



Project – **Docksway Newport**

Deep Soil Mixing General Site Proposals



Understanding of the Project

The works are essentially for design and construction of a working platform for the future construction of the new landfill development that is to be constructed in an area that was formally the course of the River Ebww. Some areas of the site have sufficient strength and low permeability cover to provide the required conditions to place land fill waste on top but the areas marked on the drawing indicate areas of special concern that need preparation treatment to both provide strength and maintain the low level of permeability for the base of the proposed site. Long term the importance of providing a barrier to mitigate leakage from the site is essential to the works.

On the site there presently exists a band of very soft alluvium silts with low permeability properties that range in depths that vary between 8.0m in the east of the site and down to 2.0m in the riverbed. While these silts do have a low permeability level there is an importance to treat the top surface to form the working platform but it is considered essential that the bottom 2.0m of the silt must remain intact to provide a constant barrier to the underling terrace gravel.

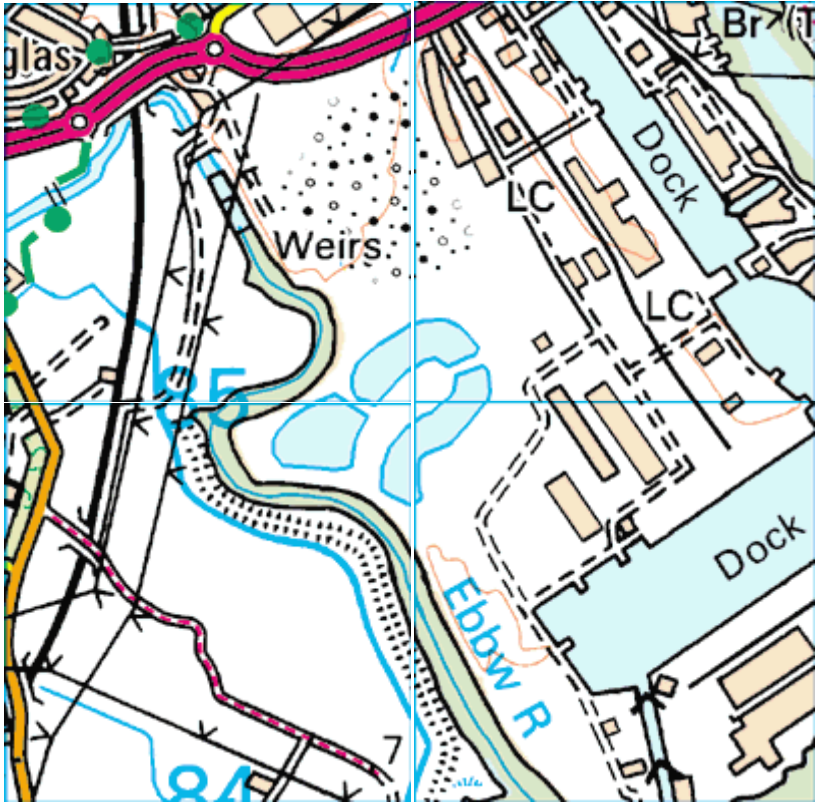
In order that the site is best understood for the depths of alluvial overlying the gravels there is a need to carry out a grid survey of the site and probe the silts down to establish their depth, sections then need to be plotted and an assessment of treatment established. This will identify areas that do not have sufficient depth of alluvium to carry out the soil mixing treatment and the areas that can have material redistributed from to enable those areas with only the 2.0m of undisturbed alluvium to have newly treated material placed on top to provide the working platform with low permeability properties.

In addition to the survey work and assessment of the above DSML shall also look to utilize the early period of the project to trial some mixing operations with the proposed plant in order to demonstrate the binders and system of mixing is providing the required specification again to the client's engineer, the EA and DEFRA.

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General Site Location





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General Working Methodology

The mass mixing would be performed using the Allu mixing head. By treating all of the soft silt material within the top 1.5-2.0m, the ground is transformed into a firm block of suitable strength to carry the proposed loading.

The ALLU PM Power Mix is a hydraulic mixing tool for excavators. The mixing power is based on the inclined locating of the drums and the unique structure of the mixing parts. The drums move simultaneously in three ways at the same time mixing the material in a controlled way. ALLU PMX Power Mix can process different materials all the way up to a depth of five meters depending on the chosen ALLU PMX Power Mix model, the excavator's reach and the quality of the material. The binder is fed by compressed air right inside the ground through a tube to a selected location near the drums. The amount of binder per square can range from only a few percent up to tens of percents. ALLU Power Mix is mounted as an accessory onto a standard excavator by a pin mounting or quick hitch adapter plate.

To maintain control of the mass mixing operation, the work needs to be carried out in cellular blocks ranging from approximately 70m³ to 100m³ at a time. Pre-construction layout of grids, individually identified, will be established on the construction drawings. Grid sizes and depth will be clarified on site prior to the mass mixing taking place and with the known volume to be mixed shall be calculated on a cell-by-cell bases. Monitoring equipment to record the binder volume used in each cell keeps the operator informed of how much is in the cell and how much is still needed to go in. Each cell has its unique number identified on the site plan with a print out of the volume used within that cell.

Treatment of the silts shall be by a wet mix system; dry binders shall be delivered to site in sealed containers and transferred into site-based silos through sealed pipelines. Then utilising the self contained batching plant that draws the powder/binder from the silos, mixing these with predetermined water: binder ratio the resultant grout is held in suspension in an agitating vessel until called off by the mixing rig operator.

Each batch that is mixed in automatic mode is electronically recorded for source of binders, with two binders being mixed on site records are downloaded on a daily bases to show the percentages of each binder being used in a batch, the weight of binder, volume of water, mixing times both period of mixing and time of day.

DSML propose to use Mass Stabilisation as the method for achieving the requirements of the project at Docksway Disposal Site. Mass stabilisation is a method to stabilise soft soils by



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adding binders to improve the shear strength. It is proposed to use blended bentonite and cement powder as the binder at Docksway this will be batched in ratios determined by the site trials and introduced to the soils requiring stabilisation using a computerised automated batching plant and an Allu mixing head attached to a 35T CAT 330 excavator. (See Below Sketches and Photo.)

It is proposed to use a wet mass mixing solution, in order to produce a consistent grout a specialised batching plant shall be erected with feeds from two silos that contain the dry powders. To produce the wet grout, a predetermined quantity of water is dropped into the mixing tank of the batching plant, followed by the programmed weight of Bentonite and Cement Binders, these shall be blended to the required consistency within the mixing pan before being discharged as a grout to the holding/agitator hopper where the grout is stored before being pumped to the soil mixing head. The speed of the grout being pumped is controlled by the Allu soil mixing operator who is mixing a particular cell. Each cell shall be individually identified and the actual volume of each cell shall be calculated and the required quantity of binder known in advance. The grout shall be continually supplied until the predetermined quantity has been batched for that particular cell size.

DSML consider that the top 1.5 – 2.0m of silt can be mass mixed to meet both the required soil strength and the permeability factors.

Full method statement shall be provided for all these activities prior to the work commencing but it is clear to say that the client's engineer, Newport CC the EA and DEFRA shall all be satisfied with the survey information and the working proposals prior to commencing any full scale stabilization operations.

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As mentioned previously for installation of the actual works we shall be bringing in our own ALLU mixing equipment and our own batching plant for the mixing and pumping of the binders as a grout.

We recognise the importance of probing the alluvium layer to identify the depth to the gravels and this shall be carried out with a small dynamic probe rig that we shall again sub-contract in but this process we consider is not needed for the complete 6m by 6m grid.

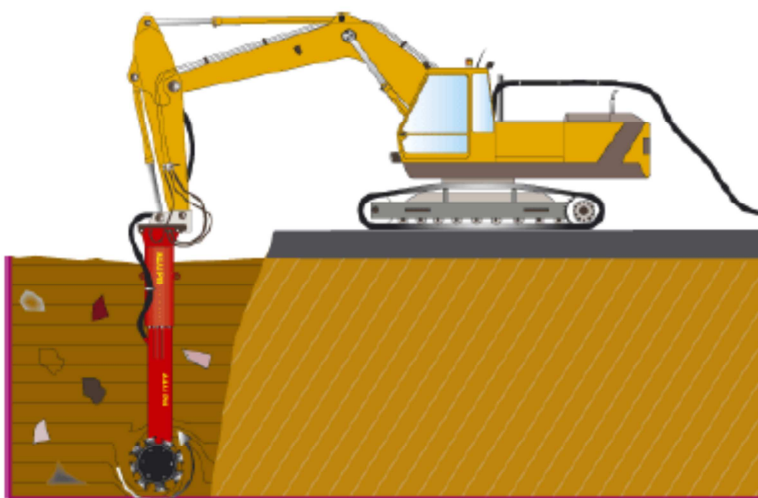
We propose initially carrying out cross-sections of the site at about 20 m spacing with the probing being concentrated nearer the old riverbed thus identifying the risk areas for depth of alluvium and potential areas that need material transferred to/built up.

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For this work, we envisage placing large timber rafts on top of the softer silts to provide a safe working platform for the probing rig.

For the main work, all men on site shall be directly employed by DSML. With an experience soil mixing foreman working full time on the project the upper tier management shall be either Colin Critchlow or Robert McGall who shall be onsite a minimum of 90% of the working week but who shall always be available on mobile phone. Full time site Engineer/manager shall be George Olney.

Mass Mix



Mass mixing with the ALLU mixing arm and head can enable the mixing operations to reach depths of 5.0m but as seen in the photograph a simple mark to represent the desired depth keeps the operator aware and the engineer in tune with the correct depth.

Sketch showing typical Mass Mixing Operation using the ALLU Mixing Head



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2) Site Programme

Short Programme

Description	Weeks	Months									
		Jan	Feb	Mar	Apr	May	Jun	July	Aug		
Mobilisation of Plant site compound fencing	2	■									
Field Trials with ALLU mixing head.	1	■									
Site Survey - Probing of site and lay out of cells	3		■								
Testing of site trial samples and assessment of results	1		■								
Anticipated main works start date Week Commencing 16 th Feb 2015			■								
Installation of soil mixed blanket over site 15000m2	15			■							
Testing procedures and validation works					■	■	■	■	■		
Decommission and move off site									■		
Design Validation report and Warrantees issued	4								■		

While this is a simple programme, there will be a need to expand this once the site survey and plan of mixing cells has been established with ID's, plan sizes and depths.

With this information recorded, the anticipated progress programme shall be established and used to monitor weekly working progress reports. Testing regime and designer reporting schedule shall also be plotted onto the contract programme with monthly site meetings.