Waste Mapping Guidance for Hotels in Cyprus: Saving money and improving the environment

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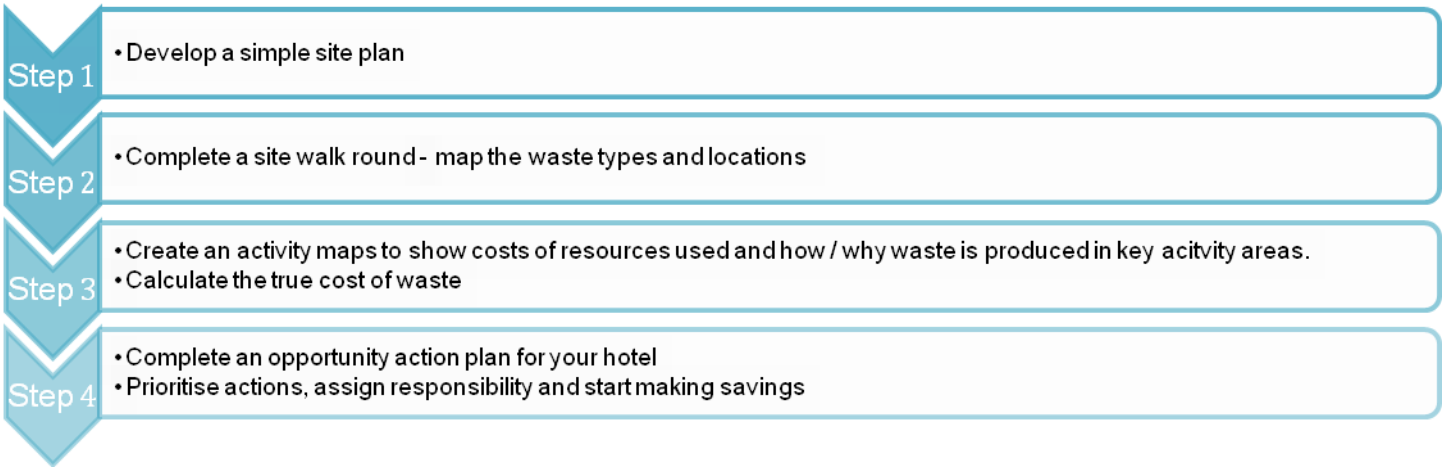
Executive Summary

This guidance document is tailored principally to meet the needs of hotel operators and other organisations working in the Cypriot tourism industry to highlight the financial and environmental benefits of undertaking waste mapping as part of their on-going business operations.

Waste mapping enables you to identify the sources, types and quantities of waste you produce. The mapping approach allows you to investigate where and how waste arises, and present this visually in a way that can help to identify hidden costs of waste (purchasing costs, staff time etc). The process will help you to prioritise areas where simple actions can be taken to minimise waste, save money and achieve lasting sustainable waste management.

This guide is structured to take you through the key steps in implementing a waste mapping process. We recommend you read each of the chapters within the guide in sequence before starting on a waste mapping exercise at your site(s). The flow chart below summarises the steps you should take to successfully complete a waste map, and provides an overview of the whole process. The guide equips hotel operators and organisations in the tourism industry with the practical skills, knowledge and tools needed to introduce and implement waste mapping techniques, to identify and quantity opportunities to implement low or no cost measures to prevent and reduce waste, and thus save money.



Throughout the guide diagrams, photographs, and templates are provided for you to help highlight key elements of the guidance, and to help you to complete your own waste map.

Worked examples for hotels in Cyprus are also provided to illustrate the approach in real situations, and case studies are included throughout the guide to highlight good practice that has already been adopted by other organisations that you may be able to adopt within your business. The case studies provide practical insight into what can be achieved, and more critically, give you the benefit of the experience of others who have already successfully completed the waste mapping process.

"We welcome the introduction of the waste-mapping project in the tourism industry, another important and practical step in promoting sustainable practices within the on-going business operation of Cypriot tourist enterprises. We urge tourism businesses in Cyprus to embrace this new initiative which at the same time, will promote the image of Cyprus as a sustainable and caring destination and also save money to the tourism business."

Marios Hannides
Director General – Cyprus Tourism Organisation

"As a hotelier myself, I understand that it's not always easy to see the value of reducing the amount of waste in the bins - after all, in Cyprus, we pay a flat rate for disposal whether they are full or empty, but that's only part of the story. Every bag of waste you throw out has hidden costs, for example the cost of purchase of materials or ingredients, labour costs in handling them, storage facilities and energy costs. Using this guide will help you calculate and reduce those hidden costs, plus look after Cyprus's beautiful environment - both of which will benefit your business."

Philippos Drousiotis
Chairman, Cyprus Sustainable Tourism Initiative

"The Travel Foundation has been working closely with CSTI since 2006. This Waste Mapping Guidance is another great example of what such long-term partnerships can achieve. The guide, specifically tailored for hoteliers in Cyprus, will help businesses protect an important part of the holiday product, the natural environment, prepare for upcoming changes in waste legislation, and reduce their costs."

Salli Felton
Acting Chief Executive, The Travel Foundation

Contents

Glossary

Within this guide the following terms have been used:

- Green waste – refers to gardening waste, such as grass cuttings or that generated from weeding.
- Recyclable waste – refers to waste that is segregated or can be segregated for processing and incorporation into new products, e.g. glass bottles, paper etc.
- Resources – raw materials (e.g. furniture, food and drink including packaging), consumables (e.g. cleaning materials) and utilities (e.g. water, gas and electricity).
- Re-use – refers to waste that is segregated and provided to an individual or organisation for use in the same manner, e.g. furniture or mattresses donated to the army for further use.
- Waste – refers to any item which you plan to throw away. Garbage – refers to waste that is sent for disposal to landfill/ incineration (usually referred to as residual waste, mixed waste, non-recyclable waste or rubbish).

Introduction to waste mapping

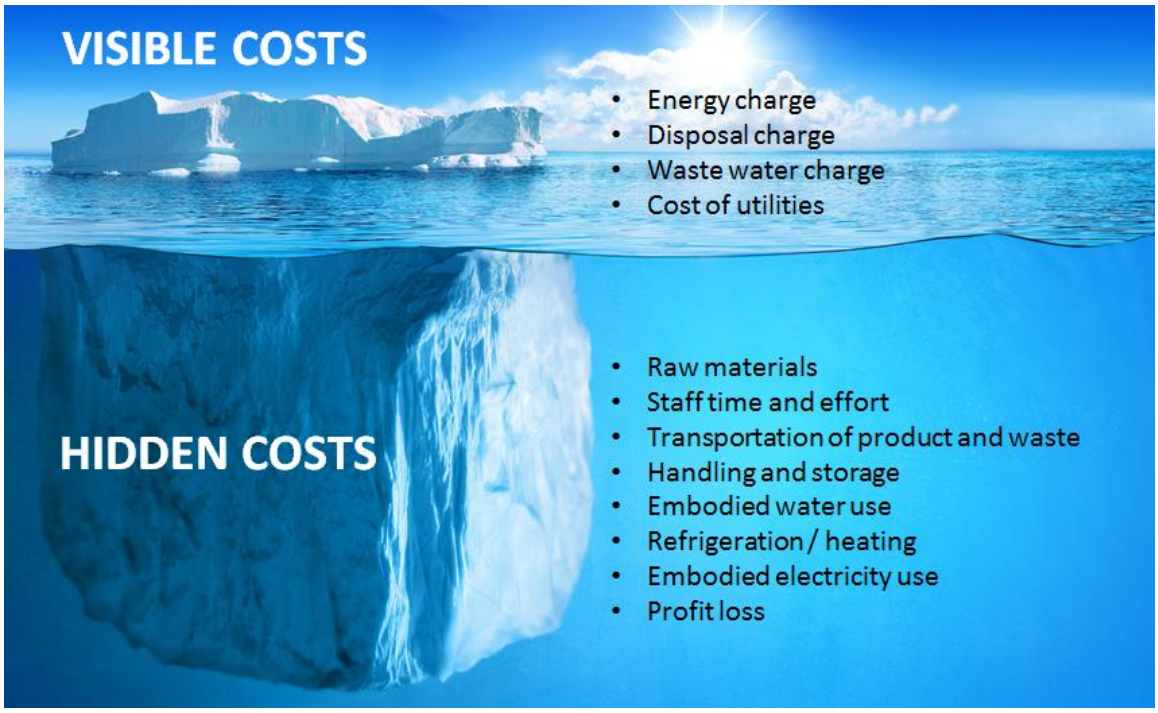
This section provides an introduction to the concept of waste mapping and how it can result in financial savings as well as environmental benefits. In addition, this section describes the key legislative drivers and requirements of hotel operators and organisations in the tourism industry in Cyprus to prevent and reduce waste.

Many hotels underestimate the cost of waste to their business, simply viewing it as a disposal cost. Municipalities charge a fixed rate for waste collections based on the maximum occupancy level, hence waste prevention measures or the introduction of recycling schemes will presently have no impact on these fees payable to the municipality. However you shouldn't be complacent, this may change in the near future - further information is provided within this guide on possible future waste charging systems.

The true cost of waste management is often significantly higher than just the collection and disposal cost as the poor management of resources and waste will also result in additional cost to your hotel and its operations, e.g. avoidable damage to raw materials, spoilage of food, handling of wastes, and staff time for transporting waste etc.

As highlighted in Figure 1, the waste cost you can see in your municipality bill is just the tip of the iceberg of what it is actually costing your business!

Figure 1: Hidden cost of waste



Rising operational costs and materials and utility constraints are affecting the profitability of the tourism sector and this impact is likely to grow in coming years. Taking a more sustainable approach to your business operations by looking at the waste you produce can help you use resources and raw materials more wisely, save money and increase profit. For example, switching to refillable toiletries can save you money compared to buying single use disposable products.

The use of waste mapping techniques enables resource use and types and locations of waste generated to be identified and represented visually, or 'mapped out'.

Mapping waste in this way can help you develop a complete overview of activities on your site, and to identify areas where resources are wasted. It also allows you to identify opportunities where waste could be prevented or segregated for re-use or recycling.

The principal aim of this guide is to provide hotel operators and organisations in the tourism industry in Cyprus with the practical skills, knowledge and tools needed to introduce waste mapping techniques, to identify opportunities to implement low or no-cost measures to prevent and reduce waste and reduce business costs.

Scope

This guide is aimed at hotel operators and organisations working in the tourism industry.

Every hotel will have different waste management approaches, e.g. some may have garbage collection only, and others may have additional separate collections of materials suitable for re-use or recycling. Whether large or small, all inclusive, or bed and breakfast, managing resource use and waste effectively is a key part of reducing business costs. It is also something that all staff can contribute to.

- **Managers** can set clear procedures and promote good practice when buying products and materials (sustainable procurement), in using and disposing of items, and in ensuring that garbage and recycling bins are used properly by staff (and visitors).
- **Chefs, waiting staff and bar staff**, can think about how they buy raw ingredients, prepare food and avoid waste being created, as well as how waste produced by guests is disposed of.
- **Housekeeping staff** can promote waste prevention measures and use refillable toiletries wherever appropriate (instead of single use items).
- **Grounds maintenance** staff can consider composting 'green waste' (garden cuttings) on-site and use the compost produced in flower beds and pots instead of purchasing compost.

Benefits of waste mapping

Improved waste management practices in hotels can help protect and safeguard the local socio-economic environment of tourist destinations from pollution and litter and enhance the holiday experience of customers.

Protecting the natural assets and cultures of destinations that the tourist industry depends on now will also help to ensure a sustainable and profitable future.

Waste mapping will help you to identify opportunities for reducing resource use, and managing your waste more effectively. Case Study 1 and 2 show examples of the savings and benefits that can be achieved from improved waste management.

Case study 1

Plastic Reduction in Ayia Napa and Paphos

The Travel Foundation and CSTI (Cyprus Sustainable Tourism Initiative) in conjunction with Thomas Cook worked with 21 hotels in Ayia Napa and Paphos to reduce the amount of plastic generated without impacting on the guest experience. The key results were:

- On average, participating hotels saved 19% on the total number of plastic items used from the previous season
- The total number of plastic items saved = 2.2 million over a comparison period of only 4 to 5 months
- Over half of customer respondents felt more positive towards Thomas Cook
- 50% said that the plastic reduction initiative had a positive impact on their holiday
- 98% would like to see similar projects rolled out in other destinations.

Further details on this project is available from:
http://csti-cyprus.org/wp-content/uploads/2012/12/Cyprus_plastics_summary_FINAL.pdf

Case study 2

Accor Hotels

Accor's sustainability strategy 'Planet 21' was launched in 2011, to set out a course for sustainable development for the group, employees, partners and customers of hoteliers. The scheme defines 21 commitments and ambitious targets for all hotels to meet by 2015 in 7 key areas (health, nature, carbon, innovation, local, employment and dialogue) and includes a program to inform guests and employees and encourage them to contribute to sustainability.

Every year, Accor generates 2.3 million tonnes of waste of which 70% comes from construction and renovation work. In 2011, the Group strengthened and further extended the waste module in its sustainable development management application. The goal for 2015 is for 85% of hotels to recycle their waste, and to provide hotels with the means to measure their waste volumes as well as their collection and sorting costs.

At the end of **2012:**
- **79%** of hotels recycled their waste;
- **91%** of hotels sorted and recycled batteries;
- **90%** of hotels sorted and recycled fluorescent lamps and tubes; and
- **86%** of hotels sorted and recycled paper and cardboard.

Hotel managers report on waste production through an internal management tool – both in terms of cost and volume. The data is then used by Accor's sustainable development department, the operational manager and technical departments to monitor performance.

More information can be found at
http://www.accor.com/en/sustainable-development/experts-and-analysts-corner/management-method.html

Typically the wider benefits of waste mapping can include:

- Reduced costs and improved efficiency;
- Reduced risk and improved legislative compliance;
- Increased employee engagement and satisfaction;
- Competitive marketplace advantage resulting from enhanced brand image and 'green' credentials e.g. international environmental management systems – ISO 14001, or Travelife; and
- Promoting your hotel as a green / eco hotel may increase business. For example Late Rooms (www.laterooms.com) promote 'eco-friendly' hotels from their main landing page (Figure 2).

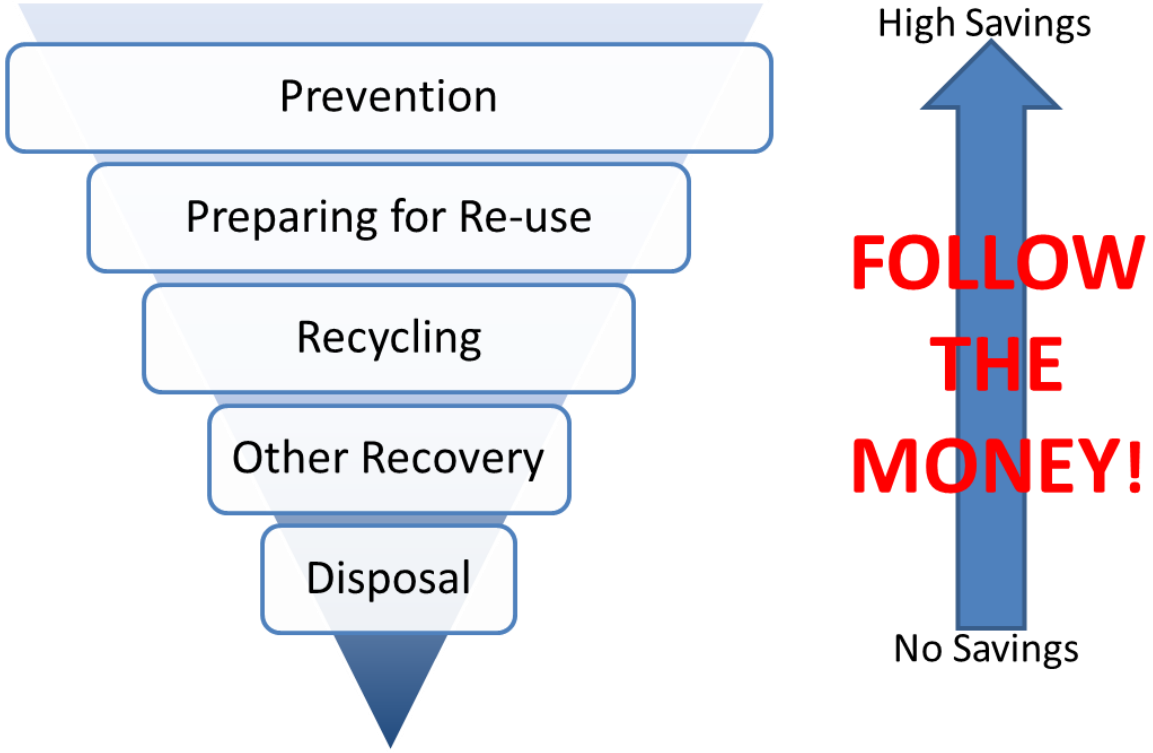
Figure 2: Promotion of eco-friendly hotels on Late Rooms website

Waste Management Policy and Legislation

This section describes the key legislative drivers and requirements of hotel operators and organisations in the tourism industry in Cyprus to prevent and reduce waste.

Waste management policy and legislation across European Member States is ultimately developed as a result of drivers from the European Union. The Landfill Directive requires Member States to divert biodegradable waste (organic waste that breaks down naturally, e.g. food waste) from landfill. The Waste Framework Directive requires action on waste to be focused firstly on waste prevention and secondly on preparation for reuse and recycling or 'other recovery', which is recovery through composting or energy from waste. In addition, there is a further requirement for separate collection of recyclable materials. Prioritising waste management options in this way is referred to as the Waste Hierarchy (Figure 3).

Figure 3: Waste hierarchy



The requirements of these Directives were introduced in Cyprus through the National Strategic Solid Waste Management Plan (2002), through which a number of legislative measures related to the management of solid waste from commercial premises were implemented.

Regulation ΚΔΠ 563/2003 includes a requirement for landfill diversion of biodegradable waste, with a target to reduce the level of biodegradable waste sent to landfill to 35% of the 1995 level by 2016. The Waste Law 2011

(Law No. 185(I)/2011) specifies that by 2015 a separate collection must be established for the main recyclable materials (namely paper, glass, metal and plastic) from households and business (including hotels), and also encourages the separate collection of the organic waste fraction e.g. food waste. It also transposed EU recycling targets into Cypriot law, setting a 50% recycling target for municipal solid waste (MSW) (which includes that generated by hotels) by 2020 and 70% construction and demolition (C&D) waste by 2020. The Cyprus Department of the Environment is currently preparing a piece of legislation that will transfer the responsibility of separate collection to local authorities, which may also include targets.

Planned actions to meet these targets are included in the Management Plan for Household and Similar Type Waste (Αρ. Σύμβασης 03/2011[1]), which was published in 2012 by the Ministry of Agriculture, Natural Resources and Environment. Management of organic waste, such as food and green waste, will be one of the key themes of the programme and hospitality businesses will be targeted as major producers of organic waste.

Funding is likely to become available for municipalities to help them set up separate collections for the different waste streams (paper, plastic, glass, metals, food and green waste). Funding is also likely to become available to industries or other commercial activities either in cooperation with the municipalities or by themselves to promote separate collection and proper management of their waste streams (paper, plastic, metals, food and green waste). This support mechanism, in combination with policy changes in the near future, will drive the move towards achieving Cyprus' waste targets. Currently, hotels in Cyprus must pay a waste management fee to the municipality. This fee is based on the maximum occupancy rate for the hotel, and thus is a fixed price irrespective of whether a percentage of waste is 'presented separately for recycling. Clearly the current charging mechanism alone doesn't create an incentive to change waste management practices, however there are operational efficiencies and savings that can be made when considering the true cost of waste, which this guide will help you to identify. With new policy measures on the horizon to incentivise higher participation in recycling making changes to your waste management practices and systems now will help you stay one step ahead.

Completing a waste mapping exercise for your business will help you to establish the quantity of waste you generate and the potential for identifying and prioritising waste prevention and re-use / recycling according to the waste hierarchy.

A waste mapping exercise will also help you quantify potential impacts and cost saving to your business should changes to changing mechanisms such as a 'pay as you throw' system be put in place by municipalities.

Remember, the more waste you prevent, and the less waste you dispose of, the greater your savings are likely to be!

Further guidance on waste legislation and policy is available from:
http://www.moa.gov.cy/moa/environment/environment.nsf/de09_en/de09_en?OpenDocument

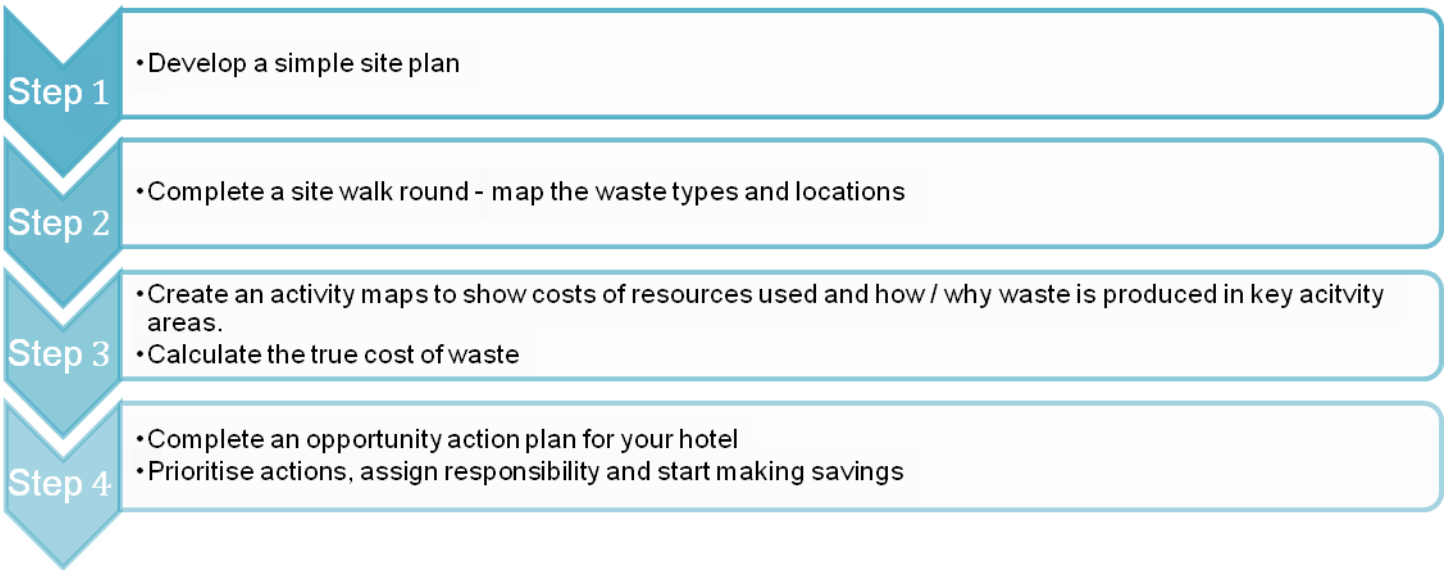
[1] http://www.moa.gov.cy/moa/environment/environment.nsf/All/908036434FFA1C6BC2257A8B0031145B?OpenDocument

Developing a waste map

This section provides step by step guidance on how to complete an initial waste map for your hotel. The waste map will provide an overview of wastes produced by the hotel as a whole and the activities that generate each type of waste produced.

The flow chart below (Figure 4) summarises the steps you should take to successfully complete a waste map, and provides an overview of the whole process.

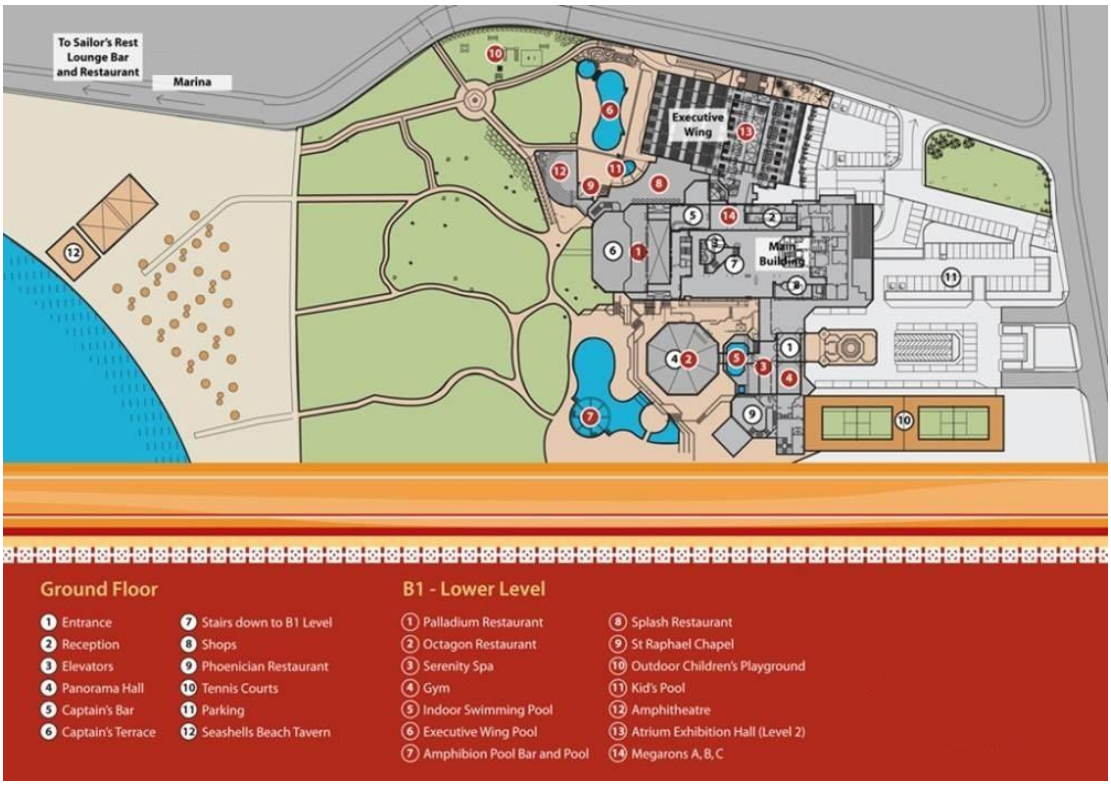
Figure 4: Steps to complete a waste map



Step 1: Produce a site plan

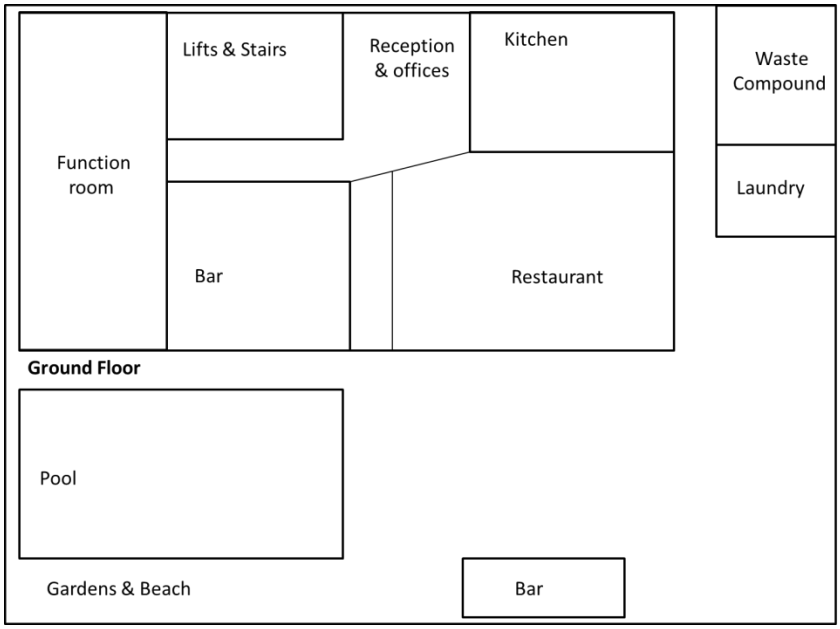
A waste map is based on the layout of your site. The first step of waste mapping is to obtain a site plan or sketch a simple layout of your hotel. Information about waste and resource use will be added to the plan in Step 2. You may be able to use a site plan that you already provide for your guests such as the example shown below for a four star all-inclusive hotel in Cyprus (Figure 5).

Figure 5: Example site plan



Alternatively, a simple block diagram can be used. An example developed for the ground floor of a hotel is shown in Figure 6.

Figure 6: Ground Floor block diagram of a hotel



In addition to those areas used by hotel guests, other back-of-house areas of the site where resources are being used are also important potential sources of waste, such as the laundry, maintenance workshop etc. Make sure you include these areas on your plan.

The areas covered by your waste map should also include areas such as:

- kitchens and bars, as well as food and beverage preparation / restaurants;
- housekeeping functions including laundry rooms;
- gardening / landscaping / maintenance operations;
- leisure / conference facilities (bar, spa / pool, gym);
- reception / administrative functions; and
- storage areas.

Remember to consider all functions of your site, not just main buildings / guest areas. You will be using your plan during part 2 of the process – the site walk, where you will map waste and resource use. Make sure you have enough space on your map to mark comments or include references.

Step 2: Map waste and resource use

The next step is to populate your site plan with information on waste and resource use. Your waste map can be completed during a site walk around. As you walk around the site:

- look for areas where waste is being produced;
- identify how waste is handled at the moment;
- mark areas of waste production on the site plan;
- make a note of the type of waste generated; and,

- if possible identify the source of the waste.

Take photographs if possible to document your route; it may be beneficial to refer to these at a later date.

Note the number of bins in each area, along with their volume and typical collection frequency (every shift/service, every day etc.). This information then enables you to estimate the weight of waste generated using conversion factors. Alternatively, if you have access to weighing equipment – weigh the bin or bags in the bin.

Further guidance on identifying bin sizes and using conversion factors is provided in Appendix 1 and 2.

The following checklist shows the aspects you should look out for in each area as you walk around the hotel. Remember to discuss the aspects below with key members of staff in each area whilst completing the waste map.

Checklist – Site Walk Around

- Record the amount of garbage and other waste streams generated in each area of your site plan.
  - If the waste is in bins:
    - What size is the bin? Some examples of common types of bins and their volumes are provided in Appendix 1.
    - How full is the bin, for example is it half full (i.e. 50%) or two thirds full (66%), or alternatively how many bags are in the bin?
    - This enables the volume of waste at the time of the site walk around to be calculated. For example if the bin has a volume of 1280 litres, and it is half full, this equates to 640 litres of waste being present. Alternatively if a bin contains 6 commercial refuse sacks of waste which typically have a volume of approximately 60 litres, this would represent 360 litres of waste.
      A worked example of converting volume to weight is provided in Appendix 2.
  - Use your waste map to calculate the total volume or weight of waste produced in each area and a total amount for your site.

Find out how often the bins are emptied by the cleaner/ responsible person, and record this information on your site plan. It is also useful to note if bins are full when they are due to be collected. If garbage is disposed of centrally and it's difficult to identify which sack was produced by which area speak with your cleaner to identify disposal times. When conducting a waste mapping exercise some organisations use stickers, plastic tie tags or different bag colours temporarily to identify the source of the garbage.

- For specific areas think about the main activities conducted, how goods, products and resources are purchased and used, and how these might produce waste (e.g. are single use items such as shampoo or bars of soap provided in each guest bedroom?).

- Identify if waste is garbage, or whether it is segregated for recycling or re-use. Is there anything that could it be recycled or reused but isn't currently?

Remember to record utility use, i.e. water, electricity, gas. If you have sub-meters installed at your hotel you may be able to obtain consumption information for areas of the hotel.

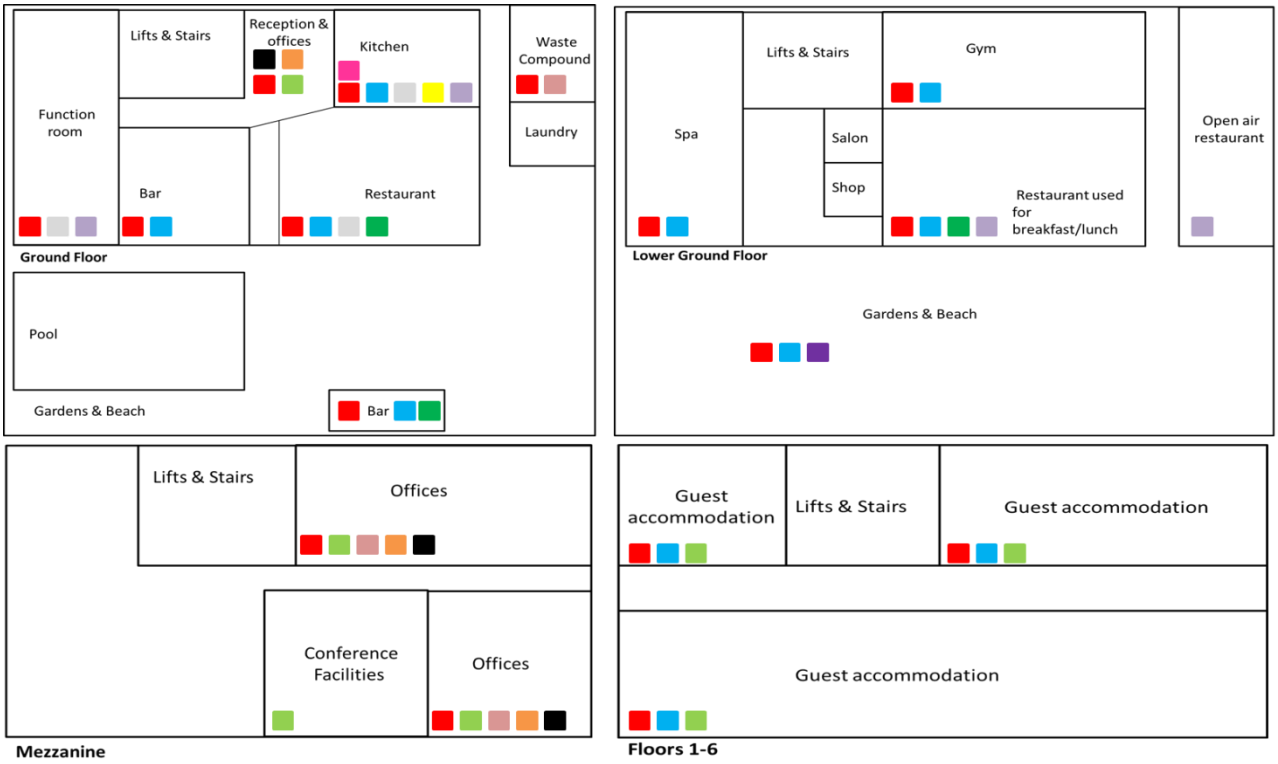
If you have designated recycling and waste disposal compounds to house bins and waste management and handling equipment such as balers and compactors, you should mark these on the map also, as well as which part or function of the hotel typically uses each compound.

Adding this level of detail to your site plan will help you build up a waste map of the whole site, as well as the wastes produced by individual areas. This information will allow you to prioritise areas for the next step of the mapping.

When identifying waste, remember that some wastes might be more obvious than others. Talking to key staff including managers of departments / estates and facilities, or maintenance managers during the site walk around about what waste they dispose of can be a big help and a real eye opener!

A waste map for an all-inclusive hotel is shown in Figure 7, and the key shown in Table 1.

Figure 7: Waste map and arisings



A simple colour coding system has been used to denote different waste types noted at the time of the waste audit, and this is shown in Table 1. You can use this approach for your waste map, or develop your own approach.

Table 1: Colour coding system for waste map

Key	Waste type	Key	Waste type
	Non-recyclable waste		Food waste
	Paper and Card		Garden waste
	Plastic		Electrical items
	Glass		Furniture

	Tins & cans		Toner cartridges
	Cartons		Vegetable oil

Information on the number of bins, bin volume, typical fullness of bins in each area and collection frequency can then be used to estimate the quantity of waste generated. Adding together the different waste estimates from each hotel department will give an overall estimate of the amount of waste the hotel produces in total. This information for different areas within an all-inclusive hotel in Cyprus is shown below in Table 2. It is a useful check to compare this against an estimate of waste arising in your waste compound(s), i.e. bins serviced by your waste contractor(s) (as shown in Table 3).

Table 2: Waste arisings for an all-inclusive hotel based on observations from different hotel areas

Area	Waste Type 1 – landfilled 2 – recycled	Conversion Factor CF	No. bins A	Bin volume (litres) B	% volume of each bin filled with waste C	Frequency of bin emptying	No. times bins emptied each week D	% volume of each bin filled with waste E	Weekly waste volume (WWV) (litres) AxBxCxD xE	Estimated weight per week (kg) WWV x CF
Bins serviced by hotel staff										
Reception & offices	Garbage[1]	0.21	7	20	50	Daily	7	50	490	103
Kitchen	Garbage[1]	0.21	4	60	100	6 times daily	42	100	10080	2117
Restaurants	Garbage[1]	0.21	5	60	100	2 times daily	14	100	4200	882
Hotel bar	Garbage[1]	0.21	2	60	100	3 times daily	21	100	2520	529
	Glass[2]	0.61	1	15	-	Once monthly	-	-	3.75	2
Poolside bar	Garbage[1]	0.21	1	60	100	7 times daily	49	100	2940	617
Guest accommodation	Garbage[1]	0.21	138x2*	15	30	Daily	7	30	6521	1369
Gardens	Garden waste	0.28	-	600*	-	Weekly	1	-	600	168
	Garbage[1]	0.21	10	30	50	Daily	7	50	1050	221
Spa	Garbage[1]	0.21	1	20	50	Daily	7	50	70	15
Gym	Garbage[1]	0.21	1	20	50	Daily	7	50	70	15
									Subtotal: garbage	**5868**

Subtotal: garden waste	**168**
Subtotal: LANDFILL (garbage + garden waste)	**6036**
Subtotal: RECYCLING	**2**
Total (LANDFILL + RECYCLING):	**6038**

* 75% occupancy rate used to calculate waste from guest accommodation and 10 bags/week of garden waste

Table 3: Waste arisings for an all-inclusive hotel based on observations from the external waste compound

Area	Waste Type 1 – landfilled 2 – recycled	Conversion Factor CF	No. bins A	Bin volume (litres) B	% volume of each bin filled with waste C	Frequency of bin emptying	No. times bins emptied each week D	% volume of each bin filled with waste E	Weekly waste volume (WWV) (litres) AxBxCxD xE	Estimated weight per week (kg) WWV x CF
Bins serviced by contractor										
External waste compound	Garbage[1]	0.21	7	1280	70	6 days/ week	6	70	37632	7903
	Waste Cooking Oil[2]	0.61	1	1000	-	Once every 4-6 weeks	-	-	200	122
Subtotal – disposal at landfill										**7903**
Subtotal – recycled										**122**
Total										**8025**

Based on the data calculated in Table 2 and 3, it is possible to sum the total for each waste type generated from bins serviced by hotel staff, as well as those serviced by waste contractors. In addition, it is also useful to identify how each waste type is managed by your waste contractor(s), i.e. whether the material is sent to landfill, recycled, composted etc.

Based on the waste mapping exercise, the data collated from bins serviced by hotel staff indicates that the hotel generates 5,868kg or approximately 6 tonnes of garbage each week. However, since the green waste is ultimately disposed of in the garbage bins, the total estimated weight is 6,036kg (5,868+168). This can be compared to the data calculated from the garbage bins serviced by the contractor, which indicates that the hotel generates 7,903kg or approximately 8 tonnes of garbage each week.

The variation between the two weights of waste is likely to be caused by the accuracy of information provided by staff, packing of waste into bins in the waste compound, as well as the composition of the different types of waste. In addition, you may have more bins supplied by your waste contractor than you need. Calculating both numbers is useful as it enables you to assess whether the information collected is within a similar order of accuracy for cross checking your results. For example, if the waste collected within the waste compound is double that from individual areas, this would suggest that there is potential error in your results which needs further investigation, either from a source of waste that has been missed, or the results from individual areas are too low.

What the waste mapping exercise highlights is that the key areas where most waste is produced for the hotel are the main kitchen followed by guest accommodation.

Don't forget to take photographs to show types of waste that you record on your waste map – evidence at this early stage can help you later on in the process, examples are shown in Figure 8.

Figure 8: Bin contents identified during waste mapping (garbage from external bin, guest accommodation, office & kitchen)

Top Tips:
When you do your site walk round remember to record:
- Date and time you completed the audit (is it a guest changeover day?).
- Hotel occupancy rates
- Were any non-routine activities such as construction work underway?

If you complete a second walk round at a later date these details will be useful to help compare results.

Having completed your waste map and identified types and quantities of waste produced in each area, you can now prioritise which areas to investigate further by considering the following aspects:

- common waste streams generated in many areas;
- area with the greatest amount of waste produced; and
- those areas where a large amount of purchased material is potentially being wasted, e.g. kitchen operations.

The waste map for the hotel highlights that the greatest amount of waste is generated in the kitchen area, which also coincides with significant cost in purchasing food for the hotel. It is also clear from the types of waste observed in each area that there is significant potential for recycling services.

Move forward to Step 3 for guidance on completing an 'activity map' for each area to better understand how and why the specific waste is produced at that location.

Step 3: Develop an activity map

The amount and type of waste created is dependent on the activity of an area in the hotel, or its function. Looking at the activity of each area of your hotel in more detail will help you trace the **inputs** of goods and products and the factors that contribute to the production of waste (the **output)**.

Looking at the inputs of goods and products will help you understand the flow of resources and enable you to calculate the hidden cost associated with the waste. This will highlight intervention opportunities and potential financial savings and environmental benefits to be quantified and subsequently prioritised in terms of future planned activities and interventions (Step 4.)

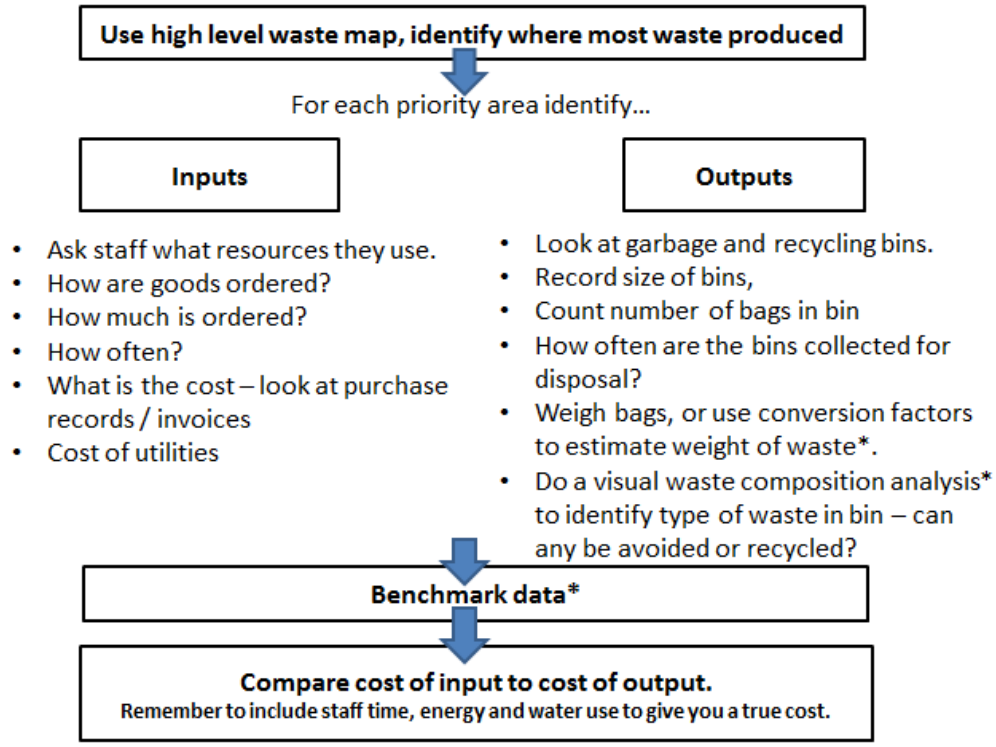
Resources aren't just raw materials, but can include;

- staff time;
- product / supplies handling, ordering and storage; and
- utility usage, e.g. heating, lighting, refrigeration, water.

The diagram overleaf (Figure 9) provides a step by step guide to quantifying inputs and outputs.

Complete this exercise for each area of your hotel, or specific areas that you want to focus on. Checklists for each area are provided in Appendix 3, along with an example completed for an all-inclusive hotel in Cyprus in Appendix 4.

Figure 9: Flow chart for qualifying inputs and outputs



*Information on using conversion factors, waste composition analysis and benchmarking data can be found in the Appendices.

To ensure that you complete your waste map correctly, make sure that your inputs and outputs are quantified over the same period, e.g. a day, a week, a calendar month.

As for the initial waste map, it is also beneficial to record the date and time the activity map was completed, along with information on occupancy rates and number of meals served as appropriate.

Ask questions of key staff about what happens to empty cleaning product containers, waste office paper, waste water, packaging from deliveries etc. Ask what goods are ordered, how they are stored and how they are used, why are some damaged?

Using the waste types identified in the overall waste map, an input / output diagram for each key area should be produced detailing the inputs / raw materials (ingredients, cleaning chemicals, etc) as well as each waste type produced, (e.g. cardboard packaging, plastic, food waste).

Aspects to consider to help you identify inputs and outputs in each area of your hotel are provided below. Checklists for completing activity maps for each key area of hotel operations are provided in Appendix 3.

Table 4: Key aspects to identify inputs and outputs

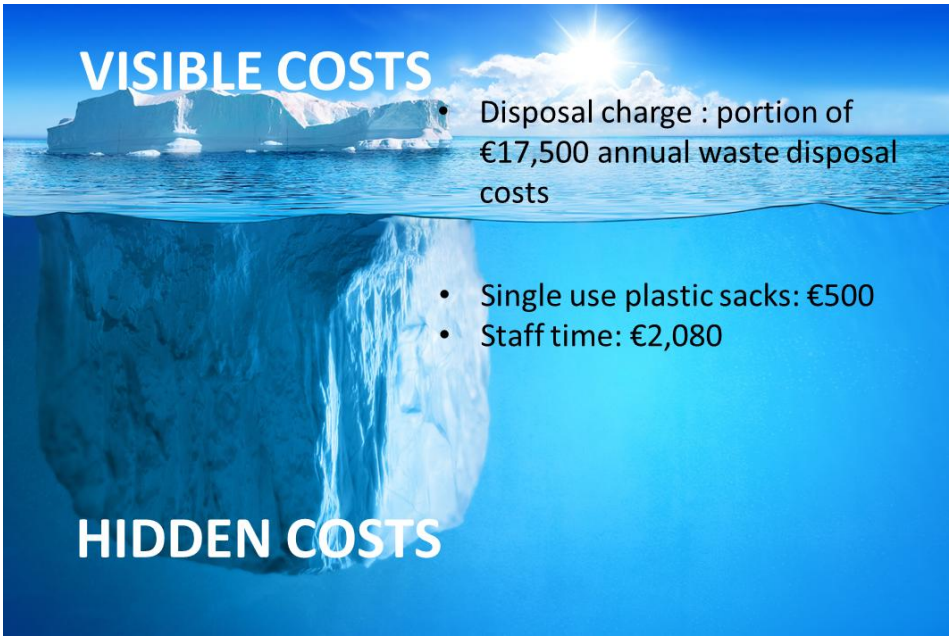
Purchasing	• How are ingredients and consumables purchased? Are they centrally purchased or do individual departments purchase their own stock? • What packaging is used for the delivery of ingredients and other consumables from suppliers? • Is any packaging returned to suppliers? • How are stock levels monitored and how frequently? • Are goods over ordered? • Are condiments (butter, sugar, salt etc.) purchased in bulk or single serve sachets? • Are cleaning chemicals purchased in bulk? • What is the cost and number of units of key items purchased?
Storage	• Are goods stored ensuring that those with the earliest use by date/ expiry date are used soonest? • If goods are passed their use by date/ expiry date and need to be disposed of, why weren't they used?
Staff time	• How many staff are involved in handling stock orders and products? • How many staff are involved in handling waste? • What proportion of their time is spent in handling and transporting waste?
Utility usage	• Is there a sub-meter available to identify electricity/ water/ gas usage for the activity? • Are any chill rooms used to store food waste prior to disposal?
Waste generation	• How much waste is generated? • What is the composition of the waste?

The following sections discuss typical inputs and outputs for different hotel areas in more detail.

The data from the checklists, will provide you with an indication of the true cost of each waste stream. Don't worry if not all of the data is available, but recognize where there is a potential impact even if you cannot quantify it.

In the case of an all-inclusive hotel, this process has enabled further information on the costs associated with garden/green waste to be calculated. The full detail is provided in Appendix 4. The true cost of garden/green waste is summarised below in Figure 10.

Figure 10: Costs associated with green waste generation at an all-inclusive hotel in Cyprus



For kitchen operations food preparation and service produces large volumes of waste. Further guidance on food waste is provided in the next section.

Food preparation in kitchen / restaurant food service areas

Food preparation often results in a large amount of waste, from peelings to off-cuts or spoiled products, and conducting additional monitoring in this area may be beneficial to identify efficiencies and potential savings. The true cost of waste from these areas can be difficult to quantify given the large number of stages involved in food ordering, storage, preparation and service.

Understanding the type and source of food waste produced from the food and beverage area is very important. As a minimum you should aim to quantify total food waste, but measuring the type and source of food waste from all stages of food preparation and service is recommended
The key types of food waste generated are:

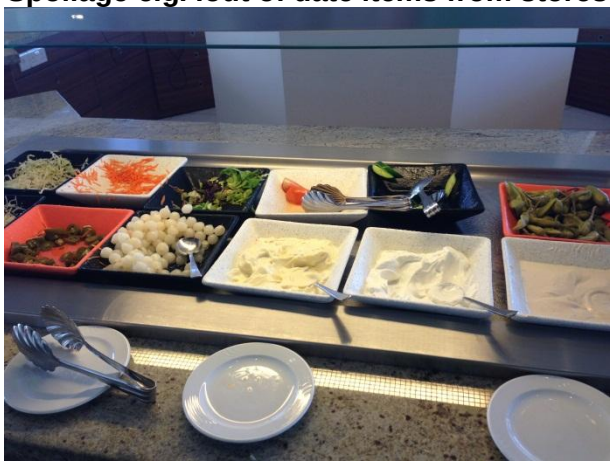
- **spoilage of raw materials:** anything from the kitchen that is not suitable for use e.g. bruised or mouldy potatoes, spoiled produce, goods that are damaged / past expiry date;
- **preparation waste:** anything that is thrown out, e.g. potato peelings, cut offs, dropped / burnt food, **meat / fish bones etc.;**
- **overproduced food:** i.e. food portions prepared that have not been sold/ consumed – including leftover buffet waste; and,
- **plate scrapings** from customers.

Examples of these are shown in Figure 11.

Figure 11: Types of food waste

Spoilage e.g. .out of date items from stores

Preparation waste



Overproduced food

Plate scrapings

All staff including chefs, waiters and managers can, and should, get involved in helping to map food waste, and help to identify opportunities to reduce food waste.

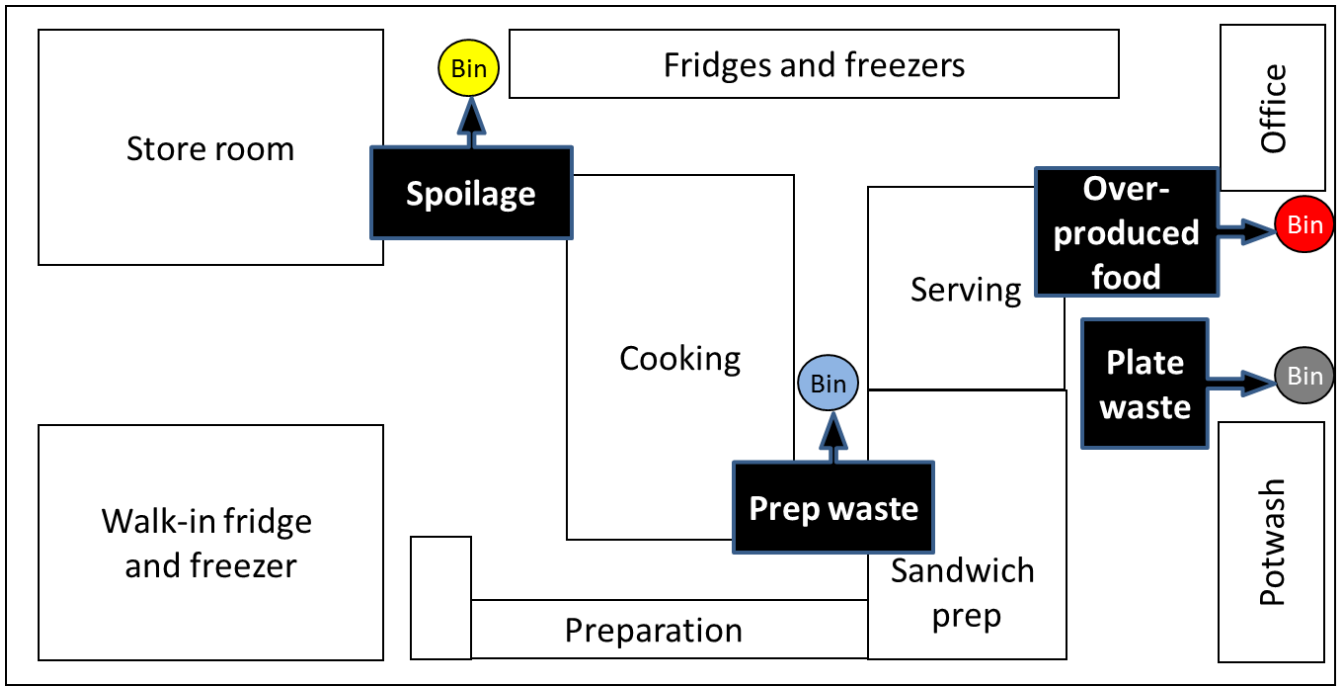
To fully understand how much food waste is produced on an average day it is good practice to conduct a dedicated food waste mapping study.

To complete the food waste mapping you will need 4 bins – one for each area / type of food waste (spoilage, preparation, overproduced food and plate scrapings), and a simple set of weighing scales.

Top Tip:

Put the bins next to the type of food waste you are measuring. Put one bin in the stock room, one in the kitchen, one behind the serving areas, and one in the pot wash area where the plates are scraped. This is shown in Figure 12.

Figure 12: Example of bin locations in kitchen



Follow the steps in Figure 13 and record your data using the template provided in Appendix 5. The results of food waste mapping conducted at an all-inclusive hotel in Cyprus is shown in Table 5.

Figure 13: Flow chart to complete food waste audit

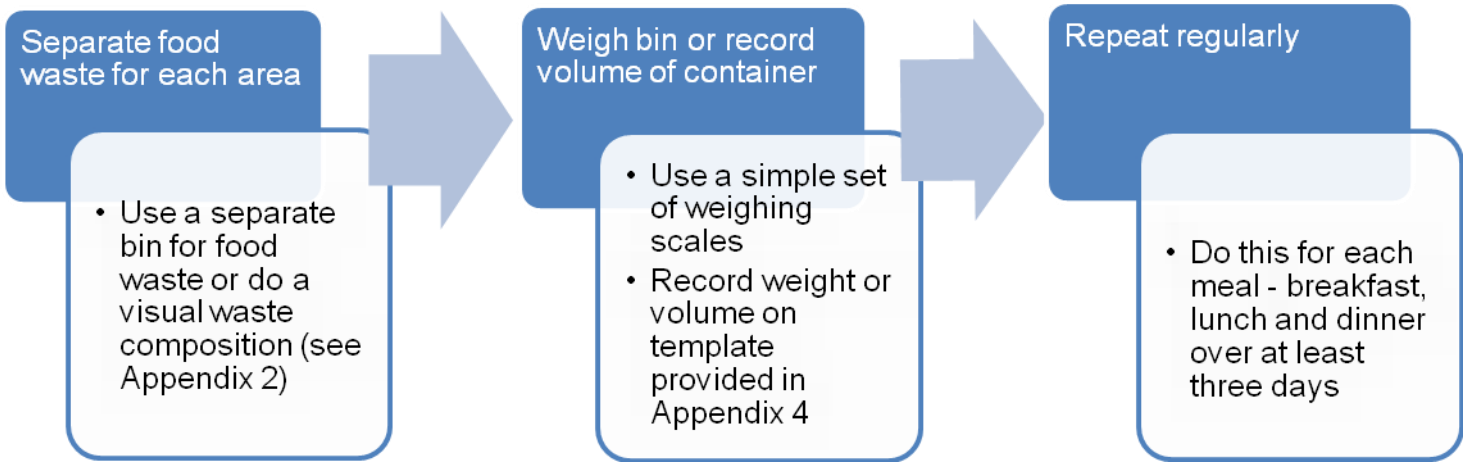


Table 5: Food waste mapping recording table

Meal time:		Evening buffet meal (all you can eat)					
No. meals served/ covers:		180					
Spoilage (kg)		**Preparation waste (kg)**		**Overproduced food (kg)**		**Plate scrapings (kg)**	
Total spoilage	6.0	Total preparation waste	10.9	Total overproduction	28.8	Total plate scrapings	48.0
Spoilage per Cover	0.033	Preparation waste per cover	0.061	Overproduction waste per cover	0.160	Plate scrapings per cover	0.267
Total Waste (kg)		93.7					
Total Waste per cover (kg)		0.521					

The results highlight that total waste per cover for this meal was 0.521 kg or 521 grams. The greatest fraction of food waste came from plate scrapings (51.2%) and over-produced food (30.7%). Some of the over-produced food waste was kept and used in the staff canteen, and hence not all was disposed of as waste, and it would be beneficial to capture this as a separate stream (as a direct cost to the hotel), as well as any subsequent waste generated. It was not possible to complete this as part of the audit, as the food was not necessarily used on the same day, but stored for use at a later date. However, if this is common practice at your hotel, you may wish to label food and record the quantity which is later thrown away.

This exercise at an all-inclusive hotel in Cyprus identifies that there may be significant opportunities for savings. Note: that this was completed for one evening sitting only, and it is recommended that you repeat the audit for all meals over a period of at least three days to obtain a better data set before implementing any changes. This will allow you to calculate an average waste figure per meal that accounts for daily variations in number of covers, and occupancy.

Following completion of the food waste audit exercise you will be able to identify the following:

- the meal time that produces the most waste;
- the area that produces the most waste;
- the types of food waste produced;

This information when coupled with the budgeted cost of meals provides an indication of which area and meal time to prioritise for further attention.

True cost of food waste

Having identified the quantity of waste produced, you should aim to determine a more accurate cost of waste. Waste mapping helps you determine this cost as it takes into account product cost, staff time and utility usage.

Case study 3: Cost of food waste to business

Research carried out by the Sustainable Restaurant Association and Lean Path (USA) estimated that around 6-14% of food purchased ended up as food waste – clearly at cost to the businesses surveyed. A survey of restaurants found that around 0.5 kg of food waste was generated per meal served. Overall, the average food waste balance from the surveyed restaurants was:

- 65% of food waste comes from preparation – peelings, off cuts and anything ruined while cooking
- 30% of food waste comes back from customers' plates
- 5% of food waste is classified as 'spoilage' – out-of-date or unusable items

The cost of waste food is far greater than just the proportion of fixed waste disposal cost that can be assigned to food and beverage areas. If a whole meal is wasted, the value of the ingredients that were bought and used to make that meal will also be wasted. When you add on the cost of labour, gas and electric to the cost of each plate of food that is wasted, you will begin to see the real cost of food waste.

While a true cost of food waste can be difficult to calculate, a starting point would be to look at a typical menu and ask the following questions:

- What raw ingredients are used to make the food?
- What is the cost of the raw ingredients purchased to make the food?
- What is the total weight of raw ingredients purchased?
- How much energy is used in kitchen operations?
- How much water is used?
- What are the staff costs?

It is important to note that reducing food waste generated may not impact on electricity usage or gas usage for example, as you are only likely to realize any savings if the hours that the kitchen is preparing food is reduced, or the number of fridges or ovens in use are reduced, for example.

The example in Table 6 shows how to calculate the cost of food waste for a restaurant serving 100 meals per day. The numbers in the table are fictional, to provide an estimated cost of food waste. The table can be replicated and completed using your own figures.

Table 6: Example calculation of true cost of food waste

Cost of ingredients used during the day	**Cost (€)**	**Weight (kg)**
Steak (20 x 200g items)	50	4.0
Burgers (30 items)	24	6.0
Lasagne - ready-made (50 items)	70	7.5
Potatoes (30kg)	24	30.0
Vegetables/ Salad (20kg)	20	20.0
Bread (100 x 50g)	15	5.0
TOTAL	**203**	**72.5**
Average cost per kg of food (€ / kg of food)	**= 203 / 72.5**	**2.80**
Average cost per plate of food (€ / number of meals)	**= 203 / 100**	**2.03**

Labour Cost per day	**Cost (€)**
Chef	75

Preparation / Pot wash - 3 staff	150
2 x waiting staff	100
TOTAL	**325**

Utility cost for kitchen/ restaurant only (assuming submetering)	Cost per month (€)	Cost per day (€)	
Gas	200	= (200 x 12) / 365	6.58
Electricity	100	= (100 x 12) / 365	3.29
Water	100	= (100 x 12) / 365	3.29
TOTAL	**400**	**= (100 x 12) / 365**	**13.15**

Total Cost for producing 100 meals of food per day (€/day) (daily cost of ingredients, labour and utilities)	**= 203 + 325 + 13.15**	**541.15**

Food Waste mapping results	Weight (kg/day)
Spoilage	1.0
Preparation waste	2.3
Overproduction	1.3
Plate scrapings	3.0
TOTAL	**7.6**

Based on the results above, the true cost of food waste per day for this example is:

Food Waste Type	Cost (€)		Cost per meal (€)
Spoilage	= 1.0 x 2.80	2.80	0.03
Preparation waste	= 2.3 x 2.80	6.44	0.06
Overproduction	= 1.3 x 2.80	3.64	0.04
Plate scrapings	= 3.0 x 2.80	8.40	0.08
TOTAL	**= 7.6 x 2.80**	**21.28**	**0.21**

Meal Cost i.e. daily cost divided by 100 meals	Cost (€)
Raw ingredients	2.03
Labour	3.25
Gas	0.07
Electricity	0.03
Water	0.03
TOTAL	**5.41**

% of meal cost that is wasted	**=(0.21/5.41)x100**	**3.9%**

Move forward to Step 4 for guidance on identifying and assessing opportunities, and developing a prioritized action plan.

Step 4: Identifying & prioritising opportunities

As a result of your waste mapping activities you should now know:

- which areas produce the most waste;
- the types of waste most commonly produced;
- what factors / activities are contributing to waste in each area; and
- the cost of waste, including purchasing costs, operational costs.

You can now begin to identify and prioritise actions that can be taken to reduce waste, to realise financial savings and environmental benefits.

How to identify opportunities to reduce waste

- Consider the sources of waste and purchase costs then decide your priorities. These may be those with the highest purchase cost or largest amount of waste depending on your objectives.[2]
- Consider opportunities that can result in savings at little or no investment cost
- Consider opportunities that have the greatest savings in relation to cost of implementation.
- Obtain suggestions and ideas from staff.
- Remember to consider the practical aspects with any potential change, e.g. will it be easy to implement, will it have a potential negative impact on other aspects of the hotel such as increased staff time?
- Remember to consider the waste hierarchy: the best way to prevent waste and realise financial savings is to reduce resource use – follow the money!
-

Simple recommendations to reduce food waste include the following.

- review the menu planning process to ensure that the data provided to the chef is accurate;
- display food in smaller trays enabling additional items to be stored appropriately in the kitchen, thereby extending the shelf-life of the product, and enabling unused food to be chilled for use the following day/ meal; and
- consider providing smaller plates and serving spoons for guests as research has identified that this can cut food waste by 20% (see case study 3 and 4).

Composting food waste such as vegetable peelings and other food preparation waste is environmentally better and can be cheaper than disposing of waste to landfill. Composting food waste on site also has the benefit of producing a composting product that you can use in the hotel gardens as a plant fertiliser.

[2] Note that in the future the costs for waste disposal may no longer be a fixed fee, but based on the quantity of waste generated. If this is the case waste management costs should also be a factor in identifying opportunities.

Other options to reduce food waste include donating unused, over produced (surplus) food to charities. Local charities, soup kitchens or other organisations often accept food donations to provide for those in need of help and support. Showing your support for the local community will further help to ensure a sustainable future for tourism.

Case study 4: Reducing plate waste

Reducing food waste saves money on the purchasing of raw ingredients, and in time energy / staff resources involved in food preparation and service.

Reducing food waste can also reduce greenhouse gas emissions. The Centre for International Climate and Environmental Research in Norway found that by reducing plate size, and providing posters to invite guests to return to the buffet as many times as they wish until they are full, instead of filling their plate during a single visit to the buffet reduced food waste in hotel restaurants by approximately 20%. [3]

In partnership with the Sustainable Restaurant Association, Unilever Food Solutions has developed a Wise up on Waste Toolkit[4]. The toolkit provides templates and guidance that can be downloaded to help you plan menus whilst tracking costs. An example of a monitoring tool that can be used is provided in Figure 14.

Additionally, the toolkit provides posters that can be used in kitchens to increase staff awareness of issues and provide visual prompts to aid behaviour change. These posters are in English, but they can provide ideas for developing your own local posters.

Figure 14: Mise en Place Planning Form

your KITCHEN

Mise en Place Planning Form

Unilever Food Solutions
Inspiration every day

Use the list to plan your production
Note all the preparation items you need to create your menu - check your stock levels and note down how much you need to prepare to meet demand
The current items are listed as a template - fill in your own items

Notes

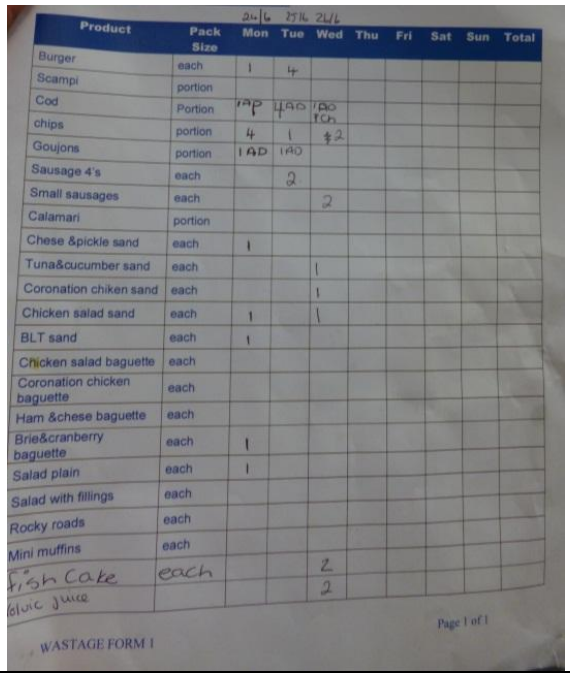
	Stock	Production		Stock	Production		Stock	Production
Clean onions			Pepper sauce			Ham slices		
Slice onions			Hollandaise sauce			Diced ham		
Chopped onions			Chocolate sauce			Ham burgers		
Onion rings			Fruit coulis			Chicken skewers		
Chopped parsley			Demi-glace			Diced bacon		
Parsley garnish			Bread sauce			Cod filets		
Chopped chive			Chasseur sauce			Diced haddock		
Chive garnish			Mushroom sauce			Lamb cutlets		

Suggested opportunities to reduce waste and reduce cost in other areas of your hotel are presented in Table 7.

Table 7: Quick win opportunities for your hotel

Hotel area	Example 'quick win' opportunities	Benefits of taking action

[3] http://www.ciwm.co.uk/CIWM/Publications/LatestNews/GovNudgeUnitUrgesHoteliersToReduceFoodPortionSize.aspx
[4] http://www.unileverfoodsolutions.ie/our-services/your-kitchen/wise-waste-business/waste_toolkit

Hotel area	Example 'quick win' opportunities	Benefits of taking action
Food & beverage	• Use re-usable plastic glasses for drinks in beachside bars. • Give customers the option of refillable glasses • Ask whether the customer actually wants accompaniments for meals, e.g. bread, salad garnish, vegetables rather than simply serving them automatically. • Remove individual portions and sachets of condiments and replace with dispensers, pourers and shakers.  • Monitor stock control and overproduction of waste regularly, for example at the end of each sitting the number of portions remaining can be recorded.  WASTAGE FORM 1	• Reduce breakage of glass, reduce replacement costs • Savings on washing energy and water. • Reuse of washable / refillable items is preferable to buying new or single use items, and has greater carbon benefits. • Reducing food waste has financial benefits as outlined above. • Removing individual portions and sachets can often save money as well as reducing waste. • Data on the number of portions remaining can be fed into future menu planning and identify those meals that do not sell as frequently as others. • Providing receipts on request only reduces your consumption of receipt rolls, and therefore reduces purchasing cost.

Hotel area	Example 'quick win' opportunities	Benefits of taking action
	• Use unlaminated paper for menus – so that this can be recycled. • Use carafes of water on tables instead of bottled water. • Provide receipts to customers on request	
Housekeeping:	• Remove individual toiletries and switch to bulk system.   • Re-use of towels and bed linen.  • For longer term guests, can bed linen be changed less frequently? • Remove plastic bin liners from bins in guest bedrooms, and provide in bathroom bins only. • Use old sheets or baskets to move laundry around the hotel • Use old linens as cleaning cloths rather than purchase new.	• Removing individual portions and sachets can often save money as well as reducing waste. • Reduce energy and water use from washing less. • Staff and guests encouraged to change behaviours. • Removal of plastic bin liners from some bins reduces their use and therefore purchasing costs. • Using old sheets to move linen to the laundry means that plastic bags are not purchased for this use. • Reusing linen as cleaning cloths will reduce expenditure on new cleaning cloths, and reduce waste.
Reception/ administrative functions	• Reduce paper consumption for hotel invoices/ receipts by only providing receipts to customers on request. • Recycle as much paper waste as you can. • Consider switching to smaller receipts for guests by using A5 size paper instead of A4, or send customers electronic receipts and invoices. • Print double sided where possible. • Reuse partially used paper pads and pens /	• Reducing paper use and therefore cutting purchasing costs.

Hotel area	Example 'quick win' opportunities	Benefits of taking action
	pencils removed from guest rooms or conference facilities.	
Gardening & maintenance	• On-site composting of garden waste and kitchen scraps • Purchase chemicals in bulk, use concentrates. • Use energy efficient, longer lasting light bulbs and rechargeable batteries.	• Offset the purchase of compost/ fertilizer • Reduce single use containers. • Reduce electricity consumption and reduce waste.

In the UK – the Waste and Resource Action Programme (WRAP) has developed an interactive tool called Green Town to help businesses become more resource efficient and save money. The virtual hotel and restaurant in Green Town features different rooms that you can 'go into', and look at opportunities for improvements by clicking on 'hotspots'. The tool can be accessed at:
http://greentown.wrap.org.uk/

Deciding which opportunity to action first can be a challenge!

The first step is to consider the outline costs of the opportunity compared to the current process as well as its impact on the environment, staff, guest experience and the ease of implementation. For example, single use toiletries are provided for guest accommodation at the all-inclusive hotel in Cyprus, therefore there is an opportunity for toiletries to be provided in bulk. Two alternative approaches were considered:

- the use of a fixed dispenser systems with refill system; and
- the use of refillable bottles which would be manually refilled by staff.

Assessing the opportunity (see Appendix 6), established that the use of refillable bottles was cheaper than the current system, would be easy to implement, generate less waste but is likely to result in more staff time being spent in guest accommodation. Note, that this assessment is not a robust assessment of these approaches in all situations, as prices vary significantly between manufacturers.

Assessing each opportunity in this way, will enable you to prioritise the opportunities for implementation. A template for completing this assessment is provided in Appendix 7. Once, you have assessed and prioritised the opportunities, you can complete an action plan (template provided in Appendix 8) summarizing the action to be taken and staff responsible. An example completed action plan is provided below in Figure 15.

Figure 15: Example Completed Action Plan

Opportunity reference	Description	Timescale for implementation	Responsibility
1	Implement bulk toiletries system in guest accommodation: • Further investigate prices and systems from suppliers	1 month	Housekeeping manager

	• Agree preferred approach • Purchase system • Provide training to staff • Roll out new approach	3 months 4 months 6 months 7 months	Hotel manager Hotel manager Housekeeping manager Housekeeping manager
2	Introduce food waste monitoring scheme into kitchens and restaurants: • Discuss monitoring scheme and approach with key kitchen and restaurant staff • Develop recording sheets • Provide training to staff • Roll out monitoring process • Monitor usage.	 1 month 1 month 2 months 2 months 3 months	 Food and beverage manager Food and beverage manager Food and beverage manager Food and beverage manager Food and beverage manager

Next steps

This section provides guidance on actions to take once you have completed the waste mapping exercise.

Repeat the waste mapping process at regular intervals at least once per season. If significant changes are implemented in a particular area it would be beneficial to repeat the mapping process for that area so that you can monitor and evaluate the changes (% waste reduced and % reduction in costs). Repeating the process regularly will enable you to monitor progress, track trends in consumption and disposal and also to demonstrate continuous improvement, i.e. that your organisation is continually working to become more sustainable.

Behaviour change

This guide has provided practical tips and interventions to help you to understand your waste arisings and to divert waste from disposal to increase recycling, reuse and waste prevention. An important part of implementing these changes is to ensure that alongside the physical interventions provided such as introducing recycling bins there is also communications support so that staff and customers understand what they need to do and why they should do it. Behaviour change is crucial to long-term resource efficiency – making resource efficient actions become a habit. There are a number of different things to consider for your staff and customers when implementing any resource efficient practices:

Training

Staff need to understand what they are required to do and why it's important for them to implement the required changes. Consider what you're hoping to implement and who it will affect. For example, will chefs be required to monitor food wastage, will cleaners be required to empty additional recycling bins?

Tailor your training to the audience – perhaps cleaners will require on the job training whereas a hotel manager may need a more in depth training programme which focuses on cost savings and procedures. Repeat the training at regular intervals and ensure that staff members understand who they can speak to for more information and where any new procedures are documented.

Communications

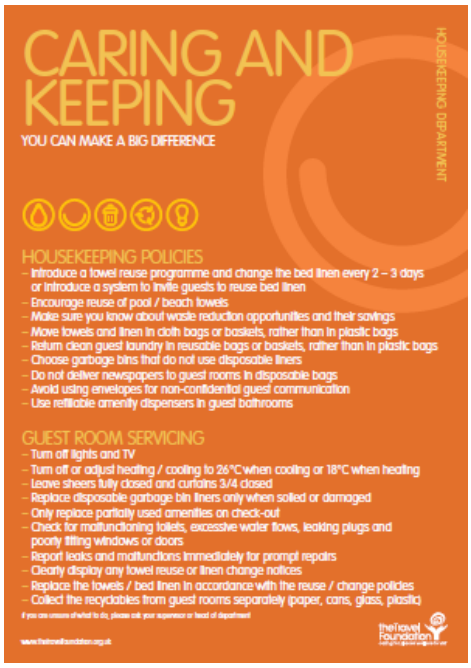
It's worth developing a communications plan so that you can understand who your stakeholders are and how you'd like to engage with them.

Senior management commitment to change is essential. Other target groups will include managers and hotel staff, customers, suppliers and contractors.

Ensure that the changes that your organisation would like to implement are fully documented and are publicised at team meetings, through posters and written material at staff training or review sessions. Posters should be easy to understand, engaging and appropriate for the area and each target group. Many organisations, including the Travel Foundation provide examples of posters that can be tailored to your needs

and displayed around hotels. Examples shown in Figure 16 include a poster that is part of the Unilever Wise up to waste toolkit[5] and is appropriate for use in kitchen areas.

Figure 16: Examples of posters that can be used in the kitchen / food and beverage areas, housekeeping and maintenance departments



[5] http://www.unileverfoodsolutions.ie/our-services/your-kitchen/wise-waste-business/waste_toolkit

Green teams

Change of any kind can often be a challenging process. Recruiting a 'green team' of champions from existing staff members will help to ease the transition by providing support advice and importantly enthusiasm.

Pick members of your staff that are passionate about environmental issues to be members of your green team. Senior managers that can be seen to lead by example and staff members that are committed to change will be keen to support other staff.

Ideally a team will have representatives of each hotel department / area as well as senior managers. Training will be provided so that the green team understands what the hotel is trying to achieve and how they will be undertaking the changes required. The team members will then be able to share this information with other staff members.

The green team should meet regularly (at least once per month) to discuss progress and identify any potential opportunities or areas that require additional attention.

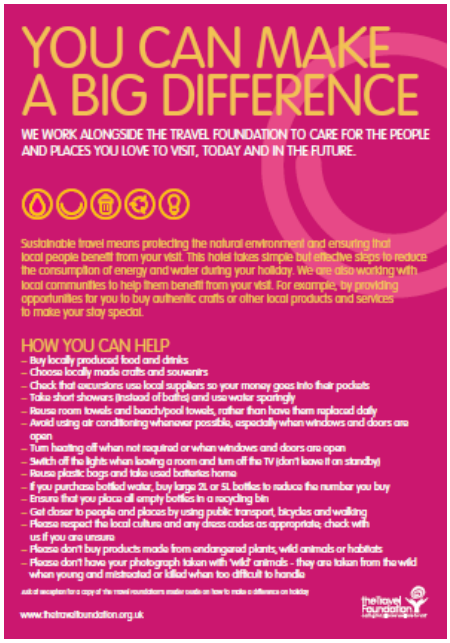
Supply chain engagement

Don't forget to work with your suppliers – the organisations that provide you with goods and services such as your food suppliers. Speak with them to explain what changes you're trying to implement and ask them how they could potentially help. Very often they will be able to offer returnable packaging solutions for deliveries, or use of more easily reusable/recyclable packaging. There may be additional benefits if you can work together to solve a problem.

Communicating with external stakeholders

Tell your guests about your plans and how they can help you reduce costs and waste. Why not let them know at check in about the recycling facilities within the hotel? You could also add details about your environmental activities to the hotels guest information packages and let the local tourist information board and tour operators know about your green agenda. Figure 17 promotes the benefits of sustainable tourism to guests, and how to make a difference when on holiday.

Figure 17: Travel Foundation sustainable travel poster



Again, make sure that any posters displayed are clear and easy to understand. Try and use images instead of words so that any guest can understand the meaning. The Mobius loop (Figure 18) is an internationally recognized symbol for recycling and can be used on any communications material.

Figure 18: Mobius Loop

Providing feedback – promoting your achievements

Don't forget to let everyone know how you're doing and what your current environmental performance is. Tell them how much waste has been prevented and recycled, let your staff know how their hard work has allowed the hotel to save money and help protect the environment. If you're doing really well you might want to consider entering an award scheme.

Sharing best practice with your neighbours is a great way to learn. Why not invite local hotel managers to your hotel – show off your achievements!

Make sure that you're also giving regular feedback to those travel agents that promote your hotel. As discussed earlier a reputation for being green can help a hotel to generate additional business.

Environmental management system
Implementing the criteria for an environment management system (EMS) and obtaining certification to ISO14001 or Travelife, will help you to progress to continual improvement and provides an external verification of your performance. Further guidance on developing and implementing and EMS is available from:
http://www.wrap.org.uk/content/your-guide-environmental-management-systems-ems

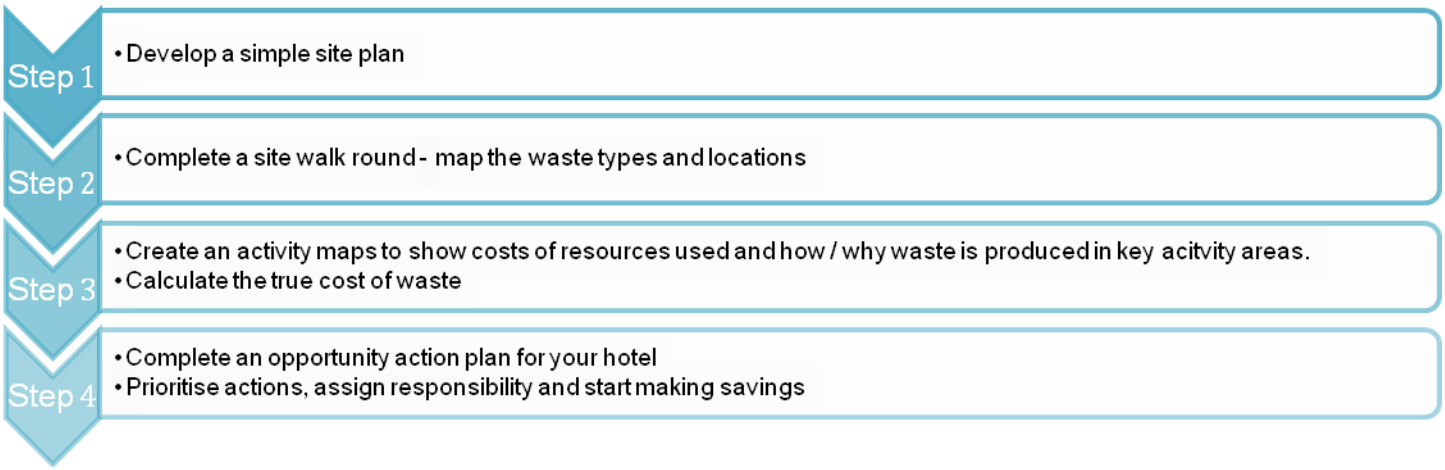
By adding SMART (Specific, Measurable, Attainable, Relevant, Timely) targets to your action plan and part of your EMS, and incorporating waste minimisation as part of a wider environmental action plan, will ensure that the overall efficiency and competitiveness of operation is maintained.

Summary

Waste mapping enables you to identify the sources, types and quantities of waste you produce. The mapping approach outlined in this document allows you to investigate where and how waste arises, and present this visually in a way that can help to identify hidden costs of waste (e.g. purchasing costs, staff time).

Following the four step waste mapping process as shown in Figure 19 helps you to prioritise areas for action and identify opportunities to implement low or no-cost measures to prevent and reduce waste and reduce business costs.

Figure 19: Steps to complete a waste map



For more information on sustainable tourism visit the Travel Foundation website: www.thetravelfoundation.org.uk

Appendices

Appendix 1: Bin sizes

Appendix 2: Waste composition analysis

Appendix 3: Checklists for each area

Appendix 4: Food waste mapping template

Appendix 5: Prioritised action plan template

Appendix 1 – Bin sizes

Common bin sizes used are shown in Table 8 below along with the number of garbage bags they typically hold. Examples of typical bins and containers are shown in Figure 20.

Table 8: Common bin sizes and bag capacity

Container Type and size	Average number garbage bags stored
Garbage bag (typically 60-80 litres)	-
120 litre wheeled bin	2-3 garbage bags
240 litre wheeled bin	3-4 garbage bags
360 litre wheeled bin	4-5 garbage bags
660 litre wheeled bin	10-13 garbage bags
1100 litre wheeled bin	18-22 garbage bags
1280 litre wheeled bin	20-25 garbage bags

Figure 20: Typical bins and containers

1280 litre wheeled bins

1100 litre wheeled bin

Garbage compactor – 11.5m^3
Typical compaction ratio – 3:1
Actual volume of waste stored – 34.5m^3

240 litre wheeled bin

Top Tip

Sometimes waste containers will state the volume on them – for example compactors will typically have an identification plate which states its volume and compaction ratio.

Appendix 2 – Waste composition analysis

Most waste is disposed of by volume rather than weight. If you do not know the weight of your waste, or are unable to access equipment to weigh bags in bins, you will need to use a volume to weight conversion to estimate the weight of waste. This is done in 2 stages.

Stage 1: convert all volumes of bins into the same 'unit of measure' – usually cubic metres or m^3
Stage 2: use the conversion factors for each type of waste / recycling / garbage to calculate a weight in tonnes from the volume.

Example 1: What is the weight (in tonnes) of the contents of a full 1280 litre wheeled bin containing paper?

- Divide 1280 litres by 1000 to calculate the volume of the bin in cubic metres = 1.28m^3
- 1.28m^3 multiplied by conversion factor for paper 0.21 (Table 9) = 0.269 tonnes or 269kg.

Example 2: What is the weight (in tonnes) of the contents of a 35 yd^3 container containing concrete?

- Multiply 35 cubic yards by 0.7646 (from Table 10) = 26.761 cubic metres
- 26.761 x conversion factor for concrete 1.27 = 33.986 tonnes

If you have more than one container multiply tonnage of container by quantity of containers.

Table 9: Unit of measure conversion factors

1 tonne	1000 kilograms	1 cubic yard	0.7646 cubic metres
1 kilogram	1000 grams	1 gallon	4.536 litres
1 cubic metres (m^3)	1000 litres	1 kilogram	2.2 pounds
1 litre	1000 millilitres	16 ounces	1 pound

Table 10: Volume to weight conversion factors

Material type	Conversion factor (m3 to tonnes)	Material type	Conversion factor
Garbage	0.21	Edible oil and fat	0.61
Paper and cardboard	0.21	Wooden packaging	0.23
Plastic bottles	0.05	Textiles	0.27
Plastic film	0.01	Concrete	1.27
Tins and cans	0.06	Bricks	1.20
Biodegradable kitchen and canteen waste	0.20	Tiles and ceramics	0.59
Electrical equipment	0.21	Mixture of concrete, bricks, tiles and ceramics	1.24

Garden waste / Green waste	0.28	Wood	0.34
Glass	0.61	Furniture and bulky items	0.18

Appendix 3 – Activity Area Checklists

This contains checklists for use in each core hotel area, to identify in greater detail the type and quantity of each waste stream generated and the true costs associated with that waste.

Checklists are provided for:

- Housekeeping to include guest room servicing and laundry
- Engineering/ facilities management
- Reception and administrative functions
- Food and beverage

Initially, you may not have all the data to fully complete the checklists, but populate them with as much data as you have available, as this will provide you with further information and help you identify opportunities for improvement.

Supporting information is likely to be required to complete the checklists, for example the waste composition analysis guidance.

The key piece of equipment needed to complete the checklist is a weighing scale, such as a simple luggage scale.

Housekeeping

This checklist will help you identify type and quantity of waste produced from housekeeping activities, and identify opportunities to prevent and reduce waste.

Auditor Name:		**Date of Audit:**	
Hotel Name:		**Number of room nights / occupancy at time of audit**	
No. guest rooms:			
INPUTS i.e. Resource use			

• Do you have a laundry on-site?
• Do you service guest linen from rooms, as well as linens from food and beverage areas?
• Are towels changed daily?
• Are guests provided with an option of keeping their towels for longer if they wish?
• Are all towels from all rooms laundered daily?
• What are the costs associated with laundering of towels (per month/year – delete as appropriate)
  ○ Estimate the proportion (%) of towels in total laundry operation in comparison to room occupancy?
  ○ How much electricity is used for the laundry (if known) over this period? How much does this cost?
  ○ How much water is used in the laundry (if known) over this period? How much does this cost?
  ○ What are the labour costs for the laundry over this period?
  ○ What is the cost of detergent over this period?
• If towels are changed daily, the average number of towel changes per day is equivalent to the occupancy rate multiplied by the number of guest rooms
			Y/N
			Y/N
			Y/N
			Y/N
			Y/N

• Are complimentary toiletries provided? • If so, are these individual bottles?		Y/N Y/N	

Record the types of toiletries (e.g. soap bags, shower gel) provided below, and obtain data on their consumption and costs. If you do not have this information contact your accounts department who may be able to provide this information, based on purchase/ invoicing history. Use the number of room occupancy nights recorded at the start of this checklist, to standardise the total volume and costs to enable comparisons with other periods and potentially with other hotels.

Type of toiletries	Volume/ weight (note units below, e.g. 1 litre bottle)	No. units used per month/ year (delete as appropriate)	Total volume/ weight used per month	Total volume/ weight per room night	Purchase cost for month (delete as appropriate)	Cost per room night

• Are any cleaning products purchased in bulk / concentrated? List each product and identify whether it is purchased in bulk/ concentrate form Could additional cleaning products be purchased in bulk / concentrated?	Y/N
• Are single use plastic sacks used to collect laundry from guest accommodation by housekeeping staff during room services/ changeovers? • Are single use plastic sacks used for the guest personal laundry service?	Y/N Y/N

If single use plastic sacks are used for guest laundry, record details below. Where possible split the costs for single use plastic sacks, and the sacks provided for guest use. If you do not have this information contact your accounts department who may be able to provide this information, based on purchase/ invoicing history. Using the number of room nights recorded at the start of this checklist, to standardize the total volume and costs to enable comparisons with other periods and potentially with other hotels.

No. units plastic sacks used per month/ year (delete as appropriate)	Unit size	Purchase cost per unit	Total purchase cost	Total units per room night	Cost per room night

Insert details of other inputs identified:

OUTPUTS i.e. Waste Generation		
What waste streams are collected in guest accommodation? (Circle as appropriate)	Garbage Dry Recycling Other (list)	Y/N Y/N

Consider waste generation from guest accommodation during daily clean and change-over separately. Ask your housekeeping staff to segregate each waste stream collected from guest accommodation waste from both types of service for at least one floor of the hotel for a period of one day. Different coloured sacks could be used to help keep waste separate, or you could label sacks or use plastic tie tags. Then record the weight of each type of waste generated, along with the number of rooms cleaned and serviced at the time of the audit in the table below. You may wish to repeat this over a number of days to obtain more detailed information.

Service type	Waste type	Number of rooms cleaned at time of audit	Weight of waste (kg)	Waste arisings - kg/room/day	Total waste arisings – kg/room/day
Daily clean	Residual				
	Dry Recycling				
	Other: ……				
Change over	Residual				
	Dry Recycling				
	Other: ……				

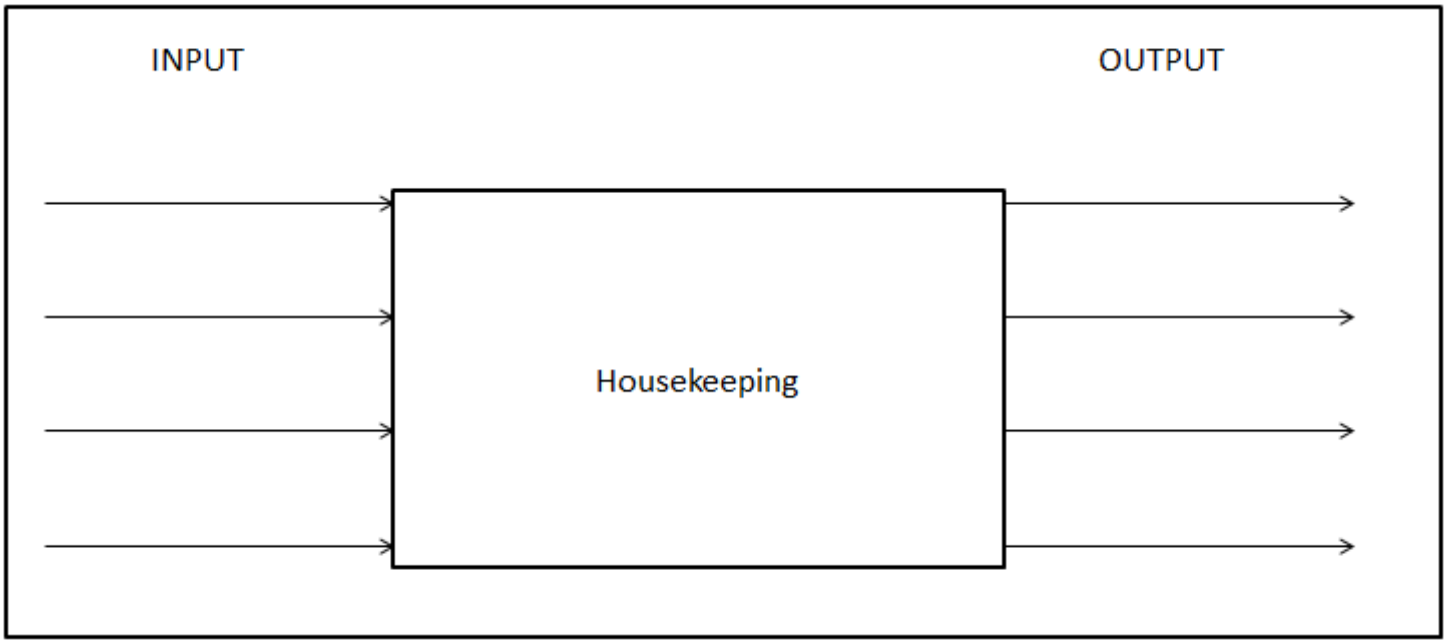
Take a sample from each stream from both service types and undertake a composition analysis – guidance for completing this is provided in Appendix 2.

Insert details of other outputs identified:

OTHER	
Staff training	
• Are housekeeping staff provided with any environmental training?	Y/N
Guest information	
• Are guests provided any environmental information in their	Y/N

guidance packs? • If so, does this contain any information on waste and recycling?	Y/N

SUMMARY



KEY OPPORTUNITIES IDENTIFIED:

E.g.

- *Increase towel re-use*
- *Increase bulk purchase of toiletries / cleaning products*

Engineering/ Maintenance/ Facilities Management

This checklist will help you identify type and quantity of waste produced from engineering / maintenance / facilities management activities, and identify opportunities to prevent and reduce waste.

Auditor Name:		**Date of Audit:**	
Hotel Name:		**Number of room nights / occupancy at time of audit**	
No. guest rooms:			
INPUTS i.e. resource use			
Gardening			
• Are any single use bags purchased by the hotel to transport garden waste? • If single use bags are used, how many are used and what are the purchase costs for the bags per year? • Is fertilizer/ compost purchased for use in the gardens? • If so, what quantity is purchased and what is the purchase cost?			Y/N Bags / week Y/N
Construction			
• Where contractors are used for building works/repairs, are they responsible for disposing of their own waste?			Y/N
Insert details of other inputs identified:			
OUTPUTS i.e. waste generation			
Gardening			

• Is grass cutting/ gardening done by hotel employees?
• If the grass cutting/ gardening is done by staff:
  ○ How often is the grass cut?
  ○ What are the labour costs for gardening only?
  ○ If the grass cutting / gardening is not done by hotel staff, is the waste taken away?
• Identify the disposal method for this stream (delete as appropriate)
			Y/N
			/ week
			Garbage, composting

• How much garden waste is generated each week – this can be estimated based on the number of bags used/ lawnmower boxes filled multiplied by their volume. – *use the guidance provided to convert volume of waste to weight*	

Construction waste	
• Identify the disposal method for this stream (delete as appropriate) • How much construction waste is generated for disposal by the hotel each month? *Estimate the volume of waste based on discussion with staff, or as this is likely to be an irregular waste-stream better data may be obtained by asking staff to keep this stream separate over a period of time.* • Using the appropriate conversion factor provided in Appendix 2 estimate the weight of construction waste generated.	Garbage, dedicated construction waste skip
Hazardous waste	

• Are hazardous items generated for disposal:
  ○ Light fittings e.g. fluorescent tubes / CFLs (Compact Fluorescent Lamp)
  ○ Chemicals
  ○ Paint tins
• Are hazardous items generated for disposal in guest accommodation e.g. medical syringes? *If this is the case, consider providing guidance for guests on appropriate disposal for these items.*
• Identify the disposal method for this stream (delete as appropriate)
 	
• Is the type and quantity of hazardous waste generated recorded?
• If so, record the quantity.
	
	Y/N
	
	Y/N
	Y/N
	
	Garbage, specialist disposal
	Y/N

Electrical items	
• Are waste electrical items returned to the supplier that replaces the items? • If not, identify the disposal method for this stream (delete as appropriate) • How much electrical waste is generated for disposal by the hotel? Estimate the number and type of items based on discussion with staff, or as this is likely to be an irregular waste-stream better data may be obtained by asking staff to record this stream over a period of time. *The WEEE directive implemented by the European Union, places a responsibility on producers, retailers and importers of electrical items that they implement systems for its recycling.*	Y/N Garbage, dedicated electrical waste skip/ donated to charity Garbage, dedicated construction waste skip
Public facing bins for guests	

• Are bins provided for guests / other public use?
• What type of bins are provided:
  ○ Garbage?
  ○ Dry recycling?
	Y/N
	
	Y/N
	Y/N

○ Other (list)?	

Record information on public facing bins in the table below. You may wish to repeat this over a number of days to obtain more detailed information

Waste stream	Bin Volume (V)	Number of bins (N)	Number of times bin emptied each day (F)	Record the weight of a minimum three bags (kg)			Waste generated per day (=NxFx((B1+B2+B3)/3)
				B1	B2	B3	

Take a sample from each stream from both service types and undertake a composition analysis – guidance for completing this is provided in Appendix 2.

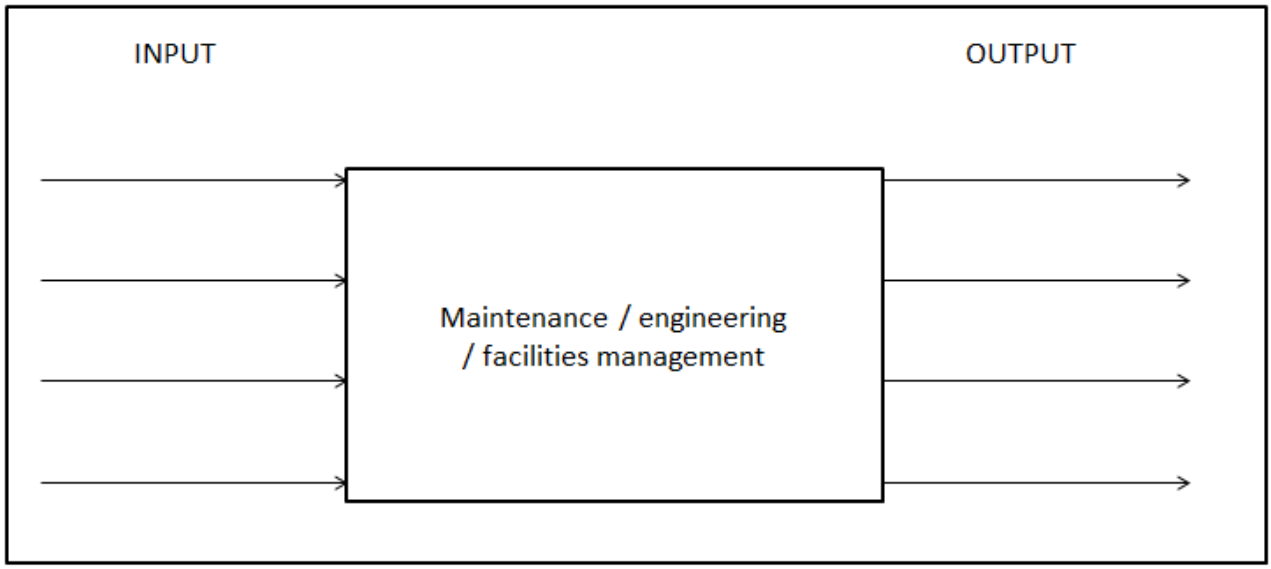
Insert details of other outputs identified:

OTHER

Staff training

• Are staff provided with any environmental training? • If so, record type of training provided *E.g. Awareness of recycling and hazardous waste bins and their correct use?*	Y/N

SUMMARY



KEY OPPORTUNITIES IDENTIFIED:

E.g.

- *On-site composting of garden waste*
- *Implement segregation of WEEE for separate disposal*

Reception/ Administrative Functions

This checklist will help you identify type and quantity of waste produced from reception areas / other administrative activities, and identify opportunities to prevent and reduce waste.

Auditor Name:		**Date of Audit:**	
Hotel Name:		**Number of room nights / occupancy at time of audit**	
No. guest rooms:			

INPUTS

Purchasing

• How many reams of paper (packets of 500 sheets) are purchased per year? • Record the weight – the weight of a ream should be stated on the packaging • Calculate the weight of paper purchased per year divided by the number of room nights • What is the purchase cost? • Calculate the cost of paper purchased per year divided by the number of room nights / occupancy at the time of the audit.	

Insert details of other inputs identified:

OUTPUTS

Waste bins

Record information for each type of waste bin (garbage, paper etc.) in the table below. You may wish to repeat this over a number of days to obtain more detailed information

Waste stream	Bin Volume (V)	Number of bins (N)	Number of times bin emptied each day (F)	Record the weight of a minimum three bags (kg)			Waste generated per day (=NxFx((B1+B2+B3)/3)
				B1	B2	B3	

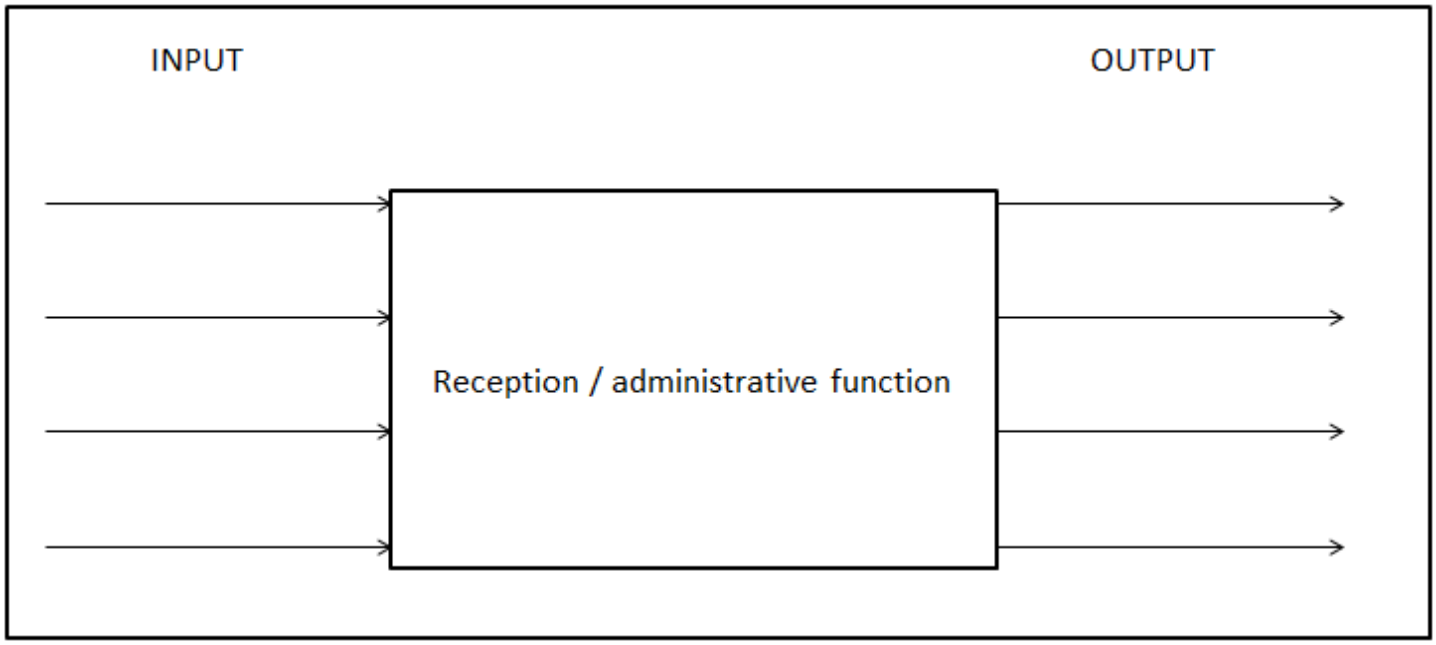
Take a sample from each stream from both service types and undertake a composition analysis – guidance for completing this is provided in Appendix 2.

Paper Usage

• Is double sided printing used where possible?	Y/N
• Does the hotel operate a paperless system for internal documentation?	Y/N

Printer cartridges	
• Are printer cartridges returned to the supplier for recycling? • If not, state the disposal method for this stream	Y/N
Waste electronics – computers, phones etc.	
• Are items returned to the suppliers of new items? • If not, identify the disposal method for this stream (delete as appropriate) • Is the type and quantity of electrical waste generated recorded? • If so, record the quantity.	Y/N Garbage, specialist disposal, re-use Y/N
Insert details of other outputs identified:	
OTHER	
Staff training	
• Are staff provided with any environmental training? • If so, record type of training provided *E.g. how to use printer to print double sided* *Awareness and correct use of recycling bins* *Communication and awareness raising with guests*	Y/N

SUMMARY



KEY OPPORTUNITIES IDENTIFIED: *E.g.* • *Reduce paper consumption* • *Only provide receipts to customers on request, or use electronic invoicing* • *Recycle paper waste*

Leisure/ conference/ pool areas

This checklist will help you identify type and quantity of waste produced from leisure, conference and pool area, and identify opportunities to prevent and reduce waste.

Auditor Name:		**Date of Audit:**	
Hotel Name:		**Number of room nights / occupancy at time of audit**	
No. guest rooms:			

INPUTS i.e. resource use	
• How frequently is a stock check undertaken? • Is this recorded? • Is stock rotated on receipt of each delivery (this may be important for chemical agents such as pool cleaning products for example)? • Are items purchased in bulk (if appropriate) • Are disposable items purchased for use? e.g. disposable napkins, straws etc.	Y/N Y/N Y/N

List items, quantity purchased and costs in the table below. This information should be available from your accounts department from your purchase/ invoicing history. Using the number of covers recorded at the start of this checklist, to standardise the total volume and costs to enable comparisons with other periods and potentially with other hotels.

Type	Unit size (weight)	No. Units used per month/ year (delete as appropriate)	Total weight used	Total weight used per cover	Purchase cost for month/ year (delete as appropriate)

Insert details of other inputs identified:

OUTPUTS i.e. Waste Generation

Record information on each waste stream generated in the table below. You may wish to repeat this over a number of days to obtain more detailed information

Waste stream	Bin Volume (V)	Number of bins (N)	Number of times bin emptied each day (F)	Record the weight of a minimum three bags (kg)			Waste generated per day (=NxFx((B1+B2+B3)/3)
				B1	B2	B3	

Take a sample from each stream from both service types and undertake a composition analysis – guidance for completing this is provided in Appendix 2.

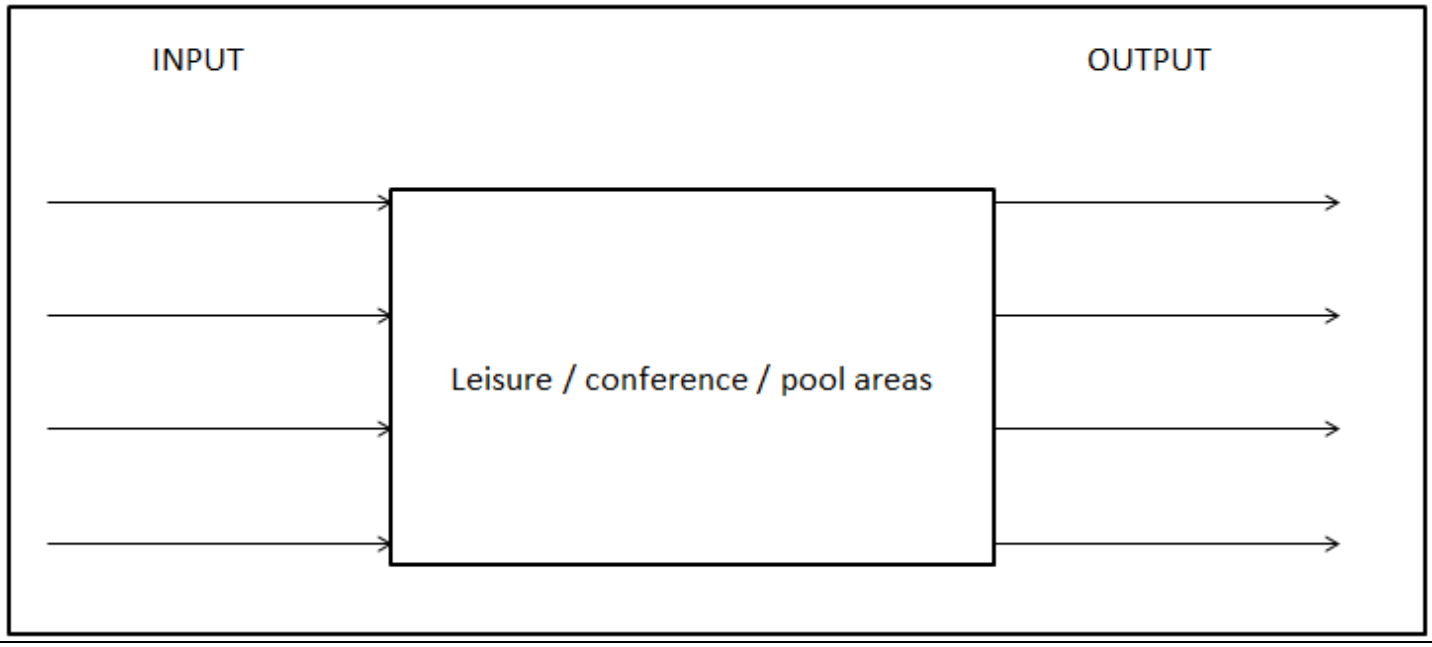
Insert details of other outputs identified:

OTHER

Staff training

• Are staff provided with any environmental training? E.g. Correct use and disposal of chemicals	Y/N

SUMMARY



KEY OPPORTUNITIES IDENTIFIED:

E.g.

- *Reduce paper consumption*
- *Request guests to refill bottles with water rather than use plastic cups*

Food and Beverage

This checklist will help you identify type and quantity of waste produced from food and beverage areas, and identify opportunities to prevent and reduce waste

Auditor Name:		**Date of Audit:**	
Hotel Name:			
Complete a separate checklist for each food and beverage area			
Food & beverage area:		**Description of service:**	
No. covers served during audit period:		**Hours of operation:**	
INPUTS i.e. resource use			
• How frequently is a stock check undertaken? • Is this recorded? • Is stock rotated on receipt of each delivery? • Are items purchased in bulk (if appropriate)			 Y/N Y/N

How frequently are deliveries received from each supplier?
List key suppliers below and the delivery frequency. In addition, record whether any returnable packaging is used by the supplier.

Supplier	No. deliveries per week	Average spend with supplier	Returnable packaging used

- What quantity of food is purchased (if known)? *(you may wish to list number and type of items purchased)*

Product	Unit size (weight)	No. Units used per month/ year (delete as appropriate)	Total weight used	Purchase cost per unit	Purchase cost for month/ year (delete as appropriate)	Cost per cover

Are disposable items purchased for use? E.g. disposable napkins, plastic cups, straws
List items, quantity purchased and costs in the table below. This information should be available from your accounts department's purchase/ invoicing records.

Use the number of covers recorded at the start of this checklist, to standardise the total volume and costs. This will enable you to make comparisons with other audit periods and potentially with other hotels.

Type of disposable item purchased	Unit size or purchase e.g. 1 box, 250 cups per box, or weight	No. units used per month/ year (delete as appropriate)	Total weight used	Total weight used per cover	Purchase cost for month/ year (delete as appropriate)	Cost per cover

Insert details of other inputs identified:

OUTPUTS i.e. Waste Generation

Record information on each waste stream generated in the table below. You may wish to repeat this over a number of days to obtain more detailed information

Waste stream	Bin Volume (V)	Number of bins (N)	Number of times bin emptied each day (F)	Record the weight of a minimum three bags (kg)			Waste generated per day (=NxFx((B1+B2+B3)/3)
				B1	B2	B3	

Take a sample from each stream from both service types and undertake a composition analysis – guidance for completing this is provided in Appendix 2. However, for areas producing and serving food it would be beneficial to conduct a food waste mapping exercise, a template for completing this is provided in Appendix 4.

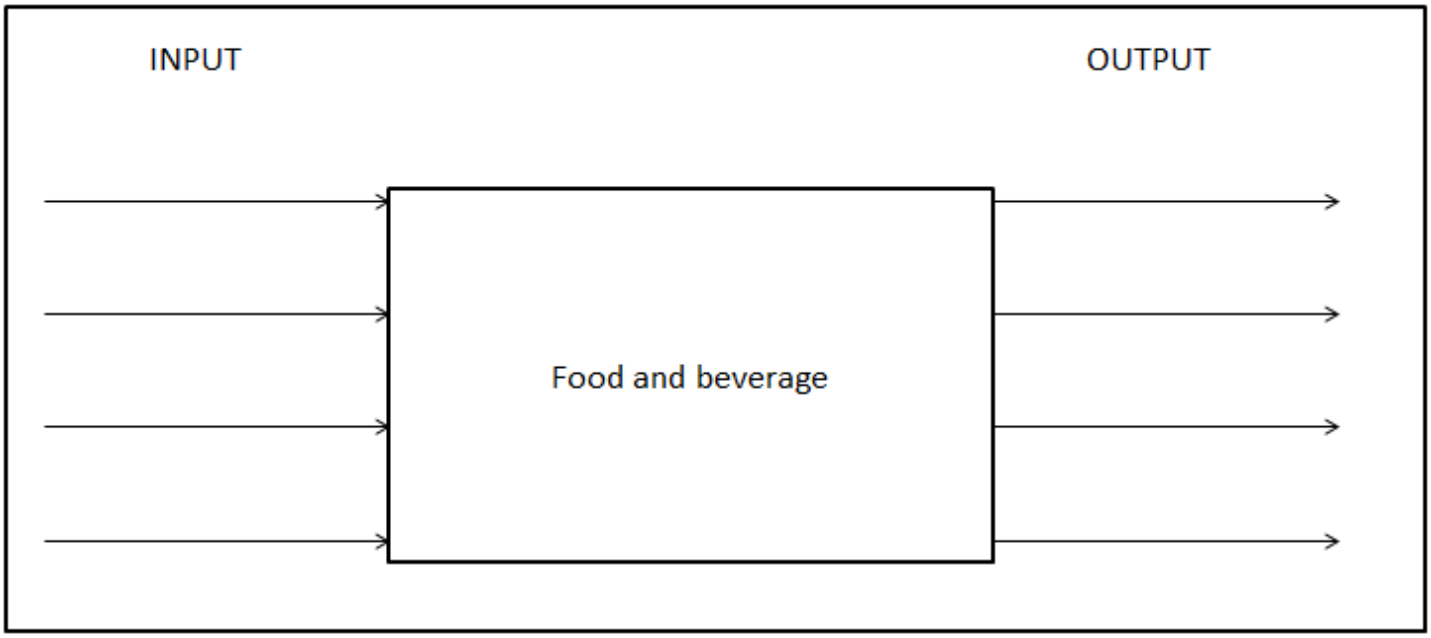
Insert details of other outputs identified:

OTHER

Staff training

- Are staff provided with any environmental training?
  E.g. correct preparation of food to avoid excess waste when peeling vegetables
  Correct use of recycling and food waste bins
  Segregation of waste oil for recycling
  Water and energy saving in food preparation
  Correct use and disposal of cleaning products

SUMMARY



KEY OPPORTUNITIES IDENTIFIED:

E.g.

- *Segregation of food waste for on-site composting*

Appendix 4– Example completed for an all-inclusive hotel in Cyprus

Engineering/ Maintenance/ Facilities Management

Auditor Name:	Nia Owen	**Date of Audit:**	27/5/13
Hotel Name:	All-inclusive hotel in Cyprus	**Average occupancy at time of audit**	75%
No. guest rooms:	272		
INPUTS i.e. resource use			
Gardening			
• Are any single use bags purchased by the hotel to transport garden waste? • If single use bags are used, how many are used and what are the purchase costs for the bags per year? • Is fertiliser/ compost purchased for use in the gardens? • If so, what quantity is purchased and what is the purchase cost?			**Y**/~~N~~ 65-70/ week Unknown **Y**/~~N~~ Unknown
Construction			
• When contractors are used for building works/ repairs, are they responsible for disposing of their own waste?			**Y**/~~N~~
Insert details of other inputs identified: None			
OUTPUTS i.e. waste generation			
Gardening			

• Is grass cutting/ gardening done by hotel employees?
• If the grass cutting/ gardening is done by staff:
  ○ How often is the grass cut?
  ○ What are the labour costs for gardening only?
• Identify the disposal method for this stream (delete as appropriate)
• How much garden waste is generated each week – this can be estimated based on the number of bags used/ lawnmower boxes filled multiplied by their volume.
			Y/~~N~~
			
			Once per week
			1 day of staff time - €40
			Garbage, ~~composting~~
			3,900 litres per week

Construction			
• Identify the disposal method for this stream (delete as appropriate) • How much construction waste is generated for disposal by the hotel each month? Estimate volume of waste based on discussion with staff, or as this is likely to be an irregular waste-stream better data may be obtained by asking			**Garbage**, ~~dedicated construction waste skip~~ Irregular waste stream

staff to keep this stream separate over a period of time. • Using the appropriate conversion factor provided in Appendix 2 estimate the weight of construction waste generated.	Further investigation required
Hazardous waste	

• Are hazardous items generated for disposal:
  ○ Light fittings e.g. fluorescent tubes
  ○ Chemicals
  ○ Paint tins
• Are hazardous items generated for disposal in guest accommodation? *If this is the case, consider providing guidance for guests on appropriate disposal for these items.*
• Identify the disposal method for this stream (delete as appropriate)
• Is the type and quantity of hazardous waste generated recorded?
• If so, record the quantity.
	Y/~~N~~
	Y/~~N~~
	Y/~~N~~
	No instances known
	~~Garbage~~, **specialist disposal**
	~~Y~~/**N**

Electrical items	
• Are electrical items returned to the supplier of replacement items? • If not, identify the disposal method for this stream (delete as appropriate) • How much electrical waste is generated for disposal by the hotel? Estimate the number and type of items based on discussion with staff, or as this is likely to be an irregular waste-stream better data may be obtained by asking staff to record this stream over a period of time.	~~Y~~/**N** **Garbage**, ~~dedicated electrical waste skip~~/ **donated to charity** Infrequent – further monitoring required
Public facing bins	

• Are bins provided for public use?
• What type of bins are provided:
  ○ Garbage?
  ○ Dry recycling?
  ○ Other (list)?
	Y/~~N~~
	Y/~~N~~
	~~Y~~/**N**
	None

Record information on public facing bins in the table below. You may wish to repeat this over a number of days to obtain more detailed information

Waste stream	Bin Volume (V)	Number of bins (N)	Number of times bin emptied each day (F)	Record the weight of a minimum three bags (kg)			Waste generated per day (=NxFx((B1+B2+B3)/3)
				B1	B2	B3	
Garbage	60 litres	3	2	7.7kg	Not available	Not available	46.2kg
Garbage	30 litres	16	2	3.2kg	Not available	Not available	102.4kg
TOTAL							148.6kg

Take a sample from each stream from both service types and undertake a composition analysis – guidance for completing this is provided in Appendix 2.
Insert details of other outputs identified: No other outputs identified. However, it was noted that the hotel pays the required charge to the municipality for waste services €11,000, however all waste is managed by a private contractor for which the hotel pays an additional cost of €17,500 for the collection of one 11.5m^3 compactor and 1 9m^3 skip collected twice weekly. No further breakdown of this cost is available. Most waste from the engineering department is deposited in the skip.

OTHER	
Staff training	
• Are staff provided with any environmental training? • If so, record type of training provided	**Y**/~~N~~ Training is provided as part of staff induction but contains little detail on waste. On the job training is also provided.

SUMMARY

INPUT	ACTIVITY	OUTPUT
Compost	Grass cutting	Grass cuttings
Singe use plastic bags	Construction/ maintenance	Construction waste
		Chemical waste
		Electrical waste
		Garbage

True cost of garden waste

Description	Annual Cost
Single use plastic bags (65 per week) - estimated	€500
Staff time (1 day per week) - estimated	€2,080
Grass disposal	Portion of the €17,500 paid to private waste contractor

KEY OPPORTUNITIES IDENTIFIED:

- Use of reusable bags for garden waste eliminating the purchase of single use plastic sacks.
- Use of on-site composting for garden waste – the compost produced could then be used for landscaping purposes and cut the costs of purchasing composts.
- Use of mulching lawnmower – this cuts the grass into fine pieces which is then left as a mulching layer on the grass, and cut the time required for staff to transport waste, and also the amount of waste requiring disposal.

Appendix 5– Food Waste Mapping

Date:							
Meal time:							
Number of meals served:							
Units used for recording						**kg/ litres * * delete as appropriate**	
Spoilage		**Preparation waste**		**Overproduced food**		**Plate scrapings**	
Bag number	Unit	Bag number	Unit	Bag number	Unit	Bag number	Unit
1		1		1		1	
2		2		2		2	
3		3		3		3	
4		4		4		4	
5		5		5		5	
Total spoilage		Total preparation waste		Total overproduction		Total plate scrapings	
Spoilage per cover		Preparation waste per cover		Overproduction waste per cover		Plate scrapings per cover	
Total waste		(total of all 4 bins)					
Total waste per cover (kg or litres)		(= total waste / number of covers)					

Appendix 6– Example opportunity analysis

Opportunity Reference	1	2
Description of opportunity	Switch from single use toiletries to fixed dispenser system systems in guest accommodation. Two dispensers required for liquid soap and a combined shower gel and shampoo product	Switch from single use toiletries to refillable bottle systems in guest accommodation. Two bottles required for liquid soap and a combined shower gel and shampoo product
Cost of current approach (€/yr)	Shampoo - €210.39 Soap bars - €69.18 Shower gel - €126.15 Total cost = €405.72	Shampoo - €210.39 Soap bars - €69.18 Shower gel - €126.15 Total cost = €405.72
Resource use associated with current approach (no. units, weight or volume per year)	Shampoo: 1125 x 30ml = 33.75 litres Soap bars: 750 x 25g = 18.75kg Shower gel: 675 x 30ml = 20.25 litres	Shampoo: 1125 x 30ml = 33.75 litres Soap bars: 750 x 25g = 18.75kg Shower gel: 675 x 30ml = 20.25 litres
Capital costs for new approach (€) It may be appropriate to retain spare items in stock and you may wish to include this in your calculation	Dispenser costs per unit = €16.75 Number of rooms = 138 Total capital cost = Dispenser cost x no. rooms €16.75 x 138 = €2311.50	Purchase costs of shower gel and shampoo bottles (6 x 300ml per pack) = €10.41 Number of rooms = 138 No. of packs required of each shower gel and shampoo= 138/6 = 23 Therefore total number of packs = 23 x 2 = 56 Total capital cost of shower gel and shampoo = 56 x €10.41 = €582.96

Opportunity Reference	1	2
Operational costs for new approach (€/yr)	Purchase costs for refill: Liquid soap: 18 x 325ml per pack - €41.86 Shower gel & shampoo: 18 x 325ml per pack - €49.41 Usage of refills: Assuming that liquid soap usage is consistent with that currently used for shampoo (i.e. 33.75 litres as identified earlier), volume of product used per year: = (33.75 x 1000)/138 = 245 ml, i.e. less than one sachet used per room Volume of shower gel and shampoo used based on current usage identified earlier = ((33.75+20.25)x1000)/138=391ml i.e. two sachets per room Therefore 8 packs of soap and 16 packs of shower gel and shampoo will be used. Total cost for refills each year: (€41.86 x 8)+ (€49.41 x 16) = €1125.44	Purchase costs for refill: Liquid soap: 5 litres - €13.90 Shower gel & shampoo: 5 litres - €13.90 Usage of refills: Assuming that liquid soap usage is consistent with that currently used for shower gel (i.e. 33.75 litres), the volume of product used per year: 1.1 = 33.75/5 = 6.75 Therefore, 7 refill containers would be required per year for liquid soap. Based on current shower gel and shampoo usage, the volume of product used per year: = (33.75+20.25)/5=10.8 Therefore, 11 containers for the combined shower gel and shampoo product each year for each product at a cost of: (€13.90 x 7) + (€13.90 x 11) = **€250.20**
Payback period i.e. capital investment/ annual savings	Capital cost / (cost of current approach – cost of new approach) = payback €541.32/(€405.72-€1125.44)= **-0.75 years**	Capital cost / (cost of current approach – cost of new approach) = payback €541.32/(€405.72-€250.20)= **3.5 years**
Financial impact	The negative payback indicates that costs of new approach will be greater than the current approach.	The positive payback period means that the costs of the new approach will be lower than current approach.
Ease of implementation	Easy to implement	Easy to implement
Impact on staff	Little impact	Increased time to refill bottles
Environmental impact	Less waste generated but greater than refill system	Less waste generated than dispensing system
Guest Experience	No impact	No impact

Appendix 7 - Opportunity analysis template

Opportunity Reference	**1**	**2**
Description		
Cost of current approach (€/yr)		
Resource use/ waste associated with current approach (no. units, weight or volume per year)		
Outline of proposed change		
Capital costs for new approach (€)		
Operational costs for new approach (€/yr)		
Payback period i.e. capital investment/ annual savings		
Financial impact		
Ease of implementation		
Impact on staff		
Environmental impact		
Guest Experience		

Appendix 8– Action Plan

Opportunity reference	Description	Timescale for implementation	Responsibility
