

# Mapping and geolocation technology for waste collection services – West Suffolk and Northamptonshire.

## Summary

In the face of budget cuts, increased tax burdens for landfill, and challenging targets to improve recycling, local authorities are increasingly using mapping technology to improve the quality and cost of waste collection services, achieve better procurement, and to develop more efficient service partnerships.

District and unitary councils have a statutory duty to make arrangements to provide a waste collection service for the removal of household waste from residential properties within their area. DEFRA estimates that 177 million tonnes of waste are produced each year in England alone<sup>1</sup>. The amount of waste to be managed, and the speed with which this increases, have implications for the environment and for the costs of managing waste.

Geographic mapping technology is used by local authorities to analyse and assess property and to plan routes to enable more efficient collection service. All local authorities are licensed to use Ordnance Survey mapping data, and have the capability to analyse and plan routes using other data sets such as the Local Land and Property Gazetteer, demographic information and other information available from service departments.

Forest Heath District Council and St Edmundsbury Borough Council joint waste collection service saved £300,000 annually and improved services through using better geographical data to optimise the routes for refuse collection and street cleaning services; the District of East Northamptonshire Council saved £200,000 annually using Ordnance Survey technology; and Middlesbrough Borough Council saved £150,000 a year using a similar technology supplied by provider webaspx.

## West Suffolk

### Objective

Two councils in West Suffolk, Forest Heath District Council and St Edmundsbury Borough Council, have been working closely together since 2007 to reduce costs and improve waste collection. In two-tier authorities, responsibilities are divided between District Councils (collection) and County Councils (disposal). In June 2010, when there were changes in the number and location of transfer stations provided by Suffolk County Council, West Suffolk and Forest Heath found that there was insufficient time to change all their existing collection rounds in response to these changes by the deadline of 28 June 2010. These rounds were previously designed and organised using a paper-based system. The councils therefore decided to review and revise the collection rounds with the objectives of:

- Optimising the use of Ordnance Survey mapping datasets and other council data
- Creating an online mapping functionality of all waste collection rounds
- Reviewing collection routes in relation to the changes to waste transfer stations
- Determining fleet capacity and improve productivity
- Balancing workloads across crews

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<sup>1</sup> <https://www.gov.uk/government/policies/reducing-and-managing-waste>

- Improving partnership working further
- Planning more effectively for future demand
- Reducing operational costs
- Reducing CO2 emissions
- Tracking vehicles to monitor performance and defend insurance claims
- 'Geo-fence' schools i.e. avoid collections between 8-9am and 2-3pm
- Allowing routes that notify crews to work single side of the road
- Providing full sets of round sheets/maps that could be followed by new starters

### **Approach**

The councils embarked on a digital mapping exercise using Ordnance Survey's mapping data together with route optimisation software, Integrated Skill's Limited Route Smart, and mapping software, ESRI® ArcGIS.

The area covered by both councils was divided into zones which could be covered and the waste collected in a single day using a set of vehicles. This allowed rounds within the zones to be changed or extended without needing to change the collection day. Detailed round reviews were then undertaken using OS Transport data sets, to balance the workloads for all crews, ensuring that all rounds could be completed in the working day without necessitating overtime, and allowing crews within each zone to support each other where necessary. The use of GIS tools allowed the new rounds to be designed rapidly.

Working with the planning departments, the councils ensured that all approved building developments were included in the mapping assumptions to ensure that the collection rounds would absorb future growth without incurring additional costs.

- **Ordnance Survey functionality**

All local authorities are already licensed to use Ordnance Survey data and RRI, which includes information about one way streets, no entry, no left or right turns, bus and taxi lanes, dual carriageways, stop signs and vehicle width, height and weight restrictions.

The following survey functionality was used:

- OS MasterMap Topography Layer
  - OS MasterMap Integrated Transport layer
  - OS OpenData™ products:
  - OS VectorMap® District
  - OS Street View®
- **RouteSmart – route optimisation functionality**  
The council used RouteSmart route optimisation technology which collates base information digitally about the road network and the locations of service points, depots and other facilities. This is used alongside selected criteria (e.g. number of rounds, length of working day, existing service day, and costs). The output is analysed, benchmarked and amended, taking into account 'real-world' factors and local knowledge to ensure routes are accurate and achievable.
  - **ESRI® ArcGIS functionality**  
This Geographic Information System (GIS) was used for creating and using maps, compiling geographic data, analysing mapped information, sharing and discovering geographic information, using maps and geographic information in a range of applications, and managing geographic information in a database. It allowed the councils to make maps and

geographic information available throughout their organisations, stakeholders and openly on the internet.

## **Outcomes**

As well as redesigned waste routes, the councils have been able to apply the technology and organisational learning to new areas including a review of the street cleansing service in 2010/11, using the OS MasterMap® Integrated Transport Network data. This allowed the same kind of analysis for cleansing on footpaths and open space as well as roads.

St Edmundsbury and Forest Heath digitally mapped and plotted 630 litter bins and 290 dog bins to help plot new sites for bins in strategic areas based on demand. 97 litter bins were found in need of replacement due to capacity, damage or because they were open topped which was contributing to littering when windy. A total of 25 dog bins were identified and replaced due to high usage.

New 'bin housings' which hold 240 litre wheelie bins are now used to increase capacity to reduce the amount of collections in order to save on fuel. They also minimise manual handling as they are now emptied using a bin lifter mechanism.

Recycling 'on the go' litter bins are now being installed in the town centres, these new bins have a separate compartment to collect paper, tins, and plastic bottles for recycling, reducing the amount of waste going to landfill.

The shared Mechanical Sweeping Rural service enabled Forest Heath to purchase a smaller mechanical sweeper to target urban areas.

The old system for route planning was labour intensive using maps and pens. The reorganisation of the waste collection rounds project started in February 2010 and went live on 28 June 2010, completing in four months compared to 12 to 18 months using the old method.

In 2010, the waste collection routes were designed to incorporate all the approved new developments.

## **The benefits for customers**

The programme has also delivered important improvement to the service for customers, including:

- Zoned 'task and finish' waste collection crews working together, helping each other in the event of hold-ups such as vehicle breakdowns or road blockages, which means that households now have fewer incidents of missed bin collections
- All stakeholders know where the crews are each day and what collection cycle they are on, meaning that the contact centre can provide instant and accurate responses to customer queries
- Routes can be adapted without changes to collection days resulting in a more responsive service without disrupting the pattern of collections for residents

## **The benefits for councils**

The council has experienced a number of benefits from the use of waste tracker, including:

- Improved speed to change route design as necessary
- Capability to analyse geographical and mapping data easily and digitally

- Capability to model and predict any requirement to change route design to optimise productivity and quality of service
- Capability to plan for and absorb future growth in demand resulting from new building developments
- Improved staff morale as crews can work more collaboratively in their collections zones, and finish work at similar times
- Improved planning capabilities for health and safety purposes
- Improved fuel efficiency
- Reduced carbon emissions
- Improved partnership working and consultation

### **Savings generated**

The councils realised the following savings in waste collection in 2010 and in cleaning in 2011, which are ongoing:

- Reduced annual fuel costs £45,000, resulting from use of appropriate vehicles and a reduction of 24,000 miles driven each year.
- £15,000 reduction in annual overtime costs through workload balancing
- £120,000 costs saving by reducing the number of rounds by one.
- Reduced carbon emissions of 115 tonnes

The joint cleansing review resulted in a cost saving of £127,500 through:

- Sharing of a Rural Channel Mechanical sweeper across the two councils, allowing more cleansing to be completed at a lower price
- Fuel savings due to increased bin capacity
- Bin refurbishments made possible by reusing existing bins

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### **East Northamptonshire – use of route optimisation software**

#### **Summary**

As part of a new contract, East Northamptonshire Council planned the introduction of a new waste and recycling collection service. Offering residents collections for refuse, food waste and co-mingled recycling. This meant that the existing collection rounds needed to be optimised for a 'one pass' collection method.

#### **Objectives**

- Reduce the number of vehicles required to provide collections to over 37,000 households.
- Provide collections for three material types – co-mingled recycling, food waste, and residual waste.
- Minimise increases in operational costs as a result of the new collections.

## Approach

The council used mapping data from Ordnance Survey together with East Northamptonshire's Local Land and Property Gazetteer and the route optimisation software RouteSmart, from Integrated Skills. This software was purchased by the Northamptonshire Waste Partnership, using funding from the East Midlands Centre of Excellence, for use by all Northamptonshire Councils and hosted by the Geographic Information System (GIS) team from East Northamptonshire.

The system was used to calculate, optimise, and balance both recycling and refuse collection routes for the six vehicles covering urban and rural locations throughout East Northamptonshire. Additional fields were added to this data to include the new refuse and collection calendars for every domestic property, allowing customers to self-serve via the council's interactive map – searching the gazetteer layer for their property to display their collection calendar.



An example of self - serve information available to customers.

<http://www.east-northamptonshire.gov.uk/bincollectiondates>

## Outcomes

The use of this data highlighted several issues. One significant issue was accuracy of the data. LLPG includes all land parcels and properties, so care had to be taken to make sure that commercial properties were removed prior to the information being processed by the route optimisation software. In addition, it was useful to 'sense check' the proposed routes with experienced drivers and operatives to ensure that routes were achievable and any individual characteristics such as narrow access or one way streets had been taken into account.

## Benefits

Geographic and route data has been integrated into the council's customer relationship management system to speed up complaint resolution and requests for service. Data is transmitted direct from the vehicles back to the contractor and to the council.

### Customer benefits

- Collection routes and times are simple to understand, so residents find it easier to recycle more and are less likely to miss a collection
- Real time information available to customer service agents means that 80 per cent of calls are handled at first point of contact.
- Information on collection days and other useful round data is available to the customer contact centre and other internal users which, means the council can provide up to date information to callers.

### Council benefits

- A financial saving of over £200,000 per annum. This equates to a 13 per cent saving. This was achieved by a reduction of three vehicles, leading to reduced capital costs and savings on maintenance and fuel. As the collections moved from a 'driver plus two' to a 'driver plus three' collection method, there was minimal reduction in operational staff, meaning that any staffing costs associated with service changes were avoided.
- Ongoing route optimisation to accommodate growth and new collection services, maintaining the most efficient use of resources possible.
- Opportunities to look at other services such as street cleansing operations and commercial waste and recycling collections.
- Improvements in the council's recycling performance from 30.8 per cent before the new contract to the current rate of 46.18 per cent.
- Ability to review collections across council boundaries with a view to future shared services.

**For more information, please contact [ctompkins@east-northamptonshire.gov.uk](mailto:ctompkins@east-northamptonshire.gov.uk)**

### Other examples

Many other councils have created important savings through the use of similar waste-tracking and route planning technology. For instance, the London Borough of Harrow has managed to cut £3.2 million off its waste disposal budget while Middlesbrough Council reduced its waste collection costs by 10 per cent, saving £150,000 a year, and was able to move to a four day week by utilising the route planning technology provided by Webaspx.