

**O'KEEFE**

A MEMBER OF THE **BYRNE** GROUP

# O'Keefe Soil Stabilisation

2023







## What is soil stabilisation?

The entire process involves the utilisation of engineering techniques to turn weak soil into a strong base for construction projects. The stabilisation process ensures the soil is stable by reducing the permeability and increasing its overall strength.





## Why Us?

Our wide range of industry leading plant allows us to tackle the most complex Soil Stabilisation projects with the highest regard for the environmental considerations within the industry today.

With over 25 years experience, we are experts in our field at using lime, cement and other binder materials to improve areas of weak soil, allowing the ground to take a greater loading for construction.

Our stabilisation methodologies allow us to offer a cost effective alternative to removing the material off site and importing other fill materials. This reduces pollution by eliminating the requirement for road lorries to transport materials in and out site.

With the capacity of in-house laboratory soil testing, we can reduce overall costs and programme time from start to finish.

# Soil Stabilisation Services

Here at O'Keefe, we offer a wide range of soil stabilisation services that can be used for the following:

- Waterlogged or winter working platforms
- Brownfield sites
- Piling mats
- Haul road construction
- Car parks
- Highway pavement construction
- Value Engineering
- Capping and sub-base replacement
- Engineered fill
- Formation improvement





# Process of Stabilisation

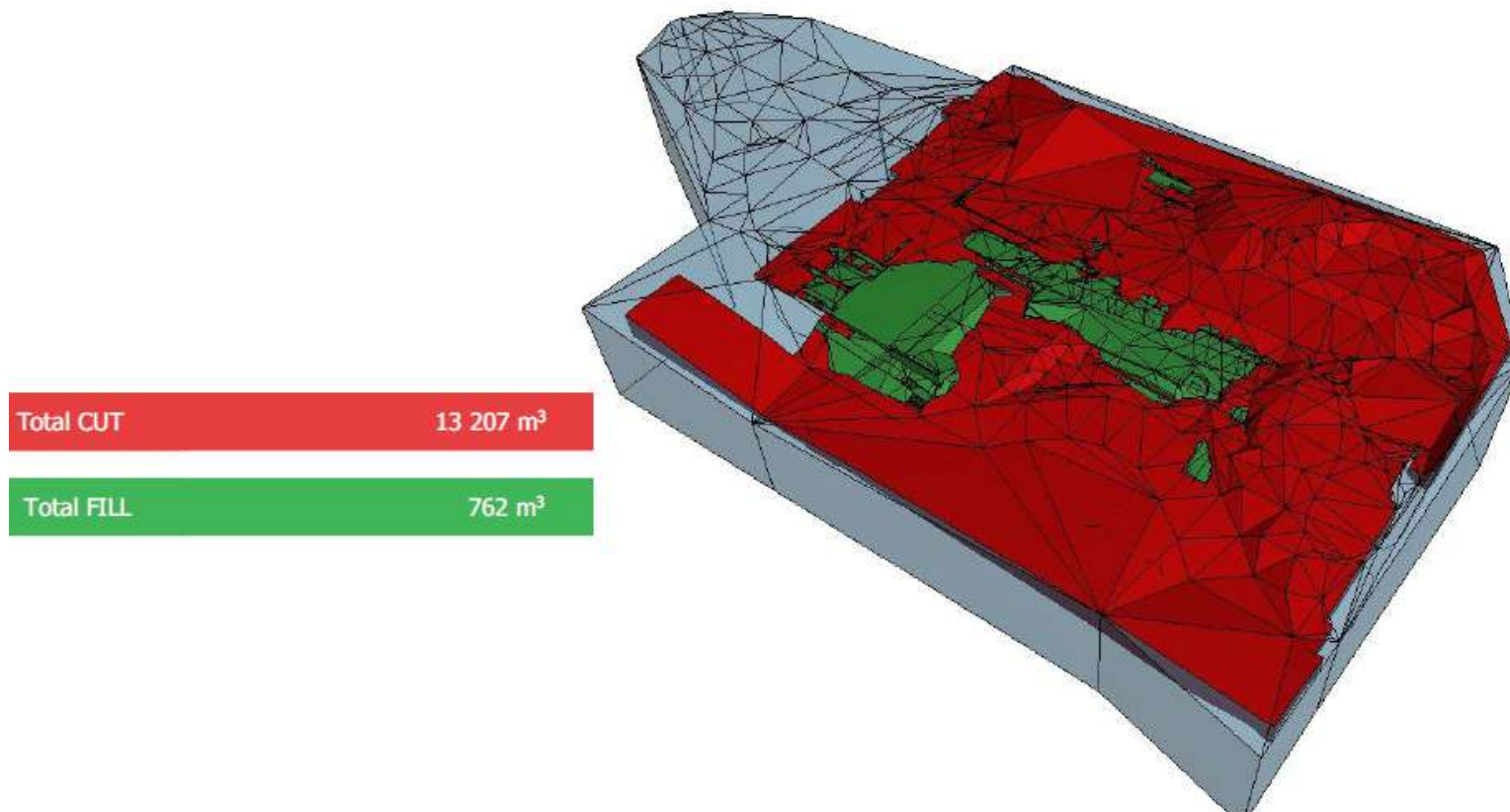
Using the integrated spreader module, the Wirtgen spreads the binding agent directly in front of the milling and mixing rotor which immediately mixes it into the soil. The closed drum housing and an additional double curtain of rubber matting prevents the formation of dust clouds and ensures that the material is exclusively spread inside the milled cut.

Metering cells ensure that the binding agent is applied in precisely metered volumetric quantities, and equally precise, continuous control of the spreading quantity is assured by microprocessor-controlled processes. A two-part transverse auger is continuously supplied with binding agent by a conveyor unit and ensures that the material is uniformly applied.



# Engineering & BIM

Using our own engineers and BIM department we carry out topographical surveys and use the data for cut and fill volumetrics and produce 3D models. Once the model is created it is upload to our GPS dozers who the level the platforms to the model our tolerance is +0.025/-0.025 although we usually achieve tighter tolerances depending on the model.



# In-house Laboratory Services

Our in-house laboratory, situated at our Head Office, has modernised & specialist equipment within air conditioned facilities, allowing us to carry out our own testing with regards to stabilisation, compaction studies, trial mixes using lime and cement, gradings and swell tests to name a few.

By having our own in-house laboratory we can turn around testing results faster than using an external laboratory allowing a continuous work flow on site and minimal disruption to programme time.





# Testing Services

## Suitability Testing

Not all soils are capable of stabilisation and the first step in the feasibility process is to undertake suitability testing. Material high in sulphate or organic matter can cause an adverse reaction with the binder (cement and/or lime). The moisture content of the soils dictates how much binder has to be introduced and principally this dictates the cost of the process.

Three tests are carried out for suitability;

- General grading of material – in line with series 600 of SHW
- Plasticity testing – in line with series 600 of SHW
- Sulphate and organic testing - to TRRL 447

Trial mixes are then undertaken using either lime, cement or GGBS if required.





# Testing Services

## Performance Testing

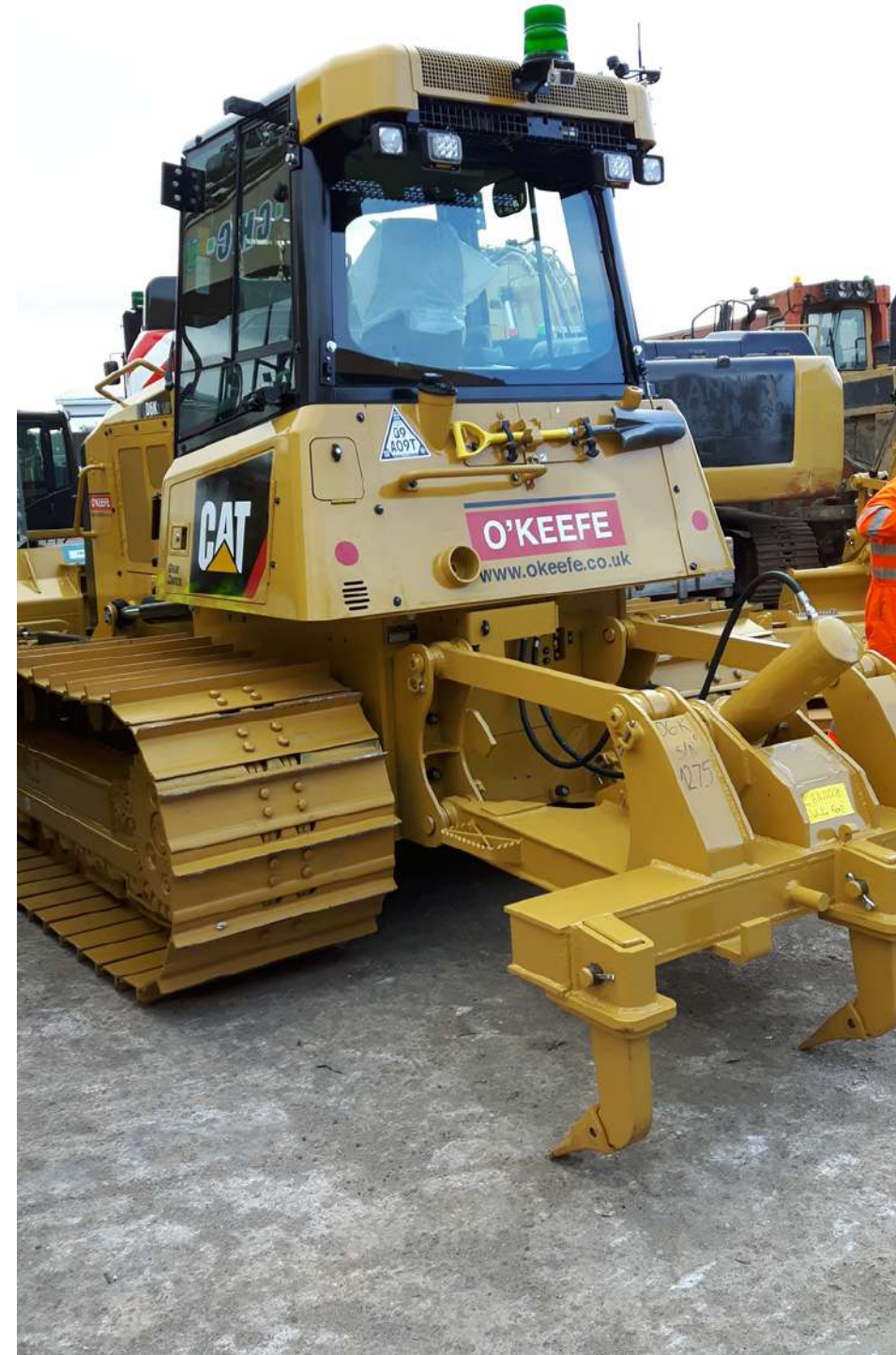
The key factor for achieving the performance specification is moisture content to achieve the optimum moisture against dry density.

- Spread level testing - The Wirtgen machine measures the sample dosage kg/m<sup>2</sup> to ensure the amount of binder is in compliance with the design.

## Performance Verification

The Moisture Control Value (MCV) test results determine if more binder is required or if additional water is required to achieve the desired MCV window. Too wet and the treated material cannot be compacted, too dry and it cannot be compacted to refusal.

- MCV testing is undertaken after the binder has been applied, to ensure MCV values are within the required window.
- In situ density testing to BS 1377 – 9 either through core cutting or the sand replacement method. Nuclear Density Gauge (NDG) is the third method of testing.







## Our Soil Plant

Wirtgen Spack is the latest version of the integrated Wirtgen recycler. Here at O'Keefe we only use integrated systems where we maximise the input of powder into the ground and minimise dust, O'Keefe have two WR2500 and one Spack. The Wirtgen machines are accurate with mixing depths and powder addition with the built in computer system, each machine has a 2.4m mixing drum containing over 300 picks and with a 700hp engine the plant can pulverise blend the mix to the maximum, the Wirtgen also has a water bar and pump that can add water to the mix to and control moisture.

We have two 50t holding Silos Storage where we store the lime and cement, the silos are articulated and transportable on site, we also have a mobile silo the transports the powder form the static silos to their Wirtgen the mobile silo holds 16 ton of binder it can also hook up to the Wirtgen whilst mixing this allow larger areas to be stabilised as the Wirtgen doesn't have to stop to refill.



At O'Keefe we have various sizes of excavators from 37t onwards. With our own plant, we offer a stabilisation and earthworks package, making the most of existing site won materials with no muck away and very little import as support plant (crushers and screeners) deal with obstructions and oversized materials.

Our 18t Hamm Vibrating Roller fleet are used for compaction, helping to meet density specifications and leave a smooth finish.

We have a 10,000 litre water tank with a ball valve fitted which allows us to connect a water supply. This is then pumped through to the Wirtgen if required.

By using all of our in-house plant, engineering and laboratory, it allows us to work efficiently & productively and not rely on external sources, we can also offer the full package with earthmoving and recycling.





# Previous Experience







Tilbury 2 | Graham Construction | 50 Weeks | £1.2m



# Project Overview

The extensive brownfield site, covering approximately 250,000m<sup>2</sup>, was levelled and compacted to a 30% CBR value before a layer of quarried type-1 aggregate is laid as a base for the final reinforced concrete paving slab.

The task was complicated by the presence of numerous underground structures, namely concrete foundations that supported the now-demolished Power Station buildings.

Due to variable ground conditions, we deployed our Wirtgen soil stabilisation machines to evenly mixed cement into the soil, effectively stiffening the soil and increasing its bearing strength.







Biggin Hill Airport | Civils Construction | 44 Weeks | £1.5m



# Project Overview

Situated air-side of Biggin Hill Airport and on the back of residential properties, this project was of a particularly sensitive nature. Extra dust and air monitoring precautions were put into place into to reduce impacts to the air-crafts and near by residents.

We were contracted to carry out a 12,500m<sup>3</sup> cut and fill stabilising layers with lime and cement to achieve a 30% CBR on the top layer. Capped off with 100mm type 1.

To prove the soil is suitable for stabilising and CBR plate testing and MCV's (moisture and density testing), we used our in-house laboratory.

By recycling all materials to be used on site, we limited costings, importation and the carbon footprint of deliveries.







Havant Portsmouth | Civils Construction | 44 Weeks | £1.5m



# Project Overview

We were instructed by our client to carry out cut, fill and stabilise to level for the development for seven future commercial units on land owned by Portsmouth Council.

The ground conditions were wet silty sand, and our works were to cut & fill to level whilst stabilising each layer. We then lime cemented the top layer of soil to 15% or 30% depending on the area of site.

After this process, we then installed land drains around the perimeter of each plot and capped the site off with 100mm of protection.

We stock piled 40,000m<sup>3</sup> of top soil. The site was ecologically sensitive for existing wildlife to the site (door mice, deer etc).







Sky Studios, Elstree | BAM Construction | 20 Weeks | £1.8m





## Project Overview

We are currently carrying out works for the new Sky Studios located in Borehamwood. Works include: Soil Stabilisation, muck away, deep drainage, groundworks and 8no. concrete slabs for studio plots.





Disney Studios, Shinfield | Curo Construction | 50 Weeks | £7.0m



# Project Overview

O'Keefe are using lime stabilisation techniques to improve ground conditions on the site of a new film and TV studio complex near Reading.

Working for main contractor Curo Construction, our enabling works package includes cut-and-fill stabilisation and the construction of pile mats, roads, deep drainage and retaining walls. We proposed a cost-saving solution entailing soil stabilisation. Although an economical solution, stabilisation was a huge undertaking, requiring the treatment of 170,000 m<sup>3</sup> of soil over an area of 695,000 m<sup>2</sup>.

O'Keefe visited the site and collected samples of the materials from the cut. These samples were then analysed at O'Keefe's own in-house geotechnical laboratory and tested alongside trial mixes using lime and ground-granulated blast-furnace slag (GGBS), a well-proven cement substitute, in varying proportions.

"GGBS is used to eliminate the risk of swell when lime is added to highly contained sulphate material," says Mr Doogue. "The samples with lime/GGBS were placed in a soaking tank for 28 days and monitored for swell."



# 2022 Carbon Savings Certificate

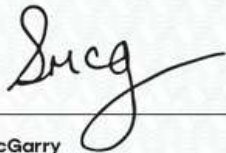
This is to certify that

O'Keefe Construction

Have Saved

2,627

Tonnes of CO<sub>2</sub>



Susan McGarry  
Managing Director, Ecocem Ireland

12.12.2022

Date



The future. Built better.

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## Carbon Saving

Following the completion of our work at Shinfield Studios, we were awarded the above certificate that demonstrates the Carbon saving made through the use of soil stabilisation against other techniques.









Ardersier Port, Inverness, Scotland | Confidential | 5 Weeks | £650k



# Project Overview

O'Keefe has completed extensive ground improvement works for to create a new 1.5km-long haul road ready for the main construction works at a port development near Inverness.

The owner of the site, is redeveloping the 450-acre site as an energy transition facility to serve offshore wind farms and other energy projects.

Preparatory works began last year with site visits and the testing of soil samples. O'Keefe's soil engineering specialists then designed a mix to suit the site conditions.

“There is no water supply on site, but we're right by the sea, so we designed a recipe that can cope with the salt in the water,” explains Mr Doogue.

Using a highly-specialised German-built Wirtgen WR250 soil stabiliser, O'Keefe has mixed approximately 1,500 tonnes of cement into the sandy soil and spread a 150mm layer of crushed concrete over the top. The cemented crush concrete offers a more robust layer as stabilised material is not a wearing course.









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