



# Case Study

The sustainable production of topsoil from dried gully waste, creating the true circular economy in the delivery of highways maintenance.



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# Project Overview

With increased flooding, it is vital to maintain drainage assets frequently and effectively. However, this maintenance leads to an increase in the amount of gully waste, which can be challenging and expensive to dispose of.

The conventional method for disposing of gully waste is to wash the waste and produce low-quality sand and gravels, with the rest of the organic and deleterious materials being sent to landfill.

An innovative alternative to this practice was developed over a period of four years by a team of individuals from Amey on the Staffordshire Highways contract, with technical support from MTS Environmental Ltd, operational support from Coldcarr Recycling Ltd and engineering support from RSL Ltd.

The aim was to recover most of the gully waste, diverting it from the landfill and producing topsoil that could be reused on the contract. Staffordshire has around 170,000 gully pots and produces 1,500 tonnes of wet waste annually, which is serviced by a fleet of six tankers and additional contract vehicles.



# Project Overview

A unique mobile drying system was developed by the team to allow the waste to be screened and remove deleterious materials. Drying involved the trial of various fuels to evaluate cost, performance, and carbon emissions.

To produce suitable soil, the team tested a range of screening techniques to ensure compliance with British Standard 3882 for topsoil production, adding to the product's intrinsic value. Blending the dried gully waste with other materials to achieve the correct balance of nutrients and physical parameters led to the creation of a low fertility soil for verge dressing and grounds maintenance works.

The project demonstrated the principles of the Circular Economy and reduction in Carbon by taking gully waste from the kerbside, processing it, and then reusing it on the adjacent verge. This initiative received significant support from the client Staffordshire County Council and local councillors.







# Our Approach

## ReCon Soil Project



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Global climate change has increased the urgency of finding new ways to address the worldwide shortage of topsoil. That's why our team participated in a European-funded project called ReCon Soil, which involved collaboration with the University of Plymouth.

The project focused on producing soil from construction waste, and ultimately demonstrated the opportunities for this type of innovation.

Through ReCon Soil, we deepened our technical expertise in understanding the soil triangle and developing the correct ratios of sand, silt, and clay. One key waste stream we worked with was gully waste, which has higher levels of sand and organic material from fields and hedgerows. We found it essential to increase the amount of material diverted from landfills, and this innovative process allowed us to recover more than 90% of the dried gully waste.

The benefits were numerous, including availability of topsoil all year round at half the commercial rate.





# Our Approach

## Technical Summary Manufacturing Top Soil

A total of 57 samples were taken over a 4 year period and tested by UKAS laboratories.

We were able to comply with Industry Standards and used other related waste streams to provide required nutrients, such as using waste biomass ash from a local power station to increase potassium levels, adding to the sustainable content of the product.

Further trials included animal waste to increase nitrogen, however the most efficient addition was PAS 100 compost produced from the County's green waste. Through this process, we gained the knowledge and ability to control soil fertility levels to meet BS 3882 and for different applications such as verge dressing and grounds maintenance works.

During the last 2 years, we've recovered more than 2,200 tonnes of gully waste and transformed it into topsoil for more than 100 sites. More than 40 projects have been supplied with the soil in the last 6 months alone with very positive feedback from operators commenting on the quality and ease of handling.





# Our Approach

## Mobile Drying and Fuel Technology

We also developed an innovative approach to mobile drying, which eliminates the need for transport to and from a static plant. Instead, the drier travels directly to the waste site, saving time and transportation costs while reducing carbon emissions.

The energy to dry the waste is derived from oil, so during the development we evaluated several fuel sources, including Gas to Liquid, Hydrogenated Vegetable Oil (HVO), Red Diesel, and Kerosene, but ultimately opted for HVO due to its reduced carbon footprint and recycled properties.

### Benefits of HVO fuel to power the Mobile Drier:

- Up to 90% reduction in net CO2 greenhouse emissions
- Renewable, sustainable and 100% biodegradable
- Reduces notifiable particulate matter (PM) and nitrogen oxide (NOx) emissions
- Meets EN15940 standard for paraffinic fuels and Fuel Quality Directive 2009/30/EC Annex II Provides excellent cold-weather performance
- Collaboration

There has been a lot of technical collaboration between environmental consultants, the client and contractors to understand the legal, physical and chemical aspects of the process. Engineering support has been provided by the manufacturers of the drier, who have consistently provided solutions to any issues that arose on a completely unique piece of plant.



# Outcomes

## Overall Objective Achieved

The project's success lies in developing a system that significantly reduces the impact of drainage maintenance on the environment, reduces carbon emissions, and enables local authorities to reuse materials, creating a circular economy.

It was achieved with the initial drying of utility spoil to produce aggregate and subsoil, recycling of rail ballast and followed by recycling gully waste. The final conclusion is that County Councils can cost effectively use mineral drying as a method for achieving the circular economy recycling within their existing depot infrastructure.



# Outcomes

## Client Approval

This innovation completed a concept of sustainability in the Staffordshire Highways contract where all suitable waste arisings from the service are recycled and reused. It is now custom and practice on the contract to utilise recovered gully waste as topsoil on a continuous basis.

## Manufacturing Topsoil to British Standards Achieved

We manufacture Topsoil to meet the British Standard 3882 which is by definition a manufactured product as you cannot dig up BS topsoil. We have test certificates produced from samples of the last 4 occasions that we dried and blended materials to produce it.

## Reducing Maintenance on Highways

We manufacture a low fertility soil to reduce the amount of grass cutting visits per year. This has saved Staffordshire County Council a significant amount of money and also reduced their carbon emissions.

## Reducing Carbon Emissions

The concept of using mobile drying technology is an advantage over the static wash plants which are the alternative, therefore reducing carbon emissions by taking the waste to the wash plant.

## Employment Opportunities

To date one additional position has been created due to this new innovation and as the process expands we expect further local job opportunities to arise.





# Outcomes

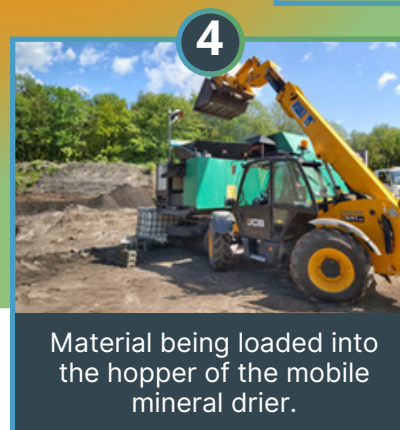
## Cost Savings Achieved

The focus was on gully waste as the most expensive waste to dispose of from the delivery of the highway maintenance service. The increasing costs of energy and materials have led to a significant demand for recycled aggregates, making the Highways waste recycling operation a viable and profitable project.

Our unique technique of transforming gully waste into soil has been a noteworthy success. By drying and blending the material the waste can be classified as soil, which meets the BS 3882 specification for multipurpose topsoil. Using a Commercial Grade soil with lower nutrient levels has been more economical, given that it is sufficient for verge dressing and fill applications. In the last 12 months, we have recovered 1300 tonnes of gully waste and transformed it into a suitable soil for use on several contracts.

The project is an exemplary demonstration of a circular economy, where waste materials are gathered, processed, and reused on the same contract. The savings that the project generates in comparison to purchasing topsoil are approximately £32,000 per year. In addition, there is also a significant saving on logistics and transportation costs estimated at £16,000. It is now established that the entire gully waste output will be recycled into soil.





# Evidencing the Circular Economy



View our video of the process here:

<https://vimeo.com/910453183/18ee66e0b6?share=copy>



Topsoil being  
raked in on a  
scheme we  
completed  
in 2023.

