Addressing Environmental Issues Valuation/Appraisal Assessments

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SUMMARY

Environmental issues effecting land and its valuation/appraisal assessment process falls into three key areas:

- Protection of environment
- Contamination of environment; and
- Remediation of "Brownfield" areas to benefit the environment.

All can have substantial impact upon the valuation/appraisal assessments process.

For example, in respect to the "protection of the environment", issues could include the treatment of and the assessment of wetlands located within a proposed residential subdivision. Alternatively, another issue could include, say, a river system traversing an agricultural farming environment. The development of GIS and GPS systems, for instance, with aerial photography and remote sensing capability, has contributed significantly towards a greater understanding of and more detailed and accurate assessment processes being undertaken.

Restructuring of industry and the redevelopment of inner urban land or residential creep into rural land can encounter degraded or derelict land requiring remediation prior to a change in use. Soil toxicity or contaminated land creates unique assessment difficulties and financial risks for owners and developers. Enhanced technology for the assessment of the volume and type of contamination coupled with methods for "clean-up/containment/remediation" has, in many cases, enabled unsafe sites to be rendered safe for an appropriate land use. We are now seeing a number of partnerships developing between government and private organisations who have realised the merit of integrating remediation with development to maximise financial returns and minimise remediation risks. Australia's environmental legislation, which empowers environment audits to assess then manage remedial action, is at the forefront of this success.

This paper will raise awareness of environmental issues and provides some brief case studies that will highlight some of the technological advancements used in the environmental audit process. This enables valuation/appraisal assessments to be undertaken with a higher degree of accuracy thus allowing greater opportunities for the remediation of Brownfield sites.

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1. INTRODUCTION

Over time land, including wetlands and waterways, across the world have suffered from not only natural elements, but also poor and sometimes blatantly irresponsible use and management practices. The result can often render the land dangerous and unusable until some form of remediation action has been undertaken. In many cases such land can have a wider impact on vital wetlands and waterways thus creating significant environmental issues beyond the boundaries of the site itself.

Worldwide, the issue of water quality and availability for both rural and urban locations has become an increasing concern for governments. Accordingly, scientists are working to offset the impact of greenhouse climate change. Indeed, "Brownfield" issues (as they are known in the US whereas in Australia, we use the term "contaminated") were acknowledged by the 1998-2002 FIG Chairman of Commission 9. Commission 9 is now seeking ways to assist their remediation. The worldwide membership of FIG comprises many land-related professionals, who recognise the impact of derelict brownfield land on valuable wetlands and waterways. Many FIG members are already working with industry experts to either decontaminate or at least contain the contamination of brownfield land to revert it back to a viable and productive use.

We trust that this paper will assist to raise awareness of the variety of ways that we can protect our environment and at the same time return Brownfield sites back to productive uses. There are many solutions available to stop ongoing, wasteful contamination. There are economical clean-up/containment methods available which continue to improve all the time. The environmental audit process has now been accepted in Australia and is providing positive benefits for those seeking to improve the problem environmental areas.

This paper is about sharing information in the hope that a wider group of people will actively work with the custodians of these problem sites to implement appropriate remedial actions. This is such an important issue that we have the support of some local environmental experts, many who are actively involved in the audit process. They are assisting by providing case studies to illustrate that these issues can be effectively dealt with.

To start the process these environmental experts have agreed to provide reference material for posting on the FIG Commission 9 website to allow interested people to gain further information on the Australian experience. In time, others may also post their environmental experience.

2. GETTING STARTED

This could be as simple as when you commence an assessment of a parcel of land by posing the question, “if this was my land, what is its best use in the current situation?" Most environmental problems can be easily seen, smelt or there may be a history of a past use that will arouse suspicion. If there is even a small problem evident at this time, its impact in the future will most probably be of greater consequence than it is today to the owner, the user or the wider community.

Early detection means that condition and outcome can be assessed so that action plans, through the environmental audit process to remove or contain any problem, can be developed. This will maximise opportunities in the future and ensure that ultimately land remains useable.

The two main variables used in determining whether land is redeveloped are

- Land value (valued in a condition suitable for development);and
- Cost (or estimate of cost) of remediation.

A simple model based on a concept presented by Chakrabarti (1997) can be used to illustrate the range of outcomes generally associated with respect to land value and remediation cost. Parker & Taber (1998).

Condition LOW LAND VALUE AND HIGH REMEDIATION COST Outcome No redevelopment – Monitor and Manage (Assumes No Environmental Impact)	Condition HIGH LAND VALUE AND HIGH REMEDIATION COST Outcome Integrate Remediation and Development to maximise return and manage remediation risk
Condition LOW LAND VALUE AND LOW REMEDIATION COST Outcome Redevelopment Marginal – Remediate Prior to Sale to Minimise Any Residual Liability	Condition HIGH LAND VALUE AND HIGH REMEDIATION COST Outcome Low Remediation Risk - Remediation Can Be Independent of Development

It is desirable to compare the various methods of remediation works with alternative end uses in order to derive the best overall outcome. This can include financial, usage and wider environmental.

For example, piping out the flow of waste into a creek which is to traverse a proposed residential development (where the creek is a key feature of the development) will improve not only the saleability of the development, but will also improve the environment.

Another example is the capping of contaminated soil with concrete to provide open car parks/storage in an industrial estate. This would follow an environmental audit and remedial works.

3. ENVIRONMENTAL LIABILITY

Around the world there appears to be various approaches in dealing with environmental problems. Australia appears to be having some success in this area which may assist others.

In Australia there is an increased awareness of environmental issues and this has made it easier because of clear planning legislation and requirements. This involves an Environment Effects Statement (usually by Government direction for major projects) or an environmental audit for various land uses.

Environmental audits are required in Victoria when rezoning industrial land to a more sensitive land use. The audits are very specific (i.e. more stringent) if the land is to be used for residential purposes or as a child care centre, pre-school centre or primary school. Both are important when assessing land value.

Each Australian State still has separate environmental laws, but governments are working towards uniform laws across the country. In Victoria in June 2000 penalties were imposed in this area in line with other states. The maximum for typical pollution offence increased dramatically from $US10,000 to $US120,000. In the case of dumping of industrial waste it was increased from $US20,000 to $US250,000. Under these same changes the courts can also apply alternative penalties, such as ordering an offender to publicise the offence and its consequences, or initiate a specific public environmental project. This will prevent companies from considering court-imposed penalties as simply "just another cost of doing business". At the same time, it provided clearer roles for environmental auditors, who have a delegated responsibility to identify the extent of an environmental problem, supervise remedial works and certify when the works are completed. Liability still remains with the source of the problem.

More businesses are now putting effective environment systems in place rather than ignoring the changes that are going on to avoid financial ruin or the possibility of imprisonment. This is assisting with identification, management and resolution of environmental problems (see 4.10).

3.1 Environmental Audit

In Victoria Environmental Protection Act 1970 (Vic) defines an environmental audit as:

A total assessment of the nature and extent of any harm or detriment caused to or the risk of any possible harm or detriment which may be caused to, any beneficial use made of any segment of the environment by any industrial process or activity, waste, substance (including any chemical substance) or noise.

To show another widely accepted definition of an environmental audit the International Chamber of Commerce published the following:

A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organisation, management and equipment are performing with the aim of helping to safeguard the environment by:

- facilitating management control of environmental practices;
- assessing compliance with company policies, which includes meeting regulatory requirements.

Here in Victoria, Australia, environmental audits may be needed in relation to:

- an industrial facility; or
- contaminated or potentially contaminated land.

3.2 Environmental effects statement (or environmental impact statement)

This is compiled prior to commencing a new major project development or development to permit a careful assessment of the potential impact of this proposal on the environment.

This is a process where the public is invited to review and make submissions on issues usually to an appointed panel.

3.3 Site remediation - Occupational Health and Safety

The environmental consultants undertaking the remediation of a site will review all occupational health and safety requirements that may be necessary to develop a *Site Action Plan*. Plans include sections on contaminant characteristics, toxicity data, general site safety, decontamination procedures, machinery and vehicle practices and emergency procedures.

3.4 Register of confirmed contaminated sites

Victoria has a State Register of Confirmed Contaminated Sites, which provides authoritative information on known sites. A site can only be removed from this register once a Certificate of Environmental Audit has been issued. It may then be added to a listing of cleared sites.

With the development of geospatial databases, this information can be shown as a layer over a digital property map and other topographical themes to assist in assessing impact on wetlands and waterways. Here in Victoria the Government is trailing other states this development, but some local environmental consultants are undertaking interesting environmental geospatial work.

4. SAMPLE CASE STUDIES

4.1 Former Small Power Station Site – Victoria

A special feature of this project was the involvement of the owner (Government Power Authority) using a developer's site plan in consultation with the site auditor**.**

The site is located on the banks of Lake Wendouree, a major landmark in Ballarat, Victoria. It is a sensitive ecological receptor, being an important local water bird habitat. It is also used for water sport. The former Power Station used briquettes as a source fuel material. The station included a large basement area to depth of four metres below ground level. Site activities included the treatment of waste ash and storage of fuels and oils in underground tanks. The project included demolition of the power station and on-site treatment of contaminated soil with the site eventually being redeveloped for an exclusive residential estate in a prime lakeside environment.

A cost effective plan for the proposed residential subdivision involved the encapsulation of the contaminated soil in the basement area, beneath the proposed roadway. A maker layer of artificially coloured sand was placed on top to mark the upper extent of the contaminated soil. Contaminated soil was placed to a minimum depth below the road surface to minimise potential health effects from contaminants with strict controls on future works in this area.

See www.ghd.com.au 'Wendouree Power Station Remediation' for details.

4.2 Remediation Project - Albion Explosives Facility – Victoria

This former Australian Department of Defence (Defence) site, included a 178-hectare area containing soil that was contaminated with metals and explosive organic compounds deposited over a 50-year period. The area underwent remediation prior to redevelopment for uses ranging from residential to commercial/industrial. A remediation strategy developed by Golder Associates for (Defence) was financially viable for the Urban Land Corporation (ULC) to purchase the site and provide the funding to action the remediation strategy (or clean up). The overall strategy was to undertake sufficient clean up and validation to provide a site suitable for the intended land use identified in the development plans and dispose of unsuitable site soil at an on-site repository.

The permanent on-site repository design for the highly contaminated soil was for an area of about 3ha, between 1m and 3m below surface level, having a maximum final height of around 10m above surface level and a design airspace of around 130,000m^3. The principal objective in the design of the repository is to protect human health and the environment commensurate with the use of the area as public space after giving due consideration to protection of land and groundwater beneficial uses in neighbouring areas.

Details from a 2000 paper from Goldar Associates by Peter Thornton and Ian Kluckow.

4.3 Kingston Foreshore Development – Canberra ACT

Development of the site was intended to return a commercial result to the ACT Government and Kingston Foreshore Development Authority, who required the Brownfield land cleared of impediments prior to sale to developers to maximise financial return for the prime site adding value to the area.

Site a prime location central to the city of Canberra on the shore of Lake Burley Griffin adjacent to Jerrabomberra Wetlands. Previously the sit**e** was occupied by numerous derelict buildings and contaminated with a range of materials reflecting previous uses.

These included:
- Massive soil and groundwater contamination from above ground diesel tanks.
- Chemical storage tanks and surrounds within the Government Printing Office.
- Ash from the power station and ash from railway engines.
- Petroleum contamination from a former refuelling station.
- Oil and solvent contamination from the bus depot and workshops.

A consultant project managed the building demolition and the remediation and environmental validation of contaminated land.

See www.ghd.com.au 'Kingston Foreshore Development' for details.

4.4 Environmental monitoring Sydney Olympic Park, Homebush NSW

During the 2000 Sydney Olympics the world viewed a first class sporting complex, that had risen out of an area with many Brownfield environmental problems, because of its poor prior use. Environment auditors planned and supervised remedial strategies for landfill systems within the vicinity of the Sydney Olympic Park/Homebush Bay area.

Each remediated site contained a number of components to provide environmental control and a facility for leachate disposal. System components include manholes, piezometers, pumping pits, and collection sumps, odour control units, solar panels, treatment ponds, evaporation ponds and holding tanks.

See www.groundscience.com 'Environmental monitoring Sydney Olympic Park' for details.

4.5 One Tree Hill Erosion Control – South Australia

Catchment Board officer worked with consultant's environmental scientist on assessment resulting in remedial works used simple technology and design criteria to minimise cost and maximise the effect of the works for erosion-effected areas of the water supply stream.

Assessment of stream erosion on a watercourse upstream of a catchment for a reservoir determined remedial works to stabilise stream banks and improve water quality. Thirteen sites

were selected for work including stream battering, lining of exposed surfaces with geotextile, placement of rock to diffuse stream erosive forces in the form of rock riffles (rock on the streambed) and along the stream banks to protect the bank surfaces from erosion. Locally worn rocks were used in this program and were sorted by landholders prior to placement. Excavation and materials placement was carried out using rubber-tracked hydraulic excavators and bobcats. This ensured a soft footprint on the area, which has fragile soils and little valley floor vegetation. One of the sites was treated with a drop timber weir, which was assembled and then dropped into place by use of the hydraulic excavator.

See www.ghd.com.au 'One Tree Hill Erosion Control' for details.

4.6 Mine Site Investigations – NSW

The Government worked with an environmental consultant to develop recommendations to ameliorate the adverse environmental effects of orphan mine sites in a water catchment.

The\Site was 100km south west of Sydney surrounded by the Warragamba drinking water catchment and the Blue Mountains National Park. Given its isolation, all food and equipment needed for the duration of the fieldwork had to be mobilised to site. A detailed project plan ensured that this proceeded smoothly.

Over 150 adits, shafts and tunnels were catalogued and evaluated with regard to safety issues, acid mine drainage, water pollution, erosion issues, loss of vegetation, heritage values and visual intrusion. Using risk assessment techniques, the sites were prioritised in relation to the most adverse environmental impact and safety hazards for future rehabilitation. A variety of modern surveying systems assisted site inspection teams with their work. This includes GPS to delineate The areas of concern and laser levelling to locate groundwater bases to ensure correct interpretation of flow direction and depth to groundwater.

During site inspections the importance and magnitude of erosion issues were scored in a standard and reproducible way to ensure a consistent appraisal of all sites. Magnitude ranged from stable surfaces through slight sheet and gully erosion to mass movement of soil. The impact was evaluated with reference to sediments or tailings adversely effecting nearby creek systems.

See www.groundscience.com for further details

4.7 Fuel Tank Time Bombs – Victoria & USA

Property professionals, when visiting a new property to value and assess for works requested by client, are wise to treat any sign of an underground fuel tank with caution.
Underground fuel tanks containing hydrocarbon have become a major pollutant, because as the tank ages it fails and begins to leak its contents into the surrounding land and into drainage systems. Over a two year period around 1995, when the Victorian power industry was

reducing the number of depots, it required at least 20 tanks to be removed and every one was leaking or had impact of poor fuel management practices.

One overseas report from the USA referred to underground fuel tanks leaking thousands of gasoline under city streets and on the downhill sides, full city blocks. The cost of remediation was so high and involved so many properties that the system came to a halt. Nothing further has been done.

To their credit some oil companies here have recognised the problem and are working with the environmental authorities to build in detection systems to stop this problem continuing with new tanks. (Simon I understand Shell website link here by Tuesday, if not they are out.)

See www.groundscience.com 'Site remediation Tank decommissioning' for details.

4.8 Former Power Pole Processing Property - Victoria

During a site inspection the strong odour of creosote warned that urgent remedial was required. The site was a 4 hour drive from the nearest toxic waste dump, so an alternative plan was developed to process on site.

This site was a former power pole storage and treatment depot where creosote was applied manually to poles. Accumulated spillage created soil contamination to depths of 4 metres. Approximately 1,000m^3 of high-level contaminated soil was excavated onto a treatment zone on the site. The proprietary methodology was applied to the soil and moisture content was monitored and maintained to ensure correct conditions for bacterial growth of bugs developed by CSIRO scientists.

After a period of six weeks, using this bacterial growth, the contaminated levels had reduced to the extent that the soil could be safely disposed at a local landfill.

The cleaned site was developed is now utilised as an industrial estate adding value to the town.

See www.ghd.com.au 'Bioremediation of Creosote Contaminated Soil Former SECV Pole Treatment Yard, Bairnsdale, Victoria'.

4.9 Site remediation while still operational – NSW

The environmental consultant was requested by an industrial client to review available investigation data prior to subdivision and sale. The objective was to demonstrate that the land was free of contamination and suitable for industrial uses.

Given that lead based paints were formerly manufactured on site, it was no surprise to find the soil to be heavily contaminated with lead concentrations of up to ten per cent. The proprietary stabilisation technique resulted in a cost saving to the client of over $US150/tonne in 2001. All

remediation works were successfully completed within the timeframe to enable subdivision of the site, with the work being undertaken while the site was still operational.

See www.groundscience.com 'Site remediation while still operational'.

4.10 An Expensive Ground Hole – Depot in rural Victoria

This case study is to show the importance of Environmental Management Plan. Internal auditing identified the problem and carried out the remedial action before the property was sold.

One of the worst cases of an attempt to hide toxic waste was a country depot in one of Victoria's irrigation areas. A hole had been drilled to a depth of about 3 metres into which a wide variety of waste products dumped and the hole covered over. Prior to selling the property, environmental consultants checked the site and found traces of poisons that had been sprayed around the boundaries. It was, however, the strong smell of the ground that that caught their attention. Following some surface tests, specialists in protective suits dug out all the contaminated ground and removed it to one of the special toxic dump locations.

This example provides a warning that some people will try to hide their poor practices. Property managers, surveyors and valuers should always be aware of the warning signs such as strong odours that are not common to the general area. They should articulate these observations in their property reports to the land owner recommending that further investigation of the site by the owner.

4.11 Maralinga Rehabilitation Project – South Australia

This project was to rehabilitate the land so that it can be returned to its traditional owners, the Maralinga Tjarutja. These Aboriginal people plan to continue living a semi-traditional lifestyle on the former British atomic test site called Maralinga, so the remediation task on this Brownfield site was for the consultant to make the land suitable for their occupancy.

This included:

- Installation of a new construction camp upgrading all services including railway infrastructure.
- 640.0003m containment burial rehabilitation sites.
- Exhumation of contents from over 90 pits.
- Collection and burial of 426,000m3 of contaminated soil and debris.
- Covering trenches with clean soil and site surface restoration around pits and selected areas.
- Collection and burial of uranium Fragments.
- Encapsulation of debris in selected debris pits by in-situ vitrification.
- Boundary marker installation surrounding areas remaining unsuitable for permanent habitation.
- Revegetation of disturbed areas with native plant species.

- Monitoring of cleared areas to confirm radiation safety criteria were met.

See www.ghd.com.au 'Maralinga Rehabilitation Project'

A Remote Sensing Farm Example (I will see if RMIT will help on Monday with this one)

5. FIG COMMISSION 9 WORKING GROUP WEBSITE PROJECT Case Studies - Remediation of Brownfield lands

The aim of this working group is to promote the use of this website to raise the awareness of positive developments that are happening with the remediation of Brownfield land. It highlights the impact on water quality around the world and demonstrates ways to assist with improving the environment.

The Commission 9 Working Group invites active involvement of FIG members. Our goal in using case studies supplied from people working in this area is to provide a link for those who need ideas or information on a Brownfield issue that they may be working on. The working group appreciates the support of the environmental consultants who have provided access to some of their work and websites. It is not, however, endorsing the services of any of these consultants.

In Munich at the FIG 2006 conference a report will be prepared presenting a summary of this website Case Studies – Brownfield Lands trial.

6. CONCLUSION

This paper represents yet another significant step forward in the long road for rectification and respect of the environment. Mr Michael Yovino-Young, Chairman of Commission 9, 1998-2003, has raised the awareness of the issue over a number of years, and now this paper provides a further foundation to this important matter. It is hoped that by linking the environmental theme of this paper to dynamic elements such as the development of the FIG website, an international exchange of environmental experience will evolve.

DISCLAIMER

I would like to draw to your attention that the views presented in this paper are authors', my own; and should not be construed as representing those of State Government of Victoria, Australia.

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Victorian Environment Protection (EPA) Website

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BIOGRAPHICAL NOTES

Simon Adcock has a wide range of valuation experience in undertaking valuation tasks on major commercial valuation sites, major office buildings, residential development sites and specialist properties with some projects and values in excess of $1 billion.

Mr. Adcock has presented a number of international papers at FIG conferences and these include conferences which have been held in Buenos Aires, South America, Durban, South Africa, Brighton, United Kingdom, Seoul, South Korea, Washington, United States. Mr. Adcock also recently presented a paper in parallel session at the 46th IFHP World Congress held in Tianjin, China.

Member of the Australian Property Institute and a member of the Victorian division of the Institution of Surveyors Australia Inc. Has promoted the benefits of FIG to the Victorian Government.

Ed Young as a licensed surveyor has a varied background in land, engineering, mining and project surveying having worked in Papua New Guinea, Canada, Malaysia and most Australian states on land settlement, mining, aid, engineering, mapping and title projects.

During the 1990's restructure of the Victorian power industry as Property Manager for both SECV and Citipower working closely with legal, valuation and property professionals.

Joined GPAC in Dept. of NRE in 1997 to assist in the development of Geospatial policies for Victoria, followed by a pivotal role in the Property Information Project developing the partnership between Land Victoria and local government.

Has presented a number of papers at international forums like SE Asian Surveying conferences in Singapore, Perth and the Association of Surveyors PNG conference in Lae.

Is a member of the Victorian division of the Institution of Surveyors Australia Inc.

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