

Land Remediation Services Overview



November 2016

Continuum Management Anstalt

Services and Solutions Overview

Continuum offers its worldwide clients a range of environmental and remediation services and solutions for both land and water contamination.

Using a range of leading edge solutions that are non-chemical, non-toxic and which utilise the earth's own natural healing powers to remediate the contamination, Continuum provides a fully guaranteed range of services that can clean up almost all known pollutants. These include hydrocarbons, chemicals, heavy metals, asbestos, drugs, PFCs as well as common industrial pollutants such as cyanide and arsenic.

The solutions use the power of bio-mimicry in which natural elements and compositions are used to neutralise, break-down and eliminate pollutants found in the water or on land.

Unlike current methods used for land remediation which routinely rely on the removal and disposal of contaminated soil and the replacement with imported clean soil (dig and haul) the Continuum solutions are applied in-situ, reducing dramatically or eliminating the need for dig and haul and are normally successfully completed within a much-reduced timescale when compared to more traditional practices.

It would be expected that an average site would be remediated within weeks rather than months or sometimes even years and, importantly, at a much lower cost.

Depending on the nature and complexity of the site it would be expected that savings of between 20-50% of total costs would be achieved using the Continuum solutions when compared to other methods. These significant savings result from the reduction in transportation and haulage costs, equipment, costs of the remediation solutions and of course the time taken.

Our methodology and solution examples

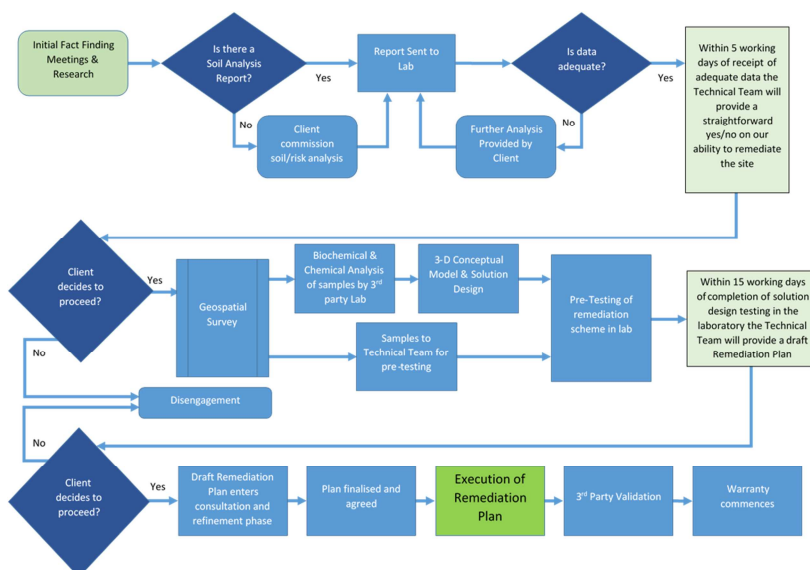
The solutions provided have a 100% success rate in the field and are provided with a full warranty of successful remediation. There has not been a site to date that we have not been able to fully remediate to the standards required by the owners or the Environmental Agencies involved. This remarkable success rate is because each solution is tailor-made and designed based on a full understanding of the site through thorough evaluation and detailed design.

To complete the solution design, our methodology is based on a very simple process. First, we undertake an initial assessment of whether we can remediate the site. If the answer is 'Yes' and the client wishes to proceed we perform a full geospatial survey and produce a solution design for the client. If the client accepts the proposition we then implement the solution.

The initial assessment is crucial and we will examine any soil analyses and other reports that the client may be in possession of. Our process considers factors that other remediation processes do not use and which are not usually included in typical soil analyses conducted for a builder or construction company. The likelihood is therefore that we would require some additional analysis before being able to make a Yes/No declaration of our ability to remediate a site. In those rare cases where the client has no analysis or environmental survey reports, we would recommend an initial risk assessment by one of our specialist environmental surveyors to provide an expert view of the types of contamination that may need to be dealt with.

Assuming we believe we can remediate a site we then give a fixed-price quotation for the geospatial survey and solution design. The survey includes the removal of numerous soil and water samples as well as samples of other relevant artefacts such as solid or liquid contaminants as well as in-situ measurements and the development of a 3-D conceptual model. Once the samples are in our laboratory and the initial results are known, the 3-D model is refined and along with the laboratory analysis results, used to construct a detailed solution design for the site. This solution is then tested and refined under laboratory conditions and once optimised the geospatial survey and proposed solution are delivered to the client in a report.

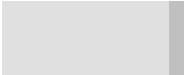
Pictorially the process follows a simple sequential flow-chart process depicted below:



Once the solution is designed an on-site test will be undertaken, if required, to ensure that the process will be successful over the whole site. Once the test application is proven to be successful the agreement is signed to undertake the work and the site remediation is started. The site work may well be completed in phases if for a large site or in one straight work job if on a smaller site.

Of course, sites and complexity vary, and therefore so does the cost for remediation. Typical land remediation applications and an example of the cost range are shown below:

- **Easy access, rural or non-dense urban brownfield or contaminated site remediation**
 - For these sites, we can offer a full range of remediation solutions to handle most known pollutants, including asbestos. These pollutants would include chemicals, hydrocarbons, heavy metals, poisons, acids and PFC's. As part of the site survey we will ascertain what the long-term use is for the site, for example storage, waste or light industrial purposes, commercial or residential accommodation, or for use as a public space. Each of the intended uses would belikely to have a different end requirement for the level and type of permissible contamination in the soil, and therefore possibly a different remediation solution. For assessing average costs, we will take the example of a rural or non-dense urban site with easy access, a site that is clear of buildings to be demolished and is considered to have a moderate level of contamination to a depth of less than 1 metre. In this case, we would expect the average cost per acre to be approximately USD \$300,000.
- **Confined/restricted access, urban, densely populated, contaminated site**
 - For a site located in a heavily populated urban environment or one with restricted access the solution would be the same as above. The difference being the access for equipment or additional cost of services and associated items, there may also be a requirement for additional specialist manpower if plant operation is restricted as in many urban sites with underground artefacts to work around. With moderate levels of contamination, the average cost of remediation per acre would be approximately USD \$500,000.
- **Heavily contaminated brownfield site.**
 - For a site, which is heavily contaminated and to a deep level the average cost of remediation per acre would be approximately USD \$750,000 per acre. This type of project will also take longer to 'cure' after the implementation phase since the deep contamination generally requires 4-6 weeks to take effect, requires complex implementation schemes and is more intensive and invasive than for shallow & moderate contamination.
- **Agricultural land remediation.**
 - We also offer solutions for agricultural land repair, improvement and enhancement. For land that has been over farmed or over utilised, suffered from years of pesticide and herbicide usage or that has simply been neglected the we can restore the land to full productive usage. In many cases (case studies available) the increase in yield is phenomenal resulting in much higher profits for the landowner. This solution has been applied across a wide range of agricultural sites including potato farms, fruit orchards and crop production. Land that is exhausted is simply brought back to life. The



cost per acre for agricultural services can vary enormously from a few thousand dollars per hectare plus survey to \$30,000 plus survey depending on the state of the soil. Water remediation may also be required, especially where poisonous agricultural run-off is damaging nearby rivers and ground water.

While the costs are indicative, our processes will always compete with dig & haul and leave no unwanted hazardous by products, nor merely shift the problem elsewhere. The Continuum land remediation services are proven and guaranteed to deliver. They are the perfect solution for land recovery, remediation and future development and at a cost which makes the land development an attractive investment opportunity.

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