

# WASTE STRATEGY -2020/21

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## EXECUTIVE SUMMARY

The Waste Strategy sets out ambitious targets for the University through the following themes of reduce, re-use, recycle and report. These targets will help the University improve both sustainable management of waste, as well as manage expected increases in disposal costs. Investment of c. £89k on achieving targets to reduce waste and increase re-use / recycling will be required, with a payback period of approximately 4.5 years. In year 5, savings of c. £20k against the business as usual scenario are expected. In the longer term over 10 years, cumulative savings of c. £226k are expected against the business as usual scenario.

Forecasting indicates however that if no action is taken, then in 2020/21 the cost of non-hazardous operational wastes could be £120k greater than in 2015/16 (a 42% increase). This is largely due to University growth and external economic drivers. However, the Waste Strategy targets aim to mitigate this rise as far as practicable, as well as fulfil the University's legal obligation to align waste management practices with the waste hierarchy (which is to treat waste in the following order: reduce, reuse, recycle or recover before considering disposal).

It is noted that this is the first Waste Strategy of this type in recent years for the University. Due to lack of formal recording of the impact (both in terms of waste and finance) of previous limited waste projects, it has made it difficult to undertake cost-benefit analysis and therefore estimate spend allocation. Costs are indicated where possible, and better recording during the course of implementing this Waste Strategy will help to more accurately inform future strategies.

## INTRODUCTION

The purpose of this Waste Strategy is to provide the framework for waste management improvements over the next 5 years to 2020/21. The University strives to achieve the highest standards of environmental performance in line with its sustainability vision:

*To be a leader in reducing its impacts on the local as well as global environment, by embedding a culture of sustainability throughout its teaching, research and operations.*

The Waste Strategy sets out the objectives, targets and actions to achieve this with respect to waste management.

The scope is as follows:

- Applicable to the three main UK campuses, MERL and properties where waste is collected by the main waste management contractors (as co-ordinated by Sustainability Services). This expressly excludes the University Farms.
- All waste streams collected by the contractors (predominantly general waste, mixed recycling, paper and card, wood, electrical waste, metal, food, confidential wastes).
- Items re-used within the University.

Reference is made to chemical waste and clinical waste (collectively as 'hazardous waste') within the business case to provide perspective on the current costs. Both this and construction/development project waste streams (managed by the project's own contractor) require further review before quantitative targets can be formulated. Non-hazardous waste, however, is where there is perceived to be currently the greatest opportunities where change can be clearly defined and also forms the largest proportion of the University's waste.

## STRATEGY DRIVERS

The University needs a strategy for the effective management of its waste to ensure:

- Compliance with relevant legislation is maintained (including the legal obligation of applying the waste hierarchy principle of treatment of waste in the following order: reduce, reuse, recycle, recover, and dispose).
- Disposal costs are controlled and increases are minimised by appropriate disposal choices.
- Certification to the ISO14001 standard is maintained and risks of non-conformances (which threaten re-certification) are minimised.
- Waste is managed securely, in particular for confidential material.
- Reputation is maintained and students' expectations are managed.
- The Environmental Policy commitment to continual environmental improvement is met.

## OBJECTIVES

The Waste Strategy supports the University's Environmental Policy, which has an overarching waste objective to:

*"Minimise the impact on the environment and use of natural resources by minimising production of waste, preventing pollution, reusing materials, recycling and reducing waste to landfill"* (Environmental Policy, 2016)

The following Waste Strategy objectives provide direction in line with the Environmental Policy:

1. To ensure that the University undertakes waste management practices that acknowledge wider sustainability principles: environmental sustainability, social sustainability and financial sustainability.
2. To ensure that there is year on year continual improvement, including regular review of and improvement in environmental best practice against appropriate targets and/or KPIs.
3. To continually improve the University's performance and ensure that greater consideration is given to moving waste management practices further up the waste hierarchy.

4. To ensure that greater consideration is given to targeted waste management measures to address fluctuating production or needs of specific areas.
5. To ensure that the University considers how sustainability could be improved using its sphere of influence in waste management and to promote behavioural change.

It is hoped that these objectives will provide the direction for positive change. They are supported by the targets below, which have been set using the SMART<sup>1</sup> methodology.

## TARGETS

1. In 2020/21 **reduce** total waste produced by 5% per capita (staff and student FTE) against forecasted business as usual. (Supports objectives 1, 2, 3 and 4).
2. By 2020/21 increase the University's annual **recycling** rate to 60%. (Supports objectives 1, 2, 3 and 4).
3. By 2020/21 achieve a 10% increase in **re-use** against a 2015/16 baseline, in order to improve a culture of re-use rather than disposal. (Supports objectives 3 and 5)
4. Each year until 2020/21 undertake reporting on the quantitative waste management impacts, and other sustainability impacts achieved as a result of Waste Strategy projects. (Supports objective 5)
5. By 2020/21 review opportunities to reduce hazardous waste. (Supports objectives 1, 3 and 4)
6. By 2020/21 review how construction waste is reported and what steps could be taken to move waste management practices further up the waste hierarchy. (Supports objectives 1, 3 and 4)

*Note: The waste hierarchy is the principle of treatment of waste in the following order to minimise environmental impact - reduce, reuse, recycle, recover, dispose.*

## TARGET DETAILS

For further context and information on calculations please see the Appendix (section 1).

**Target 1 – by 2020/21 reduce total waste produced by 5% per capita (staff and student FTE) against forecasted business as usual.**

Waste production is correlated with number of people, and therefore it is expected that future waste production will increase as student numbers grow. In light of increasing production, reducing by 5% against the forecasted business as usual production is a challenging target. To achieve the target, a reduction of 58,9t of waste in 2020/21 would be needed. Information on these values and the action required to achieve the target is outlined in the Action Plan in the Appendix (section 2). The actions have identified an estimated 65.9t offset with a value of c. £22.5k and are summarised as:

- Keep waste production in the RUSU/Catering yard stable at 2015/16 production levels.
- Keep paper and card waste production across the University stable at 2015/16 levels. It is assumed that the majority of card waste is likely to arise from procurement processes.
- Limit the rate of increase in waste production to 1.5% in the Library, science buildings (Harborne, Knight, AMS, Chemistry, Hopkins, Food Bioscience, Agriculture, Russell building) and Greenlands Campus.

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<sup>1</sup> SMART: the concept that to be effective, targets should be **S**pecific, **M**easureable, **A**chievable, **R**ealistic and **T**ime-bound.

- Reduce University waste production by 1% against the “business as usual” scenario through general behavioural change initiatives.

**Target 2 – By 2020/21 increase the University's annual recycling rate from 49.5% to 60%.**

Recycling rates are not affected by growth of the University because they are a ratio of recycling to non-recycling, rather than quantity-based. Therefore an absolute target is suitable even through the University is expected to grow. To achieve the target approximately a 2% per year improvement is needed, equating to 90t more waste to be recycled in 2020/21 against the business as usual scenario (assuming that this target is achieved simultaneously with Target 1). Information on these values and the action required to achieve the target is outlined in Action Plan in the Appendix (section 2). The actions have identified an estimated 96.5t of recycling with a value of c. £21.8k and are summarised as:

- Increase recycling by 3% each year at RUSU/Catering Yard, Library, science buildings (Harborne, Knight, AMS, Chemistry, Hopkins, Food Bioscience, Agriculture, Russell building) and Greenlands Campus.
- Increase recycling rates in HumSS, Agriculture and Meteorology/Psychology by 2% per year, and Palmer/Carrington by 1% per year.
- Bring London Road campus towards the 60% target by a 5.5% increase per year.
- Increase recycling rates across the rest of the university by a total of 4% by 2020/21.

**Target 3- By 2020/21 achieve a 10% increase in re-use against a 2015/16 baseline, in order to improve a culture of re-use rather than disposal.**

The University has a legal compliance obligation to follow the waste hierarchy, the first and second levels of which are reduce and re-use. Existing furniture re-use initiatives have been successful and are estimated to have saved 7.7t of waste with a value of c. £31k (2015/16) by Schools and Functions not disposing and not purchasing new items (recorded through the Warp-it re-use site, first year where data is available from this).

To meet the 10% target, 0.8t more would need to be re-used by 2020/21, with a value of £261 in disposal costs and £3264 in purchase costs. It is difficult to estimate the effect that actions will have on re-use as there is insufficient previous information. The actions required to achieve the target are:

- Working with Projects Team to identify and overcome barriers for re-use.
- Formalise drop-in sessions for assistance via Training and Development.
- Ensure a clearer communication strategy is in place about re-use options, including communication via In-Brief and Staff Portal.
- Review the resources required for an effective re-use system (e.g. space, time, staff) and work with relevant departments to optimise these.
- Separate the disposal function so that Warp-it is for re-use items only.
- Consider linking with existing Warp-it groups at other Universities and suitable organisations to more effectively re-use resources and reduce the disposal of good quality items.
- Consider the feasibility of re-using items other than furniture – e.g. electricals.

**Target 4 – Each year until 2020/21 undertake reporting on the quantitative waste management impacts, and other sustainability impacts achieved as a result of Waste Strategy projects.**

Although the existing data set for monitoring weights of waste produced is very comprehensive, one of the difficulties of creating this initial waste strategy was lack of recorded evidence of the impact on waste weights of previous waste management initiatives. Therefore recording and reporting of the impacts of waste management initiatives is important to inform future strategies. The target will be achieved as follows:

- When projects are initiated, details are recorded and effectiveness checks are made.
- Data (such as waste weights, recycling rates) continues to be recorded to allow progress towards targets to be evaluated.
- Annual reporting to senior management.

#### Target 5 - By 2020/21 review opportunities to reduce hazardous waste.

It is recognised that hazardous waste presents a significant cost to the University, but that current information on the processes giving rise to the waste, the nature of the waste and the quantities of the waste is either limited or currently not accessibly recorded. Therefore the target will be achieved through activities such as:

- Collation of existing information on hazardous waste streams (including identification of any legacy hazardous waste cost liabilities (e.g. redundant chemicals)
- Identification of what further information is required and how this could be gathered.
- Investigation of opportunities for improved hazardous waste management, with a view to implementation where feasible.
- Development of a phased approach to collecting information, analysing and reporting findings.

#### Target 6 - By 2020/21 review how construction waste is reported and what steps could be taken to move waste management practices further up the waste hierarchy

The University is currently undertaking a large number of Capital Projects, which include both new construction and refurbishment works. The waste generated from this therefore needs to be acknowledged within the University waste strategy, although it is distinctly separate from operational waste. This target intends to promote greater transparency on reporting to allow opportunities to be identified for improved waste management practices.

- Collation of existing information on construction waste streams.
- Identification of what further information is required and how this could be gathered.
- Investigation of opportunities for improved construction waste management, with a view to implementation where feasible.
- Development of a phased approach to collecting information, analysing and reporting findings.

## KEY DELIVERY THEMES

The actions and investment needed to address quantitative Targets 1 to 3 for non-hazardous waste can be broadly grouped as follows. All values are inclusive of VAT and calculations assume gradual spend to achieve the targets over several years, rather than utilising all investment early to achieve the targets early.

Table 1: Key delivery themes.

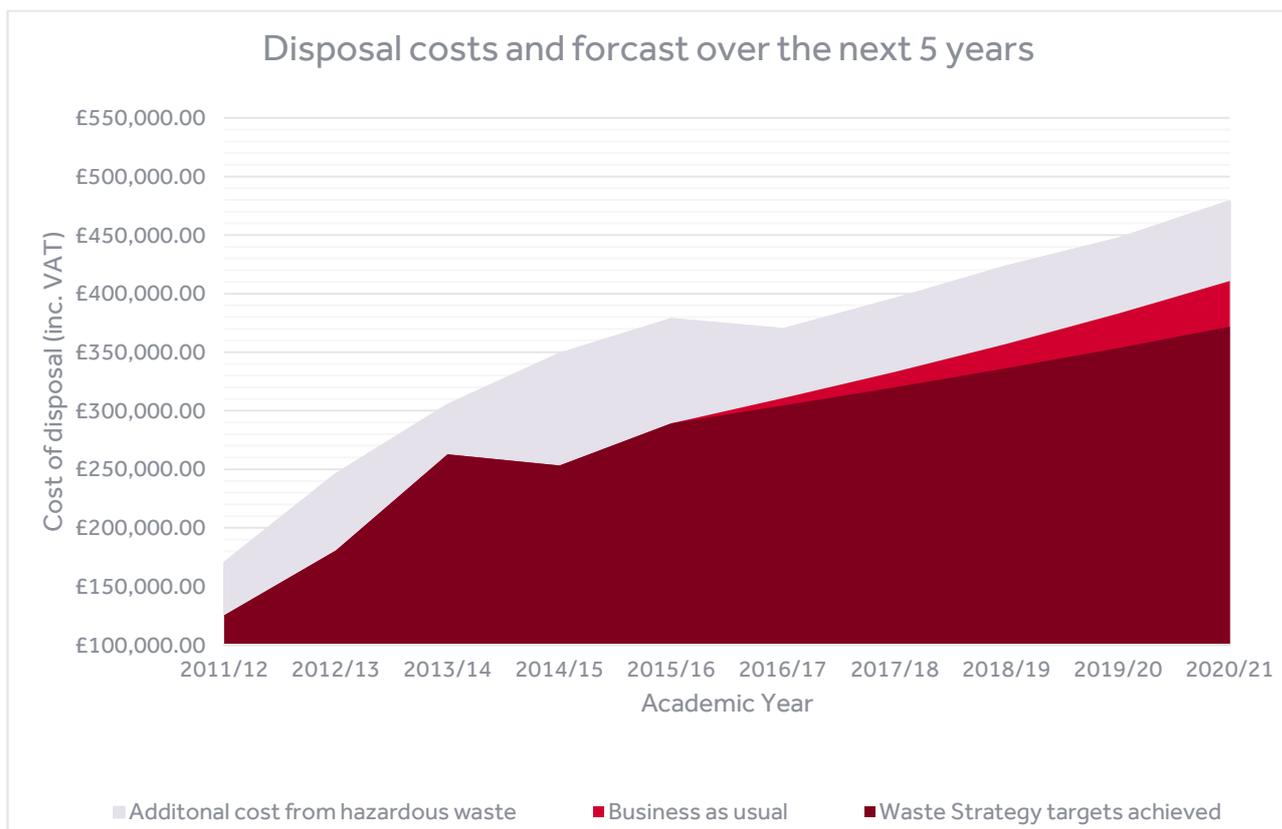
Theme	Cost over 5 years	Benefit over 5 years	Comment
Review of processes – why/how/where is waste produced, and what opportunities might arise?	£20,400	Included in total	£2400 per year for support services (e.g. consultancy, student interns) £8400 stand-alone cost for review and modification to general disposal process.

Theme	Cost over 5 years	Benefit over 5 years	Comment
Upgrade of facilities – what and where are the waste and recycling facilities? Are they adequate?	£52,590	Included in total	Provision of 45 new internal bins per year at an average of £180 per bin (£8100/yr) Refurbishing (improved signage) of 180 internal bins at an average £3.60 per bin (£648/yr) Refurbishing (improved signage) of 5 external bins per year at £150 per bin (£750/yr) Labour costs per year for above (£1020/yr)
Behavioural change and communications – are people aware of the targets? How can they be integrated in to social norms?	£15,600	Included in total	£1200 per year for campaigns such as bin tagging. £720 per year for production of literature £1200 per year for training.
Key delivery themes 5 year total:	£88,590	£108,000	Cumulative total over 5 years
Saving by 2021 - after payback (4.5 years)  <i>Long term saving by 2026 - after payback</i>	£20,000  <i>£239,000</i>		Total benefit minus total cost.
<u>Note:</u> The cost of replacing end-of-life bins in a necessary annual expenditure regardless of investment in the key delivery themes and is estimated as:			Estimated 5 external bins per year at £840 per bin Estimated 25 internal bins per year at £180 per bin Total annual spend: £8700. Total spend over 5 years: £43,500.

## BUSINESS CASE

Figure 1 sets out the expected increases in the annual cost of waste disposal at the University. By achieving the targets within the Waste Strategy it is possible to limit cost increases in the disposal of operational (non-construction) waste. It takes in to account growth; it is assumed that the University population (staff plus students) will increase each year by 3% until 2021 and assumes the annual increase in waste charges per unit will increase by 4.1% each year.

Figure 1: disposal costs and forecast over the next 5 years



The graph shows the cost of:

- Do nothing (business as usual scenario): recycling assumed to plateau at the 2015/16 rate of 49.6% and is considered to be the baseline scenario.
- Waste Strategy targets achieved: Waste reduction and recycling measures implemented to meet the targets in this strategy.
- Hazardous waste (over and above non-hazardous waste). Assumes some further clearances may be required until 2020/21, but on a smaller scale than the clearances in 2014/15 and 2015/16.

Forecasting indicates that if no further action is taken to manage waste more efficiently, then based on the findings in Figure 1 the costs of waste to the University would be as follows:

Table 1: forecasted cost of waste (including VAT)

	Business as usual (hazardous waste excluded)	Achieving targets (hazardous waste excluded)	Cost reduction if targets achieved
Disposal cost in baseline year 2015/16	£289,086	£289,086	N/A
Disposal cost for year 2020/21	£409,647	£370,759	£38,888
5-year cumulative cost (2016/17 to 2020/21)	£1,790,253	£1,682,034	£108,219
10-year cumulative cost (2016/17 to 2025/26)	£3,974,504	£3,659,082	£315,422

Ensuring no rise in baseline costs is impractical for the following reasons:

- The University is planning to grow considerably including increased student recruitment; waste production (and cost of disposal) is correlated with increased population.
- External economic drivers look set to increase the cost of disposal.
- Past investment has largely been to meet disposal costs rather than to manage production meaning existing facilities may no longer be fit for purpose.
- Historical data on the amount of waste the University produces exists, however the impact (both financial and on waste data) of the small number of previous improvement projects has not been formally recorded hindering estimation of spend required in this Waste Strategy.
- Over-ambitious targets are more likely to hinder than help and could cause some reputational damage within the sector if they are not achieved.

However, risks to this forecast (such as unexpected cost changes above annual 4.1% increases, fluctuation in student recruitment, change in University processes, changes in legislation etc.) need to be taken in to account.

The financial impact of disposal will increase over time. However, activities undertaken to achieve the targets are expected to have a 4.5 year payback period and in year 5 net **savings of c.£20k** against the business as usual scenario. Extending the projection over 10 years, cumulative net **savings of c.£226k** are expected against the business as usual scenario.

Assumptions made in the projection are specified in Section 3 of the Appendix.

### **Achieving targets early:**

Calculations in this Waste Strategy assume that targets will be achieved incrementally over 5 years. However, it is worth considering if the full investment of £89k could be spent within 2016/17 and 2018/19 to achieve:

- Early waste reduction of 5% (see Targets section, Target 1) by 2018/19.
- Very early recycling rate improvement to 60% (See Targets section. Target 2) by 2017/18

Activities undertaken to achieve the targets are expected to have a 3.5 year payback period and subsequently generate a net **saving of c.£58k** by 2021 against the business as usual scenario. Extending the projection over 10 years, cumulative net **savings of c.£268k** are expected against the business as usual scenario. Assumptions made in the projection are specified in Section 3 of the Appendix.

## **CONCLUSION**

Forecasting indicates that if no action is taken, then in 2020/21 the cost of non-hazardous wastes could be £120k greater than in 2015/16. The cumulative future spend on disposals between 2016/17 and 2020/21 could reach £1.8 million. Some of this increase is currently unavoidable. However simultaneously reducing waste by 5% and increasing recycling to 60% means the cumulative cost (2016/17 – 2020/21) could be c.£108k lower than in the business as usual scenario. It is estimated that c.£89k investment spread over 5 years would be required.

This strategy identifies objectives, targets and actions which need to be taken to mitigate both the financial risk to the University and to improve environmental performance. Some actions will relate to reviewing current practices and identifying where smarter choices could be made to achieve more

effective waste management practices. However, investment in facilities, communication and behavioural change actions will also be required to successfully achieve the targets.

In order to achieve these strategic long term targets, co-operation and support from all areas of the University will be needed and responsibilities for waste management at all levels in the University will need to be more clearly defined.

# APPENDIX

This appendix:

1. Provides background information on the context of the targets and more detailed information on their financial impact.
2. Outlines a schedule of initiatives and activities required to meet the targets.
3. Provides more details on the scenarios in the business case.

## 1: TARGET CONTEXTS

**Target 1: In 2020/21 reduce total waste produced by 5% per capita (staff and student FTE) against forecasted business as usual production.**

To achieve this target 58.9t of waste will need to be avoided in 2020/21 against the forecasted business as usual scenario. It is important to note that this is not an absolute reduction target against a baseline year – it is relative to the forecast so takes in to account the expected growth of the University.

5% reduction in 2020/21 can be achieved by a reduction of 1% per capita per year. The following factors have been used to calculate the target per capita values:

- Full time equivalent staff and student numbers, rather than headcount.
- A baseline (2015/16) per capita waste production value of 62.0kg.
- A growth rate for the University population (full time equivalent staff plus full time equivalent students) of 3%.

Table 2 sets out the calculated per capita values and the waste reductions required to meet the target. 58.9t of waste will need to be avoided overall by 2020/21. Table 3 (Action Plan) identifies actions which aim to offset c.65.9t with a value of c. £22.5k. The forecasted values are based on the business as usual scenario and assumes a 4.1% annual growth in waste disposal prices.

Table 2: Calculation of annual waste avoidance required to meet the target

Year	University population	"business as usual" per capita (tonnes pp)	Per capita production target (tonnes pp)	"business as usual" waste (tonnes)	Maximum waste to meet target (tonnes)	Waste to avoid to meet the target (tonnes)
2016/17	17199	0.062	0.0614	1,066.9	1,056.3	10.7
2017/18	17715	0.062	0.0608	1,098.9	1,077.1	21.9
2018/19	18246	0.062	0.0602	1,131.9	1,098.3	33.6
2019/20	18794	0.062	0.0596	1,165.9	1,119.9	45.9
2020/21	19358	0.062	0.0590	1,200.8	1,142.0	58.9

## **Target 2: By 2020/21 increase the University's annual recycling rate to 60%.**

To meet the target, approximately 2% per year increase in recycling is required (baseline of 49.5% in 2015/16). Recycling rates have remained fairly static over the last 5 years, fluctuating slightly (range of 2.9%), with only minor improvements in recent years. Recycling rates are less affected by growth of the University than waste reduction targets. This is because they are a ratio of recycling to non-recycling, rather than quantity-based. Recycling rates are considered to be affected more by the availability of waste management facilities and behavioural change initiatives.

Assuming that the per capita target (Target 1) is simultaneously being successfully achieved, less waste would be produced than the in the business as usual scenario. Therefore there will be proportionally less waste where recyclables need to be diverted away from general waste and in to recycling streams.

To meet a 60% recycling rate in this case by 2020/21, 90t more waste would need to be recycled in 2020/21 than in the business as usual scenario. Table 4 (Action Plan) identifies a collective 96.5t of recycling to the value of c. £21,8k.

## **Target 3 - By 2020/21 achieve a 10% increase in re-use against a 2015/16 baseline, in order to improve a culture of re-use rather than disposal.**

The University has a legal compliance obligation to follow the waste hierarchy, by applying the principles of reduce, re-use, recycle, recover and disposal, in that order. The University has for a long time run a furniture re-use store to try and prevent good quality office furniture from being disposed. However, there are still items which could be re-used that are disposed of, which negatively affects progress towards waste reduction targets. To help meet waste avoidance targets and to move up the hierarchy, re-use needs to be embedded further in to the culture of the University, beyond just ad-hoc re-use of furniture and other items.

The 10% target can be measured by the percentage increase in the number of re-use transactions recorded through the Warp-it re-use site. To meet this, 0.8t more would need to be re-used by 2020/21. Although this seems a conservative increase, there is a large amount of Capital Projects work scheduled in the coming years, the challenges of which need to be taken in to account when considering the practicality of this target. 2015/16 has been chosen for the baseline as this is the first year where there is data available for Warp-it system for the whole year.

## **Target 4 – Each year until 2020/21 undertake reporting on the quantitative waste management impacts, and other sustainability impacts achieved as a result of Waste Strategy projects.**

Although this target does not specifically relate to measures that improve re-use, recycling or waste avoidance, recording and reporting of the impacts of waste management initiatives is important to ensure that the effectiveness of management is monitored, evaluated and reported.

It is important that the impacts of the activities undertaken to achieve Targets 1 to 3 are reviewed and reported, in order to provide a base of evidence which can inform future waste strategies. Although the existing data set for monitoring weights of waste produced is very comprehensive, one of the difficulties of creating this initial waste strategy was lack of recorded evidence of the impact on waste weights of previous waste management initiatives.

## **Target 5 - Review opportunities to reduce hazardous waste.**

Current information on hazardous waste is currently limited or not recorded in an accessible way which allows meaningful interpretation of trends or forecasting. Therefore at present it is not possible to set realistic or informed quantitative targets surrounding hazardous waste

management. Work is therefore required to investigate data, identify possible management options and identify which are likely to be feasible to implement.

**Target 6 - Review how construction waste is reported and what steps could be taken to move waste management practices further up the waste hierarchy.**

Currently information on construction waste is reported annually via the HESA Estates Management Reporting. However, collecting this information in more detail would help to identify where waste management practices could be moved further up the waste hierarchy (i.e. promoting waste reduction, re-use and recycling over energy recovery or disposal). Work is therefore required to investigate data, identify possible management options and identify which are likely to be feasible to implement.

## 2: ACTION PLAN FOR TARGETS 1 AND 2

Table 3: Actions required to meet Target 1

Project	Tonnes forecast 2020/21	Cost forecast 2020/21	Target weight 2020/21	Tonnes to offset 2020/21	Saving in 2020/21	Example activities	Target number
Keep RUSU/Catering Yard waste production stable (+/- 1%) at 2015/16 levels.	168.2t	£57,384	145t	23.2t	£7,920	<ul style="list-style-type: none"> <li>• Cardboard reduction – e.g. returning to supplier.</li> <li>• Glass reduction – e.g. supplying drinks on tap or in plastic bottles.</li> <li>• Food waste reduction – e.g. signage, awareness campaigns, altering portion sizing.</li> </ul>	1
Halve the rate of waste increase (1.5%) at the Library. This accounts for Capital Projects work at the Library.	32.7t	£11,146	30.4t	2.3t	£788	<ul style="list-style-type: none"> <li>• Better facilities and signage (including of cups bins).</li> <li>• Work with Library support staff and café staff to streamline processes which produce waste.</li> <li>• Behavioural change initiatives for library users.</li> </ul>	1
Halve the rate of waste increase (1.5%) at the Science Buildings (Harborne, Knight, AMS, Chemistry, Hopkins, Food Bioscience, Agriculture, Russell) . The values shown are for all named buildings combined.	160.6t	£54,802	149.3t	11.4t	£3,876	<ul style="list-style-type: none"> <li>• Work Technical Services and School staff to streamline processes which produce waste.</li> <li>• Identify viable waste reduction initiatives – e.g. take back schemes.</li> <li>• Implement any necessary facilities upgrades.</li> <li>• Behavioural change and communication initiatives.</li> </ul>	1

Project	Tonnes forecast 2020/21	Cost forecast 2020/21	Target weight 2020/21	Tonnes to offset 2020/21	Saving in 2020/21	Example activities	Target number
Halve the rate of waste increase (1.5%) at Henley, Greenlands.	81.7t	£27,886.24	76.0t	5.8t	£1,972	Work with Henley's environmental management system to review waste production and identify where reduction initiatives can be applied, e.g. via procurement processes, take back schemes etc.	1
Keep paper and card waste production stable (+/- 1%). It is assumed that most waste arises from procurement processes.	123.1t	£10,837	106.2t	16.9t	£5,770	<ul style="list-style-type: none"> <li>Identify large supply contracts and investigate any scope for reducing or taking back packaging.</li> <li>Identify any paper-free meeting management software, and discuss with departments about embedding this in to business processes.</li> </ul>	1
Reduce waste by 1% through general behavioural change initiatives at other areas of the University not covered by the above.	634.6t	£216,485	628.3t	6.3t	£2,165	Ensuring that staff and students are engaged, aware and that targets are clearly communicated. E.g. via training, events, newsletters, targeted interventions (e.g. bin tagging).	1
<b>Cumulative totals (For target 1 actions)</b>	<b>1201t</b>	<b>£378,540</b>	<b>1135t</b>	<b>65.9t</b>	<b>£22,491</b>	<b>N/A</b>	<b>1</b>

Table 4: Actions required to meet Target 2

Project	"Business as usual" recycling 2020/21 (tonnes)	Project recycling 2020/21 (tonnes)	Equivalent recycling rate 2020/21	Tonnes more to recycle in 2020/ 21	Saving in 2020/21	Example activities	Target number
Increase recycling by 3% each year at RUSU/Catering Yard	93.2t	118.4t	70.4%	25.2t	£5,905	<ul style="list-style-type: none"> <li>• Review and upgrade of facilities as required.</li> <li>• Implement awareness campaign / behavioural change strategies.</li> <li>• Contamination reduction initiatives (e.g. from paper cup bins)</li> </ul>	2
Increase recycling at the Library by 5% each year.	8.0t	16.2t	49.5%	8.2t	£1,876	<ul style="list-style-type: none"> <li>• Bin audits, reviewing and upgrading facilities and signage.</li> <li>• Introduce paper cups bins to reduce recycling contamination.</li> <li>• Strategies such as promoting keep cups, cup return schemes.</li> <li>• Awareness/ communications campaign.</li> </ul>	2
Increase recycling at the science buildings by 3% each year. (Harborne, Knight, AMS, Chemistry, Hopkins, Food Bioscience, Agriculture, Russell)	47.1t	71.2t	44.3%	24.1t	£5,639	<ul style="list-style-type: none"> <li>• Investigations in to what processes produce waste, whether any of it is recyclable and how it could be safely and easily recycled.</li> <li>• Ensuring waste containers are standardised between departments/buildings to reduce confusion.</li> <li>• Review and upgrade facilities and signage where required.</li> </ul>	2

Project	"Business as usual" recycling 2020/21 (tonnes)	Project recycling 2020/21 (tonnes)	Equivalent recycling rate 2020/21	Tonnes more to recycle in 2020/ 21	Saving in 2020/21	Example activities	Target number
Increase recycling at Henley, Greenlands by 3% each year.	40.8t	48.7t	59.5%	7.9t	£1,844	<ul style="list-style-type: none"> <li>• Working with the local EMS team on review and upgrade of facilities as required.</li> <li>• Recycling awareness campaign / behavioural change is required.</li> <li>• Review of processes which give rise to waste, and whether streamlining could improve recycling.</li> </ul>	2
Increase recycling at HumSS by 2% each year.	27.9t	33.7t	58.3%	5.8t	£1,328	<ul style="list-style-type: none"> <li>• Review and upgrade of facilities as required.</li> <li>• Recycling awareness campaign / behavioural change is required.</li> </ul>	2
Increase recycling at Palmer/Carrington by 1% each year.	9.3t	10.2t	59.3%	0.9t	£197	<ul style="list-style-type: none"> <li>• Review and upgrade of facilities as required – Palmer in particular has a lot of rooms used out of hours for events which could benefit from clearer labelling.</li> <li>• Recycling awareness campaign / behavioural change is required.</li> </ul>	2
Increase recycling at Agriculture by 2% each year.	13.3t	15.8t	62.7%	2.5t	£578	<ul style="list-style-type: none"> <li>• Review and upgrade of facilities as required.</li> <li>• Recycling awareness campaign / behavioural change is required.</li> </ul>	2

Project	"Business as usual" recycling 2020/21 (tonnes)	Project recycling 2020/21 (tonnes)	Equivalent recycling rate 2020/21	Tonnes more to recycle in 2020/ 21	Saving in 2020/21	Example activities	Target number
Increase recycling at Meteorology / Psychology by 2% each year.	8.6t	10.5t	56.3%	1.9t	£429	<ul style="list-style-type: none"> <li>Review and upgrade of facilities as required.</li> <li>Recycling awareness campaign / behavioural change is required.</li> </ul>	2
Increase recycling at London Road Campus by 5.5% each year.	9.3t	17.1t	60.1%	7.8t	£1,794	<ul style="list-style-type: none"> <li>Review existing recycling processes and identify improvements.</li> <li>Review and upgrade of facilities as required.</li> <li>Recycling awareness campaign / behavioural change is required.</li> </ul>	2
Increase recycling by 0.5% each year across the rest of the University	241.7t	253.9t	52.1%	12.2t	£2,266	<ul style="list-style-type: none"> <li>Review and upgrade of facilities in areas not covered above.</li> <li>Removal of deskside general waste bins to encourage recycling.</li> <li>Investigate the effect of bin capacity, frequency of emptying, bin tagging etc. on awareness / behavioural change.</li> </ul>	2
Cumulative totals (for target 2)	499.2t	595.7t	N/A	96.5t	£21,856	N/A	2

## 3: BUSINESS CASE

### Calculating the business case – forecast over 5 years

This section provides more detailed information on how the business case for non-hazardous waste was calculated. 5 scenarios were investigated to inform which targets would be most efficient, and it was found that combining both recycling and waste reduction (Scenario 5) is likely to be the most efficient.

- Business as usual: Costs in 2020/21 will have risen by c. £120k against a 2015/16 baseline. The cumulative cost (2016/17 – 2020/21) will be c.£1.79 million.
- Do minimum: Costs in 2020/21 will be c.£16k less than in the business as usual scenario. The cumulative cost (2016/17 – 2020/21) will be c.£1.75 million.
- Reducing waste at a rate of 1% per year per capita (equates to Target 1): Costs in 2020/21 will be c.£20k less than in the business as usual scenario. The cumulative cost (2016/17 – 2020/21) will be c.£1.73 million.
- Increasing recycling to 60% (Target 2): Costs in 2020/21 will be c.£26k less than in the business as usual scenario. The cumulative cost (2016/17 – 2020/21) will be c. £1.72 million.
- Simultaneously reducing waste by 1% per year per capita, and increasing recycling to 60% (Scenario 5): Costs in 2020/21 will be c.£39k less than business as usual and the cumulative cost (2016/17 – 2020/21) will be c. £1.68 million.

### 10 year forecast and early achievement of targets

The following graphs (Figures 1 and 2) illustrate for information the forecast of waste disposal costs if it is extended beyond the duration of the Waste Strategy to 2025/26.

Figure 1 shows the impact of gradual achievement of the targets. Figure 2 illustrates that the early achievement of the targets brings forwards the cost benefits and increases the cumulative savings over time.

### Assumptions made in forecasting

- Student numbers grow by 3% year on year until 2020/21, after which numbers are stable.
- Growth in cost is 4.1% year on year 2020/21, after which it drops to 2% p.a.
- After targets end in 2020/21, it is assumed recycling rate does not increase beyond 60% and waste avoided does not increase. Therefore spend increase is linked with growth in cost of disposal. Future targets will be defined as 2020/21 approaches.
- For early achievement of targets: achieving a 60% recycling rate is likely to occur more quickly as it can in part be linked to significant facilities upgrades. Therefore it is assumed that this might be achievable by end of 2017/18
- For early achievement of targets: achieving a reduction in waste of 5% will take longer as it relates to behavioural change, so is set to be mid-term in the strategy, at 2018/19.

Figure 1

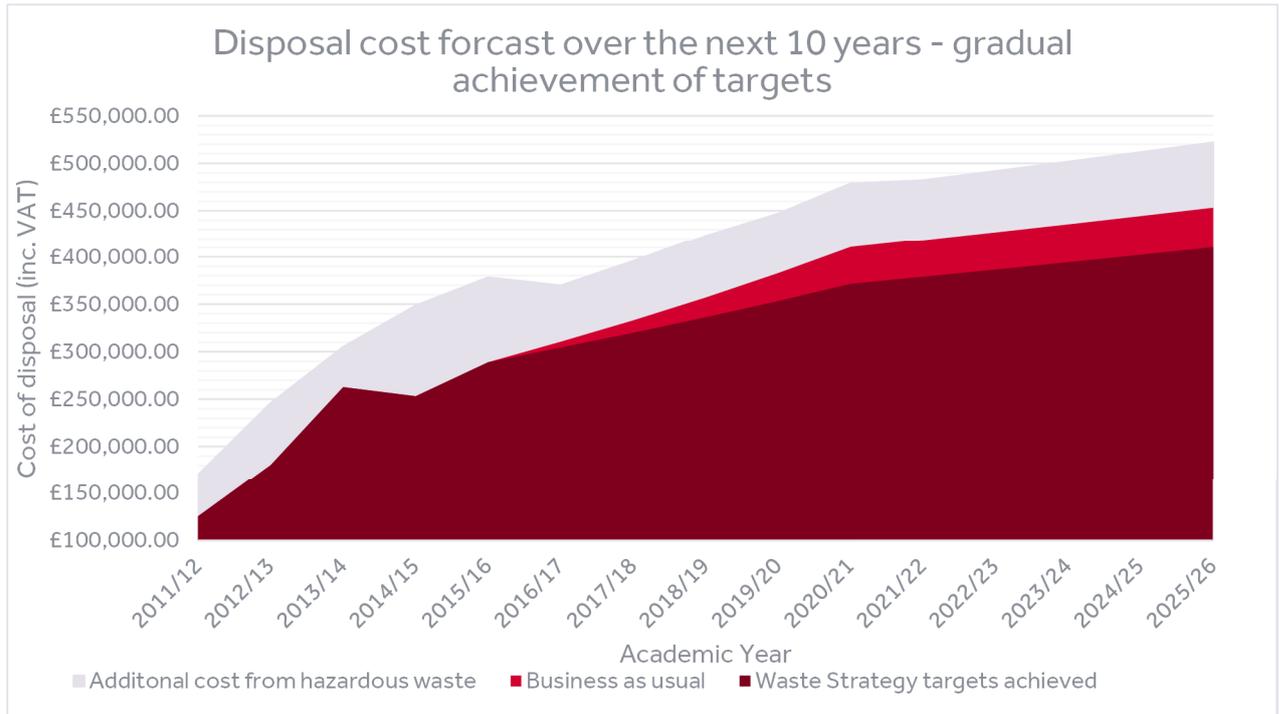


Figure 2

