



CASE STUDY

#12GGWNRNT24

PROJECT

Sustainable Retaining Wall,
for Network Rail & Northern Trains,
Located at Normanton Station Car Park



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PRODUCT INFORMATION

GGW ECO-MSE Geotextile Bags

Green Gravity Walls' ECO-MSE geotextile bags are engineered to meet high-performance standards for retaining wall applications, erosion control, and soil stabilization.

Designed for strength, durability, and environmental resilience, these bags conform to rigorous international testing standards to ensure long-term reliability in civil engineering and landscaping projects.



Material Composition & Longevity

Our 140 GSM geotextile bags are made from high-strength, non-biodegradable, and non-toxic materials, ensuring a 100-year design life. The material is resistant to UV degradation, chemical exposure, and biological decay, making it suitable for long-term applications.



Structural & Mechanical Properties

Our ECO-MSE bags are tested in accordance with recognized industry standards to provide superior structural integrity and resistance to environmental stressors, ensuring their resistance to tensile forces, tearing, and puncturing in various environmental conditions.



Hydraulic & Filtration Properties

The geotextile fabric of our ECO-MSE bags is designed to allow controlled water permeability, reducing hydrostatic pressure while maintaining soil stability. Tested to ISO 12956 (2020) for pore size and EN ISO 11058 (2019) for water flow rate, the material effectively filters out soil particles while permitting water drainage, preventing clogging and ensuring long-term performance in retaining wall and erosion control applications.



PRODUCT INFORMATION

PROPERTY	TEST STANDARD	PURPOSE
Grab Tensile Strength	ASTM D4632 (2015)	Measures fabric strength under tensile load
Trapezoidal Tear Strength	ASTM D4533 (2015)	Evaluates resistance to tearing under stress
Puncture Resistance	ASTM D6241 (2014)	Determines ability to withstand puncturing
Mass Per Unit Area	ASTM D5261 (2018)	Ensures uniform material density and weight
Pore Size	EN ISO 12956 (2020)	Controls filtration, allowing water passage
Water Flow Rate	EN ISO 11058 (2019)	Regulates drainage to prevent hydrostatic pressure
Weathering Resistance	EN12224, EN 12226:2012	Assesses durability against UV and environmental exposure



PROJECT OVERVIEW

Green Gravity Walls was commissioned to design an eco-friendly and space-efficient retaining wall solution using our ECO-MSE (Mechanically Stabilized Earth) bags at Normanton Railway Station. Network Rail & Northern Trains had given us the task of creating a 120sqm load-bearing wall capable of supporting over 100 vehicles within the new car park whilst also allowing for the installation of a vehicle incursion barrier - all without the need for a steel gabion structure.

Our innovative approach achieved a 60% cost reduction compared to traditional retaining wall methods while ensuring long-term structural stability, sustainability, and seamless environmental integration.



CHALLENGES & REQUIREMENTS

- **Soft Ground Conditions:** Unlike typical installations where our ECO-MSE bags are stacked on existing ground, this site required additional ground stabilization due to poor soil conditions.
- **Structural Integrity:** The retaining wall needed to provide long-term stability while ensuring minimal maintenance requirements.
- **Eco-Friendly & Cost-Effective:** Northern Trains aimed for a sustainable and cost-efficient solution that would integrate well with the surrounding environment.



SOLUTION & EXECUTION

Green Gravity Walls supplied its innovative soil-filled ECO-MSE bags, which provided a cost-effective, durable, and environmentally friendly alternative to traditional retaining wall solutions.

Ground Stabilization & Foundation Preparation

Generally, our ECO-MSE bags are installed on existing ground, however, due to the soft ground conditions, a reinforced concrete foundation had to be designed to provide a stable base for the ECO-MSE wall. Our design was reviewed by Northern Trains, which they then not only endorsed but also assured the design by signature.

Thanks to the exceptional durability of our ECO-MSE bags, we were able to embed them deeper into the ground, further enhancing the overall stability of the structure.



ECO-MSE Bag Retaining Wall Construction

GGW utilized high-strength geotextile ECO-MSE bags, systematically filled and stacked to form a reinforced load-bearing structure. The durability of these bags allowed for deeper placement into the ground, significantly enhancing structural integrity and reducing lateral movement. This ensured long-term stability.

Beyond structural performance, the design also prioritized environmental sustainability. The permeable geotextile material facilitated natural vegetation growth, contributing to erosion control and seamless integration with the surrounding landscape. This eco-friendly approach not only improved the wall's resilience but also helped in carbon sequestration, aligning with the project's sustainability goals.



SOLUTION & EXECUTION

Final Integration & Safety Compliance

Once construction was complete, the retaining wall underwent rigorous inspections to ensure it met Network Rail & Northern Trains' safety standards. These checks confirmed the wall's ability to withstand heavy loads, ensuring long-term stability and compliance with their infrastructure requirements.

The ECO-MSE bags were tested for durability, compaction, and resistance to shifting and water infiltration. Their deep placement into the ground enhanced structural integrity, allowing the wall to support the car park with minimal maintenance over time.



Structural Performance & Sustainable Design

Designed for seamless environmental integration, the retaining wall promotes natural vegetation growth. Unlike traditional concrete walls, the ECO-MSE system blends into the landscape, reducing visual impact while contributing to erosion control and sustainability.

Additionally, the wall supports the vehicle incursion barrier, a crucial safety feature for the car park. By providing a solid, stable foundation, the system enhances pedestrian and vehicle safety while offering a cost-effective, eco-friendly alternative to conventional retaining walls.

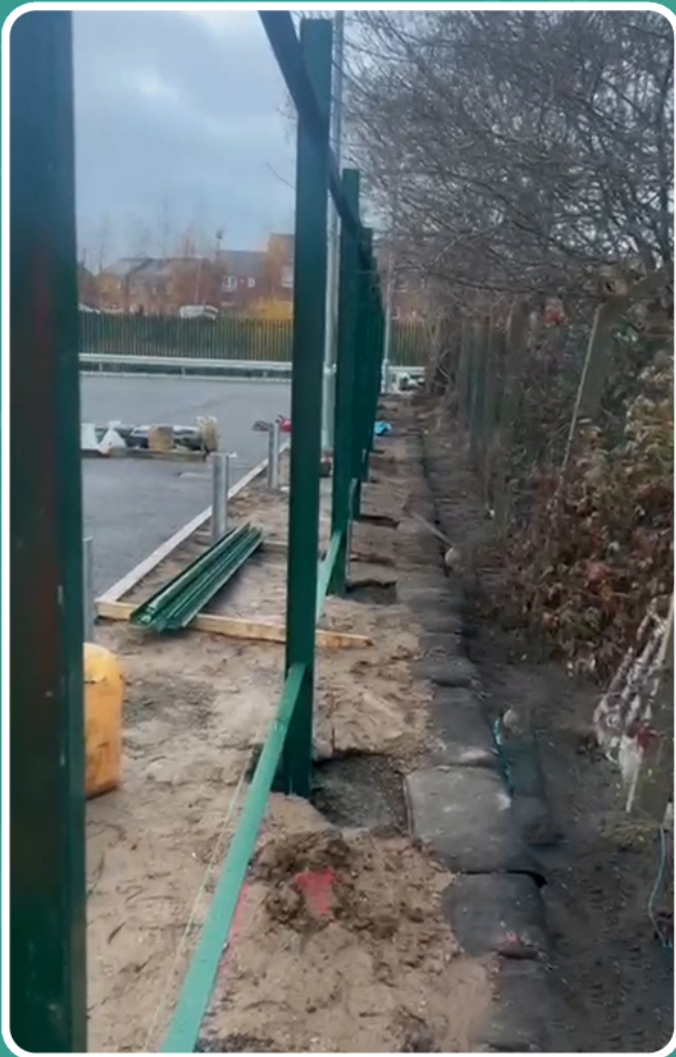


SOLUTION & EXECUTION

Integration of Palisade Fencing

The engineering of the ECO-MSE wall played a crucial role in ensuring the stability of the Palisade fencing, which was an essential security feature of the project. The structural integrity of the retaining wall had to meet strict overturning requirements to support the fence installation in its planned location.

Had the wall not been designed to these precise standards, the fence would have required a revised, larger installation footprint, leading to increased costs and additional construction time. By ensuring the ECO-MSE system met all stability and load-bearing requirements, we eliminated the need for an extended fence line, keeping the project within budget while maintaining security and efficiency.



RESULTS & BENEFITS

RAPID INSTALLATION



The installation process for our ECO-MSE bags is incredibly efficient, this minimized disruption to the site and ensured the project stayed on schedule. This rapid deployment not only reduced labour costs by as much as **60%** but also allowed other construction phases to proceed without delay.

COST-EFFICIENT APPROACH

The use of our soil-filled ECO-MSE bags provided a low-maintenance, durable solution compared to traditional retaining walls, significantly reducing material and labour costs. Their efficient installation process and long-lasting performance make them a cost-effective alternative.



SUSTAINABILITY & AESTHETIC APPEAL



The design supports natural vegetation growth, seamlessly integrating the structure into the surrounding landscape for a more organic appearance. This not only enhances the project's aesthetic appeal but also promotes sustainability by encouraging biodiversity and reducing the visual impact of built infrastructure.

SPACE MAXIMIZATION

The project maximized every available inch by extending usable land right up to the boundary, allowing the client to make the most of their site. This efficient use of space created additional functional areas without compromising stability or design.



ECO-FRIENDLY CONSTRUCTION



The use of our ECO-MSE bags significantly reduces the environmental footprint compared to traditional concrete or brick retaining walls. These bags are made from non-woven geotextile materials, which allow for natural integration with the surrounding ecosystem.



RESULTS & BENEFITS

CARBON CAPTURE & VEGETATION GROWTH



Unlike conventional retaining walls, our ECO-MSE bag systems encourage plant growth directly on the structure. As vegetation establishes itself, it absorbs CO₂ from the atmosphere, contributing to natural carbon sequestration and improving air quality.

REDUCED EMBODIED CARBON

The manufacturing and transportation of concrete and steel structures are highly carbon-intensive. By opting for our lightweight, soil-filled ECO-MSE bags, this project minimized carbon emissions associated with material production and logistics.



BIODIVERSITY ENHANCEMENT



The installed wall provides a habitat for small wildlife and pollinators, supporting local biodiversity. This contrasts with solid retaining walls that offer no ecological benefits.

SUSTAINABLE DRAINAGE BENEFITS

The porous nature of our ECO-MSE bags allows water to percolate naturally, reducing surface runoff and the risk of soil erosion. This supports healthier soil conditions and lowers the demand for artificial drainage systems, further reducing environmental impact.



CONCLUSION

The Normanton Station Car Park retaining wall project showcases GGW's expertise in delivering cost-effective, sustainable, and high-performance solutions for infrastructure projects. By using our ECO-MSE bag system, we provided a retaining wall that not only met structural and safety standards but also offered significant environmental benefits.

Our partnership with Byland Engineering allowed us to develop a technically sound and efficient solution tailored to the unique requirements of the project. The design prioritized stability, safety, and resilience, ensuring the wall could withstand the weight behind while maintaining its integrity with minimal maintenance. The combination of reinforced foundations and geotextile materials enhanced the overall strength and longevity of the structure.



Beyond functionality, the ECO-MSE wall played a vital role in promoting sustainability and environmental integration. Unlike traditional concrete walls, the geotextile system supports vegetation growth, aiding in erosion control and carbon sequestration. This green solution not only enhances stormwater management but also contributes to a more natural and visually appealing infrastructure design.

It is important to note, this project achieved around a 60% cost reduction compared to conventional retaining wall methods, demonstrating that sustainability and affordability can work hand in hand. By choosing GGW's ECO-MSE system, Network Rail & Northern Trains benefited from a high-performance, eco-friendly solution that will continue to provide lasting value and structural reliability for years to come.



GET IN TOUCH

Learn More About Green Gravity Walls

At Green Gravity Walls (GGW), we specialize in delivering sustainable, cost-effective, and high-performance retaining wall solutions for a wide range of infrastructure projects. Our ECO-MSE system is designed to provide exceptional stability, environmental benefits, and significant cost savings compared to traditional methods.

If you'd like to learn more about how our innovative solutions can benefit your next project, our team is here to help. Whether you need technical advice, project consultation, or a quote, we're ready to provide expert guidance tailored to your needs.



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