that has been used in the dataset reflects that used by each organisation audited.
 For example, the term whiteware is used generically by many organisations but many others list fridges and freezers separately.
- d. The use of the term e-waste/e-scrap is inconsistent across all e-waste service providers, particularly by Territorial Authorities. Some refer separately to whiteware and batteries when mentioning e-waste. Some providers categorise used-lead-acid batteries as e-waste, where others do not.
- 6. Repair and refurbishment agents:
 - a. This assessment excludes e-product repairs which are being undertaken or commissioned by suppliers (retailers, distributors or manufacturers) as required under the Consumer Guarantees Act and is therefore likely to underestimate the availability of all electrical and electronic product repair services in Aotearoa New Zealand.





7.0 LIMITS AND ASSUMPTIONS – GIS MAPPING AND DATA ANALYSIS

There are some limitations and assumptions inherent in the Population Access Model which may impact on the interpretation of the results.

- **Network coverage:** The drive time analysis and property coverage analysis rely upon Open Street Map (OSM) data to identify areas which are accessible. Not all properties are accessible from the roads identified in the OSM and so there will be some properties which are not covered by the model. Those areas are considered minor in the national context but may result in observable errors in maps and coverage estimates at local scales.
- Drive time assumptions: Assumptions are made about average driving speed and wait times in the drive time analysis. Those assumptions are applied nationally, without considering local variation in driver behaviour or traffic conditions.
 - If there is a lower speed limit posted for a road then that is used instead of the average default speed noted above.
 - Elevation has no impact on vehicle speed, therefore any changes in elevation of the road are not used to modify the vehicle speed.
 - Drive time delays are applied for every right turn made and every traffic light encountered. Delays for congestion have not been considered.
- **Population outside network:** It is assumed that the 2018 census population in each statistical area is within the accessible network for that area. This will generate some errors in population estimates where populations that exist outside the network coverage area are assumed to be accessible and other census statistical areas which may be wholly outside the network.

Table 2 — Average speed assumptions (by road type)

Road type	Average speed (km/h)	Road type definition
Motorway	100	A restricted access major divided highway, normally with two or more running lanes plus emergency hard shoulder.
Trunk	90	The most important roads in a country's system that are not motorways. (Need not necessarily be a divided highway)
Primary	70	The next most important roads in a country's system. (Often link larger towns)
Secondary	60	The next most important roads in a country's system. (Often link towns)
Tertiary	40	The next most important roads in a country's system. (Often link smaller towns and villages)
Residential	40	Roads which serve as access to housing, without function of connecting settlements. Often lined with housing.
Road	30	A road/way/street/ motorway/etc. of unknown type. It can stand for anything ranging from a footpath to a motorway. This tag should only be used temporarily until the road/way/etc. has been properly surveyed.
Service	5	For access roads to, or within an industrial estate, camp site, business park, car park, alleys, etc.



8.0 SUMMARY OF VOLUNTARY E-PRODUCT STEWARDSHIP PROGRAMMES

This section summarises the voluntary product stewardship schemes for e-products/e-waste and programme collection points available across Aotearoa New Zealand.

Under the Act, the New Zealand Government has accredited three voluntary product stewardship programmes for e-products that fall under the categories specified for mandatory product stewardship intervention, as per the priority product declaration note in the E-product categorisation overview, Section 4. Details of the schemes have been sourced from the Ministry's website, with a summary of the collection points related to this analysis.

None of these programmes provide sufficient information in an easy to access format to allow their sites to be included into the desktop audit, apart from those sites that were referenced from other audited websites as noted in the Limitations of the desktop audit, Section 6.

The following sections provide an overview of each scheme and the e-product category alignment with the e-product categories declared by the New Zealand Government.





8.1 FUJI XEROX ZERO LANDFILL SCHEME

Fuji Xerox New Zealand offers customers a take-back service for used machines, printer cartridges, drums and fusers. This is to ensure they are responsibly recycled rather than sent to landfill. Fuji Xerox reports the scheme has a reuse and recycling rate of over 99.5 per cent. Recycling of materials is carried out by industry partner TES-AMM New Zealand Ltd, which has R2 and ISO 14001 certifications.

Fuji Xerox customers can order a recycling collection box or arrange a pickup. E-products accepted through the Fuji Xerox programme align with Categories 4 (Large equipment) and 6 (Small IT and telecommunication equipment).

Programme collection points

The dataset does not contain any sites that are collection points for this scheme because the website does not publicise this information. The website indicates that the equipment is collected via a collection box or a pickup service.

8.2 re:mobile

The programme offers e-waste recycling for mobile phones and accessories. Unwanted mobile phones that are still working are sold for refurbishment and resale overseas while others are recycled. Proceeds from the scheme are donated to Sustainable Coastlines, an organisation which plants trees along waterways to restore habitats for native animals, reduce sediment and improve water quality.

Old phones can be dropped off at 2degrees, Spark or Vodafone retail stores and kiosks nationwide or they can be sent in by post.

E-products accepted through the RE:MOBILE programme align with Category 6 (Small IT and telecommunication equipment).

RE:MOBILE programme collection points

The dataset contains some sites that are collection points for this scheme where they have been referred to by other audited organisations. The RE:MOBILE programme website lists over 400 locations that provide collection points; however, the limitations of the desktop audit meant that the data was not able to be manually extracted from the website.



8.3

SHARP COMPREHENSIVE RECYCLING AND WASTE REDUCTION SCHEME

Sharp New Zealand aims to reuse and recycle 100% of its packaging materials, electronic products, equipment, and obsolete and used parts.

In 2016, the Sharp scheme recycled 1,006 m³ of e-waste, 18,782 toner cartridges and 1,249 m³ of packaging waste. Sharp's waste to landfill decreased 29% 2015 and 2016.

Sharp consumers can return Sharp electrical products, including microwaves, refrigerators, TVs, and display screens to any Sharp branch. Customers can also return used toner cartridges.

E-products accepted through the Sharp programme align with Categories 4 (Large equipment) and 6 (Small IT and telecommunications equipment).

Sharp programme collection points

The dataset does not contain any sites that are collection points for this scheme. Sharp's website lists the service points relative to a selected location. The limitations of the desktop audit meant that the data was not able to be manually extracted from the website.

ANALYSIS OF THE DATASET FOR ALL SITES THAT PROVIDE E-PRODUCT AND E-WASTE COLLECTION SERVICES TO THE PUBLIC



9.0 NETWORK MAPPING OVERVIEW

This section analyses the dataset for all sites that provide e-product and e-waste collection services to the public. The final part of the section covers a gap analysis of the services informed by the site profiles. The findings of each specific area of analysis are provided in the subsections below. The stakeholder groupings and definitions are detailed in the Stakeholder group definitions section. 9.1 SUMMARY OF ALL SITE PROFILES

Table 3 below summarises the classification of sites as recorded in the dataset and referred to throughout this report. The table lists those services that are provided by each site type. Where a site type provides multiple services, they will be profiled in all the relevant sections below.

Table 3 – Site ty	ypes and	available	services
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Site Type	Services provided — Collection, Recycling, Direct Reuse, Repair and Refurbishment	Definition
Community Recycling Centre	CollectionDirect Reuse	Territorial Authority owned/run operation that is called a community recycling centre. It matches the site types of resource recovery centre and transfer station.
Community Resource Recovery	CollectionDirect reuseRepair and refurbishment	Community-run organisation that provides resource recovery. It includes disability enterprises.
Territorial Authority Office	Collection	Territorial Authority office.
IT Services	Collection	Information Technology (IT) related service organisation.
Landfill	CollectionDirect reuse	Landfill site that accepts e-waste from the public. Territorial Authority or privately owned.
Op/Charity Shop	CollectionDirect reuseRepair and refurbishment	Opportunity (Op) or Charity shop that accepts e-products/e-waste. The purpose is usually to sell for reuse, however some have the capacity to repair items before reuse, and/or run a repair cafe.
Private Business	CollectionRecyclingDirect reuseRepair	Private business that offers e-waste services that does not match any of the other site types.
Recycler	CollectionRecyclingDirect reuseRepair	Organisation that recycles e-waste (see Stakeholder group definitions). These organisations are run by a Territorial Authority, community enterprise, IT service organisation or a private business.
Repair Shop	CollectionRepair and refurbishment	Organisation whose main related service is e-product repair and/or refurbishment.
Resource Recovery Centre	CollectionReuse	Territorial Authority-run resource recovery centre providing facilities to the general public.
Retailer	Collection	Retail outlet that provides services for e-waste.
Telecom Company	Collection	Telecom service company that provides services for e-waste.
Transfer Station	CollectionDirect reuse	Site for the collection and sorting of rubbish and recycling, including e-waste that is open to the general public.
Waste Company	Collection	A private waste company site that is not classified as a transfer station or landfill.

Table 4 summarises the number of sites that accept e-products and e-waste from the public for each service type listed above, along with the number of sites that accept each e-product category and the population coverage of each site type for drive times of up to 10, 20 and 30 minutes. Further analysis for each service type is detailed in the sections below summarising those sites that provide each service: collection, recycle, direct reuse, or repair and refurbishment.

Those sites providing multiple services may be more flexible in the recovery options by being able to test products and components to identify those suitable for repair. Those that aren't suitable are then potentially processed for recycling.

Table 4 — Site and service types (by e-product category) with drive time and population coverage analysis

Site Type	# of	Cat 1	Cat 2	Cat 3	<u>Cat 4</u>	<u>Cat 5</u>	<u>Cat 6</u>	<u>Cat 7</u>	Drive time population coverage %			
	sites								10 min	20 min	30 min	
Total # of collection sites	359	207	135	59	255	231	176	184	79.0	92.7	95.8	
Total # of recycling sites	92	43	38	9	86	47	72	45	53.9	77.7	85.6	
Total # of direct reuse sites	91	47	39	13	63	79	47	34	52.6	74.9	83.2	
Total # of repair and refurb sites	22	10	15	5	16	18	17	10	21.8	49.8	63.5	



9.2 COLLECTION SITE PROFILES

Collection sites analysed in this section are defined as:

A place temporarily or permanently designated for receiving electrical and electronic equipment from the public in order to sort, aggregate or transport that equipment to storage or treatment facilities¹.

The map image below is from the Drop-off Cover Map that shows the collection site services. All sites marked are collection sites.

Figure 2 — Trakk Assets tool national overview of available collection sites



01. The collection site may be co-located with storage or treatment facilities.

E-PRODUCT AND E-WASTE MANAGEMENT SERVICES IN AOTEAROA NEW ZEALAND FEBRUARY 2021

Collection Site Type	# of	Cat 1	Cat 2	Cat 2	Cat 4	Cat 5	Cat 6	Cat 7	Drive time population coverage %			
	sites	<u>our 1</u>	<u>our 1</u>	<u>our o</u>	00004	<u>our o</u>	<u>our o</u>	<u>our 1</u>	10 min	20 min	30 min	
Community Recycling Centre	4	1	1	3	1	1	1	3	0.5	2.0	4.0	
Community Resource Recovery	21	10	15	5	14	12	17	12	22.9	44.1	49.2	
Territorial Authority Office	1	0	0	0	0	0	1	0	0.2	0.4	0.6	
IT Services	2	0	0	0	0	2	2	2	1.9	3.3	3.7	
Landfill	5	4	4	2	4	4	2	3	1.1	5.3	7.9	
Op Shop	39	15	0	0	21	39	3	0	33.9	57.2	64.6	
Private Business	31	4	4	3	7	5	10	22	20.3	47.2	59.4	
Recycler	92	43	38	9	86	47	72	45	53.9	77.7	85.6	
Repair Shop	4	2	0	0	2	3	1	0	1.2	1.6	1.7	
Resource Recovery Centre	18	14	11	6	8	12	8	14	3.5	8.5	14.0	
Retailer	6	1	1	0	2	1	1	4	6.6	9.0	11.1	
Telecom Company	8	0	0	0	0	0	8	0	7.2	23.4	35.6	
Transfer Station	125	113	61	28	110	105	50	76	29.7	60.5	79.7	
Waste Company	3	0	0	3	0	0	0	3	2.8	8.8	13.4	
Total # of sites	359	207	135	59	255	231	176	184	79.0	92.7	95.8	

Table 5 — Collection sites and accepted e-product categories (by collection site type) with drive time and population coverage analysis

The mapping and analysis of the collection sites found the following:

- 359 collection/drop-off sites are available nationally.
- The collection sites together accept the complete range of e-products/e-waste categories.
- Coverage for Category 1 (Temperature exchange equipment) – 58% of the collection sites accept Category 1 products. The majority (64%) of these sites are run by Territorial Authorities, particularly transfer stations. 47% of recyclers accept this category.
- Coverage for Category 2 (Screens and monitors) 38% of the collection sites accept Category 2 products. The majority (77%) of these sites are run by Territorial Authorities, particularly transfer stations. 41% of recyclers accept this category.
- Coverage for Category 3 (Lamps) 16% of the collection sites accept Category 3 products. The majority (57%) of these sites are run by Territorial Authorities, particularly transfer stations. 10% of recyclers accept this category.
- Coverage for Category 4 (Large equipment) 71% of the collection sites accept Category 4 products. 48% of these sites are run by Territorial Authorities, particularly transfer stations. 93% of recyclers accept this category.

- Coverage for Category 5 (Small equipment) 64% of the collection sites accept Category 5 products. The majority (53%) of these sites are run by Territorial Authorities, particularly transfer stations. 51% of recyclers accept this category.
- Coverage for Category 6 (Small IT and telecommunication equipment) – 49% of the collection sites accept Category 6 products. 35% of these sites are run by Territorial Authorities, particularly transfer stations. 78% of recyclers accept this category.
- Coverage for Category 7 (Batteries) 51% of the collection sites accept Category 7 products. The majority (52%) of these sites are run by Territorial Authorities, particularly transfer stations. 49% of recyclers accept this category.
- The drop-off Cover North and Drop-off Cover South Maps show a wide coverage nationally of these collection/drop-off sites.
- Analysis of the gaps in this coverage is detailed in the Service Gap Analysis, Section 10.

COLLECTION SERVICE COSTS

The following table summarises the range of charges made by the collection sites of each type, for handling the e-products/ewaste products for each of the seven categories. Note that data on the costs charged for the services is incomplete. Many sites do not publish their charges on their websites and those that do are often not detailed enough to allow a summary to be provided.

Table 6 — Collection service cost ranges (by e-product category)

Collection Site	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Category 7
	Free to \$30 per unit.	Free to \$75 per unit.	Free to \$3 per unit.	Free to \$75 per unit.	Free to \$40 per unit.	Free to \$40 per unit.	Up to \$7.50 per kg or free to \$32 per unit.
Total # of sites	207	135	59	255	231	176	184

The analysis of the charges set by these collection sites found the following:

- Many sites collect a subset of the products within a single category, hence data in one category does not imply that all products in that category are accepted/ handled. For example, Category 1 (Temperature exchange equipment) includes refrigerators, freezers, heat pumps, and air conditioning units. Many transfer stations accept refrigerators and freezers, but do not generally list heat pumps or aircon units.
- The charges vary widely between categories and site types, and also within categories. Mobile phones, for example, are generally accepted for free nationally, but other e-waste in Category 6 (Small IT and telecommunication equipment) often incurs a charge.
- The costs of providing the service vary widely nationally depending on how far the products need to be transported for processing and the service costs set by the third party processor.
- Community Resource Recovery sites generally accept a greater range of e-product categories with charges varying greatly within some of the categories due to the range of and the service costs set by the third party processor for the different e-product categories. For example, Category 4 (Large equipment) includes washing machines and large printing and copying equipment. The recycling of a washing machine is often a simpler and cheaper process because they have a higher ferrous metal content which can create a resource incentive for collection points to accept these products at no cost to the waste generator. Printers and copying equipment, in comparison, are made from multiple materials, have less value and are more complex to recycle.

- Free services are available for some e-product categories; however, this is inconsistent across the national collection network i.e., some sites charge for a particular e-product category and others don't.
- Products that align with Category 1 (Temperature exchange equipment), in some cases, contain refrigerant gases. Some sites accept them without being degassed where others indicate that they only take those that have been degassed. This impacts the cost of the service. Refrigerant gases are one of the six priority products declared with regulatory product stewardship scheme co-design work underway.
- Category 2 (Screens and monitors) items that incur the greatest costs are usually the CRT TVs or computer monitors.
- Category 3 (Lamps) items are generally free when collected from Territorial Authority-run facilities.
- Category 4 (Large equipment) items that incur the greater costs are the large copying and printing equipment. Photovoltaic panels are generally not listed as being accepted.
- Category 5 (Small equipment) items that incur the greater costs are the microwaves.
- Category 6 (Small IT and telecommunication equipment) items that incur the greater costs are the printers.
- Category 7 (Batteries). The costs for batteries vary widely with most sites accepting lead acid batteries for free but others charging up to \$32 per unit.

9.3 RECYCLER SITE PROFILES

Recycler sites analysed in this section are defined as follows:

An organisation that undertakes operations by which electrical and electronic equipment and materials are processed into useable materials, commodities or substances, whether for the original or other purposes, and thus change the physical state from its original form. Note:

- Recycling operations in some cases can be performed by a third party, i.e., sent offshore for processing, components sent to a NZ-based recycler for processing etc.
- Recycling operations may be co-located with collection sites.
- Operations include dismantling activities.
- Recycling operations do not include energy recovery or reprocessing into materials that are used as fuels or for backfilling operations.

The recycler sites analysed in this section are indicated using the recycle legends on the maps as noted in the key below.



Figure 3 — Trakk Assets tool national overview of available recycler sites

Table 7 — Recycler sites and accepted e-product categories with drive time and population coverage analysis

Collection Site Type	# of Cat 1		Cat 2	Cat 3	Cat 4	<u>Cat 5</u>	Cat 6	Cat 7	Drive time population coverage %		
	sites								10 min	20 min	30 min
Recycler	92	43	38	9	86	47	72	45	53.9	77.7	85.6
Total # of sites	N/A	47	41	10	93	51	78	49			

The mapping and analysis of the recycler sites found the following:

- There are 92 recycler sites available nationally that accept public drop-off.
- 33% of the recyclers provide repair and/or reuse services alongside recycling.
- The recyclers are a mixture of dedicated e-waste recycling facilities, Territorial Authorities, community (including the disability sector), scrap metal merchants and other privately run organisations. They form the backbone of Aotearoa New Zealand's processing capability.
- The sites that accepts Category 3 (Lamps) for recycling send them to a third party for processing.
- The recycler sites together accept all e-product categories; however, national coverage access does not exist across all e-product categories, as noted in the Service gap analysis, Section 10.
- The organisations that run these recycling sites are presented in Table 8.

Table 8 — Recyclers (by organisation type)

Organisation type	Number of sites
Charity	1
Community enterprise	14
Private	49
Scrap metal merchant	25
Social enterprise	1
Territorial Authority	2
Total	92


RECYCLING SERVICE COSTS

The following table summarises the range of recycling charges across the seven e-product categories. Note that data on the costs charged for the services is incomplete. Many sites do not publish their charges on their websites and those that do are often not detailed enough to allow a summary to be provided.

Table 9 — Recycling service cost ranges (by e-product category)

Collection Site	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Category 7
Recycler	Free to \$15 per unit.	Free to \$75 per unit.	Free to \$3 per unit.	Free to \$75 per unit.	Free to \$12 per unit.	Free to \$40 per unit.	Up to \$5 per kg.
Total # of sites	43	38	9	86	47	72	45

The analysis of the charges made by these recycler sites found the following:

- Many sites collect a subset of the e-products within a single category, hence data in one category does not imply that all products in that category are accepted/ handled. For example Category 1 (Temperature exchange equipment) includes refrigerators, freezers, heat pumps, and air conditioning units.
- The charges vary widely between categories and site types, and also within categories. Mobile phones, for example, are generally accepted for free nationally, but other e-waste in Category 6 (Small IT and telecommunication equipment) often incurs a charge.
- The charges reflect the need to ensure the financial viability of the service. The costs vary widely nationally depending on the volume handled by the recycler, the markets for the end products, and the quality/standards of their recycling process.
- The costs are market driven and often dependent on commodity prices as well as the recyclers internal costs of handling accepted e-product categories.
- Free services are available.

- Products that align with Category 1 (Temperature exchange equipment), in some cases, contain refrigerant gases. Some sites accept them without being degassed where others indicate that they only take those that have been degassed. This impacts the cost of the service. Refrigerant gases are one of the six priority products declared with regulatory co-design work underway.
- Category 2 (Screens and monitors) items that incur the greatest costs are usually the CRT TVs or computer monitors.
- Category 3 (Lamps) are sent to a third party for recycling.
- Category 4 (Large equipment) items that incur the greater costs are the large copying and printing equipment. Photovoltaic panels are generally not listed as being accepted.
- Category 5 (Small equipment) items that incur the greater costs are the microwaves.
- Category 6 (Small IT and telecommunication equipment) items that incur the greater costs are the printers.
- Category 7 (Batteries) recyclers generally accept lead acid batteries for free as they have value.

DIRECT REUSE SITE PROFILES

Direct reuse sites analysed in this section accept e-products/ewaste from the public and process it for reuse/resale. Some of these sites also repair or recycle e-waste and may collect some items for processing by a third party.

A direct reuse site is one that uses again fully functional electrical and electronic equipment that is not waste, for the same purpose for which it was conceived, without the necessity of repair or refurbishment. The direct reuse sites analysed in this section are indicated using the four reuse legends on the maps as noted in the key below.

Analysis of the gaps in this coverage is covered in the Service gap analysis, Section 10.



Figure 4 — Trakk Assets tool national overview of available direct reuse sites

Table 10 — Direct reuse sites and accepted e-product categories with drive time and	
population coverage analysis	

Collection Site Type	# of	<u>Cat 1</u>	<u>Cat 2</u>	<u>Cat 3</u>	<u>Cat 4</u>	<u>Cat 5</u>	<u>Cat 6</u>	Cat 7	Drive time population coverage %		
	sites								10 min	20 min	30 min
Community Recycling Centre	1	1	1	0	1	1	1	0	0.5	2.0	4.0
Community Resource Recovery	10	5	7	2	8	5	7	4	22.9	44.1	49.2
Op Shop	39	15	0	0	21	39	3	0	33.9	57.2	64.6
Private Business	3	2	1	1	3	2	2	2	20.3	47.2	59.4
Recycler	30	16	27	8	26	24	28	20	53.9	77.7	85.6
Resource Recovery Centre	4	4	3	2	3	4	3	4	3.5	8.5	14.0
Transfer Station	4	4	0	0	1	4	3	4	29.7	60.5	79.7
Total # of sites	91	47	39	13	63	79	47	34	52.6	74.9	83.2

The mapping and analysis of the direct reuse sites found the following:

- There are 91 sites in this dataset that accept public drop-off of e-products/e-waste and do some processing for reuse.
- There are 56 sites (62% of the direct reuse sites) that accept public drop-off of e-products/e-waste and process the items for reuse only.
- The data is not sufficient to identify which categories are used for direct reuse by the 35 sites that also accept items for recycling and/or repair and refurbishment. The op shops provide the largest number of reuse sites. Op shops often test and tag the equipment but do not generally have the resources to repair.
- The direct reuse sites together accept the complete range of e-product categories, but may not reuse all categories, they may recycle and/or repair the items.
- The Territorial Authority sites do not generally focus on direct reuse.
- Coverage for Category 1 (Temperature exchange equipment) – 52% of sites that provide direct reuse accept this category. The majority of these sites are op shops and recyclers. All 15 op shops focus on direct reuse. Not all 16 recyclers will test for reuse before recycling the items.
- Coverage for Category 2 (Screens and monitors) 43% of sites that provide direct reuse accept this category. Op shops and transfer stations do not accept this category for direct reuse but do reuse other categories. The majority of these sites (69%) are recyclers. Not all recyclers will test for reuse before recycling the items.

- Coverage for Category 3 (Lamps) 14% of sites that provide direct reuse accept this category. Community recycling centres, op shops and transfer stations do not accept this category for direct reuse but do reuse other categories. The majority of these sites (62%) are recyclers. Not all recyclers will test for reuse before recycling the items.
- Coverage for Category 4 (Large equipment) 69% of sites that provide direct reuse accept this category. The majority of these sites are recyclers or op shops. Not all recyclers will test for reuse before recycling the items.
- Coverage for Category 5 (Small equipment) 87% of sites that provide direct reuse accept this category. The majority (49%) of these sites are op shops.
- Coverage for Category 6 (Small IT and telecommunication equipment) – 52% of sites that provide direct reuse accept this category. The majority (60%) of these sites are recyclers. Not all recyclers will test for reuse before recycling the items.
- Coverage for Category 7 (Batteries) -37% of sites that provide direct reuse accept this category. Community recycling centres and op shops do not accept this category for direct reuse but do reuse other categories. The majority (59%) of these sites are recyclers. Most recyclers will not test for reuse before recycling the items.

DIRECT REUSE SERVICE COSTS

The following table summarises the range of charges set by the available reuse services across the seven e-product categories. Note that data on the cost charged for the services is incomplete. Many sites do not publish their charges on their websites and those that do are often not detailed enough to allow a summary to be provided.

Table 11 — Direct reuse service cost ranges (by e-product category)

Collection Site	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Category 7
	Free to \$20 per unit. May only be accepted for recycling.	Free to \$45 per unit. May only be accepted for recycling.	Not accepted for reuse.	Free to \$70 per unit. May only be accepted for recycling.	Free to \$15 per unit. May only be accepted for recycling.	Free to \$40 per unit. May only be accepted for recycling.	Not accepted for reuse.
Total # of sites	47	39	13	63	79	47	34

The analysis of the charges made by these direct reuse sites found the following:

- Some of the sites will recycle or repair items if not suitable for direct reuse, or will send them to third party sites.
- Many sites collect a subset of the e-products within a single category, hence data in one category does not imply that all products in that category are accepted. For example, Category 1 (Temperature exchange equipment) includes refrigerators, freezers, heat pumps, and air conditioning units. Many transfer stations accept refrigerators and freezers, but do not generally list heat pumps or air conditioning units.
- The charges reflect the need to at least recover the costs of providing the service, and these costs vary widely nationally depending on the volume handled by the site, their markets for the end products and potentially the quality/standards of their safety and quality assessment processes.
- Charges are often levied even if the items are reusable as this covers the costs of testing and recovery if it is not reusable in the form it has been received in.
- Op shops and other sites that do not charge for the service are more likely to not take an item if they believe it may not work unless they have access to a free recycling service.

- Category 1 (Temperature exchange equipment) items can contain refrigerant gases. Some sites accept such items without being degassed but others indicate that they only take those that have been degassed. This impacts the cost of the service. There is not sufficient data to identify which sites process these items for direct reuse.
- Category 2 (Screens and monitors) items that incur the greatest costs are usually CRT TVs or computer monitors. Op shops and transfer stations don't take these items for direct reuse.
- Category 3 (Lamps) if lamps are accepted, they are sent to a third party for recycling and not reused.
- Category 4 (Large equipment) items that incur the greater costs are large copying and printing equipment. Photovoltaic panels are not listed as being accepted.
- Category 5 (Small equipment) items that incur the greater costs are microwaves.
- Category 6 (Small IT and telecommunication equipment)

 many items have a value and so the costs are generally low.
- Category 7 (Batteries) are generally not accepted at these sites but where they are, they are sent for recycling and not for direct reuse.

9.5 REPAIR AND REFURBISHMENT SITE PROFILES

Repair sites analysed in this section accept e-products/e-waste from the public and process it for repair/refurbishment. Some of these sites also reuse or recycle e-waste and may collect some items for processing by a third party.

A repair and refurbishment site is one that:

- Fixes a specified fault in used electrical and electronic equipment that is a waste and/or replaces defective components of equipment in order to make the equipment a fully functional product to be used for its originally intended purpose.
- Modifies used electrical and electronic equipment to increase or restore its performance and/or functionality or to meet applicable treatment standards, with the result of making it a fully functioning product to be used for a purpose that is at least one for which it was originally intended, including through such activities as cleaning and data sanitisation.

The repair and refurbishment sites analysed in this section are indicated using the four repair legends on the maps as noted in the key below.

Figure 5 — Trakk Assets tool national overview of available repair and refurbishment sites



Collection Site Type	# of sites	# of	<u>Cat 1</u>	<u>Cat 2</u>	<u>Cat 3</u>	<u>Cat 4</u>	<u>Cat 5</u>	<u>Cat 6</u>	<u>Cat 7</u>	Drive time population coverage %	
									10 min	20 min	30 min
Community Resource Recovery	4	1	3	1	3	3	3	2	22.9	44.1	49.2
Private Business	2	2	1	1	2	2	1	2	20.3	47.2	59.4
Recycler	12	5	11	3	9	10	12	6	53.9	77.7	85.6
Repair Shop	4	2	0	0	2	3	1	0	1.2	1.6	1.7
Total # of sites	22	10	15	5	16	18	17	10	21.8	49.8	63.5

Table 12 — Repair and refurbishment sites and accepted e-product categories with drive time and population coverage analysis

The mapping and analysis of the repair and refurbishment sites found the following:

- There are 22 sites in this dataset that accept public drop-off of e-products/e-waste and process the items for repair and refurbishment.
- There are five sites (23% of the repair and refurbishment sites) that accept public drop-off of e-products/e-waste and process the items for repair and refurbishment only.
- The repair and refurbishment sites together accept the complete range of e-products/e-waste categories but may not repair and refurbish all items within each category. They will recycle and/or reuse the items that are not repaired.
- Many sites collect a subset of the e-products within a single category, hence data in one category does not imply that all e-products in that category are accepted/ handled. For example Category 1 (Temperature exchange equipment) includes refrigerators, freezers, heat pumps, and air conditioning units. Many sites accept refrigerators and freezers, but do not generally list heat pumps or air conditioning units.
- Repair shops focus on Categories 1 (Temperature exchange equipment), 4 (Large equipment), 5 (Small equipment) and 6 (Small IT and telecommunication equipment).
- The data is not sufficient to identify which items of each category are used for repair and refurbishment by the 17 sites that also accept items for recycling and/or direct reuse.
- The recyclers provide the largest number of repair and refurbishment sites.
- The Territorial Authority sites do not provide repair and refurbishment facilities.
- Coverage for Category 1 (Temperature exchange equipment) – 45% of sites that provide repair and refurbishment accept this category. Half of these sites are recyclers. Not all five recyclers will investigate the options to repair or refurbish Category 1 items before recycling them.

- Coverage for Category 2 (Screens and monitors) 68% of sites that provide repair and refurbishment accept this category. Repair shops do not accept this category. The majority of these sites (73%) are recyclers. Not all 11 recyclers will investigate the options to repair or refurbish Category 2 items before recycling them.
- Coverage for Category 3 (Lamps) although 23% of sites that provide repair and refurbishment accept this category, these items are not repaired anywhere in Aotearoa New Zealand at present. The sites that accept them do so for recycling only.
- Coverage for Category 4 (Large equipment) 73% of sites that provide repair and refurbishment accept this category. The majority (56%) of these sites are recyclers. Not all 9 recyclers will investigate the options to repair or refurbish Category 4 items before recycling them.
- Coverage for Category 5 (Small equipment) 82% of sites that provide repair and refurbishment accept this category. The majority (56%) of these sites are recyclers. Not all 10 recyclers will investigate the options to repair or refurbish Category 5 items before recycling them.
- Coverage for Category 6 (Small IT and telecommunication equipment) – 77% of sites that provide repair and refurbishment accept this category. The majority (55%) of these sites are recyclers. Not all 12 recyclers will investigate the options to repair or refurbish Category 6 items before recycling them.
- Coverage for Category 7 (Batteries) although 45% of sites that provide repair and refurbishment accept this category, these items are not repaired anywhere in Aotearoa New Zealand at present. The sites that accept them do so for recycling only.

REPAIR AND REFURBISHMENT SERVICE COSTS

The following table summarises the range of charges set by the available repair and refurbishment services across the seven e-product categories. Note that data on the cost charged for the services is incomplete. Some sites do not publish their costs on their websites and those that do are often not detailed enough to allow a summary to be provided.

Table 13 — Repair and refurbishment service cost ranges (by e-product category)

Collection Site	<u>Category 1</u>	<u>Category 2</u>	Category 3	Category 4	Category 5	Category 6	Category 7
	Free to \$20 per unit. May be sent for recycling.	Free to \$30 per unit. May be sent for recycling.	Not accepted for repair and refurbishment.	Free to \$60 per unit. May be sent for recycling.	Free to \$8 per unit. May be sent for recycling.	Free to \$40 per unit. May be sent for recycling.	Not accepted for repair and refurbishment.
Total # of sites	10	15	5	16	18	17	10

The analysis of the charges made by these repair and refurbishment sites found the following:

- Repair shops and private businesses are commercial entities so if the quote to repair is not accepted, the item is returned to the customer. Some recyclers also offer repair services to customers.
- Repair shops, private businesses and some recyclers do not publish the costs of their repair and refurbishment services and are typically quoted on a case by case basis.
- Two community resource recovery sites that are run by community enterprises provide repair agents through repair cafes. These support the repair of items by providing access to experts; however, if the item is not repairable it will be returned to the customer. Their services are focused on repairing e-product Categories 4 (Large equipment) and 5 (Small equipment).
- Sites collect a subset of the e-products within a single category, hence data in one category does not imply that all products in that category are accepted/handled.
- Some of the sites will recycle items if not suitable for repair or refurbishment, or will send them for recycling through third party sites.
- The charges reflect the need to at least recover the costs of providing the service, and these costs vary widely nationally depending on the volume handled by the site, their markets for the end products and potentially the quality/standards of their recycling process.
- Charges are often levied even if the items can be repaired or refurbished as this covers the costs of testing and recycling if it cannot be repaired.

- Products that align with Category 1 (Temperature exchange equipment) items, in some cases, contain refrigerant gases. Some sites accept them without being degassed where others indicate that they only take those that have been degassed. This impacts the cost of the service. Refrigerant gases are one of the six priority products declared with regulatory product stewardship scheme co-design work underway.
- Category 2 (Screens and monitors) items that incur the greatest costs are usually CRT TVs or computer monitors. Repair shops don't take these items for repair and refurbishment.
- Category 3 (Lamps). If lamps are accepted, they are sent to a third party for recycling and not repaired or refurbished.
- Category 4 (Large equipment) items that incur the greater costs are the large copying and printing equipment. Photovoltaic panels are not listed as being accepted.
- Category 5 (Small equipment) items that incur the greater costs are microwaves.
- Category 6 (Small IT and telecommunication equipment)

 many items have value and so the costs are low.

 Printers are the only item that generally incurs greater costs.
- Category 7 (Batteries) are generally not accepted at these sites but where they are, they are sent for recycling and not for repair or refurbishment.



10.0 SERVICE GAP ANALYSIS

This section provides a gap analysis of the services that are available to the public. An analysis of the gaps for each service (collection, repair and refurbishment, direct reuse and recycling) is provided for each e-product/ e-waste category.

The detailed gap analysis is provided in the Analysis by service type, Section 11.

A summary of the key findings from the service gap analysis is provided below:

- All categories are accepted for one or more service.
- Servicing of a category does not imply that all items within that category are accepted.
- The following are the most commonly accepted items within each e-product/e-waste category:
 - Category 1 (Temperature exchange equipment) refrigerators and freezers.
 - Category 2 (Screens and monitors) flat screen televisions and monitors.
 - Category 3 (Lamps) fluorescent lamps.

- Category 4 (Large equipment) whiteware.
- Category 5 (Small equipment) microwaves.
- Category 6 (Small IT and telecommunication equipment) – personal computers and mobile phones.
- Category 7 (Batteries) lead acid batteries.
- Categories 1 (Temperature exchange equipment), 2 (Screens and monitors), 4 (Large equipment), 5 (Small equipment) and 7 (Batteries) are the most commonly accepted categories across all sites.
- Sites that provide direct reuse, and repair and refurbishment. They list acceptance of Categories 3 (Lamps) and 7 (Batteries); however, they only process these items for recycling.

Table 14 — Service type coverage (by e-product category)

Service	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Category 7
Collection	\checkmark						
Repair and refurbishment	\checkmark	\checkmark	Х	\checkmark	\checkmark	\checkmark	Х
Direct Reuse	\checkmark	\checkmark	Х	\checkmark	\checkmark	\checkmark	Х
Recycling	\checkmark						

The analysis of the service gaps has been performed using the Trakk Assets tool and the following maps, (all available in Appendix A):

- 1. Drop-off Cover North 2020_11_30
- 2. Drop-off Cover South 2020_11_30
- 3. Population North 2020_11_30
- 4. Population South 2020_11_30

The Trakk Assets tool includes additional maps showing the coverage of services for all e-product categories. These maps have also been used in the analysis.

THE MAIN POPULATION CENTRES IN AOTEAROA NEW ZEALAND ARE GENERALLY NOT WELL SERVICED FOR DIRECT ACCESS TO RECYCLING SERVICES

ANALYSIS BY SERVICE TYPE

Table 15 — Drive time and population coverage analysis (by service type)

Somioo	Population Coverage %					
Service	10 min	20 min	30 min			
All Collection sites	79.0	92.7	95.8			
All Repair and Refurbishment	21.8	49.8	63.5			
All Direct Reuse	52.6	74.9	83.2			
All Recycling	52.9	77.7	85.6			

- Overall, there is an active national network of e-product and e-waste life cycle management services available across Aotearoa New Zealand; however, service access and capabilities differ greatly by region and e-product category.
- Across all e-waste collection points mapped through this assessment, 95.8% of the Aotearoa New Zealand population have access to an e-waste collection point within a drive time of up to 30 minutes.
- Across all e-product repair and refurbishment services mapped through this assessment, 63.5% of the Aotearoa New Zealand population have access to e-product repair and refurbishment services within a drive time of up to 30 minutes.
- Across all direct reuse services for e-products mapped through this assessment, 83.2% of the Aotearoa New Zealand population have access to direct reuse services within a drive time of up to 30 minutes.
- Across all e-waste recycling facilities mapped through this assessment, 85.6% of the Aotearoa New Zealand population have access to an e-waste recycling facility within a drive time of up to 30 minutes.
- All e-product categories are widely accepted across the available services assessed; however, coverage for Category 3 (Lamps) is limited with only one recycler providing treatment services to the national network.
- The main population centres in Aotearoa New Zealand are generally not well serviced for direct access to recycling services for any e-product category. Categories 4 (Large equipment) and 6 (Small IT and telecommunication equipment) have the greatest coverage in the main centres. Greater access to recycling services for all categories is available through the available collection sites. E-product repair and refurbishment is limited in terms of the e-product categories accepted, the location coverage and population access. Categories 3 (Lamps) and 7 (Batteries) are not accepted for repair services anywhere in Aotearoa New Zealand at present. The South Island has severely limited access to e-product repair and refurbishment services with no coverage for Category 1 (Temperature exchange equipment), only two sites (Nelson and Wanaka) for Categories 2 (Screens and monitors), 4 (Large equipment) and 6 (Small IT and telecommunication equipment) and one site (Nelson) for Category 5 (Small equipment).
- E-product direct reuse has greater coverage in the main centres than for repair and refurbishment. The best coverage is for Categories 2 (Screens and monitors), 4 (Large equipment), 5 (Small equipment), 6 (Small IT and telecommunication equipment) and 7 (Batteries). Coverage for Categories 1 (Temperature exchange equipment) and 3 (Lamps) is poor.
- Many rural areas, with a population under 10 people per square kilometre, have limited access to all services.
- There is a wide range of charges made for the services. The charges for recycling are the highest. These higher costs are reflected in the charges made at collection, direct reuse, and repair and refurbishment sites when the e-product is likely to be recycled. Categories 2 (Screens and monitors) and 4 (Large equipment) have the highest charges for the recycling of Cathode Ray Tube (CRT) televisions and large printer equipment. These charges reflect the costs set by recyclers. Some e-products have a greater resale/resource value, such as IT equipment, mobile phones or whiteware (due to the high ferrous metal content), and are more likely to be accepted at no cost.



Table 16 — Drive time and population coverage (all services by e-product category)

E product octoriony	Coverage %					
E-product category	10 min	20 min	30 min			
Category 1 (Temperature exchange equipment)	62.8	89.8	94.1			
Category 2 (Screens and monitors)	57.3	85.1	90.6			
Category 3 (Lamps)	25.1	56.4	71.7			
Category 4 (Large equipment)	70.0	91.6	95.2			
Category 5 (Small equipment)	69.7	89.8	93.9			
Category 6 (Small IT and telecommunication equipment)	65.5	86.5	92.5			
Category 7 (Batteries)	61.6	88.3	93.2			

Categories 1 (Temperature exchange equipment), 2 (Screens and monitors), 4 (Large equipment), 5 (Small equipment), 6 (Small IT and telecommunication equipment) and 7 (Batteries) all have coverage of greater than 90% of the population within a drive time of 30 minutes. Category 3 (Lamps) has a coverage of only 71.7% for a drive time of 30 minutes. The coverage for 10 minute drive time has greater variance between the categories. Category 3 (Lamps) only has a 25.1% coverage, Category 2 (Screens and monitors) has a 57.3% coverage, and all the other categories have a coverage over 61% within 10 minutes. This highlights that Category 3 (Lamps) is the category most in need of more options nationally. The sections below analyse the coverage per category in greater detail against each service type of collection, repair and refurbishment, direct reuse and recycling.

11.1 COLLECTION

Collection sites together accept all items from all seven e-product/e-waste categories; however, not all items within each category and there are key items that are more commonly accepted.

Territorial Authorities run the most collection sites (42%) through their community recycle centres, offices, landfills, resource recovery centres and transfer stations. The majority of the Territorial Authority collection sites are transfer stations (60%). The categories that are accepted the most are 1 (Temperature exchange equipment), 4 (Large equipment), 5 (Small equipment) and 7 (Batteries). These are the categories that Territorial Authorities tend to focus on collecting. The items from these categories that are collected from most of the Territorial Authority-run sites are:

- Category 1 (Temperature exchange equipment) refrigerators and freezers.
- Category 4 (Large equipment) whiteware.
- Category 5 (Small equipment) microwaves.

• Category 7 (Batteries) – lead acid batteries.

These items are also the most common items accepted at the other collection sites.

The common items collected from the whole range of sites for the other three categories are:

- Category 2 (Screens and monitors) flat screen televisions and monitors.
- Category 3 (Lamps) fluorescent lamps.
- Category 6 (Small IT and telecommunication equipment) — personal computers and mobile phones.

The coverage statistics from the drive time mapping process identified that 95.8% of the population is covered by all collection sites within a 30 minute drive time. This includes all those that accept e-products/e-waste from the public and not just those that accept it for processing through a third party.



Table 17 — Collection service coverage and gap analysis (by e-product category and region)

E-product category	Regions/locations with good coverage	Regions/locations with poor coverage
1	Main centres in the	General lack of coverage in rural areas with less than 10 people per km ² .
(Temperature exchange equipment)	North Island. Larger cities in the South Island but not the	Northland: Small spots mostly due to the lack of formal road network, Whangarei Heads and north to Pataua, around Mangawhai Heads, Paparoa, east of Toponui, Port Albert.
	west coast or Central Otago.	Auckland: Surrounds of Warkworth including Omaha and Baddeleys Beach, north of Waiuku, north of Cleveland, Orere Point.
		Waikato: Kaiaua, north of Coromandel town, Pauanui.
		Bay of Plenty: Surrounds of Tauranga and north to Katikati, south of Whakatane.
		Hawkes Bay: Wairoa.
		Manawatu: Dannevirke.
		Wellington: Rural area west of Lower Hutt, and north-east of Upper Hutt.
		Marlborough: Marlborough Sounds including Picton.
		Tasman: St Arnaud.
		West Coast: Karamea, Greymouth and surrounds, Hokitika.
		Otago: Wanaka, Queenstown, Te Anau, Balclutha, Milton, Lawrence, Kurow, west of Dunedin, Twizel, Lake Tekapo.
2 (Screens	Main centres in the	General lack of coverage in rural areas with less than 10 people per km ² .
and monitors)	cities in the South Island but not the West Coast.	Northland: North of Kaikohe and Waipapa, Kerikeri and surrounds, east of Whangarei, Whangarei Heads and north to Pataua, south of Paparoa, Port Albert. Auckland: Surrounds of Warkworth, north of Waiuku, north of Cleveland, Orere Point, Parakai, Shelley Beach and surrounds, Waiheke Island.
		Waikato: Kaiaua, south-west of Waiuku, around Happy Valley, Whitianga, Coromandel town, Matarangi, Kuaotunu, Little Bay, Pauanui, Taupo.
		Bay of Plenty: Surrounds of Tauranga and North to Katikati, South of Whakatane.
		Hawkes Bay: Wairoa.
		Manawatu: Ohakune, Taumaranui.
		Gisborne: Gisborne and the whole of the region.
		Hawkes Bay: Wairoa.
		Wellington: Masterton, rural area West of Lower Hutt, and north-east of Upper Hutt.
		Marlborough: Marlborough Sounds including Picton.
		Tasman: Motueka and Golden Bay, Murchison, St Arnaud.
		West Coast: Karamea, Greymouth and surrounds, Hokitika.
		Otago: Queenstown, Cromwell, Te Anau, Lawrence, west of Dunedin.
		Canterbury: Akaroa, Waimate, Kurow, Omarama, Otematata.

E-product category	Regions/locations with good coverage	Regions/locations with poor coverage
3	Most main centres	Lack of coverage in rural areas with less than 10 people per km ² .
(Lamps)	but large regions not covered in the	Northland: all.
	North Island. Larger cities in the South Island but not the	Auckland: Little coverage outside the central city which include — north of Birkenhead, Huia and north beyond Muriwai Beach, Waiuku and north to Big Bay, Pukekohe and north-west to Clarks Beach, North of Pokeno to Beachlands, Great Barrier Island.
	central Otago.	Waikato: north of Te Kauwhata, all of the Coromandel peninsula, Thames, Whangamata, Tairua, surrounds of Cambridge, north-west of Pirongia, surrounds of Kihikihi, Tokoroa, Taupo, Turangi.
		Bay of Plenty: Surrounds of Tauranga, Western Bay of Plenty including Whakatane, Kaweru, Murupara west.
		Gisborne: North of Gisborne.
		Hawkes Bay: All.
		Taranaki: Most of the region including Motunui round to New Plymouth, Inglewood and Opunake.
		Manawatu: North-west of Whanganui, Dannevirke, Pahiatua, Eketahuna.
		Wellington: Corridor from Masterton, Carterton, Greytown, Featherston to Martinborough, rural area West of Lower Hutt, and north-east of Upper Hutt.
		Marlborough: Marlborough Sounds including Picton.
		Tasman: Motueka and Golden Bay, Murchison, St Arnaud.
		West Coast: Karamea, Greymouth and surrounds, Hokitika.
		Otago: Queenstown, Cromwell, the whole of the east coast, and inland to Alexandra.
		Southland: All.
		Canterbury: Akaroa, Waimate, Omarama, Otematata, Kurou.
4 (Large	Main centres in the North Island	General lack of coverage in rural areas with less than 10 people per km ² .
equipment)	Larger cities in the South Island but not	Northland: Small spots mostly due to the lack of formal road network, Whangarei Heads and north to Pataua, around Mangawhai Heads, Paparoa, east of Toponui, Port Albert.
	the West Coast or Central Otago	Auckland: Surrounds beyond Warkworth, north of Waiuku, north of Cleveland, Orere Point.
	contrai otagoi	Waikato: Kaiaua, north of Coromandel town, Pauanui.
		Bay of Plenty: Surrounds of Tauranga and north to Katikati, south of Whakatane.
		Hawkes Bay: Wairoa.
		Manawatu: Dannevirke.
		Wellington: Rural area west of Lower Hutt, and north-east of Upper Hutt.
		Marlborough: Marlborough Sounds including Picton.
		Tasman: Golden Bay, Murchison, St Arnaud.
		West Coast: Karamea, Greymouth and surrounds, Hokitika.
		Otago: Te Anau, Milton, Lawrence, Kurow, west of Dunedin, Twizel, Lake Tekapo.

E-product category	Regions/locations with good coverage	Regions/locations with poor coverage
5	Main centres in	General lack of coverage in rural areas with less than 10 people per km ² .
(Small equipment)	the North Island. Larger cities in the South Island but not	Northland: Small spots mostly due to the lack of formal road network, Whangarei Heads and north to Pataua, around Mangawhai Heads, Paparoa, east of Toponui, Port Albert.
	the West Coast or Central Otago.	Auckland: Wellsford, Surrounds of Warkworth including Omaha and Baddeleys Beach, north and west of Waiuku, north of Cleveland, Orere Point.
		Waikato: Kaiaua, north of Coromandel town, Pauanui.
		Bay of Plenty: Surrounds of Tauranga and north to Katikati, south of Whakatane.
		Hawkes Bay: Wairoa.
		Manawatu: Dannevirke.
		Wellington: Rural area west of Lower Hutt, and north-east of Upper Hutt.
		Marlborough: Marlborough Sounds including Picton.
		Tasman: Motueka, Golden Bay, Murchison, St Arnaud.
		West Coast: Karamea, Westport, Greymouth and surrounds, Hokitika, Reefton.
		Otago: Wanaka, Te Anau, Milton, Lawrence, Kurow, west of Dunedin, Lake Tekapo.
6 (Small IT and tele- communication equipment)	Main centres in the North Island. Larger cities in the South Island but not the West Coast.	General lack of coverage in rural areas with less than 10 people per km ² . Northland: Small spots mostly due to the lack of formal road network, west of Pukenui, north of Kerikeri, Omapere and around the Hokianga harbour, Dargaville, Whangarei Heads and north to Pataua, around Mangawhai Heads, Paparoa, east of Toponui, Port Albert.
		Auckland: Surrounds of Warkworth, north of Helensville, surrounds of Muriwai Beach, north of Waiuku, north of Cleveland, Orere Point, Waiuku and surrounds, Waiheke Island.
		Waikato: Kaiaua, north of Coromandel town, Whitianga, surrounds of Te Awamutu and Cambridge, Pauanui.
		Bay of Plenty: Surrounds of Tauranga and north to Katikati, Kawerau, South of Whakatane.
		Gisborne: All apart from Gisborne city and surrounds.
		Hawkes Bay: Wairoa.
		Manawatu: Ohakune, Dannevirke.
		Wellington: Rural area west of Lower Hutt, and north-east of Upper Hutt.
		Marlborough: Marlborough Sounds including Picton.
		Tasman: Golden Bay, Murchison, St Arnaud, Murchison.
		West Coast: Karamea, Greymouth and surrounds, Hokitika, Reefton.
		Otago: Te Anau, Gore, Ranfurly, Naseby, Milton, Lawrence, Kurow, west of Dunedin, Twizel, Lake Tekapo.
		Canterbury: Akaroa.

E-product category	Regions/locations with good coverage	Regions/locations with poor coverage
7 (Batteries)	Main centres in the	General lack of coverage in rural areas with less than 10 people per km ² .
	North Island. Larger cities in the South Island but not the West Coast.	Northland: Small spots mostly due to the lack of formal road network, Dargaville, Tutukaka, Matapouri, Whangarei Heads and north to Pataua, south of Waipu, Mangawhai Heads, Paparoa, east of Toponui, Port Albert.
		Auckland: Surrounds of Warkworth, north of Waiuku, north of Cleveland, Orere Point, Waiheke Island.
		Waikato: South-west of Pokeno, Kaiaua, Coromandel peninsula north of Thames, Pauanui, Whangamata, surrounds of Cambridge and Te Awamutu, Whakamaru.
		Bay of Plenty: Surrounds of Tauranga and north to Katikati, south of Whakatane.
		Gisborne: All apart from surrounds of Gisborne city.
		Hawkes Bay: Wairoa.
		Manawat: Ohakune, Taumarunui, Dannevirke.
		Wellington: Rural area west of Lower Hutt, and north-east of Upper Hutt.
		Marlborough: Marlborough Sounds including Picton, Kaikoura.
		Tasman: St Arnaud.
		West Coast: Karamea, Greymouth and surrounds, Hokitika.
		Otago: Te Anau, Gore, Milton, Lawrence, Kurow, west of Dunedin, Twizel, Lake Tekapo.
		Canterbury: Akaroa.

Overall, coverage of collection sites is good. The table above gives some indication of the areas covered for each category. Coverage would improve by expanding the range of categories, and items within them, collected at some of the existing sites.

The Trakk Assets maps for all categories clearly indicate how best to increase coverage and at which sites. The tool allows a map to be zoomed into a specific region/area. By selecting between the maps of each category, it becomes clear which existing sites could be expanded.

Opportunities for the public to take their e-products/e-waste for recovery are good in the more populated areas, but the range of items taken widely seems to be limited. The costs and logistics of handling the different items and of collecting the charges from the public is one barrier to widening the range of items collected. This is the case in the community sector and is likely to be one of the reasons that Territorial Authorities don't accept a wider range.

The main centres are generally well covered by collection options and tend to have more coverage of sites that recycle, repair and refurbish and/or undertake direct reuse.

The rural areas of some regions (mainly those with a population of less than 10 people per km²) are less well served, including:

- Parts of Northland, Waikato, and Taranaki regions of the North Island.
- Northern Hawkes Bay.
- Parts of the South Island.

Many of the existing rural services are provided by transfer stations or resource recovery centres, with some areas having access to a community run site that generally accepts a wider range of items within each category. Analysis of the scope for the existing rural sites to accept a greater range of items through a product stewardship scheme would inform how best to improve the rural coverage.

It is noted that the larger recyclers in both islands accept the full range of e-products/e-waste from collection sites nationally and are likely to increase their capacity to do so if there was more demand, i.e., due to a mandatory product stewardship scheme.

Analysis of those Territorial Authority and community run sites that currently do not provide services for e-products/e-waste recovery but that would be interested in doing so if a suitable product stewardship scheme were to be implemented, would also support the provision of a greater rural coverage.

REPAIR AND REFURBISHMENT

Repairs of computers, mobile phones, whiteware and household appliances (Categories 1, 4 and some products in 5 and 6) are the most common services offered, as detailed above. Repairs of laptops (Category 6) are also provided by some sites that recycle and reuse products. Categories 3 (Lamps) and 7 (Batteries) are listed as accepted by repair sites, because they also offer other services, but they are sent for recycling.

The repair services are generally:

- 1. Recyclers that repair suitable items that are not at the end-of-life, and some also provide repair services direct to customers.
- 2. Private businesses that charge the customer based on the work required.
- Community groups or private businesses repairing e-products that have been received from the public for recovery/recycling. The goods are then resold to the community.
- Repair cafes. The public brings an item for repair into a venue that provides access to expert support to facilitate a repair.

Opportunities for repairing e-products are limited. There are likely to be more private repair businesses that are not part of the dataset. Communities are starting to develop repair cafes and building greater community awareness. The wide coverage of collection/drop-off sites may provide opportunities to increase the coverage of repair services.



Table 18 — Repair and refurbishment service coverage and gap analysis (by e-product category and region)

E-product category	Regions/locations with coverage
1 (Temperature exchange equipment)	North Island: Limited to Great Barrier Island, Tauranga, Raglan, New Plymouth, Paraparaumu, Upper Hutt.
2 (Screens and monitors)	North island: Limited to Great Barrier Island, two sites in Auckland, Thames, Tauranga, Raglan, Whanganui, Paraparaumu, Upper Hutt, Lower Hutt.
	South Island: Nelson and Wanaka.
3 (Lamps)	Only accepted for recycling. North Island: Limited to Raglan, Paraparaumu. South Island: Wanaka.
4 (Large equipment)	North Island: Limited to Great Barrier Island, Waihi, Tauranga, Raglan, New Plymouth, Whanganui, Paraparaumu, Upper Hutt, Lower Hutt. South Island: Nelson and Wanaka.
5 (Small equipment)	North Island: Limited to Great Barrier Island, one site in Auckland, Waihi, Tauranga, Raglan, Paraparaumu, Upper Hutt, Lower Hutt. South Island: Nelson.
6 (Small IT and telecommunication equipment)	North Island: Limited to Great Barrier Island, Thames, Waihi, Raglan, Paraparaumu, Upper Hutt, Lower Hutt. South Island: Nelson and Wanaka.
7 (Batteries)	Only accepted for recycling. North Island: Limited to Great Barrier Island, Thames, Tauranga, Raglan, Whanganui, Paraparaumu, Upper Hutt. South Island: Nelson and Wanaka.

Overall, coverage of repair and refurbishment sites is poor. The table above gives some indication of the limited areas that are covered for each category. By expanding the range of categories and items within the categories accepted at some of the existing sites the coverage would improve.

The Trakk Assets maps for all categories clearly indicate how best to increase the coverage and at which sites. The tool allows a map to be zoomed into a specific region/area. By selecting between the maps of each category, it becomes clear which existing sites could be expanded.



11.3 DIRECT REUSE

Reuse covers products in e-product/e-waste Categories 1 to 6. Fluorescent and CFL lamps (Category 3) and Batteries (Category 7) are often accepted at reuse sites, but they are sent to a third party for recycling, the main item being lead acid batteries. Direct reuse requires the site to have the capacity to tag and test the items and relates to e-products that do not need a repair.

It is noted that reuse is also happening naturally in the market through online marketplaces such as TradeMe. However, this has not been included in this analysis.

There may be scope for greater direct reuse through some of the collection sites that currently do not offer this service, particularly in areas with low population density.

E-product category	Regions/locations with coverage
1 (Temperature exchange equipment)	North Island: Limited to Great Barrier Island, Kaitaia, Auckland, Tauranga, Raglan, New Plymouth, Paraparaumu, Porirua, Upper Hutt. South Island: Nelson, Kaikoura, Christchurch, Rakaia, Ashburton, Oamaru, Dunedin.
2 (Screens and monitors)	 North Island: Limited to Great Barrier Island, Auckland, Waiuku, Thames, Waihi, Tauranga, Raglan, Hamilton, New Plymouth, Whanganui, Hastings, Paraparaumu, Porirua, Upper Hutt, Lower Hutt. South Island: Nelson, Kaikoura, Christchurch, Rakaia, Ashburton, Oamaru, Alexandra and Wanaka.
3 (Lamps)	Only accepted for recycling. North Island: Limited to Raglan, Paraparaumu, Porirua, Lower Hutt. South Island: Christchurch, Rakaia, Ashburton, Wanaka, Alexandra.
4 (Large equipment)	 North Island: Limited to Great Barrier Island, Kaitaia, Waiuku, Pukekohe, Waihi, Tauranga, Raglan, Hamilton, Whakatane, Rotorua, New Plymouth, Paraparaumu, Porirua, Upper Hutt, Lower Hutt. South Island: Nelson, Kaikoura, Christchurch, Rakaia, Ashburton, Wanaka, Oamaru.
5 (Small equipment)	 North Island: Limited to Great Barrier Island, Kaitaia, Whangarei, Auckland, Pukekohe, Coromandel town, Waihi, Tauranga, Raglan, Hamilton, Whakatane, Rotorua, Gisborne, Taupo, New Plymouth, Whakatane, Palmerston North, Levin, Paraparaumu, Porirua, Wainuiomata, Upper Hutt, Lower Hutt. South Island: Nelson, Kaikoura, Christchurch, Rakaia, Ashburton, Oamaru, Dunedin.
6 (Small IT and telecommunication equipment)	 North Island: Limited to Great Barrier Island, Auckland, Coromandel town, Thames, Waihi, Raglan, Tauranga, New Plymouth, Hastings, Paraparaumu, Porirua, Upper Hutt, Lower Hutt. South Island: Nelson, Kaikoura, Christchurch, Rakaia, Ashburton, Oamaru, Wanaka, Alexandra.
7 (Batteries)	Only accepted for recycling. North Island: Limited to Great Barrier Island, Kaitaia, Auckland, Waihi, Thames, Tauranga, Raglan, New Plymouth, Paraparaumu, Porirua, Upper Hutt, Lower Hutt. South Island: Nelson, Christchurch, Rakaia, Ashburton, Oamaru, Wanaka, Dunedin.

Table 19 — Direct reuse service coverage and gap analysis (by e-product category and region)

Overall coverage of reuse sites is poor. The table above gives some indication of the areas that are covered for each category. By expanding the range of categories and items within the categories accepted at some of the existing sites the coverage would improve. The Trakk Assets maps for all categories clearly indicate how best to increase the coverage and at which sites. The tool allows a map to be zoomed into a specific region/area. By selecting between the maps of each category, it becomes clear which existing sites could be expanded.

11.4 RECYCLING

Recyclers handle all e-product categories. There is only one recycler of Category 3 (Lamps), Interwaste. They provide a nationwide collection service through selling collection boxes that have the courier costs included in the price.

The larger recyclers provide a nationwide service to collection sites and handle all e-product/e-waste categories. Access to recycling is available to the public nationally through the collection/drop-off sites. Access to a recycler in each region is not necessary and possibly not viable in Aotearoa New Zealand.

The websites of the sites that were audited to create the dataset had a number of common practices when noting the e-products they accept. These result in a lack of clarity of exactly which products within each category the sites accept. The main concerns are:

- Category 1 (Temperature exchange equipment) heat pumps and air conditioning units are not generally listed. Listings generally imply that the target market is for household equipment rather than commercial units.
- Category 2 (Screens and monitors) laptops, tablets and notebooks are not generally listed but the report has assumed that they are handled when computer monitors and computers are listed.

- Category 3 (Lamps) high intensity and LED lamps are generally not listed.
- Category 4 (Large equipment) the term whiteware is used widely but not defined. Separate whiteware items are often mentioned as well as the term whiteware. Photovoltaic panels and print and photocopier consumables are generally not listed.
- Category 5 (Small equipment) some sites consider microwaves to be whiteware. A detailed breakdown of items accepted is generally not provided.
- Category 6 (Small IT and telecommunication equipment) – telephones, calculators and other small equipment are generally not specifically listed. Print and photocopier consumables are also generally not listed.
- Category 7 (Batteries) listings are generally not specific terms of battery types. Car batteries are mentioned, and they have been assumed to be lead acid batteries rather than electric vehicle batteries.



E-product category	Regions/locations with coverage
1 (Temperature exchange equipment)	North Island: Limited to Great Barrier Island, Helensville, Auckland, Pukekohe, Tauranga, Raglan, Hamilton, Whakatane, Rotorua, Tokoroa, Gisborne, New Plymouth, Hastings, Palmerston North, Levin, Porirua, Upper Hutt, Lower Hutt.
	South Island: Nelson, Blenheim, Christchurch, Dunedin, Invercargill.
2 (Screens and monitors)	 North Island: Limited to Great Barrier Island, Hibiscus Coast, Auckland, Thames, Waihi, Tauranga, Raglan, Hamilton, Whakatane, Rotorua, Tokoroa, New Plymouth, Hastings, Porirua, Upper Hutt, Lower Hutt. South Island: Nelson, Blenheim, Christchurch, Timaru, Dunedin, Invercargill.
3 (Lamps)	Only accepted for recycling. North Island: Limited to Raglan, Porirua, Lower Hutt. South Island: Christchurch, Timaru.
4 (Large equipment)	 North Island: Limited to Great Barrier Island, Kaitaia, Auckland, Tauranga, Raglan, Hamilton, Waihi, Rotorua, Tokoroa, Taupo, Whakatane, Gisborne, New Plymouth, Whanganui, Hastings, Napier, Palmerston North, Levin, Porirua, Upper Hutt, Lower Hutt. South Island: Nelson, Motueka, Westport, Blenheim, Rangiora, Christchurch, Ashburton, Timaru, Oamaru, Alexandra, Dunedin, Balaclutha, Invercargill.
5 (Small equipment)	 North Island: Limited to Great Barrier Island, Helensville, Auckland, Pukekohe, Tauranga, Raglan, Hamilton, Thames, Waihi, Rotorua, Tokoroa, Whakatane, New Plymouth, Whanganui, Hastings, Palmerston North, Levin, Porirua, Upper Hutt, Lower Hutt. South Island: Nelson, Blenheim, Christchurch, Timaru, Dunedin, Invercargill.
6 (Small IT and telecommunication equipment)	 North Island: Limited to Great Barrier Island, Kaitaia, Auckland, Tauranga, Raglan, Hamilton, Waihi, Rotorua, Tokoroa, Taupo, Whakatane, Gisborne, New Plymouth, Whanganui, Hastings, Napier, Palmerston North, Levin, Porirua, Upper Hutt, Lower Hutt. South Island: Nelson, Motueka, Westport, Blenheim, Rangiora, Christchurch, Ashburton, Timaru, Oamaru, Alexandra, Dunedin, Balaclutha, Invercargill.
7 (Batteries)	Only accepted for recycling. North Island: Limited to Great Barrier Island, Helensville, Auckland, Thames, Tauranga, Raglan, Hamilton, New Plymouth, Gisborne, Hastings, Palmerston North, Levin, Porirua, Upper Hutt, Lower Hutt. South Island: Nelson, Christchurch, Timaru, Dunedin, Invercargill.

Table 20 — Recycling service coverage and gap analysis (by e-product category and region)

Overall coverage of recycler sites is poor, but many existing recyclers service e-waste accepted by the other collection sites. The table above gives some indication of the areas covered for each category. There is scope and interest for some of the non-recycler sites to start recycling if it became viable for them to do so.

The Trakk Assets maps for all categories clearly indicate how best to increase coverage and at which sites. The tool allows a map to be zoomed into a specific region/area. By selecting between the maps of each category, it becomes clear which existing sites could support the expansion to take other categories. The West Coast of the South Island is isolated from easy access to the main recycling opportunities and is not well serviced by collection/drop-off sites. A recycling, repair and reuse hub on the West Coast could consolidate e-products/e-waste, develop capabilities and thus generate employment in a region that is desperate for new opportunities.

OVERALL POPULATION COVERAGE BY CURRENT FACILITIES IN THE NETWORK AS WELL AS E-PRODUCT CATEGORY-SPECIFIC COVERAGE



12.0 REGIONAL ACCESS ASSESSMENT

SUMMARY

In understanding the current network population coverage and facility access, gaps or areas to improve the e-products and e-waste service network can be identified. Using GIS mapping of current sites, population data and drive time estimations using the national road network, a qualitative analysis was carried out to assess the overall population coverage by current facilities in the network as well as e-product category-specific coverage. A summary is also provided on the kind of access that drop-off points have to recycling facilities and the overall access to repair and reuse services in each region.

Each summary examines the population coverage within a maximum 30-minute drive to a facility and also points out where drive times are shorter than 30 minutes, such as in cities.

REGIONAL SUMMARY: NORTHLAND

Coverage summary:

• Coverage within Northland is patchy with Whangarei being the only population centre to be covered by all but Category 3 (Lamps). There are coverage gaps at Whangarei Heads and Mangawhai Heads.

Recycling access:

- With only one recycler in the Northland region at Kaitaia, there is limited access to recyclers for drop-off points in this region. Collected materials would likely have to be shipped to Auckland for processing.
- The recycler in Kaitaia is for Brother printers and consumables.
- A recycling centre in Whangarei would cover the large gap in service coverage between Kaitaia and Auckland.

Repair and reuse access:

- Collection points in Northland are all transfer stations apart from the one located in Kaitaia.
- Reuse sites are available for the majority of the Whangarei and Kaitaia population.
- There are no repair sites recorded in Northland, meaning a trip to Auckland for repair.

Figure 6 — Map of Northland





Table 21 — Northland: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
 Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: Whangarei Heads Mangawhai Heads 	 Majority of population south of Kawakawa covered within 30 minutes. Coverage gaps: All other populations north of Kawakawa Whangarei Heads 	No coverage for this category in the Northland region.	 Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: Whangarei Heads Mangawhai Heads 	Majority of the population around the Whangarei District covered within 20 minutes. Kaitaia population covered within 20 minutes Limited coverage within 30 minutes for population centres around Kawakawa. Coverage gaps: • Whangarei Heads • Mangawhai Heads • Dargaville • Kerikeri	Majority of population covered within 30 minutes; main centres within 20 minutes. Coverage gaps: • Dargaville • Whangarei Heads • Mangawhai Heads	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Whangarei Heads • Mangawhai Heads



REGIONAL SUMMARY: AUCKLAND

Coverage summary:

• The main population area of Auckland is well covered for all categories, largely within a drive time of 10 minutes. There are coverage issues for populations located in the more remote locations, such as Waiheke, as well as those far from the central city such as Wellsford.

Recycling access:

• Excluding the drop-offsites in Wellsford and Walkworth, there are ample recycling points within a drive time of 30 minutes of collection points. In the central metropolitan area, the drive time is reduced to <10 minutes.

Repair and reuse access:

- Repair options mean the large majority of Auckland is covered within 10-20 minutes drive time.
- South of Papakura, the area is covered by two reuse sites, and a recycler/repair site. To the north-west there is only a single reuse/recycle site.
- Reuse is widely unavailable except for the northern part of the region between Albany and Wellsford.

Figure 7 — Map of Auckland



Table 22 — Auckland: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Majority of population covered within 30 minutes; main centres covered within 10 minutes. Coverage gaps: • Matakana	Majority of population covered within 30 minutes; main centres covered within 10 minutes. Coverage gaps: • Waiheke Island	Coverage within drive time of 30 minutes for populations on the main isthmus between Albany and Drury. Coverage gaps: • All other populations areas	Majority of population covered within 30 minutes; main centres covered within 10 minutes. Coverage gaps: • Manukau Heads	Urban Auckland population covered within 20 minutes. Coverage gaps: • Wellsford • Matakana • Waiheke • Manukau Heads	Majority of population covered within 30 minutes; main centres covered within 10 minutes. Coverage gaps: • Waiheke • Waiuku • Manukau Heads	Majority of population covered within 30 minutes; main centres within 10 minutes. Coverage gaps: • Waiheke • Manukau Heads

REGIONAL SUMMARY: WAIKATO

Coverage summary:

 Coverage for all categories through the centre of the Waikato region is strong. However, many coverage gaps appear on the edges of the region. In some cases, there is no coverage for some categories for the entire Coromandel Peninsula or around Lake Taupo.

Recycling access:

- Recycling options are sparse in the Waikato region with significant gaps existing in the areas to the south and east of Hamilton, the northern Coromandel and South of Taupo.
- The south-east of the Waikato region is without any significant infrastructure beyond drop-off points.
- Collection sites north of Tauranga may find it faster to cross into the Waikato region to drop-off collected goods at the Waihi recycling station.

Repair and reuse access:

- The area is reasonably well serviced by repair options compared to other regions, with the majority of Hamilton as well as all of Raglan, Thames and Waihi covered.
- Reuse options exist in the major centres with gaps to the north and south of Hamilton and eastern part of the Coromandel.

Figure 8 — Map of Waikato





Table 23 — Waikato: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Pauanui • Kaiaua	Majority of population north of Taupo and south of the Coromandel covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Coromandel (excluding Thames) • Taupo • Turangi	Coverage within 20 minutes for the populations at Raglan, Hamilton, Morrinsville, Te Aroha, Matamata and Te Kuiti. Coverage gaps: • Coromandel • Tuakau • Te Kauwhata • Te Awamutu • Tokoroa • Taupo • Turangi	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Pauanui • Kaiaua	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Whitianga • Pauanui • Kaiaua • Turangi	Majority of population covered within 30 minutes; main centres within 20 minutes. Coverage gaps: • Coromandel (excluding Thames)	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Pauanui • Kaiaua



REGIONAL SUMMARY: BAY OF PLENTY

Coverage summary:

• The population in the Bay of Plenty region is well covered for most categories within a drive time of 30 minutes. The locations of drop-off services also mean that drive times are usually closer to 20 minutes for most of the population. Category 3 (Lamps) coverage needs improvement.

Recycling access:

- With a well-developed recycling network already in the region, only those collection sites in the south of the region would have difficulty accessing recycling facilities within 30 minutes or less of driving.
- With the southern collection sites existing along the same road, collection using a single truck when required would not be overly costly.
- Main centres, including Hamilton, Rotorua, Taupo and Thames, are sufficiently covered largely within 20 minutes of driving.

Repair and reuse access:

- Repair coverage exists for the majority of the Tauranga population but is non-existent elsewhere.
- Reuse options are available in major centres giving the population a reasonable level of coverage within 30 minute drive time.

Figure 9 — Map of Bay of Plenty



Table 24 — Bay of Plenty: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Majority of populat 30 minutes; main within 20 minutes. Coverage gaps: • Murupara	tion covered within centres covered	Coverage within 30 minutes for populations between Waihi and Te Puke. Coverage gaps: • Whakatane • Kawerau • Murupara • Opotiki • Te Kaha	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Murupara	Majority of populat centres covered wi Coverage gaps: • Murupara	ion covered within 3 thin 20 minutes.	30 minutes; main

REGIONAL SUMMARY: GISBORNE

Coverage summary:

 The Gisborne region's coverage is piecemeal with several categories only available to the population in the town of Gisborne. There is also no coverage for Category 2 (Screens and monitors). Population density north of Gisborne is low with numerous small towns.

Recycling access:

- Despite being well covered by drop-off points, the only recycling sites are located in Gisborne, leaving much of the region without access to a recycling service within a 30 minute drive.
- In the most eastern parts of the region, the closest recycling option is located in the Bay of Plenty Region.

Repair and reuse access:

- There is no repair coverage in the area.
- There is a reuse option in Gisborne.

Figure 10 — Map of Gisborne



Table 25 — Gisborne: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
All population centres covered within a 30 minute drive; main centres are covered within 20 minutes.	No coverage for this category in the Gisborne region.	Coverage within 30 minutes for the population at Gisborne. Coverage gaps: • All population centres north of Gisborne	Majority of popular 30 minutes; main within 20 minutes Coverage gaps: • Tolaga Bay	tion covered within centres covered	Coverage within 30 population of Gisb Coverage gaps: • All population of Gisborne	O minutes for the orne. centres north

REGIONAL SUMMARY: HAWKES BAY

Coverage summary:

• In the Hawkes Bay region, the only significant coverage gap is Wairoa as it is geographically isolated from the other major population centres in the region.

Recycling access:

• Recycling facilities in the region are centrally located in Napier and Hastings which reduces the distance to sites which are solely drop-off. Both the southern and northern parts of the region are without access to a recycling service within 30 minutes drive time.

Repair and reuse access:

- There is no repair coverage in the region.
- Reuse sites are located in Napier and Hastings.

Figure 11 — Map of Hawkes Bay



Table 26 — Hawkes Bay: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Majority of popula 30 minutes; main within 20 minutes Coverage gaps: • Wairoa	tion covered within centres covered	No coverage for this category in the Hawkes Bay region.	Majority of popula within 20 minutes Coverage gaps: • Wairoa	tion covered within	30 minutes; main co	entres covered

REGIONAL SUMMARY: TARANAKI

Coverage summary:

 For most categories apart from Category 3 (Lamps), the majority of the population in the Taranaki region is covered by some form of drop-off service within a 30-minute drive time. Coverage gaps exist across most categories.

Recycling access:

- A lack of recycling sites outside of New Plymouth limit serviceability for the other drop-off sites in the region.
- In Hawera, the drop-off site may be best served by the recycling site in Whanganui.

Repair and reuse access:

- Three repair sites in New Plymouth serve the entirety of the city, but all other high population areas are left unserved.
- A single reuse option is located in New Plymouth.

Figure 12 — Map of Taranaki



Table 27 — Taranaki: population drive time coverage and gaps for drop-off points (by e-product category)

1 2 Temperature Screens exchange and monitors equipment	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
 Majority of population covered within 30 minutes; main centres covered within 10 minutes. Coverage gaps: Opunake Waverley Rahotu 	Coverage within 30 minutes for the population at Stratford and within 10 minutes for the population of Hawera. Coverage gaps: New Plymouth Waitara Urenui Inglewood Rahotu Opunake Waverley	Majority of popular within 10 minutes Coverage gaps: • Opunake • Waverley • Rahotu	ion covered within 3	30 minutes; main ce	entres covered

REGIONAL SUMMARY: MANAWATU-WHANGANUI

Coverage summary:

 Despite several coverage gaps, the majority of the Manawatu-Whanganui region's population has access to all categories within a drive time of 30 minutes. Coverage gaps are largely limited to population centres in the eastern portion of the region.

Recycling access:

- There are 3 drop-off sites well spread across the southern part of the region enabling easy access.
- The northern portion of the region is without any recycling options, with the closest being in Whanganui or, in some cases, Taupo.
- Placing a recycling facility in the northern part of the region at Taumaranui would help to cover a large service gap that exists in the central part of the North Island.

Repair and reuse access:

- Reuse sites are available, but only in the southern part of the region.
- Repair sites only exist in Whanganui and near Otaki in the south.

Figure 13 — Map of Manawatu-Whanganui



Table 28 — Manawatu-Whanganui: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Dannevirke • Pahiatua • Pongaroa	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Ohakune • Taumarunui	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Dannevirke • Pahiatua • Pongaroa • Eketahuna	Majority of popular 30 minutes; main within 20 minutes; Coverage gaps: • Dannevirke • Pahiatua • Pongaroa	tion covered within centres covered	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Dannevirke • Pahiatua • Pongaroa • Ohakune • Taumarunui	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Dannevirke • Pahiatua • Pongaroa

REGIONAL SUMMARY: WELLINGTON

Coverage summary:

 Most of the Wellington region's population is covered within 30 minutes drive time for all categories except Category 3 (Lamps). Castlepoint has severely limited coverage for all services. Its isolation from the rest of the region's population centres would likely make any collection point uneconomical.

Recycling facility access:

- Collection sites in the west of the region around Wellington have good access to recycling facilities.
- To the east of the region there are no recycling facilities within a 30 minute drive.
- The whole eastern portion of the southern tip of the North Island has limited recycling access. Having a site in Masterton may help to provide more effective coverage for this area of the country.

Repair and reuse access:

• Reuse and repair options are limited to the Wellington City area.

Figure 14 — Map of Wellington



Table 29 — Wellington: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Castlepoint	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Masterton • Castlepoint	Coverage within 30 minutes for the population centres in the west of the region including Wellington, Lower/ Upper Hutt and Porirua. Coverage gaps: • Featherston • Martinborough • Greytown • Carterton • Masterton • Castlepoint	Majority of populat within 20 minutes. Coverage gaps: • Castlepoint	tion covered within 3	30 minutes; main ce	entres covered
REGIONAL SUMMARY: MARLBOROUGH

Coverage summary:

• The Marlborough region is served by two facilities both located in Blenheim. Outside of this, there is no coverage for any category in the rest of the region.

Recycling access:

- There are two recycling facilities located in Blenheim providing coverage for the entire region.
- One of these sites only serves Category 4 (Large equipment) recycling, while the other serves all categories expect Category 7 (Batteries) for which it only serves as a drop-off location.

Repair and reuse access:

• There are no repair or reuse sites in the region. The closest option for the major population centre at Blenheim is either Kaikoura or Nelson.

Figure 15 — Map of Marlborough



Table 30 — Marlborough: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Coverage within 3	Coverage within 30 minutes for the population around Blenheim.					
Coverage gaps:						
• Picton						

- Anakiwa
- Havelock
- Ward

REGIONAL SUMMARY: NELSON-TASMAN

Coverage summary:

 The Nelson Tasman region only sees good coverage for all categories for the population around Nelson. Outside of Nelson, coverage is patchy and several areas are left without any coverage at all.

Recycling access:

- Collection points in Nelson and Motueka have access to a recycling facility within a drive time of 10 minutes.
- Collection points to the north-west in Collingwood and Takaka would require an approximate one-hour drive to reach the recycling facility in Moteuka.
- For the majority of the population recycling facilities are available within a drive time of 30 minutes, with several options available in Nelson and one in Motueka.

Repair and reuse access:

- A repair facility exists in Nelson which covers the population of Nelson within a 30 minute drive. The rest of the region is left without service.
- Reuse facilities are also available in Nelson, which serve the majority of the population in that area. No other reuse option exists in the region before Kaikoura.

Figure 16 — Map of Nelson-Tasman



Table 31 — Nelson-Tasman: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Tapawera • St. Arnaud	Coverage within 3 population around within 20 minutes urban areas of Ne Coverage gaps: • Motueka • Takaka • Parapara • Tapawera • Murchison • St Arnaud	D minutes for the Nelson. Coverage for the main Ison.	Coverage within 30 minutes for the population around Nelson and Motueka. Coverage within 10 minutes for the main urban areas of Nelson and Motueka. Coverage gaps: • Takaka • Parapara • Tapawera • Murchison • St Arnaud	Coverage within 30 minutes for the population around Nelson. Coverage within 20 minutes for the main urban areas of Nelson. Coverage gaps: • Motueka • Takaka • Parapara • Tapawera • Murchison • St Arnaud	Coverage within 30 minutes for the population around Nelson and Motueka. Coverage within 10 minutes for the main urban areas of Nelson and Motueka. Coverage gaps: • Takaka • Parapara • Tapawera • Murchison • St Arnaud	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Tapawera • St Arnaud

REGIONAL SUMMARY: WEST COAST

Coverage summary:

 In the West Coast region overall coverage is poor, with major population centres, such as Greymouth and Hokitika, not covered for any category. There are also several categories which have no service options at all in the region.

Recycling access:

• Westport is the only area in the region that has a recycling site. The rest of the population outside of a 30 minute drive time from the Westport facility is left without coverage.

Repair and reuse access:

• There are no repair or reuse facilities in the region.

Figure 17 — Map of West Coast



Table 32 – West Coast: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Coverage within 20 minutes for the populations at Reefton and Westport. Coverage gaps: • Karamea • Greymouth • Hokitika • Ross • Southern glacier towns	No coverage for th West Coast region	is category in the	Coverage within 20 minutes for the populations at Reefton and Westport. Coverage gaps: • Karamea • Greymouth • Hokitika • Ross • Southern glacier towns	No coverage for this category in the West Coast region.	Coverage within 24 for the populations and Westport. Coverage gaps: • Karamea • Greymouth • Hokitika • Ross • Southern glaci	D minutes at Reefton

REGIONAL SUMMARY: CANTERBURY

Coverage summary:

 Canterbury's main centres on its central plains have good coverage levels for all categories. However, there is a coverage dead spot for all categories in the southwestern part of the region.

Recycling access

- Several recycling facilities exist in the main centres of the southern part of the region. There are none north of Waimakariri.
- Western and northern areas of the region would find it difficult to reach a recycling centre within a drive time of 30 minutes.
- Northern drop-off points would see an approx. one-hour drive to the recycling centre north of Christchurch.
- Drop-off sites on Banks Peninsula have an approx. 30-40 minute drive to the nearest recycling facility.
- Most drop-off points in the south are covered within a drive time of 30 minutes to the recycling facilities at Timaru, except for Fairlie, where the drive time would likely be 50 minutes.

Repair and reuse access:

- Reuse facilities exist in Kaikoura and along State Highway 1 from Christchurch through to Ashburton.
- There is only one repair site, located in central Christchurch.

Figure 18 — Map of Canterbury





Table 33 — Canterbury: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Tekapo • Twizel • Omarama • Kurow	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Akaroa • Diamond Harbour • Tekapo • Twizel • Omarama • Kurow	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Kaikoura • Akaroa • Diamond Harbour • Waimate • Tekapo • Twizel • Omarama • Kurow	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Waimate • Tekapo • Twizel • Omarama • Kurow	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Kurow	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Akaroa • Diamond Harbour • Tekapo • Twizel • Omarama • Kurow	Majority of population covered within 30 minutes; main centres covered within 20 minutes. Coverage gaps: • Kaikoura • Akaroa • Diamond Harbour • Tekapo • Twizel • Omarama • Kurow



REGIONAL SUMMARY: OTAGO

Coverage summary:

 Coverage in Otago sees all categories being accessible by most of the region's population within 30 minutes. However, there are several coverage dead spots. In the case of Category 3 (Lamps) coverage fails to support main centre populations such as Dunedin and Queenstown.

Recycling access:

- Drop-off sites north of Dunedin do not have access within 30 minutes to a recycling centre.
- The repair/reuse centre at Wanaka does not have access to a recycling site within 30 minutes.

Repair and reuse access:

- Reuse sites exist in Dunedin, Oamaru, Wanaka and Alexandra. This covers the majority of the populations of these towns within a 30 minute drive. There is no coverage for Queenstown.
- There is only one repair site which provides Wanaka with service coverage largely within a drive time of 20 minutes.

Figure 19 — Map of Otago



Table 34 — Otago: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Majority of population covered within 30 minutes; main centres covered within 20 minutes.	Majority of population covered within 30 minutes; main centres covered within 20 minutes.	Coverage within 30 minutes for populations in Wanaka and Alexandra. Coverage gaps:	Majority of population covered within 30 minutes; main centres covered within 20 minutes.			
Coverage gaps: Balcultha Milton Queenstown Wanaka Lawrence Kingston	Coverage gaps: Lawrence Ranfurly Queenstown Naseby Kingston	 Queenstown Kingston Balclutha Milton Dunedin Waikouaiti Oamaru Tapanui 	Coverage gaps: Lawrence 	Coverage gaps: • Lawrence • Wanaka	Coverage gaps: Lawrence Ranfurly Tapanui	Coverage gaps: Palmerston Waikouaiti Lawrence Tapanui

REGIONAL SUMMARY: SOUTHLAND

Coverage summary:

 Coverage for all categories in Southland is provided through sites located in Invercargill and Gore. This leaves the majority of the region's population without access within a 30 minute drive, particularly in the west.

Recycling access:

- There is only one recycling facility in Southland, located in Invercargill. This sees the population of Invercargill served within a 30 minute drive.
- The collection point in Gore has access to recycling facilities in either Balclutha or Invercargill within a drive time of approximately 60 minutes.

Repair and reuse access:

• There are no repair or reuse options available in Southland.

Figure 20 — Map of Southland



Table 35 — Southland: population drive time coverage and gaps for drop-off points (by e-product category)

1 Temperature exchange equipment	2 Screens and monitors	3 Lamps	4 Large equipment	5 Small equipment	6 Small IT communication equipment	7 Batteries
Coverage within 30 populations at Gor and Bluff. Coverage gaps: • Riverton • Tuatapere • Nightcaps • Otautau • Lumsden • Waikaia • Manapouri • Te Anau • Stewart Island) minutes for e, Invercargill	No coverage for this category in Southland region.	Coverage within 30 populations at Gor and Bluff. Coverage gaps: • Riverton • Tuatapere • Nightcaps • Otautau • Lumsden • Waikaia • Manapouri • Te Anau • Stewart Island	D minutes for re, Invercargill	Coverage within 30 urban area of Inver Coverage gaps: • Riverton • Gore • Riversdale • Tuatapere • Nightcaps • Otautau • Lumsden • Waikaia • Manapouri • Te Anau) minutes for the rcargill and Bluff.
					Stewart Island	

PRODUCT RECOVERY METHODS AND COLLECTION EQUIPMENT OVERVIEW

A variety of collection recovery methods exist for e-waste. To help develop a set of e-waste recovery methods that can be utilised in different situations, several common recovery methods have been assessed based on:

- · overall suitability
- supported e-waste types
- the availability of the recovery method in Aotearoa New Zealand
- · the safety of the recovery method in terms of the environment and human health and safety
- cost
- · examples of the method in existing e-waste recovery situations.

13.0 NOTES

- L NZ Post Size and Weight Limitation https://www.nzpost.co.nz/business/sending-within-nz/parcels/sending-standards#size-weight
- ² Terracycle E-Waste Pallets with Bags <u>https://zerowasteboxes.terracycle.com/products/e-waste-zero-waste-pallet</u>
- ³ Shipping container shortage due to coronavirus <u>https://www.stuff.co.nz/business/120823075/coronavirus-shortage-of-shipping-containers-could-hurt-exports?rm=a</u>
- ⁴ Dangerous goods carried by transport service operators <u>https://nzta.govt.nz/assets/resources/factsheets/67/docs/67-dangerous-goods.pdf</u>
- ⁵. Pace and Courier Post terms and conditions <u>https://www.nzpost.co.nz/about-us/who-we-are/terms-of-business/pace-courierpost#DG</u>
- 6. Wheelie Bin 240 litre <u>https://totalbins.co.nz/product/wheelie-bin-240-litre</u>
- ^{*L*} Wheelie Bin 1100 litre <u>https://totalbins.co.nz/product/mobile-garbage-bin-1100-litre</u>
- 8. Computer Recycling e-waste recycling bins <u>https://www.computerrecycling.co.nz/bins/</u>
- 9. Astrolift Stillage Cage SSZ-LEM-002 <u>https://www.astrolift.co.nz/product/272-Stillage-Cage</u>
- 10. Shipping container costs <u>https://shippingcontainers.co.nz/buying-a-shipping-container/shipping-container-prices/</u>





Parcels (<25 kg)

Suitability

- NZ Post limits 25 kg, 0.125m³ and 1.5m in length¹.
- Heavily reliant on the individual to organise, package and send off.
- Could make it less attractive than a drop-off point.
- Dangerous goods handling issues if loose or damaged batteries are included in the parcel.
- Parcels are highly suitable for recovery of small e-products for reuse, or repair/refurbishment and subsequent reuse as items are typically packaged individually, reducing the chance of breakage or damage during transport activities.

E-waste types

E-waste weighing up to 25 kg such as:

- Laptop computers.
- Mice.
- Power Supplies.
- Cables.
- Keyboards.
- Desktop computers.
- Laptop and computer batteries.
- Modems.
- Mobile Phones.
- USBs and related storage devices.

Availability

- Highly accessible through post shops throughout the country.
- Could help cover the gaps in the drop-off network as there is a post shop in most towns across the country.

Safety

- Could have some issues with dangerous goods and limitations for items, such as batteries, if there is a sizable quantity being shipped⁴.
- Need to consider the declaration requirements of the individual dropping it off to the post shop for shipping⁵.
- Poor packaging by individual could lead to breakages and a safety risk to people handling the parcel or to the environment.

Cost

- Cost of the largest parcel box at 25 kg from New Plymouth to Auckland is \$44.00 – this cost may make it prohibitive for use as a collection method.
- Low economies of scale as items are sent and transported individually for recycling.

Examples of use elsewhere

- TechCollect Australia About our e-waste recycling service | <u>TechCollect</u>.
- Various postal services in the United States accept e-waste for recycling such as Terracycle and UPS – E-Waste Recycling Programme | <u>TerraCycle.</u>



Wheelie Bins

Suitability

- Can allow more much greater weights and variety of goods than parcels.
- Useful for one off large amounts of e-waste disposal.
- E-waste bin sizes range from 120L up to 1100L.
- Likely useful for drop-off sites in areas with smaller population densities.
- Smaller two-wheel bins will not be able to take larger items such as TVs due to their size. Only the larger four-wheel (1100L) skips will likely be able to manage this.
- Enables the sorting of different categories of e-waste at point of disposal, e.g., separating mobile phones from TVs (relies on collection/transport keeping it separate).
- Need a truck with lifting capabilities. Wheels need to be locked/collection unit needs to be strapped to the truck to prevent movement during transport.
- Wheelie bins may not be suitable for recovery of e-products for reuse, or repair/refurbishment and subsequent reuse, without protective packaging to reduce the chance of breakage or damage during collection, consolidation and transport activities.

E-waste types

• Depending on the size, wheelie bins can accommodate almost all small types of e-waste. However, wheelie bins are not suitable for large e-waste items such as televisions, fridges and freezers etc.

Availability

• Can be easily obtained through a variety of bin suppliers.

Safety

- Wheelie bins will weigh a significant amount when full, particularly the larger four wheeled bins.
- As loading the bin requires the user to place everything in from the top, there is the potential for injuries from lifting heavier items such as TVs and stereos.
- Depending on the size, some items could be broken when they are dropped in the bin leading to the potential escape of hazardous materials and danger to those handling the waste post disposal.
- Emptying the bins will require machinery due to the weight.
- If bins are emptied into a truck for transport rather than being taken on the truck, there is the chance of breakage on loading.
- As the bins have lids, there is less risk of water ingress, reducing the chance of contamination of water with heavy metals etc.

Cost

- 240L wheelie bins cost around \$131.10 incl GST⁶.
- 1100L wheelie bins cost around \$703.80 incl GST^z.
- Enables greater economies of scale for collection in those areas where there are lower areas of population.
- For one-off collections, Computer Recycling charge \$90+GST for a 240L bin and \$180+GST for a 1100L bin⁸.

Examples of use elsewhere

- Computer Recycling <u>E-waste recycling bin hire in</u> <u>Auckland made easy for you – Computer Recycling.</u>
- SUEZ <u>SUEZ Australia & New Zealand | Water and</u> <u>Wastewater Management.</u>



Pallets

Suitability

- Provides flexibility for a variety of larger e-waste types.
- Would require forklift machinery to move around or a pallet jack and a truck with lifting capabilities.
- More suitable for collection points where there is a wide variety and volume of goods being received.
- Requires labour and shrink wrap to stack and wrap the pallets, leading to double handling of items at public drop-offs as the public wouldn't be able to do it themselves for H&S reasons.
- Items need to be sorted by their product type/size to enable them to be stacked safely and efficiently.
- Greater flexibility offered for pallets with bulk bags on them as this reduces the need for stacking².
- Provided items are stacked properly and secured there is less chance of breakage and items are kept separated by their types from drop-off to processing.
- Have weight and height limits. Will limit the number of larger items that can be placed on them.
- Unless placed undercover will not protect against the elements and will see water ingress.
- Pallets may not be suitable for recovery of e-products for reuse, or repair/refurbishment and subsequent reuse, without protective packaging to reduce the chance of breakage or damage during collection, consolidation and transport activities.

E-waste types

- Suitable for larger types of e-waste such as fridges, freezers, desktop computers, TVs, printers and CRT monitors.
- Not useful for smaller electronic waste, such as mobile phones, tablets and laptops, as these would likely be too small to stack efficiently unless a skip bag or box was used.

Availability

- Pallets are simple to acquire and low in cost. There are a variety of suppliers across Aotearoa New Zealand.
- Difficult aspect with pallets is the labour to stack and manage them and the equipment needed to move them around which could reduce the availability or usability of this option.
- Need a forklift/pallet jack and qualified operator.

Safety

- Would require alignment with some H&S criteria due to the danger of falling stacks of e-waste and the stacking, moving and loading of pallets for transport.
- Requires infrastructure to protect the pallets from the elements.
- Failure to protect pallets from the elements could result in water ingress and runoff.
- Mishandling could cause breakage of items from toppling over.
- Safe, provided they are protected from the weather and not mishandled.
- Requires heavy machinery to move and stack and would still require some form of monitoring to ensure safe operation of collection site.

Cost

- Pallets are cheap and readily available but are not overly durable and can be broken more easily than other forms of transport options.
- Would provide economies of scale for larger items as they can be grouped together on various pallets and shipped using large curtain-side trucks.

Examples of use elsewhere

- Veolia recycling <u>E-waste | Veolia Australia and</u> <u>New Zealand.</u>
- Timaru District Council <u>E-Scrap Facilities Timaru</u> <u>District Council.</u>



Bulk Bags

Suitability

- Provides a versatile option for both busy collection sites and less populated areas as can be delivered through courier and picked up by truck.
- Enables the bulk collection of smaller e-waste products, such as mobile phones, but can still be used for larger products such as computers.
- In places where there is a wide variety of e-waste categories being received, there would need to be bags for each type to ensure safe and effective use of the option for both busy collection sites and less populated areas.
- Would require forklift machinery to move around or a pallet jack and truck with lifting capabilities.
- High level of strength in each bag allows for a large volume of material to be collected in one bag.
- Does not require significant amounts of staff input to stack or manage the bags while collection is in progress.
- Unless placed undercover will not protect against the elements and will see water ingress.
- Bulk bags are unlikely to be suitable for recovery of e-products for reuse, or repair/refurbishment and subsequent reuse as there are limited controls available to reduce the chance of breakage or damage during collection, consolidation and transport activities.

E-waste types

 Suitable for small to medium size e-waste such as mobile phones, computers (all types), stereos, printers. Not suitable for large e-waste such as fridges and freezers, TVs.

Availability

 Bulk bags are readily available in Aotearoa New Zealand and can be supplied via post and courier service options.

Safety

- Requires weather protection infrastructure to protect the bags from the elements.
- Bulk bags are not waterproof or watertight so failure to protect them from the elements could result in water ingress and runoff.
- Mishandling during collection and transport could cause breakages and toppling of bags should they be poorly stacked.
- Provided they are protected from the weather and not mishandled, bulk bags are a convenient and safe way of collecting e-waste and preventing adverse environmental effects.
- Requires heavy machinery to move and stack and would still require some form of monitoring to ensure safe operation of collection site.

Cost

• Bulk bags are low in cost and easy to find. They are also reasonably durable, provided they are treated properly — this will allow for reuse.

Examples of use elsewhere

 Terracycle (with bags) – <u>Zero Waste Box™ by TerraCycle®</u> <u>– US.</u>



Stillages

Suitability

- Provides similar suitability as a pallet but with greater durability and weight bearing capability — including weight bearing capacities of 1000+ kg.
- Can support separation of waste streams while protecting goods from breakage and enabling stacking for more efficient space usage.
- Come in a variety of sizes, allowing for a variety of e-waste categories to be collected by them.
- Likely to cost more to purchase initially but this could be outweighed by the lifespan of the product.
- Can be used by individuals dropping off their waste as the built-up sides mean there is less chance of e-waste toppling over onto the individual like with a pallet.
- Will require forklift machinery to move or a pallet jack and truck with lifting capabilities.
- For big and heavy items such as fridges, it may not be suitable due to the need to lift the object over the lip on the front of the stillage.
- Potential to have collapsible stillages for storage when not in use.
- Unless placed undercover will not protect against the elements and will see water ingress.
- May not be suitable for recovery of e-products for reuse, or repair/refurbishment and subsequent reuse, without protective packaging to reduce the chance of breakage or damage during collection, consolidation and transport activities.

E-waste types

- More suited to the same type of e-waste as a pallet.
- Smaller e-waste such as phones and tablets likely too small unless boxes are placed inside the stillage.

Availability

• Several companies build and supply stillages to the New Zealand market and are readily available.

Safety

- Lower the risk of e-waste falling onto people by having solid sides.
- Still a risk of breakage if e-waste is dropped into the stillage or heavy items are placed on top of items which cannot handle the weight.
- If not kept undercover they will allow for water ingress.
- Requires heavy machinery to move and stack and would still require some form of monitoring to ensure safe operation of collection site.

Cost

- Are more expensive than pallets, with one company quoting \$695 for a 1000 kg capacity stillage cage⁹.
- Economies of scale would likely be on par with pallets in terms of the amount of e-waste able to be collected with a stillage.

Examples of use elsewhere

<u>TechCollect Australia</u>.



Skips

Suitability

- Provides a high-volume option for collecting e-waste.
- Has the strength and weight tolerance for large amounts of heavy e-waste.
- Due to access to the skip, likely that breakages will occur when placing items in it.
- Some heavier items unlikely to be able to be lifted into the skip due to weight.
- Unless there is room for multiple skips on site, it will not allow for separation of different e-waste categories.
- Unless placed undercover will not protect against the elements and will see water ingress.
- Require heavy lift trucks to move.
- Large skips can carry more than 1.5 tonnes of waste, making them suitable for places which have high volumes.
- Are not suitable for recovery of e-products for reuse, or repair/refurbishment and subsequent reuse as there are limited controls available to reduce the chance of breakage or damage during collection, consolidation and transport activities.

E-waste types

• Likely suitable for all e-waste types – small to large.

Availability

• Several companies in Aotearoa New Zealand provide skips.

Safety

- Once items are contained in the skip, they are well secured and should not pose any risk to safety.
- Some safety risks related to lifting items over the lip and blow back from breakages is likely to occur when dropping items into the skip.
- Are not watertight and could result in contaminated water getting out into the environment.
- Due to the difficulty in getting items into the skip, there is the risk of breakage to waste products or injury to those putting items into the skip.

Cost

- Are likely to be more costly to purchase due to their size.
- The high volume of the skip will bring economies of scale in terms of weight, but this may be offset by the need to sort waste once it has been collected.

Examples of use elsewhere

• Australia's National Television and Computer Recycling Scheme (NTCRS).



Containers

Suitability

- A good option for high volume collection points or where items are being prepared for long distance travel.
- Enables easy loading, particularly for larger items such as fridges and freezers as there is no lip to lift the item over.
- Enables separation of e-waste by categories.
- Suitable for larger items and smaller items can be boxed and stacked.
- Requires staff supervision and monitoring to stack and prepare each container.
- Requires a specialised transport vehicle.
- Covered over so no risk of water ingress or leakage of chemicals into the environment.
- Can be combined with other methods such as pallets or stillages to enable longer distance transport of e-waste collected from various drop-off sites.
- Are not suitable for recovery of e-products for reuse, or repair/refurbishment and subsequent reuse as there are limited controls available to reduce the chance of breakage or damage during collection, consolidation and transport activities.

E-waste types

- Can suit all types of e-waste provided small items are boxed or in some form of container.
- Without packaging smaller items, a container would be more suitable for large items such as fridges, freezers, dishwashers etc.

Availability

- Several companies in Aotearoa New Zealand provide shipping containers.
- Availability can be affected by the flow of imports and exports into the country as has been seen recently in Aotearoa New Zealand³.

Safety

- Safety risk involved with the stacking of electronic goods in the container and their risk of falling.
- Less risk of injury from lifting goods into the container than other options such as skips and wheelie bins.

Cost

- Shipping container costs vary based on the market demand at the time and the availability of shipping containers.
- Prices for shipping containers can range from \$2,200 to \$6,950 depending on condition and size¹⁰.

Examples of use elsewhere

• Australia's National Television and Computer Recycling Scheme (NTCRS).



SPECIAL HANDLING REQUIREMENTS AND CONSIDERATIONS

The handling of e-waste in Aotearoa New Zealand is governed by several laws, regulations and general guidance principles. To enable a clearer, high-level understanding of these various governing documents and how they interact with handling e-waste in Aotearoa New Zealand, these have been collated in the table below. We look at the seven different categories of e-waste and highlight any category-specific guidance that is of importance for the operation of an e-product stewardship scheme in the following section.

14.0 NOTES

- <u>https://environment.govt.nz/publications/wasteelectrical-and-electronic-equipment-guidance-forcollection-reuse-and-recycling/</u>
- 2. <u>https://environment.govt.nz/publications/waste-electrical-and-electronic-equipment-guidance-for-collection-reuse-and-recycling/</u>
- <u>http://www.legislation.govt.nz/act/public/2015/0070/</u> latest/DLM5976660.html
- Health and Safety at Work (Hazardous Substances) Regulations 2017 – <u>http://www.legislation.govt.nz/</u> regulation/public/2017/0131/latest/DLM7309401. <u>html</u>
- 5. EPA Hazardous Waste types <u>https://www.epa.govt.</u> nz/industry-areas/hazardous-substances/hazardouswaste/hazardous-waste-types/
- ⁶. What the Hazardous Substances Regulations mean for you – <u>https://www.worksafe.govt.nz/topic-and-industry/</u> <u>hazardous-substances/managing/what-the-hazardoussubstances-regulations-mean-for-you/#:~:text=The%20</u> <u>Health%20and%20Safety%20at,to%20recycle%20</u> <u>these%20through%20AgRecovery.</u>
- ¹ <u>http://www.legislation.govt.nz/act/public/1996/0030/</u> <u>latest/DLM381228.html#DLM381228</u>
- <u>a. https://www.gazette.govt.nz/notice/id/2017-au5634</u>
- <u>9</u> EPA Hazardous Waste types <u>https://www.epa.govt.</u> nz/industry-areas/hazardous-substances/rulesfor-hazardous-substances/hazardous-substancesclassification-codes/
- <u>10.</u> EPA Hazardous Waste types <u>https://www.epa.govt.</u> <u>nz/industry-areas/hazardous-substances/rules-</u> <u>for-hazardous-substances/hazardous-substances-</u> <u>classification-codes/</u>

- NZTA Transporting Dangerous or Hazardous Goods <u>https://www.nzta.govt.nz/driver-licences/getting-a-licence/licences-by-vehicle-type/transporting-dangerous-or-hazardous-goods/</u>
- 12. Export-electronic-waste.pdf (epa.govt.nz)
- 13. Flammable Refrigerants Fact Sheet 1.pdf (ccca.org.nz)
- 14. Flammable_Refrigerants_Fact_Sheet_1.pdf (ccca.org.nz)
- 15. Releasing-refrigerants-is-illegal.pdf (epa.govt.nz)
- <u>16.</u> <u>Milestone-2-Report-1-Critique-existing-</u> <u>systems-including-product-regulations-Final.pdf</u> (refrigerantstewardship.co.nz)
- <u>index.php (refrigerantstewardship.co.nz)</u>
- <u>18.</u> Environmental Recycling Aotearoa New Zealand <u>Remarkit</u>
- 19. Smoke alarms | Ministry of Health NZ
- 20. Better practice resource recovery centres (sustainability. vic.gov.au)
- 21. BU-704: How to Transport Batteries Battery University
- 22. UN 38.3 Certification for Lithium Batteries (intertek. com)
- 23. BU-704: How to Transport Batteries Battery University

AOTEAROA NEW ZEALAND GENERIC GUIDANCE AND CONSIDERATIONS

Table 36 — E-waste handling guidance and considerations (by item)

Item	Description
Ministry for the Environment Guidance Principles	 The Ministry provides a set of guiding principles for the management for e-waste during collection, reuse or recycling¹: 1. All parties in the disposal chain have 'disposal chain' responsibilities. 2. Prioritise reuse. 3. If you cannot measure it, you cannot manage it. 4. Good practice companies have procedures to manage their risks.
Ministry for the Environment guidelines for the collection, transporting and storing of WEEE	 The Ministry recommends that e-waste should be collected, transported and stored in such a way that²: Minimises the health and safety risks associated with e-waste collections. Ensures e-waste is collected in a way that enables it to be reused or recycled. Records the data so e-waste can be monitored through the disposal chain. Ensures competent companies handle the e-waste at the next stage of the disposal chain.
International agreements ratified by Aotearoa New Zealand	 The following international agreements relate to the handling and transport of hazardous waste including e-waste that Aotearoa New Zealand has ratified: Basel Convention – regulating the international traffic of hazardous waste. OECD Control of Transboundary Movements of Recoverable Wastes – controls the movement of waste across borders between countries that are OECD members but have not necessarily ratified the other conventions. Waigani Convention a regional agreement under the Basel Convention ensures that hazardous waste cannot travel from Aotearoa New Zealand or Australia to another Pacific country or to Antarctica. The Rotterdam Convention – established a system to ensure there is consent by all parties when certain hazardous chemicals are shipped across borders. Stockholm Convention on Persistent Organic Pollutants – bans the production and use of some of the most toxic chemicals.

AOTEAROA NEW ZEALAND HEALTH AND SAFETY REGULATION AND LEGISLATION LIKELY RELATING TO HANDLING OF E-WASTE

Table 37 — E-waste health and safety regulation and legislation considerations (by item)

Item	Description				
Worksafe — Health and Safety. More detailed information can be found at <u>Health and</u> <u>safety considerations</u> <u>when reusing or</u> <u>recycling WEEE</u> <u> Ministry for the</u> <u>Environment</u> (mfe.govt.nz)	 Relevant legislation/regulation: Health and Safety at Work Act 2015³. How it applies to e-waste: The regulation applies to all business generally, requiring them to manage and mitigate the risks that are posed to people while at sites or participating in activities that they are responsible for. In carrying out collection, sorting and/or transportation of e-waste, companies must proactively identify and manage the risks to their employees or others so that everyone is safe and healthy. 				
Worksafe – Hazardous Substances	 Relevant legislation/regulation: Health and Safety at Work (Hazardous Substances) 2017⁴. Application to e-waste: To understand whether certain e-waste is hazardous, the EPA recommends consulting the Basel Convention, specifically Y-codes in Annex I, A-codes in Annex VIII and the non-hazardous B-codes in Annex IX⁵. In managing hazardous waste, organisations must know what hazardous substances (HS) they have, and how much, to ensure they can safely manage their risks to people. To do this, organisations need to⁸: Create an inventory — including all the HS at the workplace, ensuring it is kept up to date and accurate and readily accessible to emergency service workers. Exception exists for transit facilities where goods stay in their packaging and are covered by the dangerous goods transport rules. Have a safety data sheet — one sheet per HS, its impact on health and safety and how to manage the risks posed by it (see example of Lead Acid Battery SDS at SDS-02207-NZ-Lead-Acid-Battery-Wet, pdf (centurybatteries.co.nz)) Take appropriate measures to mitigate risks posed by hazardous waste. Inform and train workers — all those around and handling HS must have the knowledge to work with them safely. Label hazardous materials — ensure that all places where HS are stored have it clearly labelled for people to see. Install signs — place signs detailing the type of HS, the type of hazard and what to do in an emergency at key points at each site, such as entranceways, on buildings or outdoor areas where HS are stored. Store HS safely — regulations prescribe the requirements for the different situations, types, classes and quantities of the HS onsite. Plan for an emergency — have a plan for who is responsible and for what in an emergency. Dispose of unwanted substances safely and in an appropriate manner. 				

AOTEAROA NEW ZEALAND HAZARDOUS WASTE AND TRANSPORTATION REGULATION AND LEGISLATION LIKELY RELATING TO THE HANDLING OF E-WASTE

Table 38 — Aotearoa New Zealand hazardous waste and transport regulation and legislation considerations for e-waste (by item)

Item	Description
	Relevant legislation/regulation:
	• Hazardous Substances and New Organisms Act 1996 ^z .
	 Hazardous Substances (Classification) Notice 2017⁸.
	Application to e-waste:
Environmental Protection Agency —	• E-waste is likely to contain a variety of hazardous materials which can pose a risk to people's health and the environment.
Hazardous Waste	• The EPA advises that it is safest to assume that the e-waste collected is hazardous as it will likely contain some type of hazardous material ⁹ .
	 It is the responsibility of the consigner to determine if their e-waste is hazardous and apply the appropriate controls.
	• To understand whether certain e-waste is hazardous the EPA recommends consulting the Basel Convention, specifically Y-codes in Annex I, A-codes in Annex VIII and the non-hazardous B-codes in Annex IX ¹⁰ .
	Relevant legalisation/regulations:
	Land Transport Rule: Dangerous Goods 2005.
	• Aotearoa New Zealand Standard 5433:2012 Transport of dangerous goods on land (NZS 5433:2012).
	Basel Convention and various other conventions.
	Aotearoa New Zealand Imports and Exports (Restrictions) Act 1988.
	• Aotearoa New Zealand Imports and Exports (Restrictions) Prohibition Order (No 2) 2004.
Transportation. More information	How it applies to e-waste:
available at <u>64-dangerous-goods.</u>	• Due to its potential to harm the environment as a result of some of the materials in the e-waste there are regulations to protect people and environment while e-waste is in transit.
<u>pdf (nzta.govt.nz)</u>	• Within Aotearoa New Zealand, the transport of e-waste is governed by the Land Transport Rule: Dangerous Goods 2005 provided the transportation is in large quantities ¹¹ .
	• Manufacturers, importers or distributors of dangerous goods will require technical information to meet their responsibilities, which is provided in Aotearoa New Zealand Standard 5433:2012 Transport of dangerous goods on land (NZS 5433:2012).
	• When exporting e-waste there are restrictions and permits required for e-waste that contains various controlled substances listed under the import and exports (restrictions) act 1988.
	• Exports also must comply with the requirements of the various conventions that Aotearoa New Zealand has ratified, such as the Basel Convention.

AOTEAROA NEW ZEALAND E-WASTE SPECIAL HANDLING CONSIDERATION BY E-PRODUCT CATEGORY

The Aotearoa New Zealand EPA recommends that all e-waste be considered hazardous waste unless it is verified as not being hazardous¹². The following table examines specific special handling requirements and considerations for each of the seven e-product categories.

Table 39 — Special handling considerations for e-waste in Aotearoa New Zealand (by e-product category)

Category	Considerations
	Temperature exchange equipment (TEE) contains various refrigerant gases which require special handling to avoid adverse effects on people and the environment. The most commonly used refrigerants are synthetic greenhouse gases (SGG) and belong to the Chlorofluorocarbons (CFC), Hydrochlorofluorocarbons (HCFC) and Hydrofluorocarbons (HFC) families. Some more recent refrigerants are traditional hydrocarbons and are highly flammable.
	To handle refrigerants requires licensed handlers. Individuals must obtain an approved filler licence from an EPA approved licence provider whose course complies with the Health and Safety at Work Act.
	For those refrigerant gases which are considered flammable, the party responsible for managing or controlling a refrigerant system is required to comply with regulations in the Health and Safety at Work Act 2017 which require either ¹³ :
	Adherence to AS/NZS 5149:2016, or;
	• A relevant safe work instrument that sets out requirements for work with flammable refrigerant gases.
	This requirement does not apply to domestic refrigerators, domestic heat pumps, or room air conditioners. ¹⁴
1– Temperature exchange equipment (e.g., fridges/freezers, air conditioning equipment)	While it is illegal to release SGG into the atmosphere ¹⁵ , many of the regulations surrounding the management of refrigerants only impact commercial TEE. For example, there are no requirements for records to be held regarding installations, charging or degassing of residential air conditioning units. ¹⁶ As a result, many domestic TEE ends up at scrap metal yards without being degassed. This poses issues for scrap metal dealers and would likely impact an e-waste product stewardship scheme by increasing handling costs.
	For those refrigerant gases that are recovered, RECOVERY is the main organisation in Aotearoa New Zealand that deals with the collection, storage and destruction of waste gases. It is funded through an advanced disposal fee by bulk importing companies only. This scheme is not comprehensive and does not cover all TEE, especially domestic TEE. The development of a more comprehensive product stewardship scheme for all refrigerants is underway and would likely help solve the lack of a wide-ranging disposal service for both commercial and domestic TEE ¹⁷ .
	For refrigerators with plastics containing brominated flame retardants there are special handling considerations in the case that these screens are to be exported for processing overseas. This guidance is provided by the Ministry of the Environment and assists in determining the types of permits and conventions that need to be adhered to for export to occur. This guidance can be found <u>here</u> .
	Other TEE special handling considerations include heaters which use oil as a medium for heat transfer. Most heaters use some form of mineral oil which needs to be removed before the heater can be processed for recycling. In 2000, The Ministry has released guidance on the management and handling of waste oil which can be found <u>here</u> . Worksafe has some guidance on its website; however, this is provided with a caveat that it has not been updated since before the Health and Safety at Work Act 2015 came into effect; this guidance can be found <u>here</u> .

Category	Considerations
2 – Screens, monitors, and equipment containing screens having a surface greater than 100 cm ² (e.g., televisions, monitors, laptops)	Screens contain a variety of hazardous substances. CRT screens contain lead, up to 3 kg in some cases ¹⁸ . LCD screens with CCFL backlights contain mercury. Screens may also contain brominated flame retardants. More generally screens may contain lead, mercury, cadmium and arsenic. For equipment with screens which contain brominated flame retardants, there are special handling considerations if these screens are to be exported for processing overseas. This guidance is provided by the Ministry of the Environment and assists in determining the types of permits and conventions that need to be adhered to for export. This guidance can be found <u>here</u> . Aside from special considerations around brominated flame retardants, there is no specific guidance for the handling of this category. The handling and transportation of the hazardous substances in this category of e-waste would be governed by the general hazardous waste handling and transportation regulations.
3 – Lamps (e.g., fluorescent lamps, LED lighting)	Lamps can contain small amounts of hazardous substances such as mercury, arsenic and lead. There is no special guidance specific to this category of e-waste — the handling and transportation of the hazardous substances in this category would be governed by the general hazardous waste handling and transportation regulations.
4 – Large equipment with any external dimension over 50cm (e.g., washing machines, dishwashers, electric stoves, large printing and copying machines)	Large printing and copying machines may contain small amounts of cadmium sulphide. There is no special guidance specific to this category of e-waste — the handling and transportation of the hazardous substances in this category would be governed by the general hazardous waste handling and transportation regulations.
5 – Small equipment (e.g., vacuum cleaners, microwaves, toasters, musical instruments, electronic toys)	lonisation smoke alarms contain a small amount of radioactive material, considered too small to be a concern. It is estimated that 300–400 ionisation smoke alarms would be needed to get the same radioactivity as the average brick house ¹⁹ . Desktop-based research revealed no specific discussion or consideration of any special handling or transport requirements for these items. There is no special guidance specific to this category of e-waste — the handling and transportation of the hazardous substances in this category would be governed by the general hazardous waste handling and transportation regulations.
6 – Small IT and telecommunication equipment with no external dimension of more than 50cm (e.g., mobile phones, GPS, personal computers)	Smaller IT and telecommunication devices may contain a variety of hazardous substances in small amounts such as lead, bromine, chlorine, mercury and cadmium. There is no special guidance specific to this category of e-waste — the handling and transportation of the hazardous substances in this category would be governed by the general hazardous waste handling and transportation regulations.

Category	Considerations			
	Batteries come in Lead acid b Alkaline bat Nickel-meta Rechargeat Lithium-ion Mercury bat Some of these bat general waste. Ho mishandled or dis battery types (from	a variety of compositions, the most common of which are ²⁰ : atteries from cars (and farm equipment in regional areas only). tteries (AA, AAA, 9V and 6V lantern (or spring)). al hydride (NiMH) batteries (used in toys, torches, radios, etc.). ble alkaline, nickel cadmium (NiCad) and lithium metal batteries (used in hearing aids). batteries (used in power tools, mobile phones and laptop computers). tteries (usually in round button cells) used in small older devices. httery types, such as alkaline batteries, are low risk and can even be disposed of in powever, more energy dense batteries, such as Lithium-ion, can present much greater risk if sposed of incorrectly. The following are risks posed by the more energy dense/higher risk m BiG SLG Guidelines First Draft):		
	Chemistry Type/Battery Technology	Risks (For a full explanation of the risks presented by different battery types, see Section 3.2 of AS/NZS 5139:2019 'Electrical installations — Safety of battery systems for use with power conversion equipment')		
7 – Batteries (e.g., all batteries excluding EV batteries and large energy storage equipment)	Lithium-ion	 Electrical hazard; Energy hazard; mechanical hazard; Level 1 fire hazard; Explosive gas hazard (lithium chemistries that release hydrogen under fault conditions, e.g., lithium manganese); Toxic fume hazard. Significant risk of fire and thermal runaway. Releases toxic fumes when burning, such as hydrogen fluoride. Potential hazardous off-gassing during handling and processing. High voltage electrical hazard. 		
storage equipment)	Lead acid	 Electrical hazard; Energy hazard; mechanical hazard; Level 2 fire hazard; Explosive gas hazard; Chemical hazard; Toxic fume hazard. Can ignite and start a fire if shorted. Emits a corrosive and explosive mix of hydrogen and oxygen gases during the final stages of charging that can potentially ignite if exposed to a spark or flame. Contains sulfuric acid electrolyte that can cause serious burns if spilt. Lead is a toxic metal. 		
	Nickel-Based	 Electrical hazard; Energy hazard; mechanical hazard; Level 2 fire hazard; Explosive gas hazard; Chemical hazard; Toxic fume hazard. Emits explosive gas, such as hydrogen, while charging, presenting an explosive gas hazard. 		
	Transportation — UN Recommenda Due to their preva are classified as o the provisions laid own. It also applie manufacturer; ma with non-original	The Aotearoa New Zealand Dangerous Goods Transportation Regulation aligns with the tions on the Transportation of Dangerous Goods guidance and rules on batteries. alence in many consumer devices and their higher volatility, all lithium-based batteries class 9 dangerous goods. To be safely transported by air, sea, rail or road they must meet d out in UN38.3 ²¹ . This applies to batteries both in devices and being transported on their es to all points in the battery's transportation process: from sub-suppliers to end-product anufacturer to distributor; in or out of the product; in the field; during product returns or packaging ²² .		



Category	Considerations
7 – Batteries (e.g., all batteries excluding EV batteries and large energy storage equipment)	Spillable lead acid batteries are considered dangerous goods under Class 8 and controlled by UN2794. These batteries should be carried upright on a wood pallet, with honeycomb cardboard between layers and limit stacking to three layers per pallet. The pallet should be shrink-wrapped to improve stability and a UN2794 corrosive label should be applied. Some wet, non-spillable, sealed lead acid batteries grouped under UN2800 are exempt from Class 8 ²³ .
	Nickel based batteries do not have transport limitations, but some precautions should be taken to prevent any short circuiting such as individual wrapping of batteries to prevent them from touching each other.
	Storage:
	The BiG group suggests in the SLG Guidelines First Draft that, at a minimum, an area designated for battery storage should be:
	• Cool and dry, under cover and out of direct sunlight, and protected from water, humidity and any water condensation.
	Away from any heat sources or sources of ignition.
	• Protected from extreme and fluctuating temperatures and able to maintain a stable temperature of between five and 20 degrees Celsius.
	• Bunded with impermeable surfaces and weatherproof coverings to retain any contaminated run-off, e.g., heavy metals. Measures should be taken to prevent potentially hazardous material entering stormwater drainage.
	• Fitted with emergency response equipment specific to the risks inherent to lithium, including suitable fire extinguishing media, such as CO ₂ , sand, vermiculite, copper powder, sodium bicarbonate; and personal protective equipment.
	• Capable of keeping unsupervised batteries under external surveillance. For example, infra-red cameras to detect any excessive temperatures.
	General considerations:
	As with all categories, handling and transportation of the hazardous substances in this category of e-waste would be governed by the general hazardous waste handling and transportation regulations.

SPECIFIC REQUIREMENTS OR GUIDANCE FOR THE SAFE HANDLING OF E-WASTE IN AUSTRALIA, THE UK AND EU



15.0 E-WASTE HANDLING AND TRANSPORTATION GUIDANCE

Understanding how international product stewardship schemes operate will help to form the design of guidance material for the Aotearoa New Zealand e-product stewardship scheme when it comes into effect. The following sections highlight any specific requirements or guidance for the safe handling of e-waste in Australia, the UK and across the EU.

15.0 NOTES

- ¹ Available for purchase at <u>standards.org.au</u> or <u>https://www.standards.govt.nz/shop/asnzs-53772013/</u>
- <u>http://www.gazette.vic.gov.au/gazette/Gazettes2018/GG2018G026.pdf#page=41</u>
- 3. Storing e-waste | Environment Protection Authority Victoria (epa.vic.gov.au)
- 4. Storing e-waste | Environment Protection Authority Victoria (epa.vic.gov.au)
- 5. <u>Reprocessing e-waste | Environment Protection Authority Victoria (epa.vic.gov.au)</u>
- <u>https://ec.europa.eu/environment/waste/shipments/#:~:text=The%20Regulation%20includes%20a%20ban,listed%22%20</u> <u>non-hazardous%20wastes.</u>
- <u>https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en</u> * The UK is still considered to be impacted by these directives despite having left the EU as UK legislation changes will take some time to see any significant deviation from the EU directives.
- ⁸ <u>https://ec.europa.eu/environment/topics/waste-and-recycling/waste-electrical-and-electronic-equipment-weee_en</u>
- 9. https://ec.europa.eu/environment/topics/waste-and-recycling/rohs-directive_en
- 10. Directive 89/391/EEC OSH "Framework Directive" Safety and health at work EU-OSHA (europa.eu)
- 11. Directive 2004/37/EC carcinogens or mutagens at work Safety and health at work EU-OSHA (europa.eu)
- 12 Directive 98/24/EC risks related to chemical agents at work Safety and health at work EU-OSHA (europa.eu)
- <u>13.</u> <u>Guidance on Best Available Treatment, Recovery and Recycling Techniques and Treatment of Waste Electrical and Electronic Equipment (WEEE) (nationalarchives.gov.uk)</u>

VICTORIA (AU) E-WASTE SPECIAL HANDLING GUIDANCE

Victoria (AU) Hazardous Waste and Transportation Regulation and Legislation relating to the handling of e-waste

Sustainability Victoria E-waste Fact Sheet 2020

Regulations:

A new Waste Management Policy (E-waste) came into operation from 1 July 2019 (No. G26, Gazette 28 June 2018). This policy aims to reduce e-waste in landfill, increase resource recovery and ensure e-waste is managed in a way that minimises risks to human health and the environment.

Some of the acts, regulations, standards and guidelines that apply to the safe handling, storing, transferring, transporting and recycling of e-waste are listed below.

Table 40 — Regulations, standards and guidelines

Occupational	Occupational Health and Safety Act 2004
health and safety (OHS)	Occupational Health and Safety Regulations 2007
	Compliance code: Hazardous manual handling (WorkSafe Victoria, 2018)
	Liquid storage and handling guidelines (EPA publication 1698)
Environmental	Environment Protection Act 1970
	Environment Protection (Industrial Waste Resource) Regulations 2009
	National Television and Computer Recycling Scheme – guide for local government
	Management and storage of combustible recyclable and waste materials – guideline (Publication 1667.2, October 2018)
EPA waste management	Waste Management Policy (Combustible Recyclable and Waste Materials)
policies	Waste Management Policy (E-Waste) — from 1 July 2019
Australian standards	AS/NZS 5377:2013 — Collection, storage, transport and treatment of end-of-life electrical and electronic equipment

AS/NZS 5337:2013 Collection, storage, transport and treatment of end-of-life electrical and electronic equipment¹

Operations involved in the collection, storage, transport and treatment of electrical and electronic products, whether it be for reuse of parts or recycling purposes, are encouraged to understand all obligations and take all reasonable and practicable steps to ensure that these products are managed in a manner that will protect human health and the environment against the adverse effects that may result from such wastes.

Section 1.6 - Organizational Requirements.

Section 2 - Requirements for Collection and Storage Facilities.

Section 3 – Recovery for Reuse from End-of-Life Electrical and Electronic Equipment.

Section 4 – Requirements for Transportation.

Section 5 – Requirements for the Treatment of End-of-Life Electrical and Electronic Equipment.

Victoria Waste Management Policy (E-Waste) — from 1 July 2019²

The e-waste policy places operational and record keeping requirements on e-waste service providers, which is defined as any person who conducts a business or undertaking that accepts e-waste for collection, storage, handling, transport or reprocessing.

There are additional record keeping requirements placed on those who transport and/or reprocess lighting equipment, as they are categorised as specified electronic waste i.e., to and from addresses, type and quantity of specified waste, and describe the processes used to process it.

Complying with 5337:2013 is taken to be compliance with the new Victoria policy.

Victoria (AU) E-Waste Special Handling Guidance

EPA Victoria – Storing E-Waste Guidance³

E-waste should only be stored for the purpose of transfer, recycling or reprocessing, all steps should be taken to reduce the time the e-waste is stored.

The guidance in this area directs businesses who store e-waste to:

- Understand the risks of harm to human health and the environment posed by e-waste and communicate this to staff.
- Store, transport and handle e-waste to eliminate or reduce risk of harm to human health and environment, including fire.
- Separate and store e-waste away from other waste.
- Provide e-waste to an appropriate collector or re-processor that complies with the Waste Management Policy.
- Keep records of e-waste movement to the primary re-processor.
- Prevent breakage or spoilage of e-waste that might limit its suitability for reprocessing.
- Only store e-waste for the purposes of transfer, recycling and reprocessing.
- Take all reasonable steps to minimise how long e-waste under their control or in their possession is stored.

There are certain types of e-waste that must be stored on an impermeable surface. These items are called specified e-waste and include:

- Rechargeable batteries.
- Cathode ray tube monitors and televisions.
- Flat panel monitors and televisions.
- Information technology and telecommunications equipment.
- Lighting.
- Photovoltaic panels.

Record keeping – all required records must be kept for a minimum of five years, including:

- Origin of e-waste name and address of e-waste source.
- Transport name and address of who transported the e-waste and the vehicle registration numbers.
- E-waste type, volume and a description of the hazards associated for the purposes of transport.

Specified e-waste — detail on those items set as specified e-waste including transportation dates, origin and destination addresses, what it is and how much was sent.

EPA Victoria – Transporting e-waste⁴

Victorian guidance states that, at a minimum, e-waste loads should be secure before transporting and moved in such a way that minimises damage or breakage. There are additional requirements for transporting lithium batteries as laid out in the Australian Code for the Transport of Dangerous Goods by Road and Rail.

EPA Victoria – reprocessing e-waste⁵

Reprocessing businesses must:

- Understand the risks of harm to human health and the environment posed by e-waste and communicate this to staff.
- Store, transport and handle e-waste to eliminate or reduce risk of harm to human health and environment, including fire risk.
- Maximise material recovery.
- Keep records for the movements of e-waste.
- Keep records of e-waste materials through to point of usable material or disposal.
- Document the assessment of downstream processors or vendors of e-waste, process materials and residual waste.
- Support upstream providers to ensure e-waste is received in a way that minimises risk of harm to human health and the environment.

As with storage businesses, they must take special action on those e-waste items designated as "specified e-waste".

There is a special restriction on smoke detectors and smoke alarms. The guidance states that these should not be crushed, shredded or dismantled in a way that releases the small amount of radioactive material inside. However, they can be disposed of in general waste.

There are specific rules around crushing and shredding with the purpose of avoiding the release of toxic/dangerous dust particles, reducing the risk of harm to human health and the environment and to prevent the destruction of dangerous items such as lithium batteries and the release of liquid components such as heating oils.

Reprocessing businesses must keep records for a minimum of five years for:

- Each load of specified e-waste accepted.
- Total e-waste flows per financial year.
- Total material recovery rate per financial year.
- Compliance with material recovery standards.

Evidence for the above can be demonstrated by receipts/ invoices from a downstream vendor or processor of materials recovered from e-waste.

EU AND UK E-WASTE SPECIAL HANDLING GUIDANCE

EU and UK Hazardous Waste and Transportation Directives relating to the handling of e-waste

The Waste Shipment Regulation (WSR) (EC) No. 1013/2006⁶

- The WSR adopted by the EU in 2006 is a binding legalisation that sets out legal procedures and control regimes for the shipment of waste to better synchronise the requirements of the Basel Convention and the OECD Decision (referenced in Annex VIII of the Regulation).
- The WSR provides waste codes for e-waste and non-ewaste. For example, there are codes for electronic scrap, for assemblies, for cathode ray tubes, for waste leadacid batteries, copper alloys etc.
- In its article 49, the WSR provides that for exported waste that is to be processed/recovered overseas, the member state from which the waste was sent is required to ensure that the facility which receives the waste will be operated in accordance with human health and environmental protection standards that are "broadly equivalent to standards established in Community legislation".

The Waste Framework Directive (WFD) (2008/98/EC)⁷

- Sets out the basic concepts and definitions related the waste management such as definitions of waste, recycling, and recovery. Also introduces a waste hierarchy which flows from prevention through preparing for reuse, recycling, recovery and finally to disposal.
- The transport of waste is also covered by the WFD in alignment with the WSR requirements.
- The WFD also sets out a legal framework for the treatment of waste including permits that waste treatment facilities must obtain to operate and requirements for the control, mixing, labelling and record keeping of hazardous waste.

Directive on waste electrical and electronic equipment (WEEE) 2012/19/EU^{8}

The WEEE Directive is the most comprehensive piece of legislation relating to the management of e-waste in the EU. In regard to end-of-life recovery and waste management, the WEEE Directive requires that exports of WEEE meet the requirements of the WSR and the e-waste treated within the EU must be done so at a treatment facility that has been approved by the relevant member state authority.

The WEEE Directive does not set out specific standards for the treatment of WEEE beyond specific requirements to remove and treat certain substances, mixtures and components such as batteries, asbestos and PCB containing capacitors along with specific treatments for certain WEEE products such as CRT monitors. The WEEE Directive relies on the rules set out by the WFD, specifically article 23, which require the WEEE treatment operations to obtain a permit in order to operate. The permit is required to detail, at a minimum, the following information:

- The types and quantities of waste that may be treated.
- For each type of operation permitted, the technical and any other requirements relevant to the site concerned.
- The safety and precautionary measures to be taken.
- The method to be used for each type of operation.
- Such monitoring and control operations as may be necessary.
- Such closure and after-care provisions as may be necessary.

MS shall also ensure that the permit includes all conditions that are necessary for the compliance with the requirements of Article 8(2), (3) and (5) and for the achievement of the recovery targets set out in the article 11 of the WEEE Directive.

Directive on the use restrictions of certain hazardous substances in electrical and electronic equipment 2011/65/EU (ROHS)⁹

The ROHS Directive sets out restrictions on the use of certain hazardous substances in EEE and promotes the collection and recycling of EEE.

Hazardous substances affected by the directive include heavy metals such as lead, mercury, cadmium, and hexavalent chromium and flame retardants such as polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). The directive requires the substances to be substituted by safer alternatives.

The OSH Framework Directive¹⁰

The aim of this Directive is to introduce measures to encourage improvements in the safety and health of workers. It applies to all sectors of activity, both public and private, except for specific public service activities, such as the armed forces, the police or certain civil protection services.

Directive 2004/37/EC – carcinogens or mutagens at work $^{\underline{11}}$

This Directive covers the protection of workers from health and safety risks from exposure to carcinogens or mutagens.

Directive 98/24/EC - risks related to chemical agents at work $^{\underline{12}}$

The objective of this Directive is to lay down minimum requirements for the protection of workers from risks to their safety and health arising, or likely to arise, from the effects of chemical agents that are present at the workplace or as a result of any work activity involving chemical agents.



EU and UK E-Waste Special Handling Guidance

Licensing

Member state agencies are responsible for administering the WEEE Directive in accordance with article 6 which requires that WEEE is treated with the best available treatment, recovery and recycling techniques (BATRRT).

As part of this the agencies are, in discussion with operators, required to impose appropriate licence conditions on operators to ensure that BATRRT is adopted.

Treatment

At a minimum, treatment under the WEEE Directive requires the removal of all fluids and the appropriate selective treatments in accordance with Annex II to the Directive. Any storage that is required must be done appropriately in a way that does not endanger people or the environment.

Removal of components

Annex II of the WEEE Directive requires that certain items are removed from any further circulation. Removal is not defined in the WEEE Directive but is interpreted as including mechanical, chemical or manual processes and could occur at any stage in the treatment process. The way removal is achieved will therefore depend on the type of WEEE involved, whether hazardous components are present and whether it is intended that a component is to be reused. Removal may therefore be a staged process and may also be undertaken at different facilities. Once removed, these components must be disposed of in accordance with Article 4 of the WFD and relevant member state legalisation.

The following are specific components that must be removed as a whole before being processed:

- Capacitors containing polychlorinated biphenyls (PCBs)
- Mercury containing components

- Toner cartridges
- Asbestos
- Components containing refractory ceramic fibres
- Components containing radioactive substances
- Gas discharge lamps
- Cathode ray tubes
- Electrolyte capacitors containing substances of concern
- Batteries that can be removed prior to treatment and internal hazardous batteries

The following are specific items that can be removed as materials before being processed:

- Plastic containing brominated flame retardants
- CFCs, HCFCs, HFCs and HCs
- External electric cables
- Circuit boards
- Liquid Crystal Displays
- Batteries other than those mentioned in the list in paragraph 42
- The fluorescent coating in cathode ray tubes

Transport/transfer of WEE

When the WEEE is transferred between two licensed processing/storage facilities for further treatment/storage/ processing then it must be transferred in such a way that all further recipients of the transferred WEEE are aware of the treatments that have been undertaken and those that remain to be undertaken.





Fluids

All fluids in WEEE must be removed before crushing or shredding operations take place.

The recovery of oil fluids is considered complete once oil or other fluids have been extracted under gravity or by vacuum to an extent that free draining oil or fluid cannot be obtained from the appliance anymore. Oil fluids cannot be mixed and must be stored in separate containers for disposal or recovery.

WEEE containing various refrigerants and ozone depleting substances must have their gases removed from the appliance and disposed of in accordance with the relevant local legislation before further processing can be carried out.

Facility requirements

Storage areas must have the following:

- Impermeable surfaces for appropriate areas with appropriate spillage collection facilities, and where appropriate, decanters and degreasers
- Weatherproof covering for appropriate areas
- Treatment areas must have the following:
- Impermeable surfaces for appropriate areas with appropriate spillage
- Collection facilities and, where appropriate, decanters
 and degreasers
- Appropriate storage for dissembled spare parts
- Appropriate containers for storage of batteries, capacitors containing PCBs or
- PCTS, and other hazardous waste such as radioactive waste
- Equipment for the treatment of water, including rainwater
- (Suitable) balances for measuring the weight of treated waste.

Impermeable surface

An impermeable surface means a surface or pavement constructed and maintained to a standard sufficient to prevent the transmission of liquids beyond the pavement surface. The impermeable surface should be associated with a sealed drainage system and may be needed even where weatherproof covering is used.

A drainage system must ensure:

- No liquid will run off the pavement other than via the system
- Except where they may lawfully be discharged, all liquids entering the system are collected in a sealed sump

The type of impermeable surface required will likely depend on several factors including:

- The type and quantity of WEEE being stored or processed, and
- Whether the WEEE contains hazardous substances
 and fluids
- The type and volume of other materials dealt with
- The type and level of activity undertaken on the surface
- The length of time the surface is meant to be in service
- The level of maintenance

Data and record keeping

Treatment sites are required to have balances to measure the weight of WEEE entering a treatment facility and components and materials leaving each site along with the destinations for those materials leaving.

Producers are obligated to report compliance to the WEEE Directive under member state legislation and should engage with accredited treatment facilities to gain records on the completed treatment services so that producers can show that they are meeting their requirements for treatment under the WEEE that they have responsibility for.

APPENDIX A:

This appendix provides images of the maps that were used for the analysis performed for the report.

1. Drop-off cover North 2020_11_30



2. Drop-off cover South 2020_11_30



3. Population North 2020_11_30

4. Population South 2020_11_30



TECHCOLLECT.NZ PO BOX 60128, Titirangi, Auckland 0642