Antarctica New Zealand

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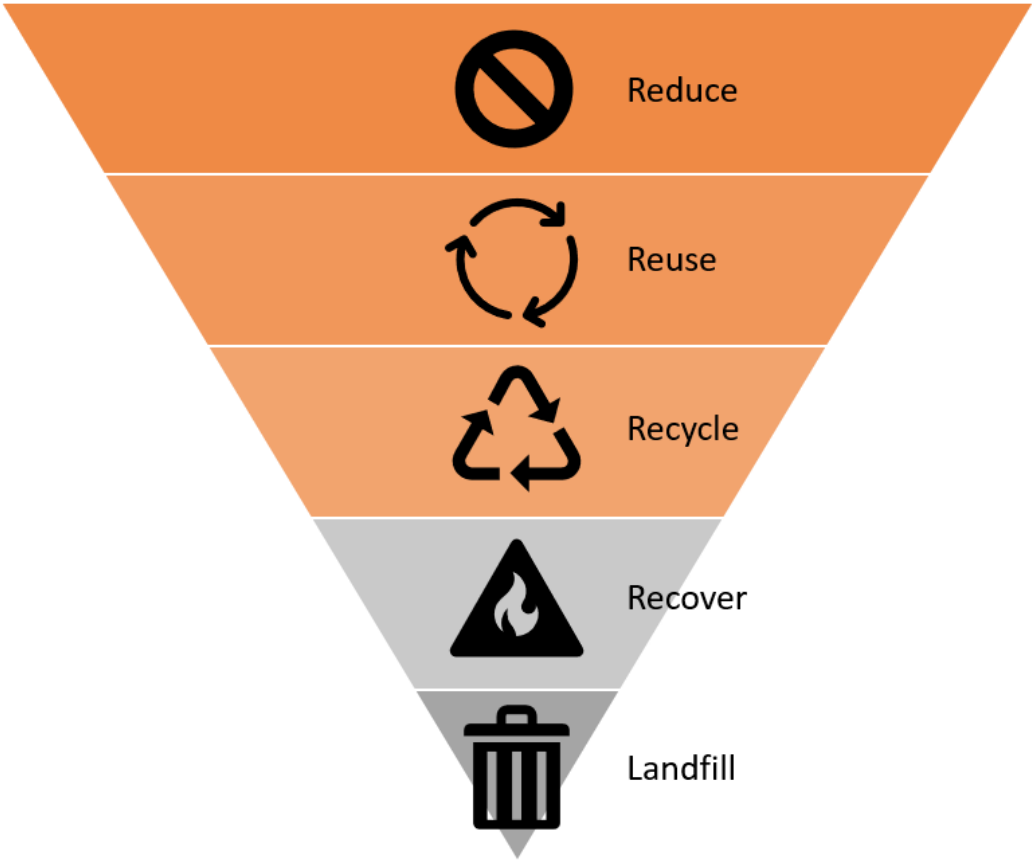

Waste Management System Manual

Antarctica New Zealand

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Antarctica New Zealand

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1. Context

Antarctica New Zealand's vision is:

Antarctica New Zealand is regarded as a global leader and trusted partner, striving to value, protect and understand Antarctica and the Southern Ocean.

Antarctica New Zealand has commitment to undertake all activities in a way that minimises impacts on the environment, both in Antarctica and New Zealand.

All human activities, whether they are associated with the operation and maintenance of Scott Base and field infrastructure, or part of the science programme, inevitably produce waste. Integral to minimising the environmental impact of these activities, is the need to develop effective waste management practices.

Antarctica New Zealand has developed a waste management system as part of its Environmental Management System (EMS), which prevents prohibited products arriving in Antarctica and follows the waste hierarchy. The waste management system first targets minimisation/reduction of waste, then reuse, recycling and finally disposal.

In 2019 and in 2025 the Antarctic Treaty Consultative Parties agreed resolutions to reduce plastic pollution which included a recommendation for their Governments to *take all relevant measures, as appropriate, to prevent or reduce plastic pollution resulting from activities within their control in the Antarctic Treaty area*. Microplastics have been discovered in Antarctic snow (Aves et al., 2022) and are a pervasive ecosystem disruptor. Antarctica New Zealand is working towards a big goal of zero non-hazardous waste to landfill by 2030 and this includes reducing our plastic waste generation and diverting it from landfill or offshore recycling where it may be mismanaged.

Once waste is generated, it is disposed of through the correct waste stream. Antarctica New Zealand staff at Scott Base ensure each stream is appropriately handled and stored for transfer back to New Zealand. All waste, except liquid sewage waste, is returned to New Zealand. Waste generated at Christchurch is disposed of through the Christchurch City Council's services or to specific waste service providers (Appendix 1) through the logistics teams.

1.1 Purpose

This manual is written to provide clear information on how waste is managed, both in Antarctica and Christchurch, for Antarctica New Zealand's staff and stakeholders. The manual provides an overview of the waste management system, from purchasing through to disposal, for all aspects of Antarctica New Zealand's operations. This manual also addresses the procedures for managing the construction waste resulting from construction projects.

This Manual is supplemented by ongoing awareness measures (such as the Scott Base Waste Posters and PADs System) which provide quick and timely information for those directly generating waste.

1.2 How to use this manual

This manual should be referred to by all people involved in the handling, storage, and disposal of waste materials at Scott Base, Scott Base Redevelopment, at field sites, and in Christchurch.

Users should refer to the appropriate section of the handbook for the correct procedures to deal with each type of waste generated in Antarctica. Specific procedures are set out for the separation, handling, storage and disposal of waste.

2. Legal Requirements

A number of national and international legal requirements exist in the context of waste management for Antarctica and New Zealand based operations including:

- Annex III of The Protocol on Environmental Protection to the Antarctic Treaty;
- Antarctica (Environmental Protection) Act (1994);
- Waste Minimisation Act (2008); and
- Hazardous Substances and New Organisms Act (HSNO) (1996).

Further information on all of Antarctica New Zealand's compliance obligations can be found in the Compliance Manual.

Annex III of the Protocol Waste Disposal and Waste Management
Under Annex III, Antarctica New Zealand must:

- Reduce waste as far as practicable to minimise the impact on the Antarctic environment and minimise interference with the natural values of Antarctica;
- When planning and conducting activities consider waste management (reducing, recycling, storage, removal and disposal);
- Return waste to New Zealand; and
- Clean up sites of past activity, unless greater environmental damage would be done conducting clean-up

Annex III also states that: 'Wastes generated at field camps shall, to the maximum extent practicable, be removed by the generator of such wastes to supporting stations or ships for disposal.'

Annex III has been included in Appendix 2 for reference.

Antarctica (Environmental Protection) Act (1994)
The Antarctica (Environmental Protection) Act (1994) implements the Protocol and its Annexes into New Zealand domestic legislation. Under the Act it is an offence to dispose of waste in a manner not in line with the Protocol. This offence carries with it up to six months imprisonment for the responsible person(s) or a fine of up to $100,000.

Waste Minimisation Act (2008)
This Act encourages waste minimisation and a decrease in waste sent to landfill. To place greater responsibility on manufacturers, importers, retailers and users for waste management, the Act introduced regulated product stewardship. The priority products identified in the Act that are relevant to Antarctica New Zealand's operations are:

- Plastic packaging;
- Tyres;
- Electrical and electronic products (e-waste); and
- Refrigerants.

As product stewardship schemes are developed for these products, Antarctica New Zealand should be ready to participate in any accredited scheme.

Hazardous Substances and New Organisms Act (1996)
This Act requires that hazardous waste that is imported into New Zealand is done so in accordance with the Act. Antarctica New Zealand applies for and receives the required permits from the Environmental Protection Authority to do so.

3. Prohibited Products

The Protocol identifies a number of prohibited products which *'shall not be introduced onto land or ice shelves or into water in the Antarctic Treaty area (other than those required for scientific, medical or hygiene purposes)'* (Article 7, Annex III). These include:

- Polychlorinated biphenyls (PCBs);
- Non-sterile soil;
- Polystyrene beads, chip or similar forms of packaging (except vermiculite which is limited to packaging of hazardous liquids)
- Pesticides (other than those required for scientific, medical or hygiene purposes); and
- Wastes containing harmful levels of heavy metals or acutely toxic or harmful persistent compounds (refer to Section 9.2 to read about persistent compounds in personal care products).

Figure 1 is an example of how Antarctica New Zealand communicates expectations of suppliers in regard to prohibited products.

Figure 1 Diagram for suppliers of prohibited products.

The use of polyvinyl chloride (PVC) products is discouraged except where no practicable alternative exists. Vermiculite products are only to be used to package hazardous substances (specifically liquids). The use of untreated wood is to be minimised due to the risk of introducing mould. This includes wood used for packing and boxing of freight.

Antarctica New Zealand also prohibits microbeads and glitter because they are micro-plastics. The Antarctic Treaty Parties agreed Resolution 5 (2019) and Resolution 5 (2025) which calls for all Parties to work towards reducing and ending plastic pollution in Antarctica, particularly the release of micro-plastics from wastewater systems. Microbeads and glitter are both prohibited at Scott Base as they

are highly pollutant to the environment. To find out if products contain microplastics, visit: www.beatthemicrobead.org/product-lists/

If prohibited products are found in Antarctica, they are immediately contained and reported via the HSE reporting system. For example, if a package is received in the mail that contains polystyrene chips, the polystyrene is collected and sent back to Christchurch and the incident is reported via the HSE incident reporting system.

4. Responsibilities in the Waste Management System

The GM Policy and Environment holds overall responsibility for Antarctica New Zealand's Waste Management System. The Environmental Manager is responsible for developing, monitoring and reviewing the Waste Management System, and for preparing reports for circulation in the annual Exchange of Information under the Antarctic Treaty. Implementation of the waste management system at is the responsibility of the Antarctic Operations Team and Engineering Team, overseen by the Engineering Supervisor.

Although specific waste management responsibilities rest with particular individuals and positions, everyone has a role to play in minimising, reducing, and disposing of it properly.

4.1 Roles and Responsibilities of specific Scott Base Staff

Role	Responsibility
All personal	Separate waste materials and place into appropriate waste streams container, or storage area at Scott Base.
Cargo Handler	Document all waste for return to NZ, including hazardous wastes and dangerous goods. Refuse any materials that are not appropriately identified or packaged.
Carpenter	Manage the process for the separation and storage of construction and wood waste to be returned to NZ. Manages waste over winter.
Chefs	Ensure that all kitchen wastes are properly disposed of, including separation of recyclables, and ensuring poultry liquids are kept out of drains.
Domestics	Empty bins around the base and take the bags to the relevant collection locations.
Engineering Supervisor	Oversee waste management duties of engineering team, hold and use Material Safety Data Sheets and asbestos documentation; maintain sewage treatment and discharge into the sea; and liaise with Logistics Manager to allocate shipping containers for waste types.
Field Event Leader	Ensure field waste management procedures are implemented in the field, and waste is taken to the correct collection points on return.
Field Support	Provide field events with appropriate containers, bags and other requirements for carrying out waste management procedures in the field, store human field waste on return, and carry out Cargo Handler's role in the winter. Reviews/audits field events to ensure best practice.
Field Training Instructors	Provide field waste management information to field parties and demonstrate field waste handling requirements and procedures.
Medic	Oversee the safe disposal of medical hazardous wastes. Supply sharps containers to events when needed. Take full sharps containers and biohazard bags from first aid room to designated container.
Mechanic	Ensure wastes in garage area, such as waste oils and fuel, oily rags, filters etc are correctly collected and labelled.
Programme Support Supervisor	Identify any specific waste management requirements of field parties, make sure each event has designated waste management officer, and oversees waste management in the field.
Plant Operators	Manage the storage and eventual packing of waste in the Container Dock, ensuring waste streams are well labelled and efficiently packed. Bales are weighed and totals given to the cargo handler.
Water Engineer	Manages the running and monitoring of the wastewater treatment plant. Coordinates anything to be processed through plant and coordinates solid biohazardous waste to be returned to NZ (specifically full poo dolav contents, sharps, disbins into the designated refrigerated shipping container).

4.2 Roles and Responsibilities of Scott Base Redevelopment Staff

Role	Responsibility
All SBR personal	Separate waste materials and place into appropriate SBR waste streams.
SBR Supervisor	Oversee and audit the waste management from SBR. Where waste is entering the BAU waste streams, ensure that the volumes of SBR waste that are entering these waste streams is recorded.
Main Contractor Supervisor	Support the SBR supervisor in overseeing and auditing the waste management from SBR. Manage the sorting, cataloguing/weighing, and storage of waste in containers ready for returning to NZ.
SBR Construction Manager	Manage the return of construction wastes to NZ. Support operational relationship with MPI and EPA, including permit applications. Oversee return of waste to NZ, including receipt, and transfer to main contractor waste platforms.
Asbestos Remediation Contractor	Oversee the safe in-situ encapsulation of contaminated land, the disposal of contaminated PPE, and the cleaning of contaminated plant through the correct contaminated waste streams.

4.3 Roles and Responsibilities of Christchurch Staff

Role	Responsibility
All staff	Explore and maximise opportunities for waste minimisation in work areas and eliminate the use of prohibited products in Antarctica.
Asset Manager	Management of the waste systems at Scott Base.
Engineering Solutions Manager	Identify and implement improvement to field operations in hazardous substance handling, storage and transport, and waste management.
Event Project Planner	Manage the event risk management process to ensure that environmental impacts around waste management are considered and mitigated. Manage the inventory of hazardous substances left in the Antarctic environment, ensure all hazardous substances are returned to New Zealand and correctly disposed of after use.
Environmental Manager	Oversee management of all system components, lead the Waste Minimisation Group and reviews performance of the system against objectives and targets. Applies for permits to return hazardous waste to New Zealand.
General Manager Policy and Environment	Work with Senior Leadership Team, CEO and Board to set objectives and targets for waste within the Environmental Management System and oversee progress on their achievement.
Logistics Coordinator	Ensures biosecurity standards are met in relation to MPI Approved Facility status for the importing of waste.
Logistics Manager	Manage the return and disposal of wastes returned to NZ. Manage operational relationship with MPI and EPA, including permit applications. Oversee return of waste to NZ, including receipt, handling and disposal in Christchurch and coordination with MAF and local authorities.
Logistics Officer (cargo)	Minimise unnecessary packaging in Antarctic cargo, receive all waste from Antarctica and arrange for disposal in Christchurch after appropriate approval has been given.
Purchasing Coordinator	Oversee and review Antarctica NZ purchasing, ensuring that suppliers are aware of prohibited items and special requirements. Work with

Role	Responsibility
	Environmental team to develop and implement the Sustainable Procurement Policy.

4.4 Waste Minimisation Group

A Waste Minimisation Group (WMG) was established in 2020 with the purpose of achieving the waste objectives and targets identified in the EMS, relating both to Christchurch and Antarctica. The group meets at least every quarter and is made up of members from every team with representation of Scott Base. The WMG is open to any other team members that wish to join or observe the meeting. The WMG have a Terms of Reference[1] and a work plan which prioritises projects over the coming year.

[1] Waste Minimisation Group Terms of Reference, online at: Waste Minimisation Group ToR.docx

5. Waste Management Hierarchy

Antarctica New Zealand must manage and reduce waste from Antarctic operations. To do this, best practice is followed by taking the waste management hierarchy approach (Figure 2). This means that the highest priority is to **reduce waste at the source**. Antarctica New Zealand makes purchasing decisions and works with suppliers to avoid purchasing and transporting materials that may end up as waste. This is particularly important when purchasing items to send to Scott Base.

The following step in the hierarchy is to **reuse** materials or identify **reusable options**. An easy example of this is reusable coffee-cups rather than take-away cups. At Scott Base, materials used to package items can be re-used as packaging for items returning to New Zealand.

The next step is purchasing goods that are made of **recyclable materials** and **recycling** any waste generated. Common types of recyclable materials are paper, cardboard, glass and aluminium cans. This ensures the raw materials that went into making these products can be used again in making new products, removing the need to use virgin materials that come with a higher environmental impact in making products.

The second to last step in the waste hierarchy is **recovering the energy** from the waste to generate heat and electricity. Waste to energy plants produce toxic ash that must be landfilled. However, EnviroNZ have a process to turn non-recyclable plastic into a material that is then used in the manufacture of concrete.

The final step is disposal to **landfill**. When all other avenues have been explored, there are some materials that can only end up in landfill. Therefore, it is important that through design and purchasing decisions the opportunity for reducing waste, reusing items and recycling materials is a priority.

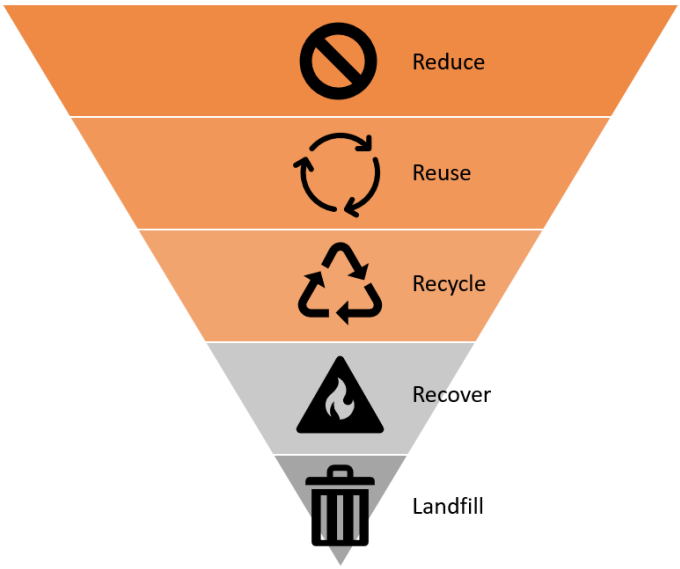


Figure 2 The Waste Hierarchy.

5.1 Reducing Waste

The less waste Antarctic activities generate, the less waste there is to dispose of. Disposal of waste generated in Antarctica has both environmental and financial costs and uses significant staff resources. Waste has to be shipped back to New Zealand, unpacked and delivered to disposal or recycling agents, and processed and/or landfilled. By minimising the volume of waste produced, costs, efforts and environmental impacts can all be reduced.

The following supplier expectations are outlined in the Antarctica New Zealand Short Form Terms and Conditions included on all purchase orders[2]:

1. In order to minimise environmental impact, goods sent to Antarctica must be free of unnecessary packaging, prohibited products (Figure 1) and any biological material such as soil, insects or plant matter. Goods that do not meet these requirements may be returned to the Supplier at the Supplier's cost.
2. The Supplier shall make themselves aware of products that are prohibited in Antarctica and ensure these are not contained in any delivery to Antarctica New Zealand.
3. Where directed by Antarctica NZ the Supplier shall complete Antarctica New Zealand's Environmental Sustainability Checklist for Suppliers.

Suppliers have to fill out an Environmental Sustainability checklist[3] when their products or services are perceived to pose environmental risk in relation to the EMS objectives. An Environmental Advisor reviews this to support the procurement team.

Purchasing guidelines
Antarctica New Zealand has developed a set of purchasing guidelines within the Sustainable Procurement Procedure. The guidelines should be followed by Antarctica New Zealand staff purchasing items to be sent to Antarctica.

The guidelines include the following:

- Order the maximum size practicable for bulk items for use at Scott Base.
- Select food packaging of various sizes, where appropriate, to help minimise food wastage.
- Select, where possible, materials that are easy to segregate, reuse or recycle.
- Buy durable, reusable, products in preference to disposable ones.
- Choose natural materials over synthetic where possible.
- Always select the least hazardous or polluting materials available.
- Where available and practicable, purchase items made from recycled materials (e.g. office supplies, plastic products, packaging materials, solvents).
- Where possible, purchase goods from local (to Christchurch) suppliers to reduce transport.
- Prohibit environmentally damaging wastes such as polystyrene beads/chips and PCBs.

Reducing excess packaging
The cargo and logistics staff at both Christchurch and Scott Base are responsible for:

- Removing excess packaging not required to transport the goods safely.
- Where possible, reuse materials for packing goods for transport (e.g. bubble wrap, cardboard and paper, NOT polystyrene beads or chips).
- Reducing packaging weight (e.g. avoiding glass) and volume (e.g. moulded polystyrene if not essential for safe transport) will help reduce fossil fuel use in transport.

[2] Short form terms and conditions online at which can be downloaded from: https://www.antarcticanz.govt.nz/contact-us/supplier-information
[3] Environmental Sustainability Checklist, online at Environmental Sustainability Procurement Checklist.docx

5.2 Reusing materials

The reuse of materials is an effective way to minimise the amount of waste produced. The reuse of materials or products should be thought of before decisions to purchase new materials. For the reuse of waste materials (such as wood offcuts), this doesn't necessarily need to be thought of before procurement but for long lasting items, such as plastic cargo containers, their reusability (and durability in the Antarctic environment) is considered before purchasing.

Opportunities for reuse occur in most work areas and may include:

- Reuse timber and metal off cuts at Scott Base where possible.
- Reuse fabric off cuts or worn out clothing as rags in the workshops where the fabric is suitable for this purpose.
- Store packaging materials such as bubble wrap, cardboard and paper for reuse in the cargo area.
- Reuse of office paper for scrap notebooks

Some items returning from Scott Base can be sent for reuse in New Zealand including some construction materials and waste fuels or oils. These items should be specifically labelled and their on-going use communicated to the Logistics Officer.

5.3 Recycling streams

Recycling prevents waste occurring by turning materials into new products. The main products that can be recycled are:

- Paper
- Cardboard
- Plastics 1, 2 and 5
- Glass
- Scrap metals including steel cans
- Aluminium cans.

We recycle in all locations and encourage staff and contractors to take responsibility for sorting their waste into the correct stream. The Waste Minimisation Group is looking for opportunities to recycle more materials as innovative approaches are tried and tested with service providers in Christchurch.

Antarctica New Zealand sends recyclable materials to the appropriate recycling suppliers that deal with these recycling waste streams (see Section 7.1).

Plastic sorting at ANZAP
The sorting of plastics serves as a training exercise for new Scott Base staff to gain an understanding of the complexity of recycling plastics, thus the importance of reducing at the source. A future objective is to monitor plastic types, so that the procurement of plastics that must enter landfill can be minimised, thus reducing at the source. A company called Comspec will take clean, clear, soft plastic with no labels. EcoCentral takes recyclable plastic (grade 1, 2 and 5) and the rest (except PVC) is sent to Enviro NZ to turn into fuel. We are constantly looking for opportunities to reduce the amount of plastic waste sent to landfill.

5.4 Energy Recovery

When materials cannot be recycled, they can still be used in waste-to-energy plants. These are not common in New Zealand.
The only partner Antarctica NZ works with to turn waste into energy is Enviro NZ[4]. They have developed a process that turns unrecyclable plastic into a fuel used in cement making[5].

Antarctica New Zealand's non-recyclable plastic waste from the plastic sorting exercise is taken by Enviro NZ for this fuel.

5.5 Disposal

Disposal is the final treatment of waste that cannot be used in any other way. Within Canterbury, solid waste is normally disposed of within a landfill, and liquid waste is normally disposed of into a sewer or septic tank.

It is important to manage residual solid and liquid waste properly. Waste not disposed of correctly can cause adverse health and environmental impacts. Antarctica New Zealand sends waste for disposal to a number of different suppliers. For a list of suppliers and the types of waste they handle, refer to Appendix 1.

Waste disposal comes at a cost. Since 2009, the waste monitoring data has shown an increasing trend in the amount of money Antarctica New Zealand spends on waste. Over 80% of the total spend is for waste disposal via landfill. It is therefore financially beneficial to reduce the amount of waste the programme produces, especially waste fit for landfill only.

In order to reduce the amount of waste going to landfill, it is fundamental to examine the goods and products that are being procured at the beginning of the cycle.

[4] www.environz.co.nz
[5] Unrecyclable plastic converted into fuel source

6. Waste handling in Christchurch

Antarctica New Zealand manages waste produced in both Antarctica and Christchurch. Many of the wastes produced in Christchurch join the Scott Base waste streams at the Christchurch Warehouse and are disposed of in the same way via the suppliers listed in Appendix 1. Other waste produced in Christchurch is disposed of via the Christchurch City Council services. Table 1-3 includes all Christchurch wastes, disposal locations and suppliers.

A number of initiatives are in place to reduce the amount of waste produced at the Christchurch locations:

- Double sided printing is encouraged
- Occasionally recycled paper jotters are created from printer waste
- Every staff member is provided with a reusable drink bottle and is encouraged to use reusable coffee cups
- Only small bins are provided for every desk instead of larger bins to discourage daily waste production
- Multiple recycling streams are available in the kitchen area

The main office produces typical office waste including paper, general waste, organics and recycling. In the kitchen there is also a battery recycling box, soft plastic and a book swap. Recyclable cardboard packaging is loaded in the cupboard by the reception.

The council collects general waste, organics and the mixed recycling. Soft plastics, cardboard and batteries end up in the Warehouse. The waste produced by the redevelopment office is separated into the same streams as the main office.

General waste from the Christchurch head office is taken to the Warehouse to be disposed of in the larger containers. This all ends up in the Kate Valley Landfill. The Warehouse may produce waste related to small scale construction projects and excess packaging.

The warehouse has a number of larger bins for recycling and landfill. There is a skip for large bulky items provided by Waste Management that goes to landfill, a cardboard only recycling bin and an area for tetrapak and soft plastic recycling.

Table 1: Bin Locations across the Christchurch offices

Main Office		
Type	**Bin Location**	**Disposal destination and supplier**
General	- Kitchen - Behind reception - Conference rooms - Individual desks have small bins This waste all enters the red City Council bin located outside the backdoor of the kitchen.	Disposal via Christchurch City Council to Kate Valley Landfill.
Recycling	- Kitchen Recycling waste enters the yellow City Council bin located outside the backdoor of the kitchen.	Christchurch City Council recycling facilities.
Organic/food	- Kitchen	Christchurch City Council composting facilities.

Main Office		
Type	**Bin Location**	**Disposal destination and supplier**
	Organic waste enters the green City Council bin located outside the backdoor of the kitchen.	
Batteries	- Kitchen – small box for batteries. Battery terminals are taped before being disposed of to reduce fire risk.	Environmental Manager take batteries from kitchen to the Warehouse. Disposal via the most cost-effective scrap metal service provider.
Soft plastics	- Kitchen Tub for soft plastics.	Environmental Manager take soft plastics from kitchen to the Warehouse. Disposal via Comspec or Enviro NZ.
E-waste (IT)	- Stored on mezzanine floor of Warehouse until there is a bulk amount to take for recycling (e-waste from Scott Base and Christchurch is stored here)	Molten Media Trust or via Christchurch City Council recycling facilities at Styx Mill (EcoDrop).
Construction waste (including metals, polystyrene, banding, wood → any large items that do not fit in City Council bins)	- Skip behind Warehouse.	Disposal to landfill by Waste Management.
Cardboard	- Main office cardboard is stored in cupboard of reception area - Warehouse cardboard thrown straight into cage at the back of the Warehouse	Cardboard is stored in the cardboard cage behind the Warehouse until full. Full Circle remove cardboard for recycling.
Paper	- Kitchen recycling bin which is then placed in yellow City Council bin, or - Paper shredder located by printer	Recycled via Christchurch City Council (yellow bin), or removed by specialty service TIMG Document Destruction Services.
Tetrapak cartons	- Kitchen recycling	Recycling with SaveBoard and turned into building materials.

Table 3: Bin Locations across the Warehouse.

Warehouse		
Type	**Bin Location**	**Disposal destination and supplier**
General	- Smoko room - Corridor - Warehouse	Disposal via Christchurch City Council to Kate Valley Landfill.
Recycling	- Smoko - Corridor - Warehouse	Recycled via Christchurch City Council.
Soft plastics	- Warehouse	Disposal via Comspec recycling supplier or EnviroNZ
Construction waste	- Warehouse	Taken by a service provider depending on type of waste and cost
Cardboard	- Warehouse	Recycled via Full Circle

Hazardous (e.g. oily rags)	- Joins Scott Base hazardous waste stream i.e. disposed of in hazardous waste container	Disposal via Chem Waste

7. Waste handling at Scott Base

Waste management at Scott Base is a daily practice that all visitors and personnel engage in. Correctly disposing of waste in Antarctica is important for reducing the need for waste sorting on arrival to New Zealand. Figure 3 is the waste management streams for event personnel and staff at Scott Base. There is also a waste map (Figure 4) that shows where the different bins can be found on station, but does not show specific waste streams in the workshops.

There are six overarching waste disposal streams at Scott Base with specific packaging, handling and disposal requirements:

- Recyclable (Section 7.1)
- Organic = food and food-contaminated (Sections 7.2 and 7.3)
- General Waste (Section 7.4)
- Non-compactable (Section 7.5)
- Hazardous Waste (Section 7.6)
- Bio-hazardous Waste (Section 7.7)

These streams involve different packaging, handling and disposal requirements. As the non-compactable waste stream is fed by the operations of Scott Base staff maintaining the base, this stream is not included on the waste posters (Figure 3) for all visitors to Scott Base.

All bedrooms have a small bin for general waste which is to be emptied into the general waste bin and all staff, personnel and visitors are informed of the importance of not putting any chemicals down the drain. Chemicals can kill the wastewater treatment plant's biology and disrupt the entire system.

In order to manage waste effectively, it is fundamental that all personnel travelling to Scott Base understand how to stream their waste correctly. Staff training is given during the Antarctica New Zealand Awareness Programme (ANZAP) including role specific training for those with greater waste management responsibilities. Training is also given to event personnel and other non-staff visitors pre-deployment. The waste poster (Figure 3) is displayed next to every bin located at base, offering information and guidance to the user. Each bin is clearly labelled for each waste stream (Appendix 3).

Figure 3. Waste stream poster displayed at Scott Base.

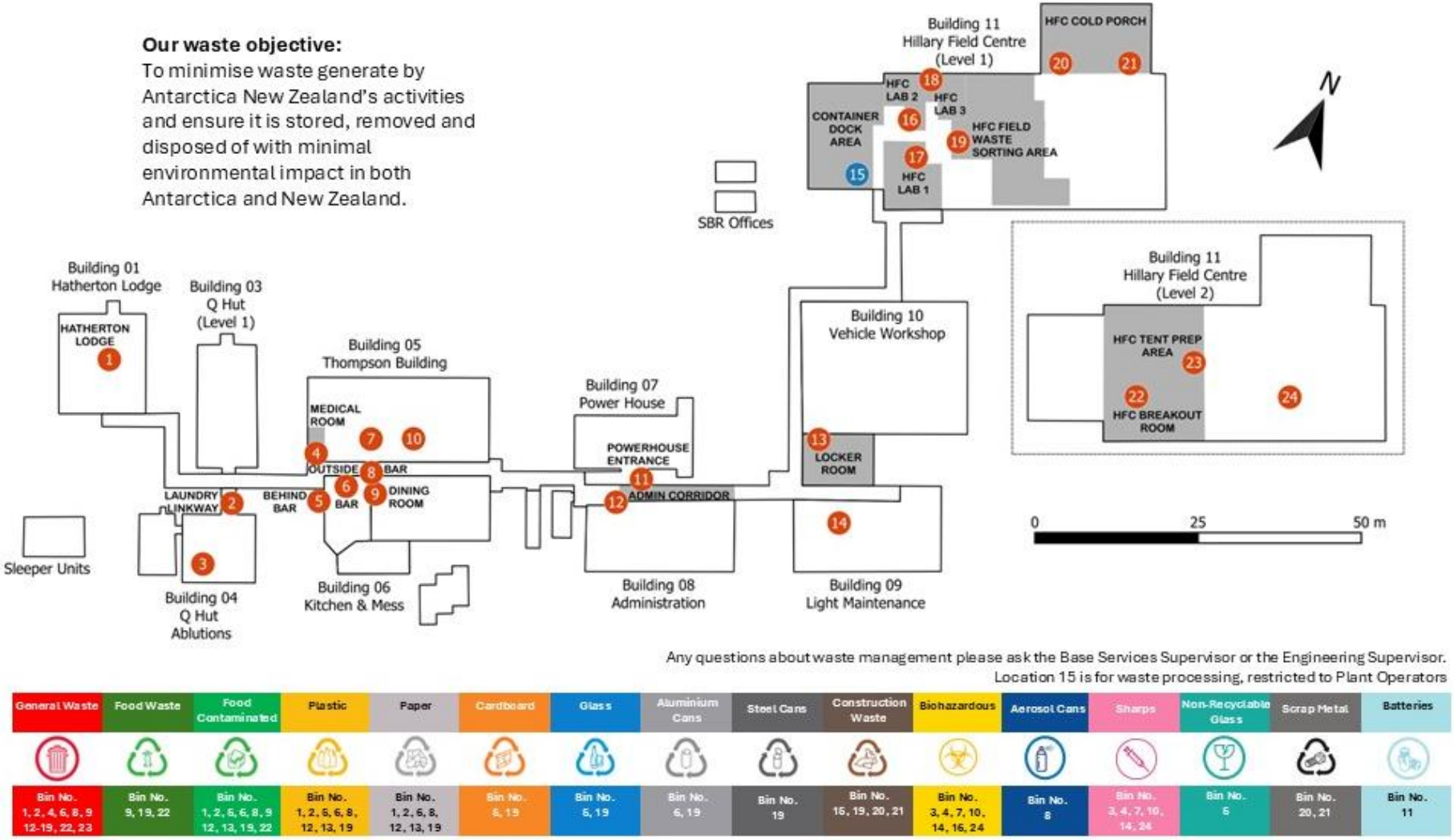


Figure 4 Scott Base Waste Management Map.

7.1 Recyclables

Recyclable waste is made of materials easily recycled in New Zealand. These materials can be broken down and remade into products. Recycling stations have been placed at various positions around the base (Figure 4).

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Cardboard	• Flattened cardboard can go in the bin outside the bar landing, next to cardboard compacter in the HFC, or in the bin under the landing by the kitchen • Cardboard recycling waste container in the Mechanic's workshop • Small card items can go in paper recycling (to avoid loss from bales) • Triwall cubers are not recyclable - general waste	• Domestics empty communal stations and bins into large bins outside the bar / kitchen for plant operators to collect. • Plant operators compact cardboard and paper in separate bales. They label, weigh, record and load bales into shipping container designated for recyclables. • Recyclables must be taken out of the plastic bags used for collection, separated if necessary and placed into the correct bale bag or container. • Recyclables of different types should not be mixed within bales – only cans compacted.	Recycled with Full Circle
Glass	• Communal waste station labelled GLASS RECYCLING located in the corridor leading to the entrance behind the bar • Bulbs, window glass, jars or drinking glasses, any colour glass **bottles** but **no lids and no broken glass**	• Plant operators put glass waste from the bar and kitchen into the outside bin under ablutions • A separate orange broken glass bin is behind the bar that tempered glass, drinking glasses and broken crockery also go in to. • Plant operators use glass crusher, weigh, record and load full bins of crushed glass into shipping container designated for recyclables.	Recycled with Eco Central
Aluminium Cans	• Communal can crusher in bar • Take other metal directly to scrap metal bin outside mechanic's workshop	• Recyclables must be taken out of the plastic bags used for collection, separated if necessary and placed into the correct bale bag or container. • Recyclables of different types should not be mixed within bales – only cans compacted	Recycled with EcoCentral

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Steel Cans	• Washed, flattened steel food cans (top and bottom are removed) are collected in the kitchen	• Steel food cans go to the scrap metal bin outside the mechanics workshop. • Recyclables must be taken out of the plastic bags used for collection, separated if necessary and placed into the correct bale bag or container. • Recyclables of different types should not be mixed within bales – only cans compacted	Recycled with local scrap metal recyclers
Scrap Metal (such as metal banding)	• Bin near garage • Oversized pieces of scrap metal are put in the non-compactable stream	• Large scrap metal cut up and put into scrap bin or container • Plant operators weigh, record and load full bins of scrap metal into shipping container designated for recyclables.	Recycled with local scrap metal recyclers
Paper	• Communal waste station (HFC) labelled PAPER RECYCLING	• Recyclables must be taken out of the plastic bags used for collection, separated if necessary and placed into the correct bale bag or container. • Recyclables of different types should not be mixed within bales – only cans compacted • Paper is stockpiled in the container dock until there is enough to bale • Important: small cardboard items such as toilet paper rolls and toothpaste boxes are too small for the cardboard compactor therefore small cardboard are disposed of in the paper waste stream.	Recycled with EcoCentral
Plastics 1, 2 and 5	• Communal waste station (HFC) labelled PLASTICS 1, 2 and 5 • Including water bottles, clean containers. No lids, lids go in Other Plastics	• Recyclables must be taken out of the plastic bags used for collection, separated if necessary and placed into the correct bale bag or container. • **Plant operators do not compact plastic** – this goes whole into designated plastics container. Plastic is returned to Christchurch where it is sorted during ANZAP before being taken to waste service providers.	EcoCentral take plastic 1, 2 and 5,

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Soft Plastics	• Communal waste Station labelled Soft Plastic: bubble wrap, soft bags and lids	• Plastic is returned to Christchurch where it is sorted during ANZAP before being taken to waste service providers	Comspec take soft plastics that is clear and without labels. Other soft plastics are taken by Enviro NZ to turn into fuel
Other Plastics (3,4,6 and 7)	• Communal waste Station labelled Plastics 3, 4, 6 and 7 • Includes the lids from	• **Plant operators do not compact plastic** – this goes whole into designated plastics container. Plastic is returned to Christchurch where it is sorted during ANZAP before being taken to waste service providers	Enviro NZ take these plastics and turn into fuel
Tetra Pak	• Bin in the mess • Cartons are to be cut open	• Plant operators to bale for return to Christchurch	Recycled with Save Board.

7.2 Food Waste

Food waste includes all food scraps as well as liquids which cannot be rinsed down drains, such as fluid from poultry products. Packaging and other compressible items should be removed for compaction (see Section 7.3). For field food waste see Section 8. Please note that **no food waste from McMurdo can enter the Scott Base food waste stream**. Antarctica New Zealand's policy is that no food from McMurdo can be brought to Scott Base, if it is and waste is generated this waste must enter the **food contaminated waste stream**. The reason for this is that non-New Zealand origin mean (e.g. meat from cows reared in the USA) cannot enter the New Zealand compost system. Meat from other countries may contain diseases not currently in New Zealand which may spread as they are not destroyed by heat treatment.

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Food waste is: • Any food 	• Bucket in kitchen • Bin in dining room next to steriliser/sink area • Bucket in engineering tea room • Coffee grinds bin below coffee machine	• Planties empty the waste stations in the kitchen, dining room and engineering tea room and take to the Soil Food Machine • Food waste gets fed into Soil Food Machine in batches. These batches are recorded	Useable as compost If contamination issues suspected this will be sent to landfill.
Poultry products	• **Any poultry product liquids must not be rinsed down sinks** • Chicken blood is put into specific barrels in the kitchen (managed by the chef) • Eggs can go in general food waste	• Chef ensures chicken blood goes into correct barrel • Plant Operator weighs the barrel and loads directly into the refrigerated "human waste" container where it is frozen for transportation back to New Zealand	Steam sterilisation and landfill
Waste cooking oils	• **Waste cooking oils must not be rinsed down the sinks** • Waste cooking oils are collected in containers.	• Chefs ensure waste cooking oil is contained and is transported back to New Zealand with other waste oils.	Recycled with Eco Drop

7.3 Food Contaminated Waste

Food contaminated waste includes all materials which may contain food, such as packaging and serviettes. These are separated because they are compactable, unlike straight food scraps which are dehydrated in the Soil Food Machine. Although most of this material is not organic as it is contaminated with food it poses a biosecurity risk in case mould develops in transit back to New Zealand. Any food waste that is from McMurdo Station must enter this stream. Food from McMurdo should not be brought to Scott Base.

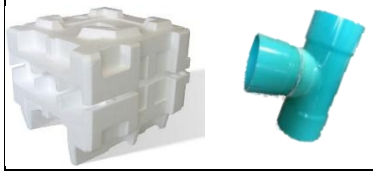
Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Food contaminated is: • Non-recyclable material (i.e. general waste) • Contaminated with food 	• Bin in the dining room next to the steriliser/sink area labelled FOOD CONTAMINATED WASTE • Bin in kitchen under the back sink • Bucket in engineering tea room labelled FOOD CONTAMINATED WASTE • Communal waste stations labelled FOOD CONTAMINATED WASTE	• Bins lined with blue bags • All personnel empty personal bins or bags into appropriate waste station. • Domestics take full bags from the waste stations in the kitchen, dining room, engineering tea room, and communal areas to the steel bins outside the kitchen or bar. • Plant operator takes food contaminated waste from the steel bins, compacts into bales, labels FOOD CONTAMINATED WASTE, weighs, records details and loads in to the shipping container designated for food contaminated waste	Steam sterilisation and landfill

Napkins and food packaging	• Bin in dining room next to steriliser/sink area (with food contaminated).	• Same procedures as food contaminated.	Steam sterilisation and landfill

7.4 Landfill Waste

Landfill waste cannot be recycled, nor reused, it is not organic and must end up in landfill. The table below provides details on types of landfill waste and how its managed. Landfill waste is produced at every location Antarctica New Zealand operates. Non-compactable general waste (e.g. construction wastes and sharp pieces of material) that create hazards will be stored separately to compactable general waste. Non-compactable waste is stored on the Carpenter's landing (see Section 7.5) before being removed by the Plant Operators.

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Most landfill waste is: • Compactable • Fits in a bin • Crushable 	Collected in bins labelled GENERAL/LANDFILL WASTE throughout the base including: • Communal waste stations (aluminium bins) • Wheelie bins in HFC • Engineering workshop • See Engineering Supervisor if unsure.	• General waste bins are lined with black bags. • All personnel empty personal bins or bags into appropriate waste station. • Domestics take bags from waste stations and communal bins to large steel bin outside the bar landing. • Plant operators take general waste from the landings by the bar and at the bottom of the kitchen landing and compact into bales, label with GENERAL WASTE, weigh, and load into the shipping container designated for general waste.	Landfill (via Container Waste) (The landfill is in Kate Valley, North Canterbury)

Some landfill waste is: • Non-compactable • Too large for the bin • Not crushable This then goes into the **Non-Compactable stream** 	Polystyrene: Place back in original box if possible and take directly to plant operator or to the hangar Non-compactable waste or bulky items should be added to non-compactable waste. Collection point in the HFC or outside the carpenter's workshop. Ask plant operator, carpenter or engineering supervisor for guidance. See Engineering Supervisor if unsure.	• Engineering supervisor identifies container(s) for non-compactable and oversized waste • **Plant operators DO NOT attempt to compact polystyrene as it disintegrates and disperses.** Where possible keep whole in original box and load in designated container • Where it is not possible to keep in the original box, Plant operators store polystyrene waste separately from other general waste and label it "POLYSTYRENE WASTE" • Plant operators take **non-compactable waste** to the container dock to store or load directly into designated container.	Landfill (via Container Waste) Or for specific engineering materials it is possible to recycle/reuse of on sell

7.5 Non-compactable Waste

This waste stream is for materials that are too large to fit in recycling or general waste. This waste stream contains engineering waste and materials that can go on for reuse, recycling or will have to be landfilled. Containers to be filled with non-compactable should be labelled non-compactable and filled with like for like materials. For example, one container could be filled with wood rather than having multiple containers with a fadge of wood offcuts in. This makes it easier for import permits to be applied and MPI to inspect.

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Polystyrene 	Place back in original box if possible and take directly to plant operator or to the container dock.	• **Plant operators DO NOT attempt to compact polystyrene as it disintegrates and disperses.** Where possible keep whole in original box and load in designated container • Where it is not possible to keep in the original box, Plant operators store polystyrene waste separately from other general waste and label it "POLYSTYRENE WASTE"	Recycled via Waste Management

Large non-compactable materials	Collection point in the HFC or outside the carpenter's workshop. Ask plant operator, carpenter or engineering supervisor for guidance. See Engineering Supervisor if unsure.	• Engineering supervisor identifies container(s) for non-compactable and oversized waste • Plant operators take **waste items** to the container dock to store or load directly into designated container.	Depends on item details.
Other materials	Other materials will be collected through processes identified by the Engineering Supervisor on a project by project basis.	• Any other materials must be stored appropriately so that they can be reused or passed on to service providers. For example, loose concrete can be put in a labelled drum, this drum must be weighed and added to the container manifest.	Reuse/ Recycle

7.6 Hazardous Waste

Hazardous waste is waste that is reasonably likely to be, or contain a substance that meets, one or more of the classification criteria for substances including explosive, flammable, oxidising, toxic, or corrosive properties. A diverse range of hazardous wastes are used at Scott Base.

Asbestos containing products have been used in the construction of huts (including Scott Base) and contained in machinery parts throughout the years of New Zealand occupying Antarctica. Antarctica New Zealand has undertaken several asbestos remediation and removal works, carried out under the supervision of licences removalists. Currently, asbestos is encapsulated in the soil around the Scott Base Operational Area.

Those who use, handle and/or store hazardous wastes (Cargo Handler, Engineering Supervisor and Logistics Officer) in Christchurch must comply with the Health and Safety at Work Act (2015) Hazardous Substance Regulations, including:

- Labelling all hazardous wastes in line with requirements;
- Listing all hazardous wastes on an inventory; and
- Training and supervising those that handle and/or store the wastes.

These requirements are included in Appendix 4.

Key documents related to hazardous waste management and asbestos management are:

- SOP HS-001 Waste Fluid Handling
- SOP HS-010 Long Term Ground Contamination Site Management Plan – Scott Base

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Aerosol cans	• Communal waste stations labelled **AEROSOLS** outside the dining room	• The Domestics empty the waste stations. • The Plant Operator packs, labels AEROSOL CANS and places in appropriate shipping container • **Aerosols do not go into general waste (they are a fire hazard)**	Landfill via Container waste
Asbestos	• Asbestos containing materials should only be handled in accordance with the Asbestos Management Plan (SOP HS-009) • Double bagged and placed straight into designated container	• Engineering Supervisor liaises with Logistics Manager to identify most suitable container	Specialist disposal by Eco Waste
Batteries	• Dry cell batteries - bin in the vestibule to the powerhouse near the Telecommunications Technicians room • Lithium batteries - bin in the vestibule to the powerhouse near the Telecommunications Technicians room • Lead acid batteries - see mechanic	• Batteries are taken to the Cargo Handler for correct packaging, labelling and shipment. • All batteries are packed in a special purpose plastic battery dispatch box and labelled by type, i.e. DRY CELL BATTERIES, LITHIUM BATTERIES or WASTE LEAD ACID BATTERIES.	Annex Road Metals
Explosives	• Explosives are stored in a special purpose container (magazine) behind Scott Base • The handling of explosives is covered by the SOP 005 – Explosives Handling	• Surplus explosives can only be returned to New Zealand within a year of initial transport to Antarctica.	Specialist disposal
Fuel / oil products	• Oily rags - labelled over pack drum in mechanics workshop then taken to the waste liquids container • Used filters - labelled over pack drum in mechanics workshop then taken to the waste liquids container	• The Engineering Supervisor ensures all waste drums and containers within the bunded ISO 20 waste liquids shipping container are well labelled and stored appropriately.	Reuse by Oil Recovery South Island or disposal by Chemwaste (fuels) or Waste Management (oils for re-use)

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
	• Contaminated snow/ice/water - labelled drum in the mechanics workshop cold porch then taken to the waste liquids container • Fuels, oils, antifreeze/coolant, contaminated soil – collect in labelled containers and store in bunded ISO container outside mechanics workshop	• Waste contaminated with fuel/oil products are handled in accordance with SOP HS-001 Contaminated Waste Handling • Specific contents of every drum should be clearly labelled (e.g. AN8, mogas, kerosene, waste oil, thinner, antifreeze/coolant) and the packing date shown so it is clear which labelling is current. • Different fuel types should not be mixed in drums. • Drums should never be filled right to the top, as temperature changes may cause expansion of liquids - leave 100mm ullage.	
Gas cylinders 	• Empty LPG cylinders should be taken directly to designated shipping container and recorded. • Fire extinguishers are collected by the carpenter.	• Never use oil or grease on the threads of regulators used on any compressed gas cylinder. • All cylinders being returned to New Zealand must have their screw caps securely fastened. • The Cargo Handler is responsible for ensuring specific packing, labelling and shipping requirements are met.	Refill or specialist disposal
Paint, thinner, stripper, paint contaminated water 	• Tins - Leave to dry, flatten and place in correct scrap metal container in the mechanics workshop • Waste paint and liquids - store in labelled containers in paint storage dangerous goods cabinet in carpenter's workshop.	• Carpenter takes full containers to the bunded ISO 20 shipping container outside the mechanics workshop.	Specialist disposal (e.g. ChemWaste)
Science Waste	• Events are responsible for end disposal of their chemicals – pack and liaise with cargo handler	• Event personnel should be closely involved in correctly identifying any hazardous waste they generate.	Science waste forwarded to event leader for disposal

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Other	• Liaise with cargo handler for return of any other hazardous materials	• The Cargo Handler oversees storage, packing, weighing, labelling, documentation and shipment of all hazardous waste at Scott Base. • All hazardous waste is to be returned to New Zealand by ship, clearly labelled. • All cubers, drums and containers used for packaging hazardous waste must be in good condition.	Specialist disposal as appropriate

7.7 Biohazardous Waste

All biohazardous waste generated at Scott Base and in the field, is to be returned to New Zealand for appropriate and Safe Disposal. **The Engineering Supervisor** is responsible for designating a shipping container (and/or other storage areas) for biohazardous waste and ensuring that such waste is collected from around the base.

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Human waste	• **For field human waste refer to Section 8** • Processed through biological treatment plant. • Urine treated and grey water treated via plant and released to marine environment • Solid waste separated by plant and shipped home. Collected in dolav bins on landing. • 1L pee bottle used for daytrips.	• Individuals dispose of pee bottle contents at the pee lab. • Plant operators take dolavs off the WWTP landing, weigh, then put into the biohazardous waste container • Events take grey water and pee containers to the PEE lab to thaw and be disposed of down the drain for treatment in the waste water treatment plant. Any build ups/back logs are dealt with by water engineer (bulk thawing on WWTP landing etc). • Solid waste from field events goes straight into the biohazardous waste container • NB: grey liquids from events that are contaminated with guano or other biological materials must be disposed of following SOP BS-006 “Disposing of biological materials from the field”.	Treatment and discharge to sea OR Steam sterilisation and landfill

Type	Collection (Scott Base)	Handling (Scott Base)	Disposal (NZ)
Medical & sanitary waste	• Yellow biohazard bag in First Aid room (for dressings, swabs etc) • Sharps container in the First Aid room and ablutions block (syringes, needles, blades) • Disbins in women and men's toilet cubicles (sanitary products, condoms - if in the field, bag and dispose of into the Disbins on return to NZ)	• Domestics remove sharps containers, Disbins and biohazard containers from the toilets, place into yellow biohazard bags, and deposit in the bin outside the bar landing. Plant operators then empty these bins and place the bags into biohazardous waste container adjacent to the HFC or coordinate disposal with the water engineer. • The First Aid Officer logs and packs any expired medical supplies, labelled TIME EXPIRED MEDICAL SUPPLIES and gives to the Cargo Handler for RTNZ Attn: Logistics Manager.	Steam sterilisation and landfill via San-i-Pak

8. Field waste

Field waste procedures are outlined in the Antarctica New Zealand Field Manual. Everyone travelling to Scott Base is given a Field Manual[6].

Waste management at Scott Base is a highly controlled and monitored system, requiring a combined effort from staff. To achieve compliance with The Protocol, it is fundamental that the same commitment to correctly handling waste within Scott Base extends to the practices of field event personnel.

The standard practice for waste disposal in the field is to return all waste, including human waste and grey water, back to Scott Base for correct handling and disposal. This includes short excursions and day trips away from base or field camps – pee bottles and biohazard bags are available from Field Support personnel for this purpose. Exceptions to this practice are only made if alternative disposal arrangements have been permitted by MFAT via the Environmental Impact Assessment process. For example:

- In some circumstances when adjacent to the sea, grey water and urine can be disposed of directly into the sea through a tide crack or hole, or on the shoreline below the high tide mark.
- In some circumstances on permanent snow and ice-covered areas, grey water and human waste may be buried if logistical constraints prevent their return to base.

As part of waste management in the field, someone from each event volunteers to be the Waste Management Officer. This does not have to be someone that works for Antarctica New Zealand but can be any event personnel.

The Waste Management Officer is accountable for the correct handling of waste in the field and the disposal of field waste on return to Scott Base. Every field party is provided with the necessary equipment to achieve accurate waste disposal. Table 4 is from the Field Manual and provides brief instruction regarding field waste procedures.

Events that are using chemicals in the field should, through the EIA process, have a pre-determined plan for managing that waste. Receptacles can be provided by the Field Support Team and bags which must be labelled with what they contain (e.g. Lab waste) so that the waste can be safely managed at Scott Base.

[6] Available on Discovery: Communications - Field Manual - Folder View

Table 4: Field waste procedures (included in the Field Manual).

Container	Waste type	Handling
Blue rubbish bag	**Food:** non-compactable, (e.g. teabags, coffee, fat)	Collect in double-layered bags and label "food" - **do not mix with food contaminated waste**
Blue rubbish bag	**Food-contaminated:** compactable (e.g. wrappers, paper towels)	Collect in double layered bags and label "food contaminated" - do not mix with food waste
Green rubbish bag	**Recyclables:** card, paper, metal and plastics	Separate each recycling stream and place in double layered bags. You can separate now or when back at Scott Base.
Green rubbish bag in box or bucket	**Recyclables:** clean glass	Double-bag unbroken glass and put in cardboard box or poo bucket to avoid breakage during transport
General waste	**General waste:** non-food, non-recyclable items	Collect in double layered black plastic bags. NO LIQUIDS.
Poo bucket	**Human waste: solid** (faeces, sanitary items)	Double bag the inside of bucket. Use bucket until 2/3 full. Cable tie both bags closed inside the bucket and secure the lid.
Pee barrel	**Human waste – liquid** (urine)	Collect in plastic "pee barrel". Fill until 3/4 full ONLY. Do not mix with grey water. Make sure the lid is secure and the O-ring in place.
Greywater barrel	**Grey water:** used washing water	Collect in plastic "pee barrel" designated for greywater. Fill until 3/4 full ONLY. Do not mix with urine. Make sure the lid is secure and the O-ring in place.
Bio-hazard bags inside poo bucket	**Hazardous waste:** waste material posing health, safety and environmental risk	Place items in a bio hazard bag, inside a poo bucket and secure tightly. Do not mix different types of hazardous waste. Label bucket with exact contents (e.g. fuel-soaked rags, broken glass) and your event number.
Sharps container	**Sharps**	Obtain sharps container from the domestics before leaving Scott Base. Full sharps container can go into biohazard bag or secure in poo bucket and label clearly.

9. Returning waste to New Zealand

9.1 Applying for permits to import waste

Permits are issued by the Environmental Protection Authority (EPA) for the import of hazardous waste. The Logistics Manager is responsible for acquiring the permit from EPA for the return of all hazardous wastes. The waste must be accepted by a service provider for the permit to be approved, therefore prior communication with the hazardous waste service providers before the ship docks in Lyttelton is important.

EPA define hazardous waste as per categories of waste detailed in Appendix 5, or containing hazardous constituents (refer to Appendix 6). As of January 2021, a permit is also required to import plastic waste unless the plastic imported can be sorted and recycled once in the country (Appendix 7). To help understand Appendix 7 a table explaining the 1 to 7 numbers of plastics and their scientific names and general uses has been included as Appendix 8.

Antarctica New Zealand will not need to apply for a permit for mixed plastic waste 1, 2 or 5 provided they will be separately sorted and recycled. This is evident from point 4 of Appendix 7 which matches to plastics 1, 2, 4 and 5 from Appendix 8. As plastic 4 (LDPE) is unrecyclable this should be excluded from the recyclables stream (plastics 1,2 and 5).

A sorting exercise is conducted during ANZAP which fulfils this requirement as it was described to EPA representatives. EPA representatives recommended clearly documenting the ANZAP plastic sorting as a waste management mechanism, something the PES team has planned to do as an SOP.

Some plastic sorting will need to take place at Scott Base into the following categories:

1. Recyclable plastic waste: 1, 2 and 5 (no import permit required)
2. All other plastic waste (EPA Hazardous waste import permit required)

Based on this information, Antarctica New Zealand typically imports the following hazardous waste (based on EPA definition of hazardous waste):

- Waste oils
- Oil contaminated water
- Oil contaminated scoria
- Lead-acid and other batteries
- Electronic or electrical waste (e-waste), including plastic casings, wires, plugs and components, fluorescent tubes
- Some plastics

These wastes must be clearly identified in the shipping container manifests by the Cargo Handler. It is important that all staff and visitors to Scott Base take their time to clean and sort their waste correctly.

To import hazardous waste Antarctica New Zealand must apply for a permit by downloading the application from the EPA website and email the completed form to importexport@epa.govt.nz. This is done by the **Logistics Manager**. This permit is to be applied for once Antarctica New Zealand knows what hazardous waste it has and when it is arriving in the country. The permit can be valid for 1 year if the timings change but this must be requested before the permit is issued. During SBR, if multiple shipments take place, Antarctica New Zealand can apply for a permit for multiple shipments too.

EPA recognise that Antarctica New Zealand is a unique case being a New Zealand entity importing New Zealand products back to New Zealand and that the legislation and EPA processes are not an exact fit for Antarctica New Zealand's context. EPA support working together to ensure any issues are avoided and that Antarctica New Zealand is able to operate effectively when it comes to importing waste and ensuring this waste is managed in an environmentally responsible way once returned to New Zealand.

In accordance with the Biosecurity Act (1993) Antarctica New Zealand informs the Ministry of Primary Industries (MPI) of all items returning from Antarctica to New Zealand by sea. A risk profiling process

is carried out by MPI and Biosecurity Authority / Clearance Certificates (BACC) are generated for all incoming goods. Risk goods are any items that may constitute, harbour or contain an organism that may cause unwanted harm to natural or physical resources or human health in New Zealand. The BACC details the receipt and handling process for all goods and also indicates when an actual inspection of goods by MPI staff is required.

Some items returning to NZ may be covered by an Import Health Standard (IHS)[7]. The IHS is item specific and gives clear directions on how the item is to be presented, packed and handled.

9.2 Waste labelling and packing

Waste must be packed correctly and stored in the appropriate container at Scott Base by the Cargo Handler. All waste cargo is transported with a packing schedule that gives details of the contents and handling requirements. Correct, clear labelling is essential for all waste returned to New Zealand.

Each item is labelled to display the following information:

- Brief description of the contents;
- Hazardous labelling as required; and
- Transportation Control Number (TCN) at time of shipment.

For an overview of how waste is packed see these videos on Discovery (note they are from a time when the hangar was operational):

- Weighing non-compactable waste
- Labelling non-compactable waste
- Explaining the baler
- Compacting a bale
- Waste containers explained
- Non-compactable waste container
- Recycling container
- Sorting Field Waste

9.3 Waste tracking and shipping

The movement of all Antarctica New Zealand cargo, including waste, is integrated with the United States Antarctic Program (USAP) using their Maximo cargo tracking system. The Scott Base Cargo Handler's desk file can be referenced for details on all cargo handling procedures. The Antarctica New Zealand (Scott Base) TCN (Transportation Control Number) and the USAP Maximo reference numbers are included on waste container labels.

All waste is returned to New Zealand annually packed in to shipping containers. Prior to their New Zealand arrival, approvals to import are sought and issued by New Zealand border agencies (MPI, EPA and NZ Customs). These approvals detail how the various waste products are to be dealt with on their arrival at the port of Lyttelton. Most containers are directed to the Antarctica New Zealand Transitional Facility for devanning. Some are directed to other Transitional Facilities when specialised handling is required. This is the case for all the biological waste (human, waste water treatment plant, food and food contaminated waste) which is disposed of after steam sterilisation.

[7] Import Health Standards, online at: www.mpi.govt.nz/law-and-policy/requirements/ihs-import-health-standards/

The Logistics Team at Antarctica New Zealand includes an MPI approved Transitional Facility Operator and MPI accredited persons for the receipt and devanning of shipping containers. It is this team that processes all wastes that transit through the Antarctica New Zealand facility. This processing includes onward dispatch, disposal, recycling or reuse as appropriate.

No waste item or container will be accepted for return to New Zealand if the exact nature of the waste is unknown.

10. Waste Water Treatment Plant

Article 5(1) of Annex III of the Protocol sets out the following requirements for the disposal of waste in the sea:

Sewage and domestic liquid wastes may be discharged directly into the sea, taking into account the assimilative capacity of the receiving marine environment and provided that:

a) such discharge is located, wherever practicable, where conditions exist for initial dilution and rapid dispersal; and

b) large quantities of such wastes (generated in a station where the average weekly occupancy over the austral summer is approximately 30 individuals or more) shall be treated at least by maceration.

In accordance with these provisions, Scott Base operates a waste water treatment plant (WWTP), commissioned in October 2002. The WWTP is depicted in Figure 5.

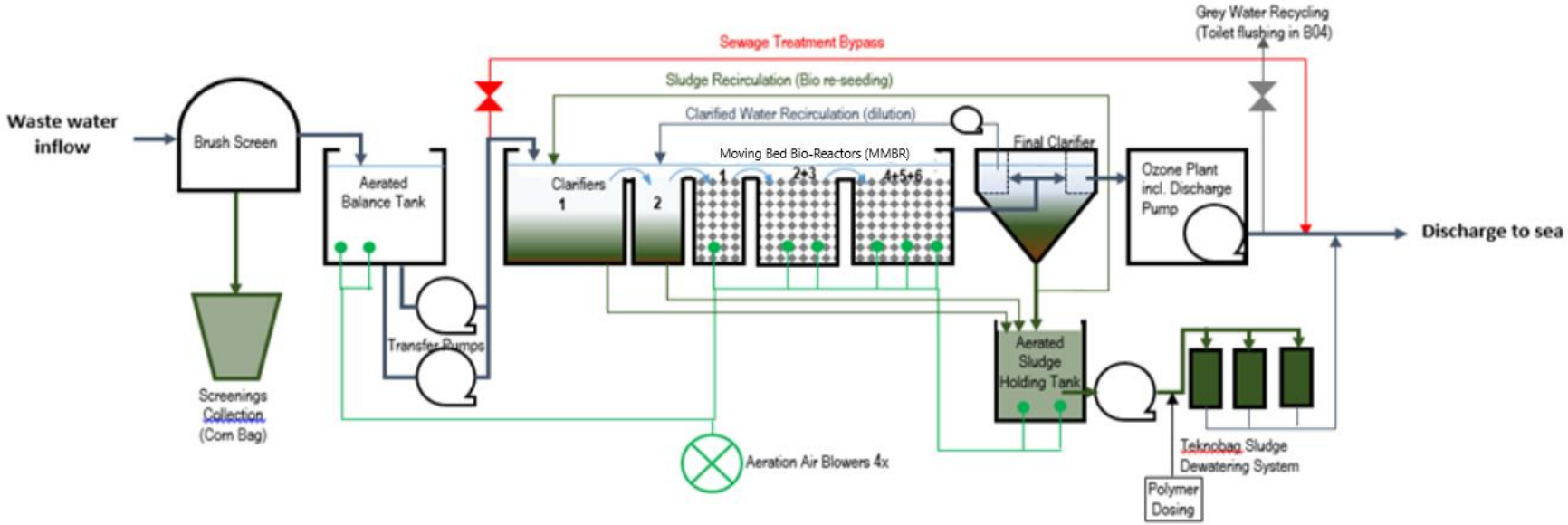


Figure 5: Simplified schematic of Waste Water Treatment Plant process (image from Sewage Asset Plan).

Waste water in flow
Waste water from around base (e.g. from the toilets, showers, kitchen) flows into the WWTP system via the water reticulation system. Once this waste enters the WWTP it receives three levels of treatment: primary screening and settlement; secondary biological treatment in fixed media beds; and tertiary ozone disinfection.

The maceration of waste water occurs at points in the waste water reticulation system that contain solid waste. Simply, solid waste is churned into smaller particles before entering the WWTP for treatment.

Chemicals have the potential to kill the biology in the WWTP and disrupt the entire treatment process. Chemicals are not poured down the drains at Scott Base for this reason. For the disposal of chemicals, the Water Engineer is consulted for advice.

Sludge (human solid waste)
The WWTP separates solid waste from liquid waste. The solid waste is dewatered inside of the Teknofanghi which are dry sludge bags (Figure 6). A flocculent is pumped into the dewatering process to assist the separation of solids and liquids. This chemical enters the bags and then drains into the catch tray below. This liquid is pumped out to sea.

Figure 6. Teknofanghi - the bags containing dewatered sludge.

The Teknofanghi/dry sludge bags are removed by the Water Engineer and placed into a biohazardous dolav outside of the WWTP. Once full, the dolav is transported to the biohazardous container for transit back to New Zealand via ship. On arrival to New Zealand, biohazardous waste is approved by MPI, steam sterilised and sent to landfill for deep burial.

Outflow
Treated waste water flows out into the ocean in front of Scott Base, or if the quality if sufficient, it can be used as toilet flushing water so is recycled back through base.

Readings of the WWTP are recorded daily by the Water Engineer in the Smart Wastewater spreadsheet.

10.1 Waste water pollutants and plastics

Personal care products such as toothpastes, shampoos and shower gels can contain microplastics. Ingestion of microplastics may have toxicological effects in key species, such as krill, with potential bioaccumulation and biomagnification of associated toxins such as phthalates as they pass up the food chain (Waller et al, 2018).

Linen and clothing textiles can also release micro-polluting fibres and plastics into the environment. Clothing made out of synthetic materials like polyester and fleece, consist of microplastics, giving them their stretch-like properties. Microplastics have now been found in the marine sediment close to research stations in Antarctica (Waller et al. 2017). According to Weller et al. (2017) “the threats to marine ecosystems presented by microplastics have been identified as a major global conservation issue and a key priority for research, but major questions concerning plastic in the Southern Ocean remain unanswered”. Antarctica New Zealand advises visitors and staff at Scott Base to take clothing made from natural fibres and reduce the number of times they wash clothing. Short-term visitors are already advised to take dirty clothing home instead of washing it in Antarctica.

Despite the effectiveness of the WWTP in treating water to a standard acceptable for disposal into the ocean, research has shown that a number of micro-pollutants are still entering the marine environment (Emnet et al. 2015; Margot et al. 2015). Pharmaceutical and personal care products are a common source of micro-pollutants, and pose a threat to aquatic organisms. These pollutants can have detrimental impacts on marine life such as disrupting endocrine function. In order to reduce the amount of these toxic chemicals entering the environment, a list of environmentally safe products has been compiled (Table 5) and made available in The Scott Base Handbook.

Table5: List of recommended products (from The Scott Base Handbook).

Product:	Recommended Brands:
Shampoo, Conditioner & Soap	Organic Care thankyou Ecostore Earthwise Ethique
Toothpaste	Ecostore Red Seal Ecoeasy toothpaste tabs (plastic free option) Maxwell & McIntyre
Deodorant	Ethique Bee Fresh It’s All Good
Sunscreen	Daylong/ Cetaphil Sun Kids Wotnot Skinnies Oasis Sun

The following personal care product ingredients are to be avoided as they are harmful to the environment: Silver, Parabens, UV Filters, SLES (sodium lauryl sulphate), SLS (sodium laureth sulphate), PEGs, Ethanolamines (DEA, MEA and TEA), PARFUM or fragrance (unless it is natural-based), Triclosan*, Aluminium, Aerosols, Formaldehyde, Mineral Oil, Oxybenzone, Propylene Glycol, BHT, Polyethylene/PE (microplastic found in personal care products).

Silver is also highly toxic and can be found embedded in sportswear and deodorants. It is highly advised that those travelling to Scott Base check product and clothing labels and avoid detrimental ingredients.

11. Clean Up/Sites of Past Activity

Article 1(5) of Annex III of the Protocol:

Past and present waste disposal sites on land and abandoned work sites of Antarctic activities shall be cleaned up by the generator of such wastes and the user of such sites. This obligation shall not be interpreted as requiring:

a) the removal of any structure designated as a historic site or monument; or
b) the removal of any structure or waste material in circumstances where the removal by any practical option would result in greater adverse environmental impact than leaving the structure or waste material in its existing location.

In addition, Article 8(3) of Annex III states:

Each such Party shall, as far as is practicable, also prepare an inventory of locations of past activities (such as traverses, field depots, field bases, crashed aircraft) before the information is lost, so that such locations can be taken into account in planning future scientific programmes (such as snow chemistry, pollutants in lichens or ice core drilling).

To enact these requirements, Antarctica New Zealand maintains a sites of past activity (SOPA) inventory, which lists any human material that has been intentionally or accidentally left, lost or found in the Antarctic environment away from permanent stations or camps.

The Sites of Past Activity Action Plan (2010) divides the inventory into six categories which describe the status of each site to assist with planning, prioritising and coordinating clean-up/removal with USAP. The categories are:

i. **Achievable**: sites or items that require removal from the environment. These sites are prioritised so that deteriorating structures/items, and items within or adjacent to ASPAs and ASMAs are removed from the environment first.
ii. **Ongoing**: this includes items that are installed for scientific investigations, management or operational activities. The ongoing requirements of these items are reviewed annually via the EIA process.
iii. **Removed and/or unrecoverable**: those items or structures that have already been removed, or are unable to be removed. No further action is required for such items.
iv. **Possible historic items**: some old/abandoned sites may be designated as Historic Sites and Monuments. These sites require priority attention and further investigation. In the case of a site of past activity deserving of historic status, the Artefact Management Procedure is followed.
v. **Sites of contamination**: sites where it is known that contamination has occurred. If clean-up is achievable, these sites are prioritised.
vi. **Needs investigating**: sites where there is a lack of information about whether remediation is necessary or if remediation has already occurred.

The process for managing sites of past activity is depicted in Figure 7.

Figure 7. Process for managing sites of past activity.

For further information regarding the process, refer to the Sites of Past Activity Action Plan (2010).

12. Monitoring the waste management system

Every season data is collected on the waste cargo returned to New Zealand. The majority of this is returned on the ship however, some may be flown.

Waste cargo is listed in the northbound cargo register for that season located in the Logistics Library on discovery. When it arrives in New Zealand some of the waste will be directed to immediate disposal and some of it will be sent to the Antarctica New Zealand warehouse. At the warehouse the team empty the containers and send it on to service providers throughout the year. Wherever the waste goes this should be tracked and recorded.

The data from the northbound container register is copied into the 2009-Present Waste Data spreadsheet.

13. Auditing the waste management system

Audits assess the performance of the waste management system and identify opportunities for improvement.

Figure 8: Benefits of auditing your waste, Ministry for Environment

There are a number of ways the waste management system is audited:

Telarc ISO14001 certification audit
Telarc audits the EMS including the waste management system for compliance with the international standard ISO 14001.

Internal EMS audit
The PES team undertake annual interim audits of the EMS including the waste management system at Scott Base. These generally occur in the same years as the Toitū Christchurch desk audits.

Engagement survey
Every year Antarctica New Zealand staff members complete an engagement survey feedback which includes question regarding the EMS and waste management system. This gives internal staff an opportunity to make recommendations to enhance system performance.

Event feedback survey
All event managers get the opportunity to provide feedback at the end of each season. This gives both staff and external personnel the opportunity to point out observed strengths and weaknesses.

Third-party audits
An external expert is occasionally invited to undertake a waste management system audit. For example, the British Antarctic Survey (BAS) completed a Scott Base Environmental Management Visit Report in 2018/19.

Scott Base Waste Audit
Historically the Postgraduate Certificate of Antarctic Studies (PCAS) at University of Canterbury students visit Scott Base and undertake two audits on waste and litter. Whilst this programme is not currently able to bring students to Scott Base, we will aim for Antarctica New Zealand staff to conduct the base waste audits.

Waste audit: examine approximately one week's worth of waste produced at Scott Base. The main aims of this annual audit are to determine:

- The amount of waste produced by the base over a certain time window (normally 7-10 days)
- The amount of recyclable vs. non-recyclable waste
- The proportion of waste that has been incorrectly streamed
- Identify any trends over time
- The effectiveness of the existing waste management systems and identify areas needing improvement

Litter audit: undertake a litter survey in the outdoor environs of the Scott Base Operational Zone. The objectives of this survey are to:

- monitor the **amount** of litter occurring in the environment from year to year
- monitor the **types** of litter occurring in the environment from year to year
- identify trends in litter occurrence e.g. increases in litter around times of construction works
- recommend improvements to ANZ in reducing litter occurrence

Waste supplier visits
Member of the Waste Minimisation Group visit waste suppliers to observe their systems and ensure that supplier environmental practices align with Antarctica New Zealand's. Waste supplier visits enable WMG to work with suppliers that offer lower environmental impactful solutions in New Zealand.

HSE Incident Reporting System

Any incidents relating to poor waste management practices or non-compliances with our system are reported via the HSE Incident Reporting System. This contributes to a long-term dataset for all reported environmental incidents since 2005. These data enable the PES team to identify trends and focus efforts in areas that require improvement.

14. References

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Emnet, P., Gaw, G., Northcott, G., Storey, B., & Graham, L. (2015). Personal care products and steroid hormones in the Antarctic coastal environment associated with two Antarctic research stations, McMurdo Station and Scott Base. *Environmental Research,* 136, 331-342.

Margot, J., Rossi, L., Barry, D. A., & Holliger, C. (2015). A review of the fate of micropollutants in wastewater treatment plants. *Wiley Interdisciplinary Reviews: Water*, *2*(5), 457-487.

Waller, C. L., Griffiths, H. J., Waluda, C. M., Thorpe, S. E., Loaiza, I., Moreno, B., ... & Hughes, K. A. (2017). Microplastics in the Antarctic marine system: an emerging area of research. *Science of the Total Environment*, *598*, 220-227.

15. Appendices

Appendix 1: Waste Service Providers

*Table 2: Providers in Canterbury (note that *numbers are a central call centre)*

SUPPLIER	SERVICES
InterWaste (T) +64 3 348 9574	Disposal of waste
EcoCentral/EcoSort (T) +64 3 941 7513*	Recycling
Annex Road Metals (T) +64 3 348 3205	Recycling scrap metals
Chem Waste (T) 0800 246 978	Hazardous waste
Comspec (T) +64 3 344 5016	Recycling certain plastics
EcoDrop at Styx Mill (T) +64 3 941 7513*	Some e-waste (if Molten Media cannot take it)
Eco Waste at Bromley (T) +64 3 941 7513*	Asbestos Removal
Enviro NZ (T) 033736782	Plastic waste (not Plastics 1, 2 or 5)
Frew's Contracting (T) +64 348 8567	Loose concrete re-used
Full Circle (T) 0800 732 925	Cardboard recycling
Landfill via Container Waste Ltd (T) +64 3 328 8411	General waste disposal into landfill
Landfill via InterWaste (T) +63 3 348 9574	Bio-hazardous waste disposal to landfill via deep burial
Molten Media (T) 030377 1154	E-waste
Waste Management Wm.nz	Waste oil disposal and/or recycling
SaveBoard Saveboard.nz	Tetra Pak recycling

Appendix 2

ANNEX III TO THE PROTOCOL ON ENVIRONMENTAL PROTECTION TO THE ANTARCTIC TREATY

WASTE DISPOSAL AND WASTE MANAGEMENT

ARTICLE 1
GENERAL OBLIGATIONS

1. This Annex shall apply to activities undertaken in the Antarctic Treaty area pursuant to scientific research programmes, tourism and all other governmental and nongovernmental activities in the Antarctic Treaty area for which advance notice is required under Article VII (5) of the Antarctic Treaty, including associated logistic support activities.

2. The amount of wastes produced or disposed of in the Antarctic Treaty area shall be reduced as far as practicable so as to minimise impact on the Antarctic environment and to minimise interference with the natural values of Antarctica, with scientific research and with other uses of Antarctica which are consistent with the Antarctic Treaty.

3. Waste storage, disposal and removal from the Antarctic Treaty area, as well as recycling and source reduction, shall be essential considerations in the planning and conduct of activities in the Antarctic Treaty area.

4. Wastes removed from the Antarctic Treaty area shall, to the maximum extent practicable, be returned to the country from which the activities generating the waste were organized or to any other country in which arrangements have been made for the disposal of such wastes in accordance with relevant international agreements.

5. Past and present waste disposal sites on land and abandoned work sites of Antarctic activities shall be cleaned up by the generator of such wastes and the user of such sites. This obligation shall not be interpreted as requiring:

    a. the removal of any structure designated as a historic site or monument; or
    b. the removal of any structure or waste material in circumstances where the removal by any practical option would result in greater adverse environmental impact than leaving the structure or waste material in its existing location.

ARTICLE 2
WASTE DISPOSAL BY REMOVAL FROM THE ANTARCTIC TREATY AREA

1. The following wastes, if generated after entry into force of this Annex, shall be removed from the Antarctic Treaty area by the generator of such wastes:

    a. radio-active materials;
    b. electrical batteries;
    c. fuel, both liquid and solid;

d. wastes containing harmful levels of heavy metals or acutely toxic or harmful persistent compounds;
e. poly-vinyl chloride (PVC), polyurethane foam, polystyrene foam, rubber and lubricating oils, treated timbers and other products which contain additives that could produce harmful emissions if incinerated;
f. all other plastic wastes, except low density polyethylene containers (such as bags for storing wastes), provided that such containers shall be incinerated in accordance with Article 3 (1);
g. fuel drums; and
h. other solid, non-combustible wastes;

provided that the obligation to remove drums and solid non-combustible wastes contained in subparagraphs (g) and (h) above shall not apply in circumstances where the removal of such wastes by any practical option would result in greater adverse environmental impact than leaving them in their existing locations.

2. Liquid wastes which are not covered by paragraph 1 above and sewage and domestic liquid wastes, shall, to the maximum extent practicable, be removed from the Antarctic Treaty area by the generator of such wastes.

3. The following wastes shall be removed from the Antarctic Treaty area by the generator of such wastes, unless incinerated, autoclaved or otherwise treated to be made sterile:

   a. residues of carcasses of imported animals;
   b. laboratory culture of micro-organisms and plant pathogens; and
   c. introduced avian products.

ARTICLE 3
WASTE DISPOSAL BY INCINERATION

1. Subject to paragraph 2 below, combustible wastes, other than those referred to in Article 2 (1), which are not removed from the Antarctic Treaty area shall be burnt in incinerators which to the maximum extent practicable reduce harmful emissions. Any emission standards and equipment guidelines which may be recommended by, inter alia, the Committee and the Scientific Committee on Antarctic Research shall be taken into account. The solid residue of such incineration shall be removed from the Antarctic Treaty area.

2. All open burning of wastes shall be phased out as soon as practicable, but no later than the end of the 1998/1999 season. Pending the completion of such phase-out, when it is necessary to dispose of wastes by open burning, allowance shall be made for the wind direction and speed and the type of wastes to be burnt to limit particulate deposition and to avoid such deposition over areas of special biological, scientific, historic, aesthetic or wilderness significance including, in particular, areas accorded protection under the Antarctic Treaty.

ARTICLE 4
OTHER WASTE DISPOSAL ON LAND

1. Wastes not removed or disposed of in accordance with Articles 2 and 3 shall not be disposed of onto ice-free areas or into fresh water systems.

2. Sewage, domestic liquid wastes and other liquid wastes not removed from the Antarctic Treaty area in accordance with Article 2, shall, to the maximum extent practicable, not be disposed of onto sea ice, ice shelves or the grounded ice-sheet, provided that such wastes which are generated by stations located inland on ice shelves or on the grounded ice-sheet may be disposed of in deep ice pits where such disposal is the only practicable option. Such pits shall not be located on known ice-flow lines which terminate at ice-free areas or in areas of high ablation.

3. Wastes generated at field camps shall, to the maximum extent practicable, be removed by the generator of such wastes to supporting stations or ships for disposal in accordance with this Annex.

ARTICLE 5
DISPOSAL OF WASTE IN THE SEA

1. Sewage and domestic liquid wastes may be discharged directly into the sea, taking into account the assimilative capacity of the receiving marine environment and provided that:

    a. such discharge is located, wherever practicable, where conditions exist for initial dilution and rapid dispersal; and
    b. large quantities of such wastes (generated in a station where the average weekly occupancy over the austral summer is approximately 30 individuals or more) shall be treated at least by maceration.

2. The by-product of sewage treatment by the Rotary Biological Contacter process or similar processes may be disposed of into the sea provided that such disposal does not adversely affect the local environment, and provided also that any such disposal at sea shall be in accordance with Annex IV to the Protocol.

ARTICLE 6
STORAGE OF WASTE

All wastes to be removed from the Antarctic Treaty area, or otherwise disposed of, shall be stored in such a way as to prevent their dispersal into the environment.

ARTICLE 7
PROHIBITED PRODUCTS

No polychlorinated biphenyls (PCBs), non-sterile soil, polystyrene beads, chips or similar forms of packaging, or pesticides (other than those required for scientific, medical or hygiene purposes) shall be introduced onto land or ice shelves or into water in the Antarctic Treaty area.

ARTICLE 8
WASTE MANAGEMENT PLANNING

1. Each Party which itself conducts activities in the Antarctic Treaty area shall, in respect of those activities, establish a waste disposal classification system as a basis for recording wastes and to facilitate studies aimed at evaluating the environmental impacts of scientific activity and associated logistic support. To that end, wastes produced shall be classified as:

    a. sewage and domestic liquid wastes (Group 1);
    b. other liquid wastes and chemicals, including fuels and lubricants (Group 2);
    c. solids to be combusted (Group 3);
    d. other solid wastes (Group 4); and
    e. radioactive material (Group 5).

2. In order to reduce further the impact of waste on the Antarctic environment, each such Party shall prepare and annually review and update its waste management plans (including waste reduction, storage and disposal), specifying for each fixed site, for field camps generally, and for each ship (other than small boats that are part of the operations of fixed sites or of ships and taking into account existing management plans for ships):

    a. programmes for cleaning up existing waste disposal sites and abandoned work sites;
    b. current and planned waste management arrangements, including final disposal;
    c. current and planned arrangements for analysing the environmental effects of waste and waste management; and
    d. other efforts to minimise any environmental effects of wastes and waste management.

3. Each such Party shall, as far as is practicable, also prepare an inventory of locations of past activities (such as traverses, field depots, field bases, crashed aircraft) before the information is lost, so that such locations can be taken into account in planning future scientific programmes (such as snow chemistry, pollutants in lichens or ice core drilling).

ARTICLE 9
CIRCULATION AND REVIEW OF WASTE MANAGEMENT PLANS

1. The waste management plans prepared in accordance with Article 8, reports on their implementation, and the inventories referred to in Article 8 (3), shall be included in the annual exchanges of information in accordance with Articles III and VII of the Antarctic Treaty and related Recommendations under Article IX of the Antarctic Treaty.

2. Each Party shall send copies of its waste management plans, and reports on their implementation and review, to the Committee.

3. The Committee may review waste management plans and reports thereon and may offer comments, including suggestions for minimising impacts and modifications and improvement to the plans, for the consideration of the Parties.

4. The Parties may exchange information and provide advice on, inter alia, available low waste technologies, reconversion of existing installations, special requirements for effluents, and appropriate disposal and discharge methods.

ARTICLE 10
MANAGEMENT PRACTICES

Each Party shall:

a) designate a waste management official to develop and monitor waste management plans; in the field, this responsibility shall be delegated to an appropriate person at each site;
b) ensure that members of its expeditions receive training designed to limit the impact of its operations on the Antarctic environment and to inform them of requirements of this Annex; and
c) discourage the use of poly-vinyl chloride (PVC) products and ensure that its expeditions to the Antarctic Treaty are advised of any PVC products they may introduce into that area in order that these products may be removed subsequently in accordance with this Annex.

ARTICLE 11
REVIEW

This Annex shall be subject to regular review in order to ensure that it is updated to reflect improvement in waste disposal technology and procedures and to ensure thereby maximum protection of the Antarctic environment.

ARTICLE 12
CASES OF EMERGENCY

1. This Annex shall not apply in cases of emergency relating to the safety of human life or of ships, aircraft or equipment and facilities of high value or the protection of the environment.

2. Notice of activities undertaken in cases of emergency shall be circulated immediately to all Parties and to the Committee.

ARTICLE 13
AMENDMENT OR MODIFICATION

1. This Annex may be amended or modified by a measure adopted in accordance with Article IX (1) of the Antarctic Treaty. Unless the measure specifies otherwise, the amendment or modification shall be deemed to have been approved, and shall become effective, one year after the close of the Antarctic Treaty Consultative Meeting at which it was adopted, unless one or more of the Antarctic Treaty Consultative Parties notifies the Depositary, within that time period, that it wishes an extension of that period or that it is unable to approve the amendment.

2. Any amendment or modification of this Annex which becomes effective in accordance with paragraph 1 above shall thereafter become effective as to any other Party when notice of approval by it has been received by the Depositary.

Appendix 3: Bin locations around Scott Base

The location of bins around Scott Base can change from year to year because staff change the locations of their bins to suit the way they work. The following tables give a general overview of bin locations throughout the main areas of base. Some restricted areas are omitted from this manual, such as the WWTP.

A map of common bin locations used by event staff can be found on Discovery[8].

Carpenter's workshop

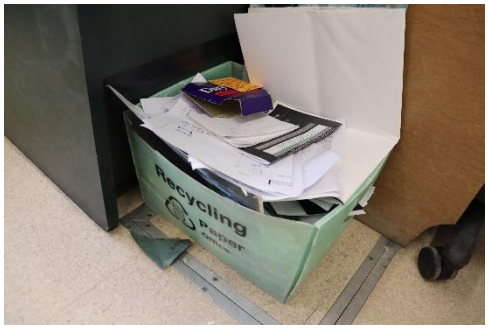
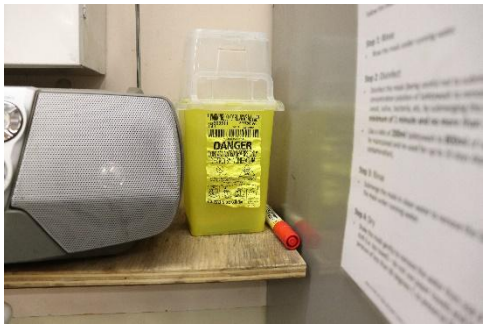
Non-compactable waste: located out the back door 	Cardboard waste and compactable waste
Paper 	

[8] SB map for event staff: http://chch/sites/Environment/_layouts/15/DocIdRedir.aspx?ID=MYJYWEEEKV6T-473883420-838

Electrical workshop

General	Paper

Light engineering workshop

Paper Smaller bins also located near to desks for general waste	General (non-recyclable, non-compactable)
	
Paper towel bin	Sharps container
	

Antarctica New Zealand

Locker room

General, food contaminated, plastics and paper

Mechanic's workshop

General (compactable), cardboard, aerosols, paper, oily rags	General (non-compactable)
Contaminated soils (to go into the hazardous liquids container – labelled)	Electrical wires

Laboratories

Margaret Bradshaw Lab: General 	Thelma Rodger: Biohazardous (Also, general and sharps bin but no picture provided)
Thelma Rodger: General 	Pamela Young: General

Antarctica New Zealand

Hillary Field Centre (HFC)

Glass, food, food-contaminated, steel cans, aluminum cans 	Outside cages: General, paper, cardboard, plastic
Cargo area: Metal banding 	Cargo area: General, glass
Cargo area: Cardboard + compactor (NB: compactor cannot take small bits of cardboard) 	Cargo area: Non-compactable waste (e.g. construction)
Upstairs HFC: General, food contaminated, plastics, paper 	Computer lab: General, food contaminated

HFC lounge/kitchen: Food waste	HFC: main hallway

Kitchen and dining room

Dining area: General, food contaminated, food waste	Kitchen: Food waste and food contaminated
Kitchen: Cardboard	Kitchen: Glass, cans
Chef office: Plastic	

Bar

Bar landing: non-recyclable glass, cardboard, glass	Can crusher in the bar

Medical room

General waste, biohazardous waste	Sharps box

Q Hut

Opposite toilets: General, food contaminated, plastics, paper	Small bins located in all bedrooms for general

Appendix 4: Hazardous Waste process

The following outlines the requirements of the hazardous waste management procedure:

Labelling:
The hazardous waste is correctly labelled if it is packed in a container that has a label in English that includes:

a) identification of the waste that reflects the nature of the waste as closely as possible (for example, chlorinated solvent waste, flammable waste, chromium VI waste); and
b) the name, address, and business telephone number of the producer of the waste; and
c) a hazard pictogram and hazard statement consistent with the classification of the waste based on the known or likely constituents of the waste.

Inventory:
The inventory must include, in relation to hazardous waste:

- an identifier that describes the nature of the waste as closely as possible; and
- the maximum quantity of the waste likely to be at the workplace; and
- the location of the waste at the workplace; and
- any specific storage or segregation requirements for the waste.

Training for those who handle hazardous waste:
Before the worker is allowed to carry out or supervise work involving those substances they must be provided with information and training. Antarctica New Zealand must ensure that every worker who uses, handles, or stores a hazardous substance (including hazardous waste). The information and the training and instruction provided may cover specific hazardous substances or groups of hazardous substances with the same hazardous properties. A worker with equivalent training who is new to the workplace must receive site-specific induction and have appropriate supervised experience at the new workplace. We must keep a record of all training and instruction provided for each worker.
The required information and training are listed below:

a) information on any operations in the worker's work area where hazardous substances are present; and the location and availability of known reference material on the hazards, safe handling, and storage of the hazardous substances found in the workplace, including (without limitation) safety data sheets.
b) training and instruction which must include the following:
c) the physio-chemical and health hazards associated with the hazardous substances the worker uses at work:
d) the procedures (if applicable) for the safe use, handling, manufacture, storage, and disposal of the hazardous substances:
e) practice in the safe use of plant (including personal protective equipment) necessary to manage the hazardous substances:
f) the worker's obligations under these regulations:
g) the actions that the worker should take in an emergency involving the hazardous substances; and
h) an appropriate period of practical experience of the matters described in paragraph (a), under direct supervision in the workplace.

Appendix 5: Categories of Waste

Source: Imports and Exports (Restrictions) Prohibition Order (No 2) 2004

1) Clinical waste from medical care in hospitals, medical centres, or clinics.
2) Waste from the production or preparation of pharmaceutical products.
3) Waste pharmaceuticals, drugs, and medicines.
4) Waste from the production, formulation, or use of biocides or phytopharmaceuticals.
5) Waste from the manufacture, formulation, or use of wood-preserving chemicals.
6) Waste from the production, formulation, or use of organic solvents.
7) Waste from heat treatment or tempering operations and containing cyanides.
8) Waste mineral oils unfit for their originally intended use.
9) Waste mixtures of—
    a. oil and water:
    b. hydrocarbons and water.
10) Waste substances or articles containing, or contaminated with, 1 or more of the following substances:
    a. polychlorinated biphenyls (PCBs):
    b. polychlorinated terphenyls (PCTs):
    c. polybrominated biphenyls (PBBs).
11) Waste tarry residues arising from refining or distillation, or any pyrolytic treatment.
12) Waste from the production, formulation, or use of inks, dyes, pigments, paints, lacquers, or varnish.
13) Waste from the production, formulation, or use of resins, latex, plasticisers, or glues or other adhesives.
14) Waste chemical substances
    a. that arise from research and development or teaching activities; and
    b. that are not identified or are new, or both; and
    c. whose effects on humans or the environment, or both, are not known.
15) Waste from the production, formulation, or use of photographic chemicals or photographic processing materials.
16) Waste resulting from the surface treatment of metals or plastics.
17) Waste arising from industrial waste disposal operations.

Appendix 6: Hazardous constituents

Source: Imports and Exports (Restrictions) Prohibition Order (No 2) 2004

- Acidic solutions and acids in solid form
- Antimony and antimony compounds
- Any congenor of polychlorinated dibenzofuran
- Any congenor of polychlorinated dibenzo-p-dioxin
- Arsenic and arsenic compounds
- Asbestos (dust or fibres)
- Basic solutions and bases in solid form
- Beryllium and beryllium compounds
- Cadmium and cadmium compounds
- Copper compounds
- Ethers
- Halogenated organic solvents
- Hexavalent chromium compounds
- Inorganic cyanides
- Inorganic fluorine compounds (excluding calcium fluoride)
- Lead and lead compounds
- Mercury and mercury compounds
- Metal carbonyls
- Organic cyanides
- Organic phosphorous compounds
- Organic solvents (excluding halogenated solvents)
- Organohalogen compounds (other than any substance referred to elsewhere in this Part)
- Phenols and phenol compounds (including chlorophenols)
- Selenium and selenium compounds
- Tellurium and tellurium compounds
- Thallium and thallium compounds
- Zinc compounds

Appendix 7: Plastic waste not to be treated as plastic waste

Source: Imports and Exports (Restrictions) Prohibition Order (No 2) 2004
Schedule 3 Part 2A: inserted, on 1 January 2021, by clause 9 of the Imports and Exports (Restrictions) Prohibition Order (No 2) 2004 Amendment Order (No 2) 2020 (LI 2020/295).
The following plastic waste is not to be treated as plastic waste, for the purposes of this order, as long as it is—
(a) to be recycled in an environmentally sound manner; and
(b) almost free from contamination and other types of waste.
1 Plastic waste consisting almost exclusively of 1 non-halogenated polymer, including the following polymers:
(a) polyethylene (PE):
(b) polypropylene (PP):
(c) polystyrene (PS):
(d) acrylonitrile butadiene styrene (ABS):
(e) polyethylene terephthalate (PET):
(f) polycarbonates (PC):
(g) polyethers.
2 Plastic waste consisting almost exclusively of 1 cured resin or condensation product, including the following resins:
(a) urea formaldehyde resins:
(b) phenol formaldehyde resins:
(c) melamine formaldehyde resins:
(d) epoxy resins:
(e) alkyd resins.
3 Plastic waste consisting almost exclusively of 1 of the following fluorinated polymers:
(a) perfluoroethylene/propylene (FEP):
(b) the following perfluoroalkoxy alkanes:
(i) tetrafluoroethylene/perfluoroalkyl vinyl ether (PFA):
(ii) tetrafluoroethylene/perfluoromethyl vinyl ether (MFA):
(c) polyvinylfluoride (PVF):
(d) polyvinylidenefluoride (PVDF).
4 Mixtures of plastic waste consisting of 2 or more of the following, as long as they are to be separately recycled, in an environmentally sound manner, and are almost free from contamination and other types of wastes:
(a) polyethylene (PE):
(b) polypropylene (PP):
(c) polyethylene terephthalate (PET)

Appendix 8: Plastic numbers and their meaning

Sources: Natural Society

Number	Meaning
1 – PET/PETE	**Polyethylene Terephthalate** Picked up by most curb side recycling programs, plastic #1 is usually clear. It's found mostly in soda bottles, water bottles, beer bottles, salad dressing containers, mouthwash bottles, and peanut butter containers. Plastic #1 is recycled into tote bags, furniture, carpet, panelling, fibre, and polar fleece
2 - HDPE	**High Density Polyethylene** Typically, opaque and picked up by most curb side recycling schemes. It's found mostly in milk jugs, household cleaner containers, juice bottles, shampoo bottles, cereal box liners, detergent bottles, motor oil bottles, yogurt tubs, and butter tubs milk jugs, detergent bottles, juice bottles, butter tubs, and toiletries bottles are made of this. Plastic #2 is recycled into pens, recycling containers, picnic tables, lumber, benches, fencing, and detergent bottles, to name a few.
3 -PVC	**Vinyl** Used to make food wrap, plumbing pipes, and detergent bottles, and is seldom accepted by curb side recycling programs. This plastic is recycled into panelling, flooring, speed bumps, decks, and roadway gutters.
4 – LDPE	**Low Density Polyethylene** Low density polyethylene is most found in squeezable bottles, shopping bags, clothing, carpet, frozen food, bread bags, and some food wraps.
5 – PP	**Polypropylene** It is typically found in yogurt containers, ketchup bottles, syrup bottles, and medicine bottles.
6 – PS	**Polystyrene** Polystyrene is Styrofoam, which is notorious for being difficult to recycle, and thus, bad for the environment. This kind of plastic also poses a health risk, leaching potentially toxic chemicals, especially when heated. Most recycling programs won't accept it.
7	**Other, Miscellaneous** All of the plastic resins that don't fit into the other categories are placed in the number 7 category. It's a mix bag of plastics that includes polycarbonate, which contains the toxic bisphenol-A (BPA). These plastics should be avoided due to possibly containing hormone disruptors like BPA, which has been linked to infertility, hyperactivity, reproductive problems, and other health issues.