In-situ soil mixing treatment of contaminated soils at Sir John Rogerson’s Quay, Dublin

by

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Sir John Rogerson’s Quay

1.1 Ha site next to River Liffey near the city centre

Cocktail of contaminants present in soils & groundwater

On site sources - former timber treatment & paint works

Off-site sources – former Dublin gas works & coal yard

Proposal for commercial, residential & leisure end

Benzene, phenols, naphthalene, benzo(a)pyrene
Risk-based remedial strategy

- removal of upper 3m of contaminated soils
- low permeability barrier (5 to 8.5m bgl)
- in-situ S/S treatment of organically contaminated soils
- improvement of ground bearing capacity (170kPa)
- concrete slab with vapour control measures
Two column configurations used
Treatment slurry materials:-
provide chemical fixation and mass encapsulation
Modified & natural bentonite clays
Ordinary Portland Cement
Pozzolans – no economical source
Mix 1

Load Settlement Charts

Mix 2
### Leachate concentrations (ug/l) at 28 days

<table>
<thead>
<tr>
<th>Compound</th>
<th>Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>100</td>
<td>&lt;0.1 - 22</td>
</tr>
<tr>
<td>Phenols</td>
<td>2000</td>
<td>&lt;10 - 30</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>10</td>
<td>&lt;0.5 - 12</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>10</td>
<td>&lt;0.1 – 1.4</td>
</tr>
</tbody>
</table>
## Geotechnical Properties at 28 days

<table>
<thead>
<tr>
<th>Property</th>
<th>Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>K ((x10^{-9} \text{m/s}))</td>
<td>1 (\times 10^{-9})</td>
<td>(&lt;0.11 – 0.94)</td>
</tr>
<tr>
<td>UCS ((\text{kPa}))</td>
<td>700</td>
<td>731 - 4148</td>
</tr>
<tr>
<td>(M_v) ((x 10^{-2} \text{m}^2/\text{MN}))</td>
<td>5 (\times 10^{-2})</td>
<td>0.01 – 0.161</td>
</tr>
<tr>
<td>Settlement ((\text{mm})) Total</td>
<td>20</td>
<td>7.93 – 10.26 at 1.5x working load</td>
</tr>
</tbody>
</table>

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*Image of a construction site with text overlay.*

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*May Gurney logo.*
In summary:-

Over 1300 lin. m of soil-mixed columns in barrier & ground improvement areas

10,000m$^3$ soils successfully mass treated

All over 14 week contract period
S/S and soil-mixing techniques –

Relatively fast
Cost effective
Treatment of multiple contaminant sites
Ground improvement
Thank you for your attention
Questions?