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Contaminated Land: A Site Auditor's Perspective?

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요 약 문

Developers have, for some time now, recognised the benefits of acquiring "brownfields"sites for future urban development. The term "brownfield" generally refers to sites that have been previously occupied and in most cases this occupation has been for industrial usage. A key issue that developers face when considering the acquisition of a former industrial site is contamination and the costs associated with remediating the land to a level that renders the site suitable for its proposed use. Understanding all of the issues and implications associated with the remediation of contaminated land can be quite daunting. The process of remediation brings together a number of stakeholders that all have some influence on the outcome of the works. The stakeholders include the vendor, the purchaser, the regulatory authorities i.e. EPA and council, the Site Auditor and local residents. Careful planning and negotiation with the above stakeholders should be considered before committing to any remediation project.

Key words: Brownfield site, remediation

What Constitutes a Contaminated Site?

The National Environmental Protection (Assessment of Site Contamination) Measure 1999 defines contamination as (1):

"the condition of land or water where any chemical substance or waste has been added at above background level, and represents, or potentially represents, an adverse health or environmental impact."

Contamination of land generally comes about as a result of manufacturing processes that were undertaken on the site, disposal of waste products on the subject land, unregulated

tipping of material on land for the purpose of reclamation or site raising. In other instances contamination can come about through accident and misadventure such as uncontained spills and leaks i.e. fuels and oils.

Why be Involved with Contaminated Sites?

The continuing push of the Australian public to reside in lifestyle locations has accelerated the development of brownfield sites in Australian cities. The city population growth trend will continue as Australians embrace lifestyle living options foregoing the more traditional " acre block"life that dominated the 60's, 70's, and 80's.

With "Greenfield" stock in Sydney at an all time low, developers are looking for alternatives. "Brownfield"and infill land is one cost effective alternative. Generally contaminated sites that are undergoing redevelopment in the Sydney Basin include sites that will service the "lifestyle living"requirement of the Australian public. Remediated lands are returning high yields for developers and excellent return on such development is not confined to waterfront. Former industrial land in desired locations is also being developed as the Australian cities population growth continues.

The key to developing contaminated land is understanding the process, timeframe and resulting cost to achieve the level of remediation for the proposed development. In some instances developers have been reluctant to pursue "brownfield" sites because of the perceived unknown and indeterminable cost associated with contamination issues.

What are the Key Issues Encountered on Contaminated Sites?

Typical contaminants of land include:

- Heavy metals lead, mercury, zinc etc
- Hydrocarbons typically fuels and oils
- By products of manufacturing processes boiler ash, tars, chlorine residues, acids etc
- Pesticides and herbicides Scheduled Chemical Wastes

Geotechnical issues that are commonly encountered on contaminated sites include:

- Uncontrolled filling with material contaminated with the above items, generally leading to poor compaction and unsuitable subgrades.
- Use of poor quality materials as fill, including builders waste, etc.

There are a number of remediation options available, all of differing cost and time implications. The most commonly used techniques include:

- Off site disposal to licensed landfill.
- Stabilisation of the material, typically with cement, so as to reduce its potential for off site impact. Generally performed in conjunction with off site disposal or on site containment.
- Cap and contain where the contaminated material is placed into a dedicated on site containment cell. Usually located in a non critical area of the site that can be monitored.
- Bioremediation which involves the on site treatment of the material, typically contaminated with organic compounds and some hydrocarbons. Material is regularly tilled in special beds, and in some cases organic matter is added, so as to promote a natural reaction that breaks down the contaminants to their natural elements.

Case Study - Rhodes Peninsula, Sydney, Australia

Located on the Rhodes Peninsula, some 15 kilometres to the west of the Sydney Central Business District and on the banks of the Parramatta River, the site has been remediated over the past 15 months in preparation for future site development as a mixed-use residential and commercial precinct.

The total land area is 19 hectares and the site had been used for the manufacture of chemicals, resins, plastics and paint. The years of manufacturing and on site disposal of waste products had left the site contaminated with a range of organic compounds including plasticizers, acetates, acids, chloride compounds. Another area of the site was heavily contaminated with lead as a result of historical paint manufacturing operations.

At completion in excess of 150,000 tonnes of lead contaminated soil was excavated and carted off site for disposal in a purpose built monocell that is fully lined and has leachate collection an monitoring capabilities

The organically contaminated material was treated on site via the bioremediation process to reduce the contaminant concentration below those allowable for the future used of the site. At completion, in excess of 74,000 cubic metres of material was treated on site, thereby saving valuable land fill space and beneficially reusing the on site material.

Naturally occurring biological systems were enhanced by the use of soluble nutrients and through aggressive soil tilling techniques to successfully accelerate the breakdown of the organic contaminants of concern.

The total cost of remediation was estimated at approximately US$8 million, with the most significant costs associated with theoff-site disposal of the lead (Pb) contaminated soils to a purpose-built monocell.

The remediation process was managed under the regulatory provisions of the Environmental Planning and Assessment Act, 1979 See www.austlii.edu.au for access to all Australian laws and legal judgements., and the Contaminated Land Management Act, 1997 Ibid., with an independent site auditor "signing-off" the works and providing a certification to the local council that the land was suitable for its intended residential and commercial purposes.

In conclusion, the responsible redevelopment of former industrial lands for beneficial reuses has become a recognised protocol that allows sustainable urban consolidation, as well as effective environmental management.

References:

1. National Environment Protection Measure for the Assessment of Contaminated sites. See www.nepc.gov.au.
2. See www.austlii.edu.au for access to all Australian laws and legal judgements.