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Executive Summary

7. The executive summary must not exceed 2 sides in total of A4 and should be understandable to the intelligent non-scientist. It should cover the main objectives, methods and findings of the research, together with any other significant events and options for new work.

This research was commissioned and funded by Defra. The views expressed reflect the research findings and the authors' interpretation. The inclusion of or reference to any particular policy in this report should not be taken to imply that it has, or will be, endorsed by Defra.

Executive Summary

The research project spanned the period May 2005 to March 2008. Its key purpose was to evaluate methods for monitoring and evaluating waste prevention as detailed in the National Resource and Waste Forum (NRWF) Household Waste Prevention Toolkit, i.e. the use of control and pilot areas supported by specific research techniques - using weight-based monitoring, measuring campaign activities, and using surveys and focus groups.

During this time there were significant changes in waste policy that have significantly raised the profile of waste management issues to the general public. Understanding waste prevention and how to measure it, therefore, has become of primary importance in meeting the challenge of sustainable waste management.

A simple, three-step process was designed to evaluate the effectiveness of the NRWF control and pilot area approach for waste prevention campaigns run in Dorset County Council:

Step 1: To ensure the closest practicable match between control and pilot populations by:

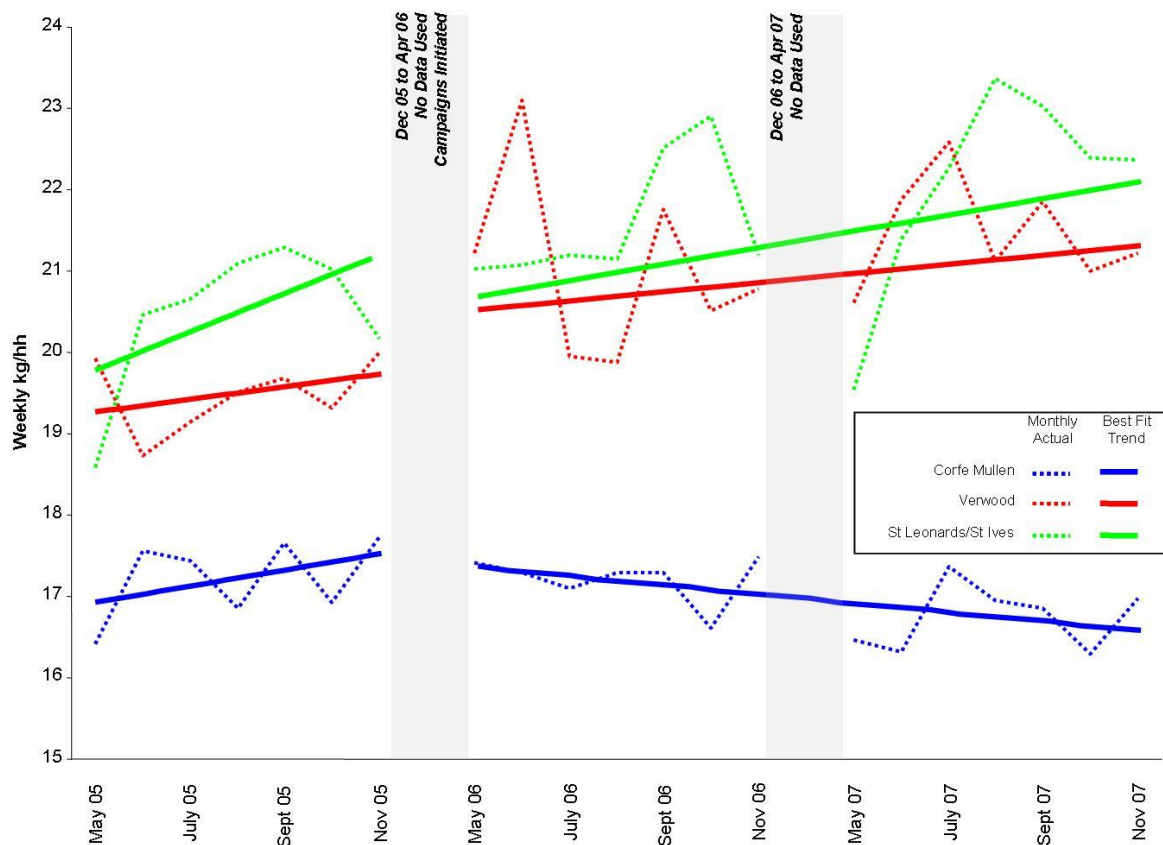
- Assessing socio-geodemographic similarity;
- Identifying key factors to assess similarity of areas, e.g. waste management service provision.

Step 2: To assess which of the factors, *that could not be influenced or matched*, have had the greatest impact on observed differences between control and pilot populations.

Step 3: To use appropriate techniques to compensate for factors identified in Step 2.

Seven control and five pilot areas were selected comprising five groups (i.e. 3 groups with 2 controls each and 2 groups with 1 control each). The Corfe Mullen group was chosen as the primary research area because East Dorset had recorded detailed and accurate waste collection data. A graph of results obtained is presented below:

Corfe Mullen, St Leonards and Verwood: Combined Weekly kg per Household for Waste Arisings

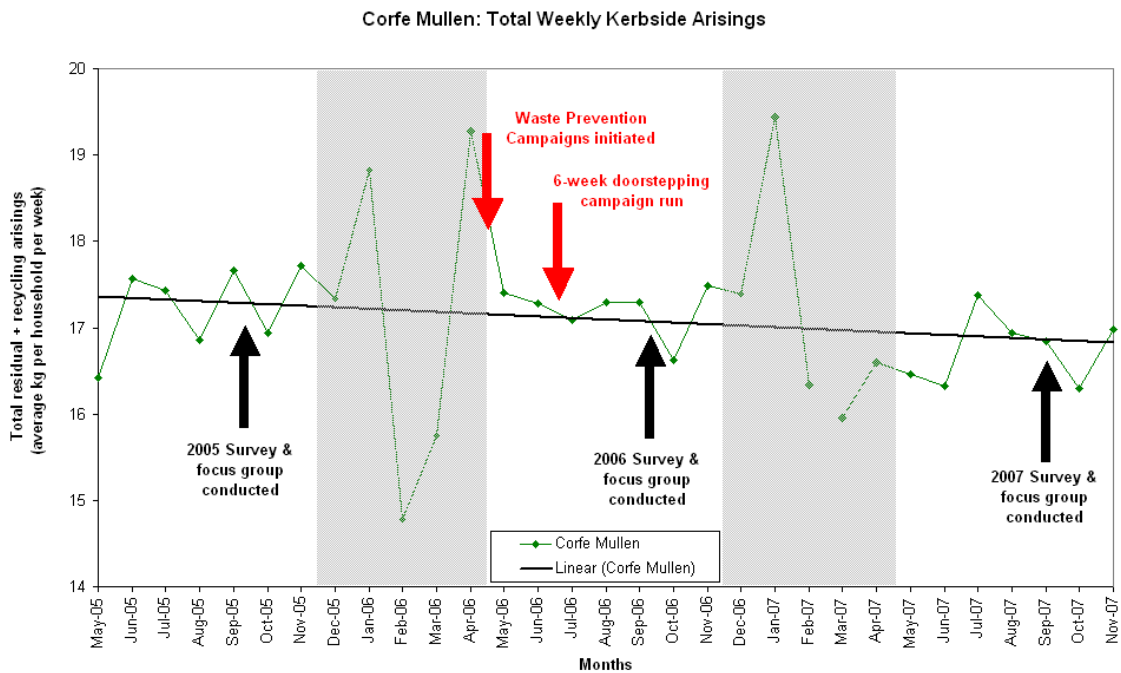


Corfe Mullen showed a sustained waste arisings fall of c.2.0% per annum since the campaign activities were launched in April 2006, whereas its control areas (Verwood and St Leonards-St-Ives) showed an increase in waste arisings¹.

The dedicated waste prevention campaign activity conducted in Corfe Mullen is most likely to be responsible for the average level of waste arisings per household per week falling by around 0.5kg per annum whereas the county-wide trend would have suggested a 0.5kg increase might otherwise have occurred.

However, the effective „matching“ of control and pilot areas, using socio-geodemographics, remains unresolved, i.e. perfect matching was not achieved. Furthermore, whilst there was an observable and quantifiable reduction in waste arisings in Corfe Mullen, this was set against a backdrop of sizable and difficult to quantify „background noise“, e.g. the effect of Christmas and Easter, media, and national campaigns. This background noise hinders the effectiveness of evaluation over the short term - see monthly trends in Corfe Mullen below.

¹ Direct comparisons with the control areas should be treated with caution as Corfe Mullen does not receive a brown bin collection.



Corfe Mullen received the most comprehensive intervention mix, e.g. Waste Reduction Pack, Junk Mail, Smart Shopping and doorstepping. The evaluation provides a measure of overall effectiveness of the entire intervention mix but cannot separate out the impact of individual campaign activity.

Whilst this was a challenging project to implement, much has been learned that will prove useful for policy-makers and local authorities. The key learning points are summarised in the short case example provided on Corfe Mullen.

Case Example: Corfe Mullen (the primary research area)

Background Noise. The evaluation in Corfe Mullen was set against a backdrop of sizable and difficult to quantify „background noise“. Much of this background noise was due to „external“ factors, i.e. those factors that were found to be beyond the influence of the local authority / delivery team. They included:

- Changing socio-economic factors and demographics, e.g. household size
- National, county-wide and local media coverage of waste-related stories
- National campaigns, e.g. WRAP’s Recycle Now and Home Composting
- Consumer-driven campaign activities, e.g. „no plastic bags“ or „junk mail“

This background noise was found to create both positive and negative fluctuations in waste arisings and reported behaviour.

Waste Collection Data. East Dorset District Council has captured and managed waste collection data since 2001. It is because this data was of such good quality, and collated over a sufficient period of time, that time series graphs could be derived for Corfe Mullen showing monthly averages of kerbside waste arisings per household.

Longitudinal Studies. By ensuring a sufficient period of evaluation time, i.e. 3 years, a distinct trend in the reduction of waste arisings in Corfe Mullen can be observed. This timeframe allowed for the short term fluctuations in waste arisings in Corfe Mullen to be separated from the overall trend.

The key lessons derived from this research (discussed in the main report) are:

- WRAP’s guidance on monitoring and evaluation of local schemes explicitly states that the use of control groups is not recommended due to the difficulties of successfully identifying appropriate control areas. This research has also shown that identifying control areas is challenging. However, we believe there is merit in this approach and that the lessons from this research should be taken on board in any future monitoring of waste prevention initiatives.

- The effective matching of control and pilot groups using geodemographic tools remains unresolved. Whilst there remain gaps in matching populations using geodemographic tools such as ACORN further exploration is required to determine: (a) whether such tools are suitable to provide the statistical robustness required to effectively match populations; (b) whether there are alternative techniques, e.g. segmentation models, that can provide the reliability and validity needed to match populations; and (c) to identify the best criteria upon which populations can (or should) be matched, e.g. using alternative profiles to socio-demographics such as values, lifestyle, behaviour.
- Waste collection data should be of sufficient quality and captured over a period of time to enable effective monitoring and evaluation. Very few local authorities collect and analyse individual collection round data to the same extent as was the case in East Dorset. This research has identified that local authorities need guidance to assist them in developing and / or improving their waste collection round data. Those local authorities that hold such data and have effective analysis systems in place should be identified as they have the potential to provide practical input and case study examples.
- Longitudinal studies are needed to understand fluctuations in waste arisings and reported behaviour generated by „background noise“. This research identified that the impact of background noise can be better understood when campaign monitoring is conducted over a sufficient period of time, i.e. at least over a three year period. This timeframe allows for short term fluctuations to be separated from the overall trend. In the case of this research, a cumulated fall (in average weekly arisings) was observed over the three years. It is unlikely that a reduction in household waste arisings, as was observed in Corfe Mullen, would have been revealed over a shorter timeframe.
- Conducting a proper „control and pilot“ approach can be resource intensive and costly. Certainly the cost-intensive nature of such research can be deemed prohibitive, as could the detailed methodology and monitoring expertise required, particularly for longitudinal studies such as undertaken by this study. This research has identified that a resource and cost-efficient approach is needed to provide potential economies of scale.

Project Report to Defra

8. As a guide this report should be no longer than 20 sides of A4. This report is to provide Defra with details of the outputs of the research project for internal purposes; to meet the terms of the contract; and to allow Defra to publish details of the outputs to meet Environmental Information Regulation or Freedom of Information obligations. This short report to Defra does not preclude contractors from also seeking to publish a full, formal scientific report/paper in an appropriate scientific or other journal/publication. Indeed, Defra actively encourages such publications as part of the contract terms. The report to Defra should include:
- the scientific objectives as set out in the contract;
 - the extent to which the objectives set out in the contract have been met;
 - details of methods used and the results obtained, including statistical analysis (if appropriate);
 - a discussion of the results and their reliability;
 - the main implications of the findings;
 - possible future work; and
 - any action resulting from the research (e.g. IP, Knowledge Transfer).
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Appendices (available as separate documents)

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1 Objectives

Municipal waste prevention² is a key component of EU, UK national and local waste policies, but has yet to achieve a fraction of its potential contribution to resource sustainability, climate change mitigation and cost reduction. A major constraint has been difficulty (both perceived and real) in monitoring and evaluating the effectiveness of waste prevention activities and campaigns.

1.1 An introduction to Dorset County Council and the Defra context

This research report, from Dorset County Council (DCC), summarises the objectives, methods used, results obtained and lessons learned from research funded by Defra's Waste Resources Evidence Programme (WR0116). The research monitored and evaluated various household waste prevention campaigns that form part of Dorset's implementation of its initial 5-year (2005-2010) Waste Reduction and Reuse Strategy³. The research was designed to evaluate the four waste prevention approaches detailed in „Section 4: Measurement of waste prevention impacts“ of the National Resource and Waste Forum (NRWF)'s Household Waste Prevention Toolkit, and contribute to five Programme Areas in Defra's original Waste and Resource Research and Development Strategy 2004/05 – 2006/07, <http://www.defra.gov.uk/environment/waste/residual/wrep/documents/rdstrategy.pdf>, namely: exploring techniques and methodologies for effective household waste prevention; understanding waste composition and trends; understanding pro-environmental behaviour and how to enhance it; development of tools and instruments to facilitate behaviour change; and performance measurement and benchmarking. The research study period spanned May 2005 to March 2008, beginning at a time when the NRWF Toolkit was completely untested and little known; ref: <http://www.nrwf.org.uk/Wasteprevention.htm>. It is important to note that this research was designed to learn more about how best to use the toolkit, rather than to prove it works in the form it was in back in 2005. However, refinements developed during and subsequent to this research could significantly improve the credibility of the techniques presented in the Toolkit. To date, this project remains the only attempt to systematically evaluate the Toolkit that has subsequently been updated and is available via the Waste and Resources Action Programme (WRAP) website: http://www.wrap.org.uk/applications/waste_prevention_toolkit

This summary report is supported by a series of appendices providing detail on the methodology and data analysis. In addition to this report, a short note is being produced which draws out useful lessons resulting from this research to help inform local authority policy and waste management activities.

The research was managed and delivered by a multi-disciplinary team comprising DCC, Mike Read Associates, AEA, The Social Marketing Practice, and The University of Northampton. A core research team was formed from representatives of all of these organisations. Details of the project team are included in Appendix 1.

1.2 Waste policy context and changes since 2005

This was designed as a 3-year research project, and it is noteworthy that over the period since the proposal was originally developed in 2004 the perspectives, interests and requirements of audiences for this work have somewhat changed and widened. Related research considered in the development of this study is outlined below and further detail can be found at Appendix 2.

- The Waste Strategy 2007 has been published which highlights waste prevention as a key theme and sets a new national target for England to reduce the amount of household waste not re-used, recycled or composted from over 22.2 million tonnes in 2000 by 29% to 15.8 million tonnes in 2010 with an aspiration to reduce it by 45% in 2020.
- New, important National Indicators for waste reduction in England have been derived:
 - NI191 highlights the role of waste prevention at the top of the waste hierarchy and states that *“Government wishes to see a year on year reduction in the amount of residual waste (through a combination of less overall waste and more reuse, recycling and composting of the waste that households produce)”*. The indicator is based on residual waste per household and monitors a local authority's performance in reducing waste that is sent to landfill, incineration or energy recovery. The greatest environmental benefits are to be gained from waste prevention and then from reuse, recycling and composting – each is given equal weight in the residual waste indicator.
 - NI192: Of the waste that is generated, as much as possible should be re-used or recycled, with higher levels of recycling and composting in an economically and environmentally efficient way. This indicator is measured by the amount of household waste reused, recycled and composted.

² The term „prevention“ is used in this report to include both reduction and reuse.

³ http://www.dorsetforyou.com/media/pdf/m/g/SR7FirstRevisionWasteReductionReuse_1.pdf

- In August 2008 the House of Lords Science Committee called on the Government to extend its efforts on waste reduction. The Committee's report, Waste Reduction⁴, calls on the Government to restructure local authority waste targets that currently focus on decreasing the weight of domestic waste sent to landfill.
- There has been an important strand of research in sustainable development policy towards pro-environmental behaviour. This evidence has increased understanding of influencing consumption behaviour. As a result, Defra has developed a new behaviour change framework (the 4Es Diamond Model – Enable, Encourage, Engage, Exemplify), and a new pro-environmental behaviours framework that provides seven new pro-environmental segments based on ecological world values and consumer purchasing behaviour⁵.
- There has been evidence emerging on waste management policy towards waste prevention behaviour from Defra's Waste Resources Evidence Programme. This includes – Modelling the Impact of Lifestyle Changes on Household Waste Behaviour (WR0107); Municipal Waste Growth: The Influence of Local Waste Policies (WR0121); and Project REDUCE Monitoring and Evaluation - Developing Tools to Measure Waste Prevention (WR0105) which investigated tools that measure specific waste prevention activities.
- There have been a number of initiatives launched by the Waste and Resources Action Programme (WRAP):
 - In April 2005, WRAP launched the national Recycle Now campaign in England and subsequently the Home Composting campaign, greatly increasing public awareness of waste management issues.
 - The Courtauld Commitment was set up by WRAP in July 2005 as an agreement between WRAP and the major retail organisations and leading suppliers. The Commitment will lead to new packaging solutions and technologies so that less rubbish ends up in the household bin. The agreement is a powerful vehicle for change and will result in reductions in packaging / food waste.
 - In November 2007, WRAP's „Love Food Hate Waste“ campaign was launched following substantive consumer research with further research published in 2008.
 - Since November 2007, WRAP has been directing its focus on waste prevention and commissioned further development to revise the NRWF Waste Prevention Toolkit as an interactive web-based tool.

The significant change in waste policy over the research period has massively raised the profile of waste management issues. Understanding waste prevention and how to measure it, therefore, has become of primary importance in meeting the challenge of waste management.

1.3 Specific objectives and the extent to which they have been met

The specific research objective was to trial and evaluate the four methods for monitoring the waste prevention approaches detailed in Section 4 „Measurement of Waste Prevention Impacts“ of the NRWF's Household Waste Prevention Toolkit. For each measurement trial, techniques were assessed against a set of criteria. This would highlight specific challenges that may require further investigation and facilitate the development of measurement and monitoring of waste prevention in other areas. A summary of the research objectives and the extent to which they have been met is provided in Table 1.

Table 1 Research Objectives		
Objective		Extent to which objectives were met
Objective 1: NRWF Approach „Tracking Waste Arisings“ (referred to as „Weight-based Monitoring“)	To analyse location and district-specific historic waste arisings, and relevant location-specific external factors. To establish baselines and pre-existing trends to guide choices of control areas, against which to measure the effectiveness of the different household waste prevention initiatives.	Residual, recycling and organic kerbside household waste arisings monitored in one pilot and two control areas over the 3 year period. See Sections 2.5.1 and 3.2.

⁴ Waste Reduction - Volume I: Report <http://www.publications.parliament.uk/pa/ld200708/ldselect/ldsctech/163/163.pdf>

Waste Reduction- Volume II: Evidence <http://www.publications.parliament.uk/pa/ld200708/ldselect/ldsctech/163/163ii.pdf>

⁵ A Framework for Pro-Environmental Behaviours, Defra (January 2008) <http://www.defra.gov.uk/evidence/social/behaviour/index.htm>

Table 1 Research Objectives		
Objective		Extent to which objectives were met
Objective 2: NRWF Approach „Using a „Control“ Area“ (referred to as „Control and Pilot Areas“)	To analyse demographic, economic and waste collection data to guide selection of a matched control and pilot areas. These to guide selection of the individual and combinations of waste prevention initiatives (then to be subject to detailed measurement, monitoring and assessment, on a credible, local scale in Objective 3).	A total of 12 areas were selected in Dorset and monitored following careful socio-economic and demographic profiling. There were 5 pilot and 7 control areas. See Sections 2.1, 2.3, 2.4 and 3.1.
Objective 3: NRWF Approach „Measuring Specific Activities“ (referred to as „Measuring Campaign Activities“)	To investigate a range of techniques for monitoring and evaluating alternative household waste prevention initiatives, alongside WRAP’s monitoring of home composting initiatives in Dorset. To be undertaken through validating proposals set out in the NRWF Toolkit, and as elaborated in Dorset’s five year Waste Reduction and Reuse Strategy. (Note: this research set out to measure changes in the uptake of desired behaviours in response to a localised waste prevention campaign. It did not set out to validate the accuracy of specific calculations within the NRWF Toolkit.)	A number of waste prevention initiatives were monitored including junk mail, Smart Shopping and home composting. Monitoring techniques included number of Mailing Preference Service (MPS) registrations, home composting bin sales, results from doorstepping activity, distribution of Waste Reduction Packs etc. Surveys of attitudes before and after specific event activity were also conducted. See Sections 2.5.2 and 3.3.
Objective 4: NRWF Approach „Declared Awareness and Behaviour“ (referred to as „Surveys and Focus Groups“)	To investigate socio-demographic factors which may affect performance of waste prevention initiatives, including marketing and other techniques to address these, such as Dorset’s Waste Prevention Pack, and doorstepping.	A survey of 3,000 households was undertaken each year to gather and evaluate quantitative data. This was supported by 3 annual focus groups to gather resident views in the primary pilot areas. See Sections 2.5.3, 3.4 and 3.5.
Objective 5	To undertake a scoping study for national waste prevention „network“.	A Scoping Study was completed and results presented to Defra recommending a new network. Reported on separately in Appendix 10.

Objective 2 (the use of control and pilot areas) is the core research objective. This was supported by three research techniques – weight-based monitoring (Objective 1), campaign activities (Objective 3), and surveys and focus groups (Objective 4). Figure 1 shows how the research objectives are presented in this report. More detail on each research objective is provided in Section 2 (Methods and Results) and Section 3 (Reliability of Results). Subsequently, an additional objective (Objective 5) was added to carry out a scoping study for a national waste prevention network. This is reported on separately in Appendix 10.

Figure 1: Representation of Research Objectives

CONTROL & PILOT AREAS (Objective 2)		
RESEARCH TECHNIQUES	TARGET AREAS	
	CONTROL	PILOT
Weight-Based Monitoring (Objective 1)	St Leonards-St Ives Verwood	Corfe Mullen
Campaign Activities (Objective 3)	No activity	Corfe Mullen and all pilot areas
Surveys and Focus Groups (Objective 4)	Surveys in all controls	Surveys in all pilots Focus groups Corfe Mullen

2 Methods and Results

2.1 Using control and pilot areas

Because there can be many influencing factors in measuring changes to waste arisings, the NRWF Toolkit proposed isolating the impact of the waste prevention programme as far as possible. This meant measuring changes to waste arisings using control⁶ areas. The control areas are used to compare progress against other areas, i.e. pilot areas, which are targeted with waste prevention campaigns. The Toolkit suggested that a control area should be representative in terms of the mix of housing stock, deprivation indices, or mix of ACORN⁷ categories. The control should ideally have no changes to waste management service provision during the assessment period, e.g. recycling collections. The key requirement is to choose one typical area as the control and establish a baseline in that area and in the pilot areas. Waste prevention interventions, e.g. campaigns, are then applied in all pilot areas except the control as far as possible. Using a parameter such as waste arisings per household per year, baselines for each control and pilot are compared with figures during and after the intervention/s. The comparative monitoring of pilot areas against the control enables an assessment of any differences due to waste prevention campaigns to be identified.

This ambitious research set out to rigorously apply the “control” technique to waste prevention over a three-year period by identifying control populations that were as similar as possible to pilot populations. From this control and pilot areas were derived for research. The aim was to evaluate the impact of waste prevention campaigns and distinguish the extent to which any changes in waste prevention behaviour were attributable to the campaign or to other influencing factors. This project developed a simple, three-step process to maximise the effectiveness and credibility of the control and pilot approach:

Step 1: To ensure the closest practicable match between control and pilot populations by:

- Assessing geodemographic profile similarity;
- Identifying a number of key factors to be used to assess potential similarity of areas.

Further details of the work undertaken under Step 1 are described below (Sections 2.2 and 2.3) with additional information on the processes provided in Appendix 4.

Step 2: To assess which of the factors, *that could not be influenced or matched*, have had the greatest impact on observed differences between the study populations. *Details are provided in Section 3.4 with additional data in Appendix 4.*

Step 3: To use appropriate techniques to compensate for factors identified in Step 2 in subsequent analysis of results. *Details are provided in Section 3.4 with additional data in Appendix 4.*

2.2 Determining „matched“ control and pilot area demographic profiles

Finding populations with a high degree of similarity was thought to be essential so that any observed differences in waste prevention behaviour could be justifiably attributed to campaign activity. Where differences between control and pilot populations were apparent, it was important to explore whether „weighting“ factors could be used to compensate for observed differences and to avoid having to discard survey response data. The use of geodemographic tools, such as ACORN, was identified in the NRWF Toolkit as key to determining similarities for the selected control and pilot study areas.

ACORN was selected as the tool to establish similarities between control and pilot areas using geodemographic profiles and was chosen solely on the basis of cost. The only alternative geodemographic tool reviewed at the time was Mosaic, however, the costs were deemed to be too prohibitive⁸. Both tools are geodemographically based containing the same raw Census data, the differences being the “input” variables that are derived from their individual survey data and, as such, are purported to increase performance levels and provide each with its competitive advantage (see Appendix 3). There is however no designated method by which the „accuracy“ of either product (in representing specific, local populations) can be measured in absolute terms. Users of either tool tend to have their own preferences, but none are able to provide quantifiable evidence to support those preferences. ACORN tends to be the preferred tool of many local authorities but this is thought to be a historical tendency.

⁶ WRAP defines a control area as “an area that is used for comparative purposes to assess the degree of change as a result of an intervention. (In the context of participation monitoring) a control area would be part of the authority in which no awareness campaigns have run or no scheme improvements have been made. Controls are most often used in scientific experiments where, for example, one group of people is given a drug while the other is given a placebo.”

⁷ A Classification of Residential Neighbourhoods, see <http://www.caci.co.uk/acorn/>.

⁸ Costs for these tools are not available for publication due to the bespoke nature of their use and commercial sensitivities of the companies involved.

ACORN is part of a “family” of geodemographic segmentation tools. All geodemographic tools are based on census data, and as such profile local areas not people. However, they are commonly used both ways round, to describe an area or a type of population that lives there. They divide people up according to demographic variables and many also include socio-economic variables like social class and income. These are combined with geographic variables giving a population’s physical location. This method results in clusters of people based on gender, age, house type and tenure that can also be identified by their physical location (e.g. by their postcode). Such tools are often combined with many layers of customer information or survey responses. ACORN is made up of 57 "Types", 17 "Groups" and 5 "Categories". Further detail on the use of ACORN and other similar tools is provided in a short paper provided at Appendix 3.

It is not known whether such tools have been used before to try and select matched control and pilot areas for the purposes of identifying differences in public behaviour (towards sustainable waste management practices).

2.3 Key factors used in the selection process for control and pilot areas

Considerable effort was expended in the initial phases of the research to determine the choice of control and pilot areas in Dorset for this study. In order to assess the potential similarity, and therefore suitability, of „matched“ control and pilot areas, a list of influencing factors that might impinge differentially upon them was developed by the research team. These factors can be broadly classified under three headings: socio/geodemographic factors, waste management service delivery infrastructure, and other factors. These are detailed in Table 2 and were the initial factors considered in the research design. Other influencing factors were identified during the course of the research and these are discussed in Reliability of Results (Section 3).

Table 2 Influencing factors that might impinge on ‘matched’ control and pilot areas	
<p>Socio / geo - demographic Factors</p> <p><i>These are typically static over the short-term, can be observed, but not managed.</i></p>	<ul style="list-style-type: none"> • Average household size. • Average garden size. • Degree of daily occupancy, e.g. holiday homes, retirement homes, proportion of people „working from home“, number of „housewives“, etc. • Demographics of occupants (age and gender), e.g. families with children; students; retired pensioners, etc. • Type of home ownership, e.g. owned, rented, council housing. • Type of property, e.g. detached house, flat, bungalow, etc. • Local affluence / level of household deprivation. • Number of residents in full-time employment.
<p>Waste Management Service Delivery Infrastructure</p> <p><i>These are typically static over the short-term and can be managed.</i></p>	<ul style="list-style-type: none"> • Residual waste bin size. • Availability of kerbside recycling and / or green waste collection. • Regularity of collection services. • Proximity to Civic Amenity Site. • Proximity to Bring Sites. • Home composting bin distribution.
<p>Other Factors</p> <p><i>These are typically highly variable over the short-term, some can be managed, others not so.</i></p>	<ul style="list-style-type: none"> • Exposure to sustainable waste management communications, for example: <ul style="list-style-type: none"> ○ localised incentive schemes, e.g. free compost bin distribution, ○ door-knocking campaigns, e.g. to promote the Mailing Preference Service (MPS), ○ schools activities, e.g. households with children attending schools with waste related curricula activities, ○ supermarket activities, e.g. re-useable bag promotions, take back schemes, etc., and ○ local community / voluntary group activity, e.g. „give and take“ days. • Proximity to local charity shops, e.g. collecting unwanted clothes / toys. • Localised free newspaper (and flyers) distribution.

The key factors used in the selection process for control and pilot areas were:

- **Socio/geodemographic factors:**
 - Close similarity of socio/geodemographic profile as indicated by ACORN categories.
- **Waste management service delivery infrastructure:**
 - Close similarity of waste management provision (e.g. recycling facilities and their proximity) over at least two years prior to the commencement of the study.
 - Confidence in the continued close similarity of waste management provision over the lifetime of the study.
- **Other factors:**
 - Similarity in proximity of supermarkets, schools, etc. that might influence waste prevention behaviour.
 - Where possible, existence of accurate waste arisings data for at least two years prior to the commencement of the study.

Further detail on the selection of these initial and other factors is provided in Section 3 and Appendix 4.

2.4 Selecting the control and pilot areas

The research team identified 18 measurable potential areas, i.e. refuse collection rounds, comprising households within individual residual waste collection rounds in Dorset that fulfilled the majority of the selection criteria described in Section 2.3⁹.

The 18 areas were mapped against ACORN profiles and compared with each other in an attempt to identify potentially similar (demographically matched) areas. The results were analysed and captured in a correlation matrix – the details are provided in Appendix 4. A probable short-list of 12 candidate areas that might be used in this study was identified. These candidate areas were then assessed with respect to the other key factors (outlined in Section 2.2) such as their proximity to Dorset waste management facilities (see Dorset Waste Management Map in Appendix 4). The final 12 areas were chosen following analysis of specific socio-demographic factors and each was assigned to one of five „control and pilot“ groups¹⁰. Detailed graphs of the factors analysed for all five groups are included in Appendix 4. Each of these groups consisted of one or two „control“ locations and one „pilot“ location. The final selection of matched control and pilot areas is shown in Table 3.

Table 3 Selected Control and pilot Areas	
Pilot Area	Control Area/s
Corfe Mullen (<i>Primary Research Area</i>)	St. Leonards and St Ives ¹¹ ; Verwood
Beaminster	Lyme Regis
Swanage	Wareham
Sturminster Newton	Stalbridge
Dorchester East	Sherborne; Shaftesbury

2.4.1 Selection of Corfe Mullen as the Primary Research Area

The Corfe Mullen pilot area was selected as the primary research area where a number of waste prevention campaigns could be initiated because:

- East Dorset was the only area that recorded detailed waste collection round data of sufficient quality to enable analysis of weight-based monitoring data for the control and pilot group. This comprised Corfe Mullen as the pilot area and the control areas of Verwood and St. Leonards-St. Ives.
- A limit upon the availability of DCC Waste Reduction Team staff resources meant that activities in the four other pilot areas had to have a limited and specific waste prevention focus. This had the additional benefit of assessing some individual campaigns in isolation to the primary research area of Corfe Mullen (i.e. where multiple campaigns were instigated).

Further details of campaign activities are discussed in Section 2.5.2 (Measuring campaign activities).

⁹ Approximately 76 residual waste collection rounds operate in Dorset.

¹⁰ See Appendix 4 – Chosen Area Correlations.

¹¹ Despite its name „St Leonards and St Ives“ is effectively one location, referred to hereafter as „St Leonards-St Ives“ for clarity.

2.5 Research techniques

The control and pilot area approach (Objective 2) was used to monitor and evaluate the following research techniques (with Corfe Mullen as the prime focus):

- Weight-based Monitoring (Objective 1)
- Measuring Campaign Activities (Objective 3)
- Surveys to determine declared awareness and behaviour (Objective 4)

In addition three, annual Focus Groups were held in Corfe Mullen (contributing to Objective 4) to provide formative insights on resident attitudes and behaviours to waste prevention and thereby help inform the choice of campaigns that might have the most impact.

2.5.1 Weight-based monitoring (in Corfe Mullen)

Objective 1 of this research was to quantify a reduction in waste tonnage as a result of implementing waste prevention campaigns in the selected pilot areas. The key performance indicator chosen for this assessment was the “weight of waste collected at the kerbside from households”. This meant that baseline weight data and ongoing monitoring was required to identify any changes in waste arisings for both the pilot subjected to the campaign and its control areas.

The ideal choice of areas for monitoring was determined by specific residual waste collection rounds -where the data recorded related directly to around 1,700 households in any one local area. The requirement for a baseline and ongoing measurement of specific collection round data on a weekly basis narrowed the choice down to areas within East Dorset District Council Waste Collection Authority. Here data had been accurately recorded in this way since April 2001. In combination with the detailed assessment of other socio and geodemographic factors (outlined in Section 2.2), the final choice of areas for weight-based monitoring was:

- Pilot: Corfe Mullen, Residual Waste Round 3 - Friday (covering 1,682 properties).
- Control 1: St. Leonards-St. Ives, Residual Waste Round 4 - Wednesday (covering 1,745 properties).
- Control 2: Verwood, Residual Waste Round 8 - Tuesday (covering 1,749 properties).

Secondary waste impacts

Recognising that a waste prevention campaign might also affect householder *recycling* and *composting* behaviour (and therefore the quantity of those materials being collected at the kerbside), monitoring of waste arisings was extended to include dry recyclables and organic waste (brown bin) kerbside collections. This was also necessary due to differences in waste collection service between the control and pilot areas. A brown bin, kerbside organic waste collection was introduced in March 2004 in Verwood and in November 2004 in St. Leonards-St. Ives, however no organic waste is collected at the kerbside in Corfe Mullen. Combining data from all household kerbside arisings for each area allows an assessment of the impact of waste prevention initiatives in the pilot area, relative to the control areas.

Table 4 illustrates the collection services in the three locations. It shows that the difference between Corfe Mullen (pilot area) and Verwood and St. Leonards-St.Ives (control areas) is that Corfe Mullen does not have a brown bin collection service. It is important to note that the collection service for these three areas was consistent throughout the data collection stage (May 2005 to November 2007).

Area	Pilot / Control Area	Residual waste collection	Dry recycling collection	Organic waste collection (brown bin)
Corfe Mullen	Pilot	✓	✓	x
Verwood	Control	✓	✓	✓ (Mar 04)
St. Leonards-St.Ives	Control	✓	✓	✓ (Nov 04)

Monitoring issues

A monitoring difficulty that had to be addressed was the difference in geographical coverage of recycling, organic waste and residual collection rounds and the need to establish representative data for all three metrics for households within the chosen control and pilot areas. Additional monitoring was therefore needed to encompass recycling rounds that were *within* the selected residual waste collection areas and representative organic waste collection rounds covering the two control areas. In Verwood, for example, three separate organic collection rounds overlaid the chosen recycling and residual collection round area so all three were monitored so that the average arisings could be calculated.

Monitoring process

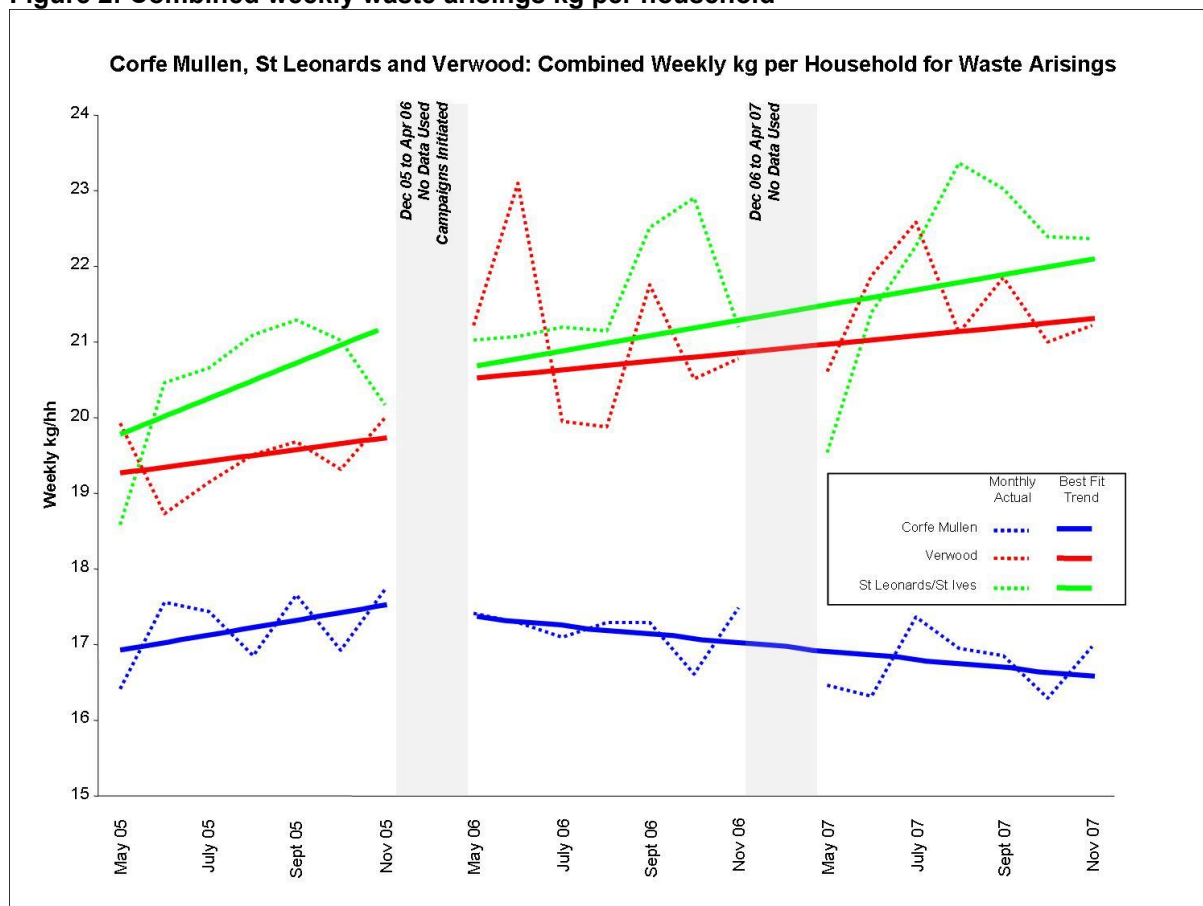
Maps of the final chosen residual and recycling collection rounds are provided in Appendix 5.

- Pilot: Corfe Mullen, Recycling Round 4 – Tuesday (675 properties)
- Control 1: St. Leonards-St. Ives, Recycling Round 37 – Monday (656 properties)
- Control 1: St. Leonards-St. Ives, Brown Bin 2 – Wednesday (1,454 properties)
- Control 2: Verwood, Recycling Round 48 – Thursday (605 properties)
- Control 2: Verwood, Brown Bin 1 – Wednesday & Thursday; Brown Bin 2 – Friday (4,705 properties)

This area of the research programme focused specifically upon tracking changes in kerbside arisings determined through the analysis of individual collection round data. The primary research area of Corfe Mullen and its two control areas are all situated in East Dorset District Council (EDDC). The EDDC waste management team had been maintaining electronic records of weighbridge ticket data, based on individual collection vehicles, since April 2001. As such the research team had the ability to interrogate monthly data for individual collection rounds and then plot time series graphs showing the monthly average of weekly (kerbside collected) arisings of residual waste and recyclables (and organic waste for the control areas) per household.

Monthly averages of the total kerbside household waste arisings collected per household per week in Corfe Mullen and its two control areas are presented, for the months May to November from 2005 to 2007, in Figure 2. It should be noted that waste prevention campaign activity was initiated in Corfe Mullen in April 2006. The data presented excludes the Christmas and Easter holiday period months (December to April) to provide a clearer picture of underlying data trends and to remove the bias associated with seasonal fluctuations created by „double waste collections“ around Bank Holidays and the increased volume of waste annually associated with those holiday periods¹².

Figure 2: Combined weekly waste arisings kg per household¹³



Results from Weight-Based Monitoring

Figure 2 indicates an increase in combined kerbside waste arisings in all three areas of between 3.5% and 6.5% per annum prior to the start of campaign activities in Corfe Mullen. Corfe Mullen then shows a sustained fall of c.2.0% per annum over the following two years, whereas the control areas continue to show an increase in waste arisings. Direct comparisons with the control areas should be undertaken cautiously as Corfe Mullen does not

¹² See Appendix 5 and Section 3.2 for further details.

¹³ A separate brown bin collection operated in the two control areas over the whole monitoring period collecting garden and food waste and cardboard, therefore overall arisings are higher in those areas compared to Corfe Mullen.

receive an organic (brown bin) kerbside collection. The increase in waste arisings in the controls is consistent with a county-wide average increase of c.2% per annum. The results show:

- A clear waste reduction trend in Corfe Mullen in the weight of total weekly waste arisings per household collected from the kerbside (after the date that waste prevention campaign activity was initiated in April 2006).
- The level of waste reduction observed in the Corfe Mullen data, over the course of a year, is in the order of 0.5kg per household per week, i.e. ~2% per annum.
- Over the same monitoring period the control areas show a continued increase in waste growth of around 0.5kg per household per week.

Although it has not been possible to determine specific levels of statistical confidence in the weight based monitoring data and analysis, the results imply that:

The dedicated waste prevention campaign activity conducted in Corfe Mullen is most likely to be responsible for the average level of waste arisings per household per week falling by around 0.5kg per annum whereas the county-wide trend would have suggested a 0.5kg increase might otherwise have occurred.

The results obtained in Corfe Mullen demonstrate the importance of recording not only levels of residual waste collected but also the secondary waste impacts outlined earlier, i.e. recycling round data and organic waste collections if they are offered to residents. If there is an increase in recycling activity in an area then there is likely to be a corresponding decrease in levels of residual waste, whilst overall arisings would remain fairly constant. The results for Corfe Mullen (presented in more detail in Appendix 5) illustrate a more significant fall in residual waste than the increase in recycling and therefore a fall in overall arisings. However, in the control areas of Verwood and St. Leonards-St Ives, a smaller fall in residual waste and slightly higher increase in recycling resulting in gradual waste growth is observed. This growth is further exacerbated in the control areas by increased collection of organic waste at the kerbside over the three year monitoring period despite there being no change in the service delivery.

It is important to note that certain waste prevention activities, such as reducing junk mail (paper) and home composting, are likely to result in reduced levels of collection of recyclable and compostable materials at the kerbside as opposed to simply reducing residual waste quantities. Therefore monitoring of all three metrics is necessary to evaluate potential campaign impacts.

Taking the above issues into account, there is still an observable and quantifiable reduction in waste arisings in Corfe Mullen compared to its control areas Verwood and St. Leonards-St Ives.

2.5.2 Measuring campaign activities

DCC's Waste Reduction Team maintained records of all waste prevention campaign activities conducted. The majority of this data identifies „outputs“ (e.g. number of junk mail flyers distributed) as opposed to direct waste prevention „outcomes“ (i.e. tonnes of avoided waste per household). The tracking of waste arisings (outlined in Section 2.5.1) has provided a measure of success based on „outcomes“ whereas the „output“ data provides an indication of the degree of interest Dorset residents have expressed in waste prevention issues.

Waste prevention initiatives were rolled out, including doorstepping, roadshows, stands at carnivals and work with school children¹⁴, as set out in Dorset's five-year Waste Reduction and Reuse Strategy¹⁵. Table 5 provides an outline of the key campaign activities and the reason for their choice.

Table 5 Pilot Areas Campaign Activities		
Pilot Area	Primary Campaign Activities	Reason for Choice
Corfe Mullen (Primary Research Area)	Waste Reduction Pack Junk Mail Smart Shopping	Good waste collection data and as a result received the most comprehensive activities
Beaminster	Home Composting	To raise home compost bin sales and provide guidance on home composting
Swanage	Smart Shopping	Had a high concentration of retailers providing more opportunity to work with local businesses compared to other pilot areas

¹⁴ See Appendix 6 for full listings of activity in pilot areas.

¹⁵ http://www.dorsetforyou.com/media/pdf/m/q/SR7FirstRevisionWasteReductionReuse_1.pdf

Sturminster Newton	(Furniture) Re-Use	Presented an opportunity to work with the community sector and ensure consistency in waste prevention messages
Dorchester East	Junk Mail Waste Reduction Pack	Postcodes (used to monitor MPS registrations) were clearly defined within the town border rather than covering a wider area as was found in other pilots

Progress and data were captured and recorded on the following campaign activities:

- **Doorstepping** - face-to-face campaign visit reports.
- **Mail Preference Service** - registrations with the MPS (including the baseline number of MPS subscribers prior to any campaign activity).
- **Waste Reduction Packs** - distribution of waste reduction packs, jute bags, re-use directories, etc.
- **Home Compost Bins** - records of home composting bin sales.
- **Events** - dates and location of events and activities (e.g. roadshows, school assemblies, competition and fun day etc) including levels of participation (e.g. number of pledges / attendance levels at events).

Corfe Mullen, as the primary pilot area, received the broadest range of campaigns, and efforts were made to record the impact of these activities. These included promotion of the waste reduction packs (leading with the junk mail message), Smart Shopping, and an intensive doorstepping campaign which included sign up to the Mailing Preference Service. It is these efforts that received the most reporting coverage. However, where data exist from other areas, this is also highlighted and full details are provided in Appendix 6.

Doorstepping (in Corfe Mullen only)

Householder interest in a range of waste prevention measures was monitored through doorstepping in Corfe Mullen. The results of 1,287 individual visits were recorded over a 6-week campaign period. There was a high take up of waste reduction packs (86%) and nearly 40% of residents signed up to the MPS service. The results showed a high level of residents interested in the waste prevention guidance (97%) promoted at the doorstep. It is recognised that some of these results do not guarantee a direct impact upon residual waste arisings, for example, the guidance issued may not have been followed. A summary table of the doorstepping results and a report from the waste prevention team who carried out the 6-week campaign is provided in Appendix 6. Useful lessons for local authorities is provided in a separate guidance document.

Mailing Preference Service registrations (Dorchester and Corfe Mullen)

The project sourced registration data from the MPS, initially to derive a baseline and then on a monthly basis to monitor the number of households continuing to register. This data provides an opportunity to calculate the percentage number of households that are registered with MPS in a selected control and pilot area. This provides an indication of the relative success of a dedicated „junk mail“ campaign. A summary table of pre- and post-campaign MPS registration data for selected areas is included in Appendix 6.

The data show a near doubling in the percentage of registrations in the Dorchester (DT1 postcode district) pilot area (from 12.5% „pre“ to 24.3% „post“) consistent with MPS being the focus of waste prevention campaign activity in that pilot area – an improvement of 95.4%. Corfe Mullen (BH21) also performs well, showing a 55.5% increase in comparison to its control area (BH22 – St Leonards) of 47.1%¹⁶. Additional MPS data obtained indicates the average regional increase over the same timescale was around 45% (illustrated in the map contained in Appendix 6).

Waste Reduction Packs (all pilots with key focus in Corfe Mullen)

The Dorset „Waste Reduction Pack“ was produced to support a range of campaign activities. Leaflets were designed so that the resident could take the whole pack or any number of the leaflets. The reduction pack was promoted in the pilot area of Dorchester but also as part of the campaigns in Corfe Mullen. An example of the pack, details of attendance at events and literature distributed (between February and December 2007), are provided in Appendix 6. Junk mail leaflets proved to be the most popular component of the pack.

Compost bin sales (Beaminster and Corfe Mullen)

Home composting activity has perhaps the most significant potential to reduce the amount of household waste requiring treatment or disposal by a local authority. Efforts were made to provide information to residents not only on the availability of subsidised home compost bins from WRAP but also to provide guidance on how to home compost successfully. Efforts were focused on the pilot areas of Beaminster and Corfe Mullen but it is important to note that households in both Beaminster and Lyme Regis (an intended control area) were issued with compost bin offer leaflets in March 2006 due to local waste management policy decisions that were outside the influence of the research team. In this respect the pilot areas for home composting campaigns were Beaminster, Lyme Regis and Corfe Mullen with the other 9 areas acting as the control areas.

¹⁶ Although not clarified, there were also increases in MPS registrations in the control areas.

Data, sourced from WRAP, made it possible to assess levels of compost bin sales to households across Dorset over the three-year monitoring period. Examination of this data showed some success in targeted promotional activity to encourage households to compost more of their biodegradable waste at home. The summary results for all areas are presented in Appendix 6 with a „compost bin sale rate per 100 households“ used to assess relative uptake in areas of differing size.

The impact of the home composting campaign activity in 2006 is apparent, particularly in Beaminster where the rate jumps from 2 to nearly 12 compost bin sales per 100 households and in Lyme Regis, increasing from 3 to nearly 9. Compost bin sales peaked at nearly 10 per 100 households in the Corfe Mullen pilot area in 2006.

Promotional events (all pilot areas with key focus in Corfe Mullen)

In an attempt to measure the impact of waste prevention campaigns such as „Smart Shopping“ and „Junk Mail“, a brief „pre“ and „post“ survey was conducted in the Dorchester area. The results are presented in the graph in Appendix 6 and appear to be encouraging, showing a large increase in MPS registrations following campaign activity, and a greater proportion of people using their own shopping bags and „often/sometimes“ buying second hand goods. However, it is acknowledged that the scale of this survey was small (with 111 and 42 responses recorded pre- and post-campaign respectively)

The results do not guarantee waste prevention has occurred, they are simply „declared“ changes in behaviour. Much of the data recorded from doorstepping, events and roadshows comprised „number of information packs“ and „leaflets issued“ to encourage waste prevention, rather than specific measures of success in reducing waste.

2.5.3 Surveys and focus groups

Quantitative and qualitative research was conducted to establish:

1. a declared awareness and behaviour baseline for year 1 (September 2005),
2. the change in declared awareness and behaviour in subsequent years (September 2006 and 2007).

The research techniques used were as follows:

- Questionnaire-based, door-to-door surveys in each of the twelve areas, acting as a quantitative measure of reported awareness and behaviour.
- Focus groups in Corfe Mullen. These were used to provide more detailed insights on resident attitudes and behaviours to waste prevention.

Quantitative survey

A total of 3,000 households were surveyed at the doorstep each year, comprising 250 households in each of the twelve areas according to a pre-defined representative profile of ACORN categories. The sample size of 250 was chosen as the best compromise between cost and the desired level of confidence in the results (which is sometimes referred to as statistical significance).

The survey (see Appendix 7) was designed at a time when there was little survey experience to draw from that specifically addressed waste prevention behaviour. The survey questions, therefore, were derived from work undertaken on home composting in Wiltshire, the behaviours from the NRW Toolkit, and the behaviours required to deliver the Dorset Waste Prevention Strategy, e.g. home composting, junk mail, waste aware shopping.

To enable direct year-on-year comparison, exactly the same questionnaire was used each year, bar some minor additions made for 2006 that were carried through into 2007. The survey was conducted via doorstep interviews. These were deemed essential instead of postal surveys and were used to ensure sufficient responses were obtained, ACORN representation, and to avoid self-selecting samples.

After Year 1, to ensure the closest match in year-to-year samples, quotas were given for male and female respondents. The survey team could randomly select households within the designated area as long as gender and socio-demographic quotas were met. Further detail on the survey process is provided in Appendix 7.

Aggregated results (from the twelve areas)

The doorstep questionnaire produced substantial data. The results are shown in Appendix 7. The combined results show a slow but steady rise in reported recycling from 2005 to 2007, but virtually no variation in reported home composting, choice of environmentally friendly or secondhand goods or use of washable nappies. A slight decrease in reported composting of garden waste appears to be balanced by a slight increase in reported composting at home for kitchen waste and cardboard. There was a slow but steady increase in those reporting *always* thinking about reducing waste whilst shopping, although there was also an increase in those reporting they never think about reducing waste whilst shopping.

A small *increase* was shown in those *reporting* taking action to reduce junk mail, avoiding over-packaged goods, buying recycled goods, considering buying used/refurbished goods, and a very small increase in reported buying in bulk to reduce waste or donating to a charity shop. However this was in some ways balanced by *decreases* in reported use of refills to reduce waste, buying from a charity shop, borrowing books from a local library or recent hiring, borrowing or sharing of equipment. There was a substantial *increase* in reported use of reusable shopping bags. There was little change in those indicating a willingness to donate surplus equipment to a reuse centre or participating in „Give and Take“ days.

Results from the pilot areas

Results show a local variation in responses from the above combined results as well as year-to-year. These differences are difficult to interpret (see Section 3.4) and may to some extent reflect small sample sizes or simply variations in survey times or surveyor techniques.

Corfe Mullen - Comparing Corfe Mullen (as the primary pilot area) to the other pilots reveals a greater than average rise of reported recycling, buying secondhand goods, donating to a charity shop, taking action to reduce junk mail or using washable nappies. Also shown is an increase in hiring, borrowing or sharing equipment (against a drop across Dorset). However Corfe Mullen also shows a drop in purchase of recycled goods, or willingness to donate to a reuse centre, a slight drop in choosing of environmentally friendly goods and buying in bulk, and a greater than average drop in composting of garden and kitchen waste and cardboard, and willingness to participate in „Give and Take“ days. The findings suggest:

1. Doorstepping and events (particularly 2006) seemed to have an impact on changing attitudes. However, the drop in reported recent purchases etc in 2007 highlights the need for long term and expanded campaigns to support behaviour change.
2. Data from the MPS highlighted a greater number of registrations that, in part, was due to sign-ups at the doorstep and at events. The Junk Mail campaign was popular and provided a relatively easy, one-off, behaviour to address.
3. The home composting advice was predominantly overshadowed by the countywide WRAP Recycle Now campaigns and marketing literature.
4. Results from collection round data, reflecting actual householder behaviour, suggests that campaign activities have reduced residual waste more than in the control areas.

Beamister (home composting) – There were considerable increases in responses to recycling in the two years that followed the baseline year. However, the control area showed similar results. Reported behaviour indicated above average participation in home composting compared to all other areas. The results also suggest that those home composting were composting more kitchen waste. This is likely to have been stimulated by WRAP home composting activities in the area.

Swanage (Smart Shopping) – Responses to the first year survey highlighted a higher than average response to those considering Smart Shopping, but fewer people considering buying less packaged goods. Responses to using reusable shopping bags showed a yearly increase in line with other areas. A greater number of responses in the pilot area reported the need for more information on packaging reduction than in the control area. Community-based activity in the control area resulted in difficulties measuring the impact of the Swanage campaign activities.

Sturminster Newton (furniture re-use) – Overall, reported recycling participation was relatively low. In the first year, there was a below average response to buying reused or refurbished goods. However, this significantly increased over the three years beyond the Dorset average. This may be due to promotion of the Furniture Reuse Centre during 2007 in partnership with the project.

Dorchester (junk mail) – The new furniture reuse centre and increasing number of charity shops may have impacted on above average attitudes in Dorchester to buying second hand and refurbished goods. The reported action on junk mail was low in comparison to the control areas particularly when data from MPS reported to the contrary. Reported recycling attitudes stayed the same over the three years.

Focus groups

Focus groups were held – one each year, in Corfe Mullen. Residents were recruited from within the survey area. The first focus group (in 2005) aimed to establish residents' general attitude to waste prevention and identify ideas for subsequent campaign activities. Two further focus groups (2006 and 2007) aimed to gain insight to developing targeted campaign activities and to see whether attitudes had changed in following years. A short discussion on the results from the focus groups is given below. A summary and full focus group reports are available at Appendix 8.

The focus groups identified the following issues and actions for Corfe Mullen:

- Unwanted items; The Re-Use Directory was developed and issued to householders.
- Work closely with schools; A programme of work with young children and schools was developed.
- Complementary messages with energy efficiency and water reduction; A series of „Money Saving Days“ was delivered.

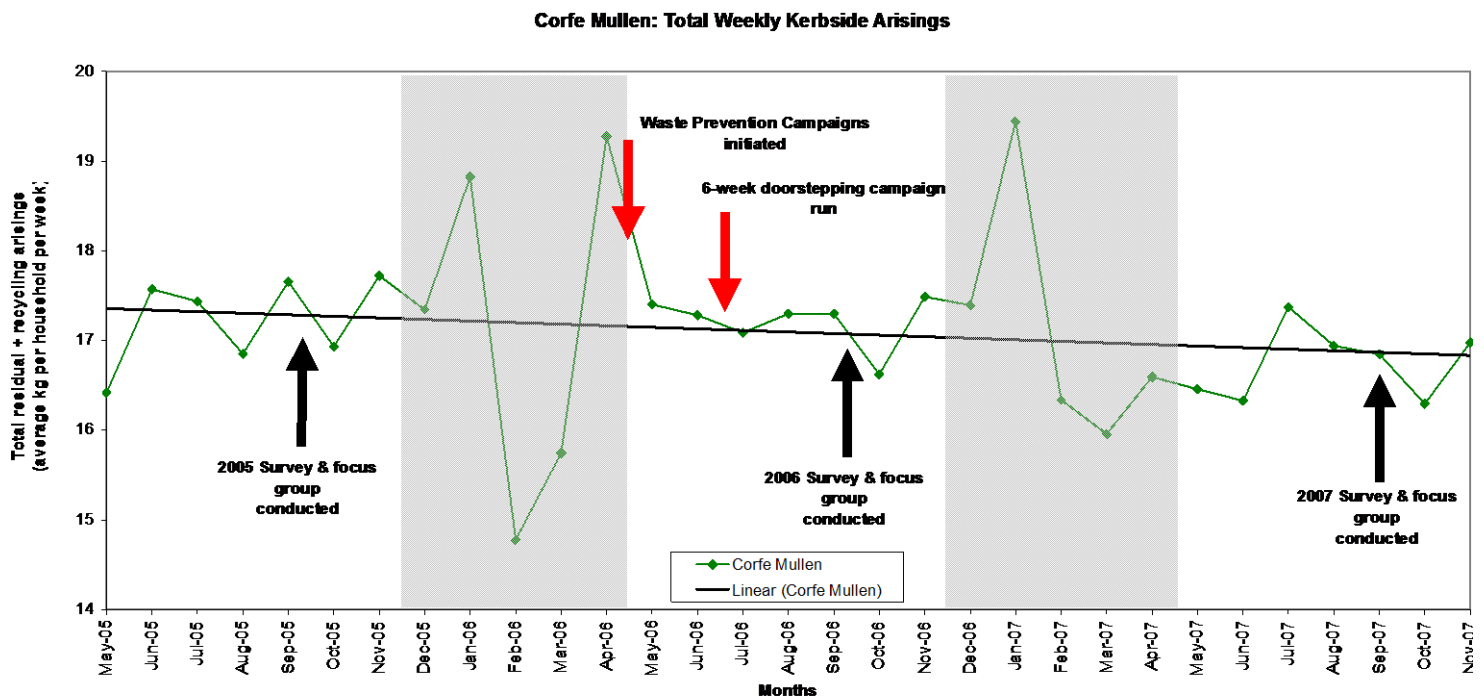
The Corfe Mullen focus groups helped to inform the following campaigns implemented in Corfe Mullen and campaigns implemented in the other pilot areas:

- A series of compost clinics (Beaminster and Corfe Mullen).
- Many roadshows about various waste prevention topics set up outside supermarkets, raising awareness both for residents and for supermarket staff (all pilot areas).
- Press releases and articles for local authority magazines, etc (all pilot areas).
- Waste education centre opened in Wareham in Summer 2007. Workshops on composting were one of the activities organised at the centre.
- Smart Shopping leaflets distributed to retailers in pilot area (Corfe Mullen and Swanage).
- Doorstep advisors and staff at roadshows promoted MPS and Royal Mail Opt Out (Corfe Mullen).

2.5.4 Overview of weight-based monitoring time series and campaign activities

Figure 3 below provides an overview of the weight-based monitoring data for Corfe Mullen (the primary research area) and the timings of key events held over the study period. It is interesting to note (though inconclusive) that there are short term falls in average weekly arisings after each waste prevention intervention.

Figure 3: Corfe Mullen Total Weekly Kerbside Arisings



The reduction in waste arisings in Corfe Mullen was set against a backdrop of sizable and difficult to quantify „background noise“, e.g. the effect of Christmas and Easter, media, and national campaigns. This background noise hinders the effectiveness of evaluation over the short term.

3 Reliability of Results

3.1 Selection of control and pilot areas

As discussed in Sections 2.1-2.4, control and pilot areas have been used as a means of comparing the effect of waste prevention campaigns in one area (i.e. pilot area) against another similar area where no intervention has been directly applied (i.e. control area).

The selection of control and pilot areas was largely informed by an assessment of ACORN socio-demographic profiles. ACORN’s five broad „Categories¹⁷“ were used to inform the selection of paired areas (see Appendix 3).

¹⁷ The ACORN five categories are: Wealthy Achievers, Urban Prosperity, Comfortably Off, Moderate Means and Hard Pressed

Matching at this level was challenging, so establishing a close match at greater levels of granularity (i.e. using the 17 Groups or 57 Types), appeared to make this even more problematic. This was further challenged by having to assess and match control and pilot areas from approximately 76 collection rounds serving the 189,000 households in Dorset. It was, therefore, decided that the more detailed ACORN classifications, could not be used for pragmatic reasons.

However, further statistical assessment (including the use of Chi square tests), conducted later in the course of the research (and reported in Appendix 4), revealed that the chosen control and pilot areas might not have been as closely matched as they originally appeared. Although this could not change the selection of control and pilot areas, it provided insight to the different techniques that could be used in any subsequent selection process (outlined below).

Step 1: Ensure the closest practicable match between control and pilot populations.

Step 2: Identify and assess which of the factors, *that could not be influenced or matched*, have had the greatest impact on observed differences between study populations.

Step 3: Use appropriate techniques to compensate for factors identified in Step 2.

Appendix 4 provides details on the three-step approach proposed as a selection process.

Using ACORN (or other geodemographic tool) as a predictor of behaviour

Predicting waste prevention behaviour using ACORN was not directly explored as part of this research project as this was well beyond the available resources and scope of the research. However, a subsequent review was conducted to examine whether geodemographic tools, such as ACORN, could have such potential. Appendix 3 provides a short paper discussing segmentation and more specifically a range of existing geodemographic tools, and whether such context-specific models can be applied to predicting pro-environmental behaviour.

The capacity of geodemographic tools to predict the characteristics or behaviours of groups, such as those used in ACORN, is dependent upon the quality of the data to which the generic classifications are tied. It should be borne in mind that geodemographic tools are generic classifications, not segmentation models generated in environmental contexts. A further drawback of all geodemographic classifications is that they „pool“ characteristics in order to cluster individuals into groupings. Thus it is very difficult to investigate correlations between particular attributes and the end behaviour in question. While data on individual characteristics could be accessed from CACI who own ACORN, undertaking further analysis along such lines would run counter to the main purpose of the tool itself.

Despite a number of examples cited where geodemographic tools have been applied in the pro-environmental context, the conclusion is there are no proven differentiating factors that support the use of geodemographic tools for predicting pro-environmental behaviour. A potentially more reliable approach would be to identify likely segmentation solutions to specific environment-related problems. The new Defra Pro-Environmental Behaviours Framework goes a substantial way to achieving this. Opportunities for testing the framework are being investigated by Defra.

In short, it is unlikely to have mattered which geodemographic tool was used in this research to establish control and pilot areas - whether it be ACORN or Mosaic.

Consideration of other influencing factors

Every effort was made within the resources and budget available to avoid, remove or account for external influencing factors. Section 2.3 refers to those factors identified at the start of the research. The aim was to reveal and understand the impact of specific waste prevention campaigns delivered in the pilot areas. Fluctuations in reported behaviour each year revealed that more subtle waste prevention behaviour change is likely to have been masked by external (unmanageable) factors impacting upon both control and pilot populations. The external factors identified during the course of the research, that may have adversely affected the ability to recognise differences in waste prevention behaviour between selected control and pilot areas, were:

- **Media** - the waste debate has reached new heights in national awareness. The media has had considerable coverage of waste-related stories (both positive and negative) since the project began in 2005, and a number of emotive topics have had an impact on people's attitude towards waste. Examples include climate change, bin weighing chips, alternate weekly collections, waste charging, recycling end markets, plastic bags, and increases in Council Tax.
- **National campaigns and businesses** - RecycleNow and WRAP's home composting campaign have raised general awareness of waste and increased home composting. More recently WRAP's „Love Food Hate Waste“ campaign aims to reduce household food waste in all parts of the country, as have retailer reusable bag schemes.

- **County-wide and local activities** - a number of county-wide promotions were particularly successful e.g. promotion of home composting through local authority newsletters delivered to every Dorset household which negates the control and pilot area distinction. Independent, local waste „champions“; stimulated by the media or by other local initiatives, can have a positive or negative influence upon resident attitudes and behaviour, e.g. home composting, „no plastic bag“ towns and villages.
- **Waste infrastructure** – minor changes in waste management service or infrastructure could influence matched control and pilot areas. For example, if a „bring bank“ accepts new materials (that could not previously be recycled at the kerbside), there will be displacement of those materials from the kerbside collection tonnage. It might, therefore, be (incorrectly) assumed that there had been an overall reduction in waste levels.
- **Re-use markets** – in addition to traditional charity shops that provide an established channel for the re-use of goods there has been a significant increase in recent years in the general public’s awareness and use of on-line facilities to find markets for unwanted items (e.g. eBay and Freecycle). The impact of locally arranged, car boot sales could also be a factor.
- Prevalence of holiday homes - ACORN failed to reveal the prevalence of holiday homes in one particular area. This is something that is likely to affect responses to waste prevention initiatives due to the high level of temporary residency.

3.2 Weight-based monitoring

The results showed that it is extremely difficult to identify short term effects within the monthly fluctuations of waste arisings due to, e.g. missed collections, Christmas and Easter holidays, DIY activity, use of local household waste recycling centres and bring banks, and bins not being put out. Furthermore, linear trend analysis of arisings one year is problematic due to the influence of significant peaks and troughs observed around traditional holiday periods (in particular Christmas and to a lesser extent at Easter). Our analysis has suggested that an interpretation of the year-on-year data between the months of May and November from 2005 to 2007 greatly reduces the influence of seasonal and „one-off“ effects, and reveals underlying trends most clearly.

The research monitored household waste arisings by analysing the weight of items put out for collection at the kerbside. It should be noted that the resources to undertake a series of waste compositional analyses to support the research findings were unavailable over the study period. The benefit of such an approach, had it been available, would be to investigate possible displacement effects of individual material streams as mentioned previously.

Campaign dilution effects

It was recognised, at the outset of this research, that it would be extremely challenging to measure relatively small decreases in waste arisings in campaign areas, against a background of continually fluctuating levels of kerbside household waste arisings. It was also noted that to achieve a sustained reduction in waste of say 10% could imply all households within the pilot area would achieve that 10% reduction equally. However, in reality, with the selected sample populations encompassing well over 1,500 households, some inevitable dilution of waste reduction impacts would be recorded due to 100% of households not participating.

By way of illustrating the significance of this effect, a simple theoretical example is provided:

Example

Percentage of target population influenced	Degree of waste reduction achieved
25%	10%
25%	6%
50%	0%
Total: 100%	Net Reduction: 4%

If a waste prevention campaign only achieved a 25% take-up at the 10% reduction level and say 25% at a slightly lower level of 6%, with the remaining 50% not changing their behaviour at all, the impact would be significantly diluted to 4% for the overall population. Impacts on this scale are around typical levels of monthly variation in average arisings and therefore unlikely to be discernable, particularly when displacement effects resulting from increased recycling activity are taken into consideration.

The research team’s approach to the problem was to record and analyse an extended time series of data (over the three years) incorporating all kerbside household waste arisings (residual, recyclables and organic) to reveal and determine any long-term data trends.

Despite the potential for campaign dilution from a proportion of non-participating households, the measurement of data for a collection round of greater than 1,500 households is likely to provide more assessment certainty than smaller waste prevention pilot studies. For smaller pilots, the extrapolation of positive impacts from dedicated, localised efforts to a much broader population could be overstated.

Secondary waste impacts

Other primary outlets for household waste include household waste recycling centres, bring sites (e.g. bottle banks) and home composting. It is not credible for any local authority to monitor individual household use of every potential outlet. However, efforts were made within this research to investigate any “observable” differences in the use of bring site facilities in the pilot area of Corfe Mullen as compared to its control Verwood. The evidence (see Appendix 6) is anecdotal but does show that there was less growth in paper material arisings at Corfe Mullen bring banks than in Verwood. This supports a hypothesis that waste prevention campaigns may have made an impact on household waste arisings at the kerbside and also reduced the need for Corfe Mullen residents to use additional bring site recycling facilities.

As noted earlier, measurement of recycling (and organic) collection round data, in combination with records of residual waste arisings, is vitally important to be able to take account of the displacement effects of increased recycling and composting trends upon residual waste levels. For example in Verwood and St. Leonards-St Ives, increases in the brown bin collection for organic wastes would imply displacement of some materials (e.g. food waste) from the residual stream. Despite these possibilities, the trend graph (Figure 2) shows a clear *increase in waste arisings for the control areas, whilst there has been an overall reduction in waste arisings in the pilot area of Corfe Mullen.*

It is also important to note that due to operational demands, one of the limitations of collection round data is that only an average total arisings per household can be calculated as opposed to being able to analyse specific arising for individual households. This is due to residual rounds not usually matching recycling or organic collection round areas.

3.3 Measuring campaign activities

It was not possible within the resource constraints of this research to validate the accuracy of specific waste prevention calculations contained within the NRWF Waste Prevention Toolkit, such as whether MPS registrations reduce unwanted mail by about a third and if typical levels of junk mail are around 1kg/month per household. Monitoring was focused instead on measuring campaign activities and changes in uptake, for example number of registrations to the MPS.

A summary of the successes (or otherwise) and measurement issues concerning the campaign activities is provided below with further detail in Appendix 6.

Doorstepping - Doorstepping was deemed a successful campaign in generating what would appear to be a short-term behaviour change among Corfe Mullen residents (see Figure 3). It was the campaign that also had the most recall among residents. Its success is most likely due to the community engagement and quality of waste prevention and local knowledge.

Mail Preference Service - Registration to the MPS, supported by the doorstep team in Corfe Mullen and promoted in Dorchester (as a lead in to waste prevention), was also deemed successful with increases well above the average regional increases in registrations. However, the accuracy and reliability of MPS data responses can be influenced by the annual MPS „data cleanse“ procedure¹⁸.

Waste Reduction Packs – The flexibility of the pack, i.e. the ability to take one or more of the enclosed leaflets or the whole pack was well supported with junk mail leaflets proving to be the most popular. The pack was used for promotional purposes to support other campaign activities, therefore, it is not possible to measure specifically, or in isolation, the impact of such promotional literature on waste prevention.

Home composting - Over 60,000 home compost bins were sold over the 3 years. However, sales dropped in 2007, having reached a peak in 2006, despite consistent promotions during 2006 and 2007. This is not surprising because the price of home compost bins increased in 2007. There is also potential reduction in sales due to saturation in some areas. Although sales are starting to drop, there is a demand for purchasing second bins. It is also recognised that there is a limit to the interpretation that can be placed upon the results in the absence of further data. For example, baseline levels of compost bins already in use before the WRAP compost bin sales, and numbers of properties in each area with a suitable garden and that use a compost bin. The supporting

¹⁸ In order to keep the MPS data accurate and up to date, each year (usually towards the end of January) MPS records that have been registered for five years or more are run against a „deansing file“. If this indicates that the registrant is still living at the registered address it will remain on file. If not, it is removed from the MPS file and this will reduce the volume of registrations.

compost clinics held in Corfe Mullen and Beaminster, were generally well attended. However, advanced promotions could have increased the turnout.

Smart Shopping – This was promoted via stands at events and supermarkets and was considered the least successful campaign. The campaign didn't attract attention as much as the other campaigns. The distribution of the Jute bags coincided with the production of reusable bags by many popular supermarkets.

Other promotional activities (Recycling Fun Day and Secret Agent Competition in Corfe Mullen) - The Recycling Fun Day needs to be in a popular location to attract passers by. Promotions could have been enhanced by advertising the event among child minders and children's holiday clubs. Large games and toys hired from toy libraries helps to reinforce the idea of hiring rather than buying new. This type of event can also be supported by community groups willing to put up an activity table. The children that participated in the competition, and accompany adults, enjoyed it and had learned new facts about waste prevention. This type of activity needs to be well planned in advance, e.g. coincide with school visits, and needs the support of local businesses. It is not possible to measure specifically, or in isolation, the impact of such promotional activities on waste prevention.

Both the MPS and home composting had increased up take in both the control and pilot areas (albeit to lesser degree in the control areas). This implies that there were external factors influencing this. For home composting this is most likely to be as a result of WRAP's national home composting campaign and promotions by individual local authorities in Dorset. However, there are no apparent reasons for the increases in MPS registrations in the control areas of St. Leonards-St. Ives (controls for Corfe Mullen), and Sherborne (control for Dorchester) where the largest increase occurred (see Appendix 6). It is possible that there were influences via county-wide promotions, media or by local champions.

In summary, the most successful and measurable campaign activities were:

- MPS registrations
- Home composting
- Doorstepping

However, they should not be treated in isolation as they were supported by a number of promotional activities, such as the Waste Prevention Pack, Smart Shopping and local events.

3.4 Surveys and focus groups

Surveys - Data charts were produced comparing 2005 survey responses with those for 2006 and 2007. Charts were likewise prepared comparing annual *changes* in responses (presented in Appendix 7).

This research identified a number of differences between matched control and pilot areas as a result of the 2005 doorstep survey. Two examples are:

- 11% of households surveyed in Beaminster (pilot) report to never recycle, whereas the figure is 22% for Lyme Regis (control).
- Of the 143 households in the pilot area of Swanage reporting "not composting", 50% reported having composted previously. Whereas in the control area of Wareham - of the 138 households reporting "not composting", just 17% reported having composted previously.

The project carefully investigated the possible reasons for such differences and concluded there might be four possible reasons:

1. Data used for the original matching of areas was inaccurate.
2. The data on which the original matching of areas was accurate, but inappropriate for matching of areas for this purpose.
3. Flawed techniques used for assessing the degree of similarity between potential study and control areas.
4. The control and pilot areas are properly matched and there were differences in doorstep techniques between the matched areas.

It is also recognised that there could have been differences in survey technique that could influence the respondent. For example, the survey team had difficulty understanding waste prevention, despite briefing, and kept reverting to the term "recycling". The time and weather conditions is also a factor that could influence survey technique. Although allocated time slots were provided this could not counter the exact time of day the surveys were conducted or any adverse weather conditions. Both these factors could result in less time and care spent at the door.

To help overcome these anomalies and to enable like-for-like comparisons between control and pilot areas, „normalising factors“ were applied to take account of the differences in demographic factors¹⁹. This was achieved by seeking advice from a statistician at Northampton University as to how the data might be best analysed. The guidance provided was to use the „sum of all twelve areas“ as the “control” against which the results from the data for each pilot area were assessed. As a result, „normalising“ enhanced the level of confidence in the results due to the total sample size for all twelve areas being used, i.e. 9,000 survey responses (i.e. 250 households x 12 areas x 3 years). More detail is provided in Appendix 4.

Following analysis of the 2005 survey data, *gender* and *tenure* (i.e. accommodation rented or owned) were identified to have a significant impact on survey responses (see Appendix 4, Annex 6). Tenure differences were more marked than gender differences. For example tenants, who may move home on perhaps a yearly basis, report being significantly less likely to home compost. Likewise, tenants that generally represented lower income groups may be more likely to buy cheaper, secondhand items, buy from charity shops, attend 'Give & Take Days', etc. Consequently, the responses for each area, and for each year, were „normalised“ using the gender and tenure balances from all 9,000 responses as the norm.

Focus groups - In interpreting the results of the focus groups, two factors should be borne in mind:

1. The DCC Citizens“ Panel provided a convenient and accessible target audience. However, Citizens“ Panel members are self-selecting which could mean inherent bias in the group, e.g. they tend to be willing participants, and are happy to be engaged and provide information about their views.
2. It should also be noted that the Panel could provide only a limited demographic sample that may not be representative of the general population of any given area.

3.5 Declared behaviour versus actual behaviour (the Value-Action Gap)

Addressing the „value-action gap“ has become the holy grail of the policy maker and social scientist and is the subject of a growing body of work²⁰.

The question of what shapes pro-environmental behaviours is a complex one. No one model or framework can adequately express the underlying disconnection between attitudes and behaviour. There is an array of factors impacting upon behaviour from all sorts of different directions such that it is not possible for policy makers to fill “the gap”. A comprehensive Defra study²¹ shows how policy-makers can possibly compensate the „value-action gap“ by addressing both the internal (psychological) and external (infrastructure) barriers. The Defra 4Es Behaviour Change Framework was designed as a result of this study to address such barriers²².

We know that there is a potential disconnect between personal attitudes or values that do not automatically translate into sustainable patterns of behaviour. However, the reverse can also be true – people appear capable of acting in sustainable ways without holding strong environmental beliefs or values. In other words, people don't necessarily have to be environmentalists in order to behave in an environmentally responsible way. Those sceptical about claims about environment degradation are in fact just as likely as others to undertake a sustainable behaviour²³.

Furthermore, studies purport to show the existence of such a value-action gap in environmental issues that has been largely based on matching the verbal commitment to environmental behaviour through self-reported data. There is also a lack of direct evidence to prove that such a discrepancy exists²⁴.

This research could not measure the disparity between declared and actual behaviour. For example, in Corfe Mullen, there was a consistent rise in „declared“ behaviour for MPS registrations. This was concurrent with MPS data. However, in Dorchester the „declared“ behaviour was surprisingly low compared to the high number of MPS registrations recorded. This may have been due to anomalies identified in the survey data discussed in Section 3.4. Also, it was not possible to quantify the specific behaviours attributable to the reduction in waste arisings in Corfe Mullen, due to the comprehensive mix of interventions and „background noise“.

¹⁹ Normalising factors are used to remove bias in survey responses caused by such differences. It is a commonly used process by statisticians to remove statistical error by allowing the underlying characteristics of datasets to be compared on a like for like basis, Wikipedia.

²⁰ Strategy Unit „*Personal Responsibility and Changing Behaviour: the state of knowledge and its implications for public policy*“ 2004

²¹ The Impact of Sustainable Development on Public Behaviour, Report 1 for DEFRA, Andrew Darnton (May 2004)

²² Defra Securing the Future 2005

²³ Brook Lyndhurst „*Bad Habits & Hard Choices – in search of sustainable lifestyles*“ 2005

²⁴ Croucher Institute for Environmental Sciences, Department of Biology, Hong Kong Baptist University, Kowloon Tong, Hong Kong.

3.6 Lessons and most helpful research techniques

As part of the research many valuable lessons were identified that may be useful for policy makers, researchers, local authorities and local waste prevention initiatives. Some of the key lessons are discussed below with more detail provided in Appendix 9.

Selection of matched control and pilot areas – In selecting matched control and pilot areas, local knowledge is important, including discussions with community liaison officers and waste collection operatives, who will have first-hand experience of individual areas and their waste arisings. The selection process is time consuming and it is important to get the socio-demographic profiles as alike as possible. However, the techniques for deriving this are not fully resolved. Possible options for investigating this are provided in Appendix 4 together with recommendations in Section 5. Pilot areas should not be popular tourist areas (unless a similar control can be identified).

Using weight-based monitoring – The research technique providing the best overall value was the analysis of individual vehicle collection rounds (residual, recycle, food, garden). This can be supported by attitudinal checks using surveys or focus groups before, during and after campaign work.

Unfortunately high quality weight-based data was not always available. Collection authorities are able to produce district wide data, yet a significant number are unable to provide household waste data by collection rounds (or even finer detail). Reasons include bulking up of residual waste (hence a number of rounds weighed together), lack of weighbridge at transfer site facility, lack of computer software (to link weighbridge outputs to spreadsheets), and joint municipal and trade collections. Other lessons/ suggestions are:

- Where quality and consistent data is sought for accurately measuring campaigns by waste arisings, liaison between disposal and collection authorities should be encouraged to overcome these issues.
- Three years" or more data is more valuable than two years" in order to identify and clarify any sustained trends, rather than annual / seasonal fluctuations attributable to external causes.
- Automated collection of household data (weighed on vehicle) or by collection round (by weighbridge) could provide quality data to measure the impacts of either prevention or recycling campaigns.
- If a local authority is tracking waste arisings in an attempt to monitor household waste prevention, it is important that the collection round data used does not include any other municipal solid waste (for example local authority collected trade waste, arisings from schools, parks and gardens or street sweepings) that might create uncertainty in interpretation of the results.
- Graphical representation of data allows rapid visual assessment of results and can assist in identification of anomalous data points for further investigation.

Measuring specific campaign activities - Measuring specific activities proved to be challenging and only the MPS data highlighted a direct one-off behaviour change through registrations. Anecdotal data showed that doorstep visits (see also Figure 3), pledges, attendance at events and distribution of leaflets were useful. These activities made a *collective* rather than an *isolated* difference. Event banners promoting junk mail reduction were the most effective in encouraging conversations with the public - to the extent that campaigns could be promoted, at the point of engagement, under this one topic. The key lessons were:

- The public understand that "recycling" relates to waste, yet don't link "waste" exclusively to household rubbish, e.g. they include water reduction and energy efficiency.
- There are indications that promotion of waste prevention increases recycling awareness. Decoupling of waste prevention from recycling was found to be impossible, therefore, hooks such as junk mail were found to be a good opening discussion point.
- Isolated campaigns, e.g. MPS registration and home composting were easier messages to "sell" than waste prevention in general. Out of all the waste prevention campaigns, these proved the most popular, with doorstepping as the most effective method of engagement with the public.
- Resources are best spent on face-to-face promotion, e.g. quality doorstepping, rather than general advertising and marketing.
- The DCC Waste Reduction Pack proved very successful. This could be developed further and marketed in a more topic related way, e.g. targeted at isolated behaviours.
- Local stories related to waste topics were popular with local media.

Surveys and focus groups - Behaviour change surveys were useful for identifying campaign needs. However, without carefully applied techniques, responses can be influenced by external factors and, therefore, become challenging to measure against small changes in behaviour.

A good working relationship is needed between the local authority and the survey team to avoid overlap between other surveys. The sample demographic for the first survey will also be the target demographic for subsequent surveys to ensure comparability e.g. gender ratios. This may have increased cost implications due to increased visits by the doorstep team to obtain the correct sample size. Large-scale, year-on-year surveys yield a wealth of

data and present almost limitless secondary analysis options. This requires the availability of statistical analysis software and expertise to analyse and interpret the outputs.

Using Citizen Panel recruitment for focus groups may not necessarily represent the views of the target audience. The Defra 4E's Behaviour Change Framework was useful in translating the outcomes from the focus groups into an action plan.

Assessing the research evaluation techniques - A separate exercise was undertaken to establish a set of criteria to assess and score the various research techniques used to deliver this research. The aim was to identify those that were thought to be the most effective. The evaluation techniques assessed were "tracking waste arisings", "using weight-based monitoring", "measuring specific campaign activities", and "using surveys and focus groups". They were divided into „input“ criteria such as the relative difficulty of obtaining the necessary staff resources, and „output“ criteria to ascertain, e.g. the value of the data in terms of its accuracy and relevance etc. Weighting factors were assigned to account for the relative importance of these criteria.

A detailed explanation of the criteria, with information on the weighting used, is presented in Appendix 9, Table 1. These criteria were established at the start of the research. At the end, each member of the project team independently assessed the methods against the criteria. The collated scores are shown in Appendix 9, Table 2.

As can be seen no clear preference was revealed - although "tracking waste arisings" and the "use of focus groups" were thought to be the most effective overall. Focus groups were assessed as the easiest/best technique, i.e. in terms of the effort they require. Anecdotally, focus groups were found to be the best technique for providing insight to resident views about waste prevention. In terms of cost, focus groups, measuring specific campaign activities and tracking waste arisings were thought to be the most cost effective techniques.

Opportunities for local authorities and community waste projects – The research identified a number of activities that DCC will continue which may be of interest to other local authorities and community groups:

1. Identifying collection authorities with quality collection round data.
2. Holding focus groups where campaigns are to be targeted, to tailor the campaign to local needs.
3. Continuing awareness-raising through one-to-one interaction through doorstepping and events.
4. Linking to national campaigns e.g. Love Food Hate Waste, RecycleNow.
5. Promoting campaigns by topic e.g. packaging or plastic bags, rather than the more generic term of "Smart Shopping".
6. Leading with campaigns such as junk mail, to stimulate discussion on wider waste issues.
7. Continuing efforts to help community waste sector organisations tackle waste topics locally.
8. Encouraging specific topic community groups (e.g. ban plastic bag groups) to work together and expand their role to raise awareness of wider waste related issues; to attend their events, work in partnership, and provide materials e.g. reduction booklets and reuse directories.
9. Being pro-active and flexible to *ad hoc* opportunities e.g. news stories, or new community waste or climate groups requesting support.
10. Providing a knowledgeable doorstepping team that can convey wider initiatives and support for waste prevention.
11. Exemplifying activities through employees as role models.

In summary, the process used in this research can help local authorities monitor and evaluate waste collection data and campaign activities by:

1. Providing relatively inexpensive long term data trends.
2. Assisting in identifying similar collection rounds in different communities as a first step towards choosing control and pilot areas for campaigns.
3. Demonstrating the impact of campaigns (such as those in the Corfe Mullen pilot area).
4. Improving the quality and ease of reporting of local authority returns, such as waste data flow.
5. Accurately reporting on the impact of prevention campaigns targeting "less waste overall" responding to NI191 (Residual Household Waste per Household).

4 Policy Implications and Interpretation of Findings

The implications and supporting options contained in this report are for policy-makers. In addition to this report, a supplementary report is being produced which draws out useful lessons resulting from this research to help inform local authority policy and waste management activities. These lessons will help to inform local authorities

on planning, carrying out and reporting local waste prevention initiatives, and in particular their monitoring and evaluation²⁵.

This research was commissioned in 2005/05 when little was understood about how to measure waste prevention. However, since the project started, there have been significant changes in waste policy and new stakeholder interest, such as WRAP's recent focus on household waste prevention. Understanding household waste prevention and how to measure it has, therefore, become of primary importance in meeting the waste management challenge. The NRWF Toolkit, published in 2004, proposed the first, untested, monitoring concepts and techniques for household waste prevention. The Toolkit provided the basis upon which this research was commissioned.

Whilst this was a challenging project to implement, much has been learned that will prove useful for policy-makers and local authorities. However, there remain some issues that are unlikely to be resolved in the short term. The lessons derived from this research are listed and discussed below:

- Potential differences from WRAP's latest monitoring guidance to local authorities;
- The effective matching of control and pilot groups using geodemographic tools remains unresolved;
- Waste collection data should be of sufficient quality and captured over a period of time to enable effective monitoring and evaluation;
- Longitudinal studies are needed to understand fluctuations in waste arisings and reported behaviour generated by „background noise“;
- Conducting a proper „control and pilot“ approach can be resource intensive and costly.

WRAP's latest guidance to local authorities. This does not advocate the use of control groups²⁶: „the difficulty in trying to use control areas in the context of waste management is finding an area that is sufficiently similar in which no changes are being made. If there are even quite small socio-demographic differences between the areas you can never be sure whether they are the cause of the differences observed rather than the scheme improvement or the communications campaign. For this reason WRAP does not recommend using controls for monitoring“.

However, WRAP agrees that without rigorous monitoring, evaluation is left open to the question of attribution, i.e. was tonnage reduction stimulated as a direct result of a waste prevention campaign or by some other influencing factor(s)? WRAP suggests that if the evidence is pointing in the same direction and an improvement is shown, then this could be deemed as good enough.

This research was designed in 2004 and commissioned in 2005. It set out to evaluate the approaches described in the NRWF Toolkit, to improve understanding, and identify opportunities for the future development of monitoring and evaluating household waste prevention. WRAP's focus on household waste prevention and views on control groups were made at a point when the study was too far advanced to consider any changes to the research approach. Furthermore, WRAP has not had an opportunity to evaluate the additional techniques set out in this report (see Appendix 4).

Whilst WRAP does not recommend the use of control groups, we believe there is still merit in understanding and addressing the lessons identified in this research.

Effective matching of control and pilot groups. The effective „matching“ of control and pilot areas, using socio/geodemographics, remains unresolved, i.e. perfect matching was not achieved.

This research has identified gaps in matching populations using geodemographic tools such as ACORN. Further exploration is required to:

- Determine whether tools, such as geodemographic tools (e.g. ACORN), are suitable to provide the statistical robustness required to effectively match populations;
- Identify whether there are alternative techniques, e.g. segmentation models, that can provide the reliability and validity needed to match populations;
- Identify the best criteria upon which populations can (or should) be matched, e.g. using alternative profiles to socio-demographics such as values, lifestyle, behaviour could provide a better match²⁷.

An alternative approach, outlined in the separate local authority guide, suggests that a random selection *within* the sample can help to ensure exact matching parity between control and pilot populations for any given factor or factors. However, to make the most of this approach a certain amount of *oversampling* is beneficial. For instance,

²⁵ This is not a definitive manual on waste prevention, but it should help Local Authorities decide which issues need to be considered.

²⁶ Ref: Improving the Performance of Waste Diversion Schemes – A Good Practice Guide to Monitoring and Evaluation http://www.wrap.org.uk/downloads/Monitoring_and_evaluation_guidance_-_full_document.fed23b71.2646.pdf

²⁷ See Appendix 3 for further detail on Defra's new Pro-Environmental Behaviour Framework

if one is aiming for sample sizes of 250 per population, then an actual sample of perhaps 300 may be required to achieve a final, matched sample of 250. The somewhat reduced matched sample size is only needed when comparing and identifying a suitable control with a pilot. For any other use of the data, the whole sample can still be used.

Waste collection data. Good quality waste collection round data available over a sufficient period of time was found to be essential. This needs to be supported by effective management and analysis systems. However, very few local authorities collect and analyse individual collection round data to the same extent as was the case in East Dorset.

This research has identified that local authorities need guidance to assist them in developing and / or improving their waste collection round data. Those local authorities that hold such data and have effective analysis systems in place should be identified as they have the potential to provide practical input and case study examples.

Longitudinal studies and background noise. There were numerous local and national influences which were difficult to identify and quantify, e.g. the effect of socio-demographics (such as household size), national media, other campaigns, and the rise in re-use markets etc. This created significant „background noise“ which can hinder the evaluation of short term impacts and attribution to waste prevention.

This research identified that the impact of background noise can be better understood when campaign monitoring is conducted over a sufficient period of time, i.e. at least over a three year period. This timeframe allows for short term fluctuations to be separated from the overall trend. In the case of this research, a cumulated fall (in average weekly arisings) was observed over the three years (see monthly trends in Figure 3, Section 2.5.4). It is unlikely that a reduction in household waste arisings, as was observed in Corfe Mullen, would have been revealed over a shorter timeframe.

Furthermore, this research has identified that isolating waste prevention behaviours helps to identify their specific influence on waste arisings, e.g. targeting single issue waste prevention behaviours such as „reusable bags“, rather than targeting a mix of behaviours under generic topics like „Smart Shopping“.

Resources and costs. There is little doubt that a properly conducted „control and pilot“ approach is a resource intensive method, and on the scale used in this research is likely to be beyond the means of any one local authority. Certainly the cost-intensive nature of such research can be deemed prohibitive, as could the detailed methodology and monitoring expertise required, particularly for longitudinal studies such as undertaken by this study.

This research has identified that a resource and cost-efficient approach is needed to provide potential economies of scale.

References to published material

9. This section should be used to record links (hypertext links where possible) or references to other published material generated by, or relating to this project.

WR0116 project appendices available from the Defra Research website:

- A1 Dorset research team
- A2 Policy context and related research
- A3 Segmentation and the use of geodemographic tools
- A4 Selecting and analysing control and pilot data
- A5 Weight-based monitoring data (collection round data)
- A6 Measuring campaign activities (local waste prevention activities)
- A7 Surveys (questionnaire, maps and results)
- A8 Focus groups (reports for 2007, 2006 and 2005)
- A9 Lessons learned
- A10 Waste prevention network report

A separate Supplementary Report, highlighting lessons learned from the research relevant to Local Authorities, is also being prepared and is due to be published by the end of 2009.

Journals and Publications:

- Title: Driving the Waste Prevention Agenda – An Evaluation of Weighing Kerbside Household Waste Arisings Methodology in Dorset, UK.
Journal of Solid Waste Technology and Management (Widener University; University of Pennsylvania)
Publication: August 2008.
Authors: Mike Read, Marten K. Gregory, Paul S. Phillips
Volume 34, Issue 3, Pages 161-176 (2008); ISSN 1088-1697
- Title: An Evaluation of Four Key Methods for Monitoring Household Waste Prevention Campaigns in the UK.
Resources, Conservation and Recycling (Elsevier)
Publication: Due December 2009.
Authors: Mike Read, Marten K. Gregory, Paul S. Phillips
[doi:10.1016/j.resconrec.2009.05.004](https://doi.org/10.1016/j.resconrec.2009.05.004)

Conference Papers and Presentations:

- WARMNET /KTN Conference, Nottingham, June 2008.
- CIWM, Torbay, June 2008.
- Solid Waste Technology and Management Conference, Philadelphia, March 2009.
- Waste Management & Recycling Congress, Berlin – October 2008

The Project team are working on a wide range of communications to professional magazines. These include:

- The CIWM magazine
- Warmer Bulletin
- Resource Management and Recovery
- Resource
- Resource and Recycling
- Recycling and Waste World
- Waste Management