Chapter 3

The Impact of Environmental Planning on Contaminated Land Value[1]

3.1 Introduction

In recent years, more and more contaminated sites have been redeveloped for alternative uses. In Sydney, well-located former industrial sites, especially those with waterfront view, are sought after for redevelopment. For example, the former Shell depot at Pulpit Point has been redeveloped for up-market residential use. The former Cabarita ICI Dulux paint factory site in Sydney has been remediated for similar redevelopment. Other notable redevelopment of contaminated land includes recycling of the former sites of the Ammunition Depot, the Newington Abattoir and the State Brickworks at Homebush Bay for the venue of the Olympic Games 2000. No doubt environmental planning has a significant impact on the fate of those sites. Since environmental planning control is one of the factors that influences the highest and best use of land, it has significant impact on the value of property, including contaminated land.

Transformation of the Cabarita ICI site
Source: ICI Dulux, c.1996

This chapter discusses the impact of environmental planning on the value of contaminated land. It also shows that while environmental planning may have a negative impact on contaminated land value, it may also enhance the land value and lead to a reduction of the number of contaminated land. The value of contaminated land is studied from a property market value point of view. The Commonwealth, New South Wales, Victoria and Queensland environmental planning laws are cited where necessary.

3.2 Development of Environmental planning in Australia

The rapid deterioration of the environment since the turn of the century has fostered the idea to incorporate into town planning environmental considerations such as:

> "a) preservation of a worthwhile environment for the individual (the preservation and enhancement of amenity);
> b) protection of the environment generally;
> c) conservation of resources;
> d) co-ordination and planning of transport and industry." (Whitmore 1981 p.123)

As far as protection of the environment is concerned, there is a shift towards the requirement of conducting an environmental impact assessment (EIA) in accordance with procedures laid-down (Ramsay & Rowe 1995). The concept of EIA was originated in the National Environment Policy Act 1969 in the USA (Hollick 1986). In short, an EIA is seen as an administrative process by which the environmental impact of a project is determined (Leeson 1994). This new concept was introduced into Australia in the 1970s (Munchenberg 1994).

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[1] This chapter is based on my refereed publication: Chan, N. 1999,The Impact of Environmental Planning on the Value of Contaminated Land, *Australian Land Economics Review*, 5(1), pp 8 – 20.

Despite its limited influence on planning matters in the States and Territories, the Federal Government was the first in Australia to formally adopt the environmental impact assessment requirement and passed the Environmental Protection (Impact of Proposals) Act (EP(IP)A) in 1974. This Act was the Commonwealth government's principal legislation in respect of environmental planning matters (Fowler 1996). This Act has recently been repealed after the Environment Protection And Biodiversity Conversation Act 1999 (EPBCA) (C'th) comes into operation on 16 July 2000. The new Act requires any development that has a national environmental significance be subject to the scrutiny of the Minister, see Chapter 2 for details.

The EP(IP)A and the EPBCA are not intended to interfere with the day to day land use and development control function of the local governments in the States and Territories. Instead it requires Commonwealth projects or proposals, which are matters likely to affect the environment to a significant extent, be subject to an EIA. The Minister is also required to ensure the outcomes from the assessment process are taken into consideration when making decisions or taking action.

Following the Federal government's lead, the state and territory governments gradually amended existing planning laws or passed new laws to incorporate environmental considerations into their planning system. Protection of the environment has been formally stated as an objective in relevant environmental planning laws, such as s. 5 of the Environmental Planning and Assessment Act 1979 (NSW) (EPAA), s. 4(1) of the Planning and Environment Act 1987 (Vic) (PEA), and s. 1.2.1 of the Integrated Planning Act 1997 (Qld) (IPA).

3.3 Current Environmental Planning Control

Environmental planning aims at, *inter alia*, balancing economic development and protection of the environment. To achieve the goals, it is necessary to plan prudently and control all developments. Development and land use control from the former planning systems are considered applicable and retained in environmental planning. Land uses are designated in local environmental plans via zoning and rezoning processes. Besides separating less intensive land uses from more intensive uses, clean land uses are also separated from dirty ones. Unless prior development consent has been obtained, no development can begin. On the other hand the public has more involvement in the environmental planning process.

Regarding public participation, councils must notify the public about any draft environmental plan and development applications. Apart from lodging an objection or submission in respect of any amendment/preparation of environmental plan and development application, some environmental planning laws allow the public to enforce provisions of the laws. For example, "s. 123 of the [EPAA] enables any person to bring proceedings to enforce the forward planning and project control provision of the Act" (Kulakowski & others 1992 p.305).

In the course of processing development applications, the environmental planning laws oblige the planning consent authorities to consider, *inter alia*, environmental issues. For example, s. 79C(1)(b) of the EPAA requires the consent authority to consider "the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality".

Similar provision is found in the environmental planning law in other States. For example, in Victoria, s. 60 of the PEA requires the authority to consider "any significant effects which the responsible authority considers the use or development may have on the environment..."(s. 60(1)(a)(iii)). In addition, the authority has to consider "any significant social and economic effects of the use or development for the application is made;" (s. 601(1)(b)(i)) and "any other relevant matter."(s. 60(1)(b)(iii)).

In Queensland, the Local Government (Planning and Environment) Act 1990 has been repealed and replaced by the IPA. The IPA introduces an Integrated Development Assessment System (IDAS). Under the new system, all assessable developments require a development permit and the consent authority is required to carry out code and impact assessment during the decision stage (ss. 3.5.4 & 3.5.5).

To comply with the above legal requirements, the consent authorities in the States and Territories have to examine the land use history of the site and the respective EPA's contaminated land register for hints about possible contamination on the site. In assessing a development application, a "performance standard" approach is adopted. Reference is also made to standards/requirements in published planning documents and guidelines. The Australian approach clearly has limitations. In order to cope with new findings from the scientific research of the hazards of land contamination, the relevant regulatory authorities have to revise and publish the standards from time to time. It will cause considerable stress on the resources of the authority. On the other hand, the public will have a feeling that the remediation standards are too flexible and blame the authorities for bureaucracy. It may also lead to more legal disputes. In other countries, such as New Zealand, a different approach known as 'effects (or merit) based' approach is adopted (Cardew 1999). Under this approach, the developer has to demonstrate that the development will not cause significant impact on the environment. Although this will impose a higher hurdle to the developers, it removes the need to set compliance criteria and standards. Future legal dispute and legal liabilities to the authority can be reduced.

In regard to separation of hazardous industries from sensitive land uses, the performance standards for various products and processes provide a basis for determining the separation distances (Westerman 1988). In NSW, the State Environmental Planning Policies No. 33 and 55, Regional Environmental Plan No. 9, Western Division Regional Environmental Plan No. 1, and the Managing Land Contamination: Planning Guidelines SEPP 55- Remediation of Land (DUAP & NSW EPA 1998) are the documents that help local councils deal with contaminated land use issues.

In Victoria the Ministerial Directive No. 1 and 2 are the relevant planning guidelines for contaminated sites. Directive No. 1, issued in October 1989, requires that the planning authorities must be satisfied that industrial land being considered for rezoning for other uses is free from contamination. Ministerial Directive No. 2, issued in May 1992, further refined this requirement for cases where a site is proposed to be used for sensitive uses such as a school or childcare centre. (Baird 1992). The latest development is that the Victoria EPA (1997) published in February 1997 an Issues Paper "Prevention and Management of Contamination of Land". A draft State Environment Protection Policy (SEPP) "Preventing and Managing Contaminated Land" has recently been prepared for public comments (Vic EPA 1998a). As at June 2000, the document is still under consultation. It is expected that the finalised document will be available very soon.

In Queensland, there is no environmental planning guideline or state planning policy in respect of contaminated land issues. The document "Technical Guidelines for the Assessment and Management of Contaminated Sites", issued by the Australian and New Zealand Environment and Conservation Council and the National Health and Medical Research Council (1992) (commonly known as the ANZECC standards), is used by local council for guidance.

Where the land is considered contaminated or potentially contaminated, the consent authority may require the applicant to submit an EIA document and other information for consideration. Table 3-1 outlines the document required under various environmental planning laws:

Table 3-1

EIA Documents	Consent Authority	Relevant Statutes
Environmental Impact Report or Public Environment Report	the Action Minister of the Commonwealth government (for Commonwealth proposals or projects only)	Sections 5, 6, & 8 of EP(IP)A After 16 July 2000, sections 98 & 103 of EPBCA
Environment Impact Statement	Local councils in NSW	Sections 78A(8)(a) & 112(1) of EPAA
Environmental Effects Statement/Preliminary Environment Report	Local councils in Victoria	Sections 3 & 8 of the Environment Effects Act 1978
Further information for assessment Site Investigation Report	Assessment managers (local councils) and concurrence agencies in Queensland Chief Executive of Department of Environment	Section 3.3.6 of IPA Section 118J of EPAct Qld

Source: Chan 1999a

The consent authority is empowered to grant consent with or without conditions, or to refuse granting consent. Some environmental planning laws allow conditions to be attached to the consent to require the carrying out environmental protection works.

Regarding contaminated land information, local councils have no legal duty to keep a contaminated land register although they generally keep a register for internal use. Keeping a contaminated land register is the business of the respective EPA in the States and Territories. Any person interested may, on payment of the prescribed fee, apply to the council for a planning certificate in respect of any land within the council area. The contents of the certificate are specified by the relevant laws and differ from state to state. In NSW, s. 149(5) of the EPAA requires the council to "include advice on such other matters affecting land of which it may be aware" in the certificate. Section 59(2) of the Contaminated Land Management Act 1997 (NSW) (CLMA) requires the council to include in the s. 149 certificate information supplied by the NSW EPA regarding any order, notice and agreement made under the CLMA. Thus information such as whether the land is contaminated is included in the certificate (White 1980). Similar provision is not found in the Victorian and Queensland laws.

3.4 Impact of Environmental Planning on Land Values

Land is a valuable asset; it has value because of its scarcity and utility to human beings. It is a special class of asset which, depending on the circumstances, may have more than one value, such as monetary value and intangible value. From a real estate point of view, land may have market value, existing use value, investment value, mortgage value, insurable value, book value, statutory value, etc. In this thesis, real estate value is under study and market value is used to mean land value.

Before March 1993, the Australian property industry relied on the court ruling in *Spencer v The Commonwealth of Australia* (1907) 5 C.L.R. 418 for the definition of market value. The High Court defined market value as "the price which a property could be expected to realise if sold by a willing but not anxious seller to a willing but not anxious buyer at the date at which the value is

required to be ascertained" (Rost & Collins 1984 p.37).

In March 1993, Australia became a signatory and accepted the market value definition of The International Assets Valuation Standards Committee (Denton 1993). The new definition defines market value as "the estimated amount for which an asset should exchange on the date of valuation between a willing buyer and a willing seller in an arm's length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion".

The market value of a property is assessed on the basis of its highest and best use. The highest and best use is defined by the Appraisal Institute (1996 p.50) as "the reasonably probable and legal use of vacant land or improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value." There are several factors that determine the highest and best use of land. They include location, market demand, legal constraints, physical characteristics of the land, construction technology, and availability of finance (Friedman & Ordway 1981).

Environmental planning control is one of the legal constraints that regulate the highest and best use of a piece of land. Through land use zoning and development application (development control) requirements, the government can control the land use and determine whether a particular development should be allowed.

Consider a parcel of land that is in the best location for a particular type of development. There is strong market demand for the proposed development and there is no problem with other determining factors. All these indicate that the development is feasible and the land should have a high value. However, if the proposal does not conform to the land use control of the land, the development cannot go ahead and the expected highest and best use value cannot be realised.

It is interesting to note that land use restriction may also enhance land value. The restriction may limit the supply and lead to a shortage of a particular class of property. If market demand is not reduced, the value of existing land with permission for that use will be increased. As shown in the following paragraphs land value may also be intentionally increased by the operation of land use control.

The land use control plan, commonly known as the zoning plan, is an important document. It shows the intention of the government to allow prescribed developments to take place. The government may encourage or discourage a particular development to take place on a site by making a provision on the zoning plan or changing the zoning of the land. The permitted land uses may enhance or decrease the value of the land concerned. Value enhancement may occur directly and indirectly. For example, if the government wants to encourage recycling of disused industrial sites, the sites can be rezoned for more profitable uses such as residential or commercial. Value is therefore directly added to the land. Alternatively, the permitted development in an area may enhance the value of the adjacent land. For example, if a parcel of government land is zoned for public reserve, the value of the nearby residential land is indirectly enhanced.

The permitted uses on the zoning plan may also have a detrimental effect on land value. The value loss may be due to incompatible developments, such as the carrying out or intended carrying out of public use or works in the neighbourhood. For instance, the nuisance from a freeway, an airport, or a sewerage treatment plant, etc. may have a significant impact on the value of nearby residential properties.

Where the government announces the scheme long before the actual carrying out of the works, the value of the land nearby may drop substantially during the intervening period. Land value loss of

this nature is said to be due to "planning blight". For example, in *E.A. Woollams & Anr v The Minister* (1957), 2 L.G.R.A., the government's scheme to construct the Warragamba Dam in Sydney was made known to the public in 1942 and the plaintiff's land was not acquired for the project until 1954. The plaintiff's land value was substantially decreased due to the scheme over the period. While in this case the land was not resumed under the planning law, it highlights the impact of "planning blight" on land value.

3.5 Impact on Contaminated Land Values

The use and development of contaminated land are governed by the relevant environmental plans and other environmental laws. The owner of a contaminated site may decide to continue the existing use on the site. Since it does not involve new development or change of use, there is little control under the local environmental plan. However the use is still governed by other environmental laws such as the Protection of the Environment Operations Act 1997 (NSW) (PEOA), Contaminated Land Management Act 1997 (NSW) (CLMA), Environment Protection Act 1970 (Vic) (EP Act Vic), and Environmental Protection Act 1994 (Qld) (EP Act Qld), etc. These laws govern the creation, storage and discharge of pollutants arising from the activities on the land. They also provide for who is liable for the land contamination. For example, in NSW, a notional owner, including a mortgagee in possession of the land, is liable for the land contamination (s. 14(1) of CLMA).

In addition, as mentioned above, the Environment Protection and Biodiversity Conservation Act 1999 (C'th) requires development on land/site which has a national environmental significance to be subject to the scrutiny of the Minister. Furthermore, local councils and respective EPAs now have a new tool to regulate contaminated land. In December 1999, the National Environment Protection Council published the National Environment Protection (Assessment of Site Contamination) Measure 1999. The document covers a number of areas such as site specific health risk assessment, ecological risk assessment, soil investigation criteria, risk communication, data collection and presentation, etc. It provides a uniform platform for assessment of site contamination in Australia. More discussion about this document can be found in Chapter 4.

When the owner wants to expand the existing use or redevelop the contaminated site for alternative use, the proposal is subject to the control of the local environment plan and a development approval is required. The consent authority may require the applicant to provide further information such as a site audit statement and an environmental impact assessment (EIA) document for consideration. The contents of a site audit statement should indicate if the site is suitable for particular land use (McFarland 2000).

Regarding the EIA document, the applicant has to commission an environmental expert to carry out the study and prepare the document. It may take considerable time to prepare an EIA document. In an analysis of EIA timing under the South Australia Planning Act 1982, Harvey (1994) finds that the mean time for preparing an EIA document is 34 weeks, and preparation of a supplement is 21.5 weeks.

While the details of individual EIA document may vary, the frameworks are similar as they are prescribed in the relevant environmental planning legislation. For example, Schedule 2 of the Environmental Planning and Assessment Regulation 1994 (NSW) prescribes the contents of an environmental impact statement. Among other information, the following must be included in an environmental impact statement:

a) a full description of the development or activity;
b) a general description of the environment likely to be affected by the development or activity, together with a detailed description of those aspects of the environment that are likely to be significantly affected;

c) the likely impact on the environment of the development or activity; and
d) a full description of the measures proposed to mitigate any adverse effects of the development or activity on the environment

The time required to process the development application for a contaminated site could be long. Generally, planners do not have the expertise to scrutinise the EIA document. Unless the consent authority has an in-house environmental specialist, it has to refer the document to the EPA or hire a private environmental consultant for advice. In addition, the public has to be notified about the proposal, and the application may subsequently be subject to a public inquiry. In certain contentious cases, extra time may be needed in getting the application adjudicated by the court.

To find out the consent authority's attitude towards contaminated land and the time required to grant planning approval, I conducted a survey in September 1996 and the Sydney metropolitan area was chosen for a case study. A questionnaire was sent to the 40 local councils in the Sydney metropolitan area. A copy of the questionnaire is attached in Appendix I. Nineteen (19) councils responded to the survey. The responses are summarised in Tables 3 – 2 and 3 – 3 below.

Table 3-2

Question: Is there any contaminated land within the council area?			
Yes	**No**	**No answer**	**Total**
17	1	1	19
89.5%	5.25%	5.25%	100%
Question: Does the council treat contaminated or potentially contaminated land differently?			
Yes	**No**	**No answer/Neutral**	**Total**
6	11	2	19
31.6%	57.9%	10.5%	100%

Source: Chan 1999a

Australia is generally regarded as a clean country and many Australians believe that their neighbourhood is clean. However, Table 3-2 shows that about 90% of the surveyed council areas have contaminated land. While the number of contaminated sites is not part of the subjects of this survey, the finding nevertheless shows land contamination is a widespread problem and probably far more common than recognised by the general population and perhaps the market. One may argue that if the problem is so widespread, should there be much stigma. It should be noted that stigma is a psychological resistance to contaminated land. It is independent of whether land contamination is common in a particular neighbourhood. More discussions of this issue are covered in Chapter 6. Despite the apparently widespread problems, the majority of the councils do not treat contaminated or potentially contaminated land differently.

Table 3-3

Question: Normally how long does it take to approve or reject a development/rezoning application, in particular, in respect of contaminated/potentially contaminated land?					
No. of Councils	**(%)**	**Development application (DA)**	**Rezoning application (RZ)**	**Contaminated land DA & RZ**	**No answer**
11	58	✓ 2 – 6 months	✓ 2 – 8 months	×	×
4	21	×	×	✓ No set time, depending on complexity of the contamination	×
4	21	×	×	×	✓
Total 19	100				

Note: ×= no response
Source: 1999a

The findings in Table 3 –3 show that the normal time frame for approving development and rezoning applications in connection with contaminated or potentially contaminated land are 2 – 6 months and 2 – 8 months respectively. In relation to contaminated land, there is no set time frame for processing the application. This adds extra uncertainty to any redevelopment proposal.

Any development approval, if subsequently granted, will be conditional on having the site cleaned up before the commencement of any actual redevelopment works. Therefore, the overall lead-time before the actual commencement of redevelopment work on the site is much longer than a clean site. The extra time and costs involved have a substantial impact on the value of contaminated land. In Chapter 1, it was mentioned that the remedial work to the Ampol Refinery site at Matraville, NSW, took 6 years from site assessment to completion of the work. Although not every contaminated site will take so long to remediate, it nevertheless highlights the time factor to be considered.

The respondents only represent about one half of the councils surveyed. While the results cannot claim to be sufficiently representative, they nevertheless provide a glimpse of the subject matters and can form the basis for further research into this area.

3.6 Why contaminated land has a lower value

Time is both money and opportunity. The lengthy process in getting development approval and remediation of the site, coupled with the high cost involved, have a significant impact on the value of contaminated land. In property valuation, the hypothetical development method is generally used to assess development land value. The following expression is a hypothetical development model commonly used for the assessment of clean land value:

$$V = E - C_d - P \qquad \text{Equation 3 – 1}$$

where
V = land value
E = expected completion value of project
C_d = development cost (including finance cost)
P = developer's profit & risk cover

In comparison to clean land, contaminated land with the same potential of land use often has a lower value. Assuming the completion value, developer's profit and risk cover, and development cost remain unchanged, the land value is assessed as follows:

$$\mathbf{V = E - (C_e + C_l + C_c + C_o) - C_d - P} \qquad \text{Equation 3 - 2}$$

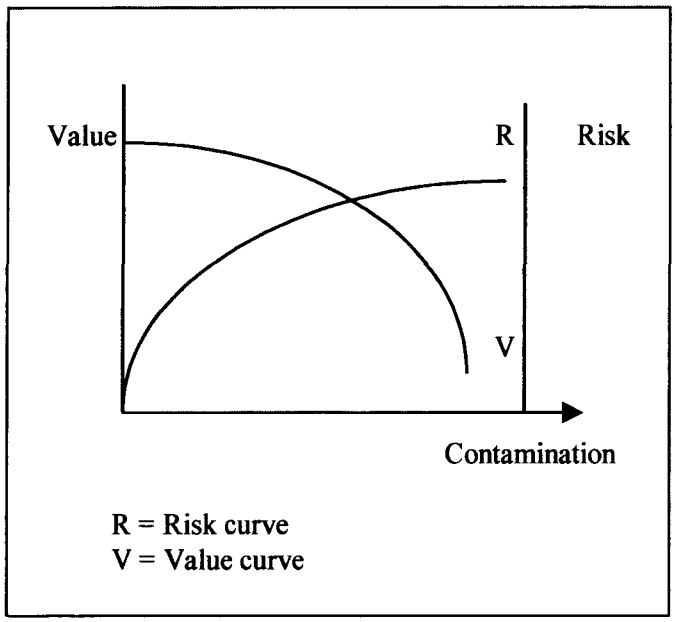
where
V = land value
E = expected completion value of project
C_e = cost of meeting EIA environments for development on contaminated/potentially contaminated land
C_l = legal cost due to litigation over remediation issues
C_c = remediation & long term monitoring costs
C_o = loss of opportunity cost during development application and remediation period
C_d = development cost (including finance cost)
P = developer's profit & risk cover

(Chan 1999a)

It can be seen in Equation 3 – 2 that the number of cost items has increased resulting in a lower residual land value V. In real life, the development cost of contaminated land is much higher than clean land. The current environmental laws, such as the CLMA, EP Act Vic, and EP Act Qld, make financiers responsible for the remediation if they take possession or control of the contaminated land. As mentioned in Chapter 2, Schwaiger (1993) found that 92% of the banks surveyed were concerned or very concerned about their liabilities under the current environmental legislation. Accordingly it is not surprised that certain financiers are not interested in financing projects involving contaminated land. For those who are willing to lend, they will increase the borrowing rate to cover the risk. On the other hand, developers require a higher profit and risk factor to cover the extra investment risk, longer development period and the impact of stigma effect is required. If these factors are taken into consideration, the resultant land value of contaminated land will be even lower. It should be noted that in Equation 3 – 2, value loss due to stigma has not been included. If this factor is applicable and included in the assessment, a much lower land value will be resulted.

One of the targets of environmental planning is to achieve ecologically sustainable development. Staib (1998) rightly points out that to achieve the goal, it will often increase the infrastructure cost. The extra costs and time, potential legal liabilities and hence the overall investment risk, are directly proportional to the complexity of the contamination. The value of a contaminated site, on the other hand, is inversely proportional to the complexity of the contamination. The relationships can be shown in Figure 3 – 1 on the next page.

Figure 3 – 1 Variation of Land Value and Risk



Source: Chan 1999a

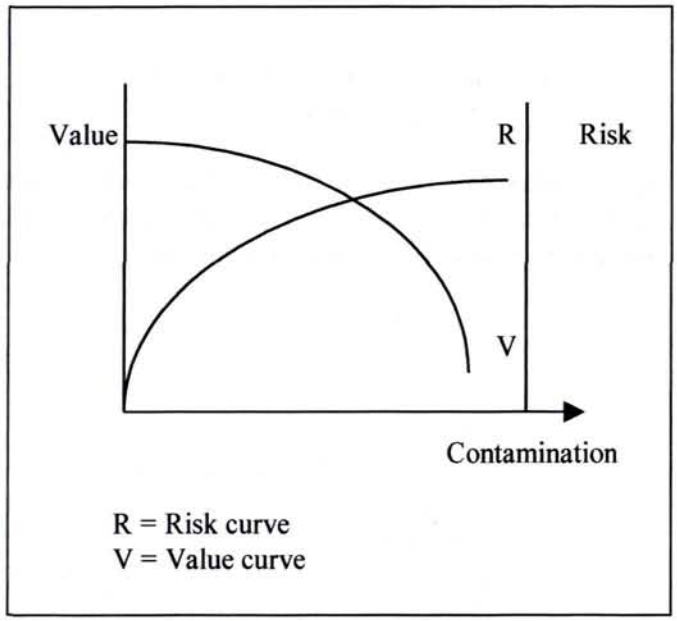
The degree of contamination, in the extreme case, may be beyond the capability of current remediation techniques, or the cost may exceed the benefit. It this happens, any redevelopment proposal will have to be shelved. Where it only involves potential contamination of the land, the impact is not so great. In *Caltex Oil Australia Ltd v Chief Executive, Department of Land* (1996) (Land Appeal Court, Queensland), it was held that the mere possibility of leaking petroleum products into the land is insufficient to constitute a detriment or 'worsement' that can affect unimproved value. The valuation should be based on the sensitivity of the intended land use and expert advice on the management and cleanup options available to the land for its highest and best use (Power & Dwyer 1998).

3.7 How environmental planning enhances contaminated land values

One of the objectives of environmental planning is to ensure a decent environment for people to live and work in. Accordingly there is an implied goal to reduce the amount of contaminated land in the community and put the land to beneficial use. In the seminal English court case *Donoghue v Stevenson* [1932] AC 562 (HL), the principle of duty of care to one's neighbour was introduced. Lord Atkin considered neighbours as "... persons who are so closely and directly affected by my act ...". Accordingly, there is a social and legal obligation (duty of care of one's neighbours) on landowners to remediate contaminated sites. However, due to the lack of finance or the absence of incentives, many contaminated sites are left idle or abandoned. While the EPA may require remediation of the sites by enforcing the relevant environmental laws, landowners or other responsible persons may not be willing to carry out the necessary remediation because of the high cost involved, and challenge the clean up order through lengthy litigation. Moreover, there is no guarantee that the land will be used to the benefit of the community afterwards. A better approach is to exercise environmental planning to achieve the goal (Chan 1999a).

Where the redevelopment of contaminated land is supported by other factors such as location and market demand, the planning authority may plan the beneficial uses of the land and accordingly rezone it to higher value uses, such as commercial or residential, to encourage the redevelopment. Coupled with economic forces, the rezoning effectively adds value to the sites and increases their redevelopment potential. If the redevelopment goes ahead, the site will be cleaned up according to he sensitivity of the alternative uses such as residential and/or commercial. The result is an end use that is acceptable to the community. If the contaminated land is in a sought after location and

Figure 3 – 1 Variation of Land Value and Risk



Source: Chan 1999a

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that there is overwhelming market demand, it is very likely that there is no stigma impact on the land value. The Cabarita ICI Dulux paint factory site mentioned below highlights this point.

To the motivated developers, the extra investment risk of redeveloping a contaminated site still exists. Although the risk cannot be completely removed, it may be reduced if the redevelopment time frame can be shortened. The example below proves that having prior consultations with the consent authority and communication with neighbourhood groups is an effective way to reduce resistance to the redevelopment proposal and shorten the redevelopment time frame. Frank discussions and consultations can reduce suspicion and distrust, after all it is to the benefit of the community to have the sites cleaned up and put to alternative uses.

For example, in the proposed redevelopment of the former Cabarita ICI Dulux paint factory site, the local council and community were informed of the existing degree of contamination on site and that the remediation would make the site 'cleaner than clean' (i.e. cleaner than background level). The effective communications and consultations reduced resistance to the redevelopment proposal to a minimum, and the redevelopment application was processed with little hindrance (Payne 1997).

The Cabarita ICI redevelopment site

Apart from motivating owners and developers to transform contaminated sites for alternative beneficial uses, environmental planning also helps convert former contaminated sites into uses which have high social value. For example, the Sydney Darling Harbour tourist precinct and the Olympic Games 2000 sports grounds at Homebush Bay are developed on former contaminated sites. This pro-active approach brings about a win-win situation. The government is seen as taking the lead to reduce the number of contaminated sites by enhancing land value via rezoning. The punitive measures under environmental laws are only used where it is necessary. On the other hand, landowners can recycle contaminated land and increase their wealth. The benefit is not only enjoyed by the landowners but also by the community too. What were previously derelict sites have now been changed to jewels in the neighbourhood.

3.8 Adequacy of Environmental Planning control on Contaminated Land

Each State and Territory in Australia has its own approach to exercise environmental planning control of land contamination. On the whole the approaches are very similar and can be grouped as follows:

a) using land use zoning control to safeguard sensitive uses such as residential, commercial, educational, etc. from environmentally unfriendly land use and development activities;
b) using planning consent requirement to control and prevent unauthorised use and development of land;
c) requiring the submission of an environmental impact statement for specified category of land uses and developments.
d) allowing public participation in planning scheme preparations and planning consent applications.

3.8.1 Survey in 1996

To find out if the current environmental planning approaches are adequate for the control of land contamination, it is necessary to survey the opinion of applicants for planning permission and that of the consent authorities. There is a problem with the survey of applicants. It is difficult to

know who are the applicants. Local councils are the primary authority to exercise environmental planning control of land contamination and they are also at the front line to receive public views about land contamination and development of contaminated land. This survey reflects the views of the councils.

From literature review, it is found that a similar survey has not been carried out before in Australia. For the purpose of this research, the Sydney metropolitan area is chosen for a case study. As mentioned in section 3.5 above, a questionnaire was sent to forty (40) local councils within the Sydney metropolitan area. After two written reminders and a number of phone calls, nineteen (19) local councils responded to the survey. Subsequently the willing planning officer of three (3) separate local councils was interviewed to verify the views expressed in their reply. As mentioned earlier, due to the small number of responses, the results may not be representative. Nevertheless they provide a glimpse of the subject matters and pave a way for further research. The responses to this survey are summarised in Table 3 – 4 below:

Table 3 - 4

Questions	Yes	No	No Answer	Total
Is the existing EIA provision adequate to control/prevent of land contamination?	53%	32%	15%	100%
Is the power under the existing environmental planning law adequate to deal with applications involving contaminated or potentially contaminated land?	47%	37%	16%	100%
Does the existing environmental planning system give the public sufficient opportunity to participate in environmental planning control of land contamination issues?	95%	5%	0%	100%
Are you satisfied with the council's performance in reducing/ controlling land contamination?	74%	5%	21%	100%

Source: Chan 1999a

The survey shows that over 50% of the respondents consider the existing EIA requirement adequate. Thirty-two percent (32%) of the respondents consider it inadequate. Their concerns are based on various reasons including that an environmental audit is not part of the compliance requirements of an EIA, a separate contamination report is not submitted to the council, and an on-going site-monitoring requirement is not incorporated in the EIA, etc.

Less than 50% of the respondents are satisfied with the power under the current environmental planning laws. Thirty-seven percent (37%) of the respondents consider it inadequate. The pitfalls of the current environmental planning system highlighted in the responses include the lack of power to require environmental audits, the lack of power to pro-actively require assessment or clean-up of contaminated sites, clarification of council's obligations in relation to identification and notification of potential land contamination, etc.

Regarding public participation in the prevention of land contamination and controlling remediation and development of contaminated sites, nearly all councils consider the existing provisions in the environmental planning law adequate. Also, the majority of the respondents are

satisfied with council's performance in the prevention and controlling of land contamination.

There have been changes to the environmental planning law in NSW since the survey. To remove the councils' concern about future legal liability in respect of contaminated land, a new Part 7A was inserted by the Environmental Planning and Assessment Amendment (Contaminated Land) Act 1996 in to the EPAA. The new s. 145B(1) provides that a planning authority does not incur any liability when discharging in good faith its planning functions that relate to contaminated land. Therefore unless the councils act negligently, they are protected by this provision.

As mentioned in Chapter 2, the old s. 90 in the EPAA has been replaced by a new s. 79C since 1 July 1998. This section requires a consent authority to consider, *inter alia*, the likely environmental impacts on both the natural and built environments and the suitability of the site for the development. In addition, under the new s. 90, local councils may impose conditions consistent with those granted by other approval bodies. They may thus require satisfactory remediation of the site prior to any development/redevelopment.

Similar changes have been made to the environmental planning law in Queensland. Under the provisions of the IPA, the Qld EPA is one of the concurrence authorities if the land is on the Environmental Management Register or the Contaminated Land Register under the Environmental Protection Act 1994 (Qld) (EP Act). Part 9B of the EP Act is dedicated to govern the use and development of contaminated land.

While the changes may not address all concerns of the local councils, they have improved the environment for the implementation of environmental planning control of contaminated land. Both the local councils and the applicants have a clear understanding of their positions and the legal procedures. There is now a consensus that the use or development of contaminated land will be closely monitored by both the government and the community.

3.8.2 Surveys in 2001

The survey in Table 3 – 4 was conducted at an early stage of this PhD study in 1996. In order to verify if there have been changes since then and on the advice of examiners, a survey of the 19 councils responded in 1996 was conducted in February 2001. The questionnaire used in the 1996 survey was sent out again with a minor update (the reporting period was changed to: 1991 to 2000). A copy of the questionnaire is attached in Appendix II. In order to provide a contrast to the views of the councils, a survey of valuers was conducted at the same time. Valuers in this instance are used a proxy for their clients (i.e. landowners and developers, etc.). A total of 50 valuers were drawn randomly from the list supplied by the Australian Property Institute New South Wales Division (the same list mentioned in Chapter 5). A copy of the questionnaire for the valuers is attached in Appendix III.

After one reminder letter and several follow up phone calls, 10 councils and 15 valuers responded to the survey. The results are presented in Tables 3 – 5 and 3 – 6. The response rate was so low that it is difficult to make comparisons. Nevertheless the results are included for the record and briefly described.

Table 3 – 5 shows that there are now more councils that consider the existing EIA requirements are adequate for the control of contaminated land and that the power under the existing environmental planning laws is adequate to control land contamination. Probably this is due to the changes to the relevant legislation since the last survey. The amendments have facilitated the councils to discharge their duties. However, there are now fewer councils that consider public participation in environmental planning control of land contamination is adequate. There are also less councils that are satisfied with their own performance. The reasons for the dissatisfaction include:

- they are unable to be proactive to deal with land contamination;
- they have no power to deal with contaminated sites unless there is eminent public health risk; and
- they can only deal with contaminated land during the planning process.

Table 3 – 5 Comparison of Council feedbacks

Questions	Yes		No		No Answer		Total	
	1996	2001	1996	2001	1996	2001	1996	2001
Is the existing EIA provision adequate to control/prevent of land contamination?	53%	55%	32%	18%	15%	27%	100%	100%
Is the power under the existing environmental planning law adequate to deal with applications involving contaminated or potentially contaminated land?	47%	70%	37%	10%	16%	20%	100%	100%
Does the existing environmental planning system give the public sufficient opportunity to participate in environmental planning control of land contamination issues?	95%	70%	5%	20%	0%	10%	100%	100%
Are you satisfied with the council's performance in reducing/ controlling land contamination?	74%	50%	5%	20%	21%	30%	100%	100%

Table 3 – 6 shows that the valuers have a different response. Less than one half of the respondents consider that the existing EIA requirements are adequate for the control of contaminated land. Only about 40% of the respondents consider that the power under the existing environmental planning laws is adequate to control land contamination. However, 60% of the respondents consider that there is sufficient public participation in environmental planning control of land contamination. The response rate is close to the one from the councils. It shows the current public participation provision is acceptable to both the private and public sectors.

Regarding whether the council's performance is satisfactory, only 20% of the respondents believe so. The reasons for the dissatisfaction include:

- councils adopt a reactive approach;
- council decisions are inconsistent;
- councils do not want to know the problems; and
- ineffective enforcement of control of contaminated land

The difference in opinion shows that councils need to address the above points to improve its

image and performance.

Table 3 – 6 Valuers' feedbacks 2001

Questions	Yes	No	No Answer	Total
Are the existing EIA requirements adequate for the control of contaminated land?	47%	13%	40%	100%
Is the power under the existing environmental planning laws adequate to control land contamination?	40%	6%	54%	100%
Is there sufficient public participation in environmental planning control of land contamination?	60%	6%	34%	100%
Is the council's performance in reducing/ controlling land contamination satisfactory?	20%	33%	47%	100%

3.9 Conclusion

Environmental planning is an extension of traditional town planning. It features more emphasis on the conservation, preservation and protection of the environment to achieve ecologically sustainable development. Land use control under environmental planning, together with other factors, determines the highest and best use value of a site. Accordingly, the value of contaminated land is definitely affected by environmental planning control.

It is obvious that environmental planning control may lengthen the development period of contaminated land, but it does not suffocate developments. From a social point of view, environmental planning is aimed at protecting and balancing the interest of the public and individual landowner/developer. Through proper land use zoning and rezoning, it encourages remediation and recycling of contaminated sites for alternative uses. What was formerly an eyesore to the community may become a good development in the neighbourhood.

The current environmental planning control on contaminated land is still not satisfactory. The current 'performance standard' approach is not responsive enough to cope with the rapidly changing social expectation of environmental planning control. The 'effects (or merit) based' approach in New Zealand is a more satisfactory approach. There is no need to set compliance criteria and standards. In addition, the local authorities are less likely to face future legal dispute and legal liabilities. It is worthwhile for Australia to consider implementing this approach.

Another problem with the current environmental planning control system is the potentially lengthy time span required to obtain development permission. Since there is a general awareness of environmental problems and there is getting more environmental requirements to meet, it is unlikely that the processing time can be reduced. While the Ampol case cited above is on the extreme side, it highlights the fact that the time factor cannot be underestimated. The overall longer time frame adds extra investment risk to redevelopment projects. Since time is of the essence in any development project, a good project may fall through if development approval cannot be obtained within reasonable time. As mentioned in Chapter 6, time factor is one of the criteria that determines stigma impact. Accordingly, a valuer should pay particular attention to this point and carry out the appraisal with due care. Valuers are expected to have a sound respect for environmental characteristics. The 'most probable use' does not mean it is the 'most

sustainable use' of the land (Lally 1998).

Although the current environmental planning control system is becoming more rational through continuous improvement, the number of contaminated sites will not be automatically reduced. There is at present no systematic/comprehensive remediation program to eliminate contaminated land. From the discussion in section 3.7, it appears the best approach is to motivate the landowners and developers to redevelop the sites by enhancing the land value. The goal requires a positive attitude to rezone the relevant land to more profitable and beneficial uses. In addition, it is required to ensure that the time required to process development applications is not excessive. For this, the government needs to review the application process and to provide more resources to local councils and other approval bodies.

In addition, the government may consider borrowing the American experience to introduce a voluntary cleanup program (see Chapter 2). In addition to the zoning/rezoning process, financial incentive such as tax credits and low interest rate loans are offered by the government. The landowners/developers are given letter of 'no further action' / 'covenant not to sue' to remove their concern about future legal action from the government (Chan, Jefferries and Simons 1998). If this American approach is used, it may help reduce or eliminate the impact of stigma because the buyers understand that future litigation in respect of the contaminated land will not be undertaken. Coupled with good site characteristics such as location and the presence of market demand, stigma impact, if any, will be substantially reduced or removed. Valuers should keep an eye on any change of environmental planning control.

Chapter 4

Identification and Management of Contaminated Land[1]

4.1 Introduction

With the increasing awareness of environmental problems, land contamination has become one of the major concerns for the community. Stakeholders such as landowners, occupiers, financiers and insurers who have an interest in a contaminated property are particularly concerned about this issue. Apart from threats to human health and the environment, it also has the potential to reduce property values and can lead to legal and financial liabilities (Schwaiger 1993). Governments around the world have passed environmental laws to regulate this problematic environmental issue, see Chapter 2 for details.

In view of the profound consequences, it is necessary to manage contaminated land properly. Contaminated land management can be broadly categorised into macro-level and micro-level. The macro-level management is management carried out by the government through the enforcement of relevant environmental laws. Chapter 2 has provided an overview of the relevant environmental laws. More information can be obtained from the relevant Environmental Protection Authority (EPA). The micro-level management is management carried out by private individuals.

Since the macro-level of management is mainly about enforcement of relevant environmental laws which have been covered in Chapter 2, this chapter will focus on the micro-level of management and aims at outlining the necessary background information about the management of contaminated land. This chapter covers the common causes of land contamination, methods of identification, common remediation methods, and contaminated land management methods. It can been seen that with proper management, a contaminated property can also be a valuable asset. In this chapter, it assumes that contaminated properties are managed by professional property managers. The terms "contaminated land" has a meaning as defined by the ANZECC guidelines (see Chapter 1) and is interchangeable with the term "contaminated properties". The term "property manager" means not only professional property managers but also decision-makers such as owners, occupiers, developers and financiers as well. Where appropriate environmental laws in the more populous States – New South Wales, Victoria and Queensland – are cited for discussion.

4.2 Objectives of Contaminated Land Management

Property management is a high growth area in the property industry in many countries (Davis & Wills 1997). At the turn of the century, its role was confined to rent collection and building maintenance. After World War II, the high level of vacancy required property managers to take care of leasing as well. Today, property managers are expected to enhance the value of properties under their management. Alexander & Muhlebach (1990) point out that property management has become more pro-active than reactive such that a successful property manager needs to anticipate problems and opportunities, and respond in advance to control the situation. To cope with the expectation, a property manager needs to have a multitude of skills and abilities.

Regarding the management of contaminated properties, property managers should note that the nature of these properties is more complex than uncontaminated property. While the primary

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[1] This chapter is based my publications as follows:
Chan N. 2000, *Turning Contaminated Land into A Valuable Asset*, Australian Property Journal, 36(4), pp. 301 – 307.

objective of property management to enhance property value has not changed, the provisions of environmental laws and public expectation have imposed a new social objective. This new objective is to "select a socially acceptable and cost effective management strategy which mitigates threats to and provides protection for public health, welfare and the environment as well as allowing flexibility in the future use of the land." (ANZECC & NHMRC 1992 p.41). Property managers accordingly need to have more skills and knowledge to look after this class of properties.

4.3 Essential background knowledge

Property managers need to have a good knowledge of land contamination issues. Guidance Note 15 " Reporting on Contaminated Land" of the API Professional Practice 2000 (API 1999) and its predecessor "Contaminated Land Practice Standard" (AIVLE 1994) provides good background reading in this regard. Property managers in other countries should refer to the relevant information in their country. In essence, property managers should make sure that they possess adequate knowledge in the following areas:

4.3.1 Causes and threats of land contamination

There are many causes of land contamination. Broadly speaking, contamination may be caused by:

1. Naturally occurring minerals in the soil. For example, asbestos, radon, uranium.
2. Commercial, industrial and agricultural activities carried out on site.
3. Contaminants brought to the site. For example, a landfill.
4. Contaminants migrating from nearby contaminated site.
5. Accidents.

(ANZECC & NHMRC 1992)

More details are covered in Chapter 1. Table 1 – 2 of that chapter provides a list of specific industries and land uses associated with site contamination. While the list is not exhaustive, it helps raise the awareness of property managers of the potential problems of the properties under their management.

4.3.2 Danger of land contamination

As mentioned earlier, land contamination may cause public health problems and endanger the ecosystem. Contaminants may affect people and the environment in the form of dust, vapour, solid and liquid. Apart from physical contact, people may also be affected if the contaminants enter the food chain. In essence, contaminants are dangerous because they can be ignitable, corrosive, reactive, and/or toxic. More information can be found in Chapter 1. Property managers may consult the relevant EPA, health authority or their environmental consultants for more details.

4.3.3 Legal knowledge

Contaminated properties are subject to the regulation of both common law and statutory law. Under common law, the polluter or landowner may be sued by persons affected by contaminants from the contaminated property for damages under strict liability[2], the tort of nuisance or trespass. Regarding statutory laws, land contamination is mainly regulated by environmental laws in each of the States and Territories. At present, there is no national land contamination law. The Commonwealth laws only have a small role to play.

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[2] The right to sue has been substantially restricted after the ruling in Burnie Port Authority *v* General Jones Pty Ltd [1994] 68 ALJR 331, see Chapter 2.

In short, the relevant statutory land contamination laws provide for the prohibition of land contamination, report of land contamination incidents, licence to control the amount of discharge, requirements for environmental audits, and remediation under the 'polluter pays' principle. In addition, there are environmental planning laws governing the use and development/redevelopment of contaminated land.

Property managers are accordingly required to have good understanding of the legal requirements and liabilities in their respective States and Territories. A summary of Commonwealth and some State land contamination laws is provided in Tables 2-1 and 2-2 of Chapter 2. If in doubt or they want for more details, they should consult their lawyer and the relevant Environment Protection Authority for clarification.

4.3.4 Site investigation/environmental audit

Property managers need to know details of contamination of the properties under their management. A site investigation or environmental audit can provide the necessary information. There are basically three stages of site investigation in Australia (Ramsay 1998). The following explanation of the different stages are from DoE Qld (1998):

Stage 1 - Preliminary site investigation

A stage 1 investigation is the preliminary assessment of any contamination on site. It includes the following steps:

- an investigation of the site history
- a physical site inspection
- a basic sampling and analysis to determine the presence of contamination, and
- a report of these results

Stage 2 – Detailed site investigation

If the Stage 1 investigation shows further investigation is required, a detailed site investigation is carried out to assess:

- the concentration of various contaminations
- the volume of soil to be remediated
- the leachability and mobility of contaminants
- any contamination of groundwater, and
- any possibility of off-site migration of contaminants.

Stage 3 – Health and environmental assessment and determination of a remediation plan

The results from the Stage 2 investigation provide information to determine the potential "human exposure and environmental impact" of the contaminants from the existing and intended land uses. If the intended use will cause unacceptable levels of human exposure or unacceptable impact on the environment, then, a partial or full remediation, or other land contamination management strategy has to be implemented. A health and environmental risk assessment has to be carried out, and a site-specific remediation plan has to be prepared.

Although the above explanation of the different investigation stages was taken from the DoE Qld's *Draft Guidelines for the Assessment & Management of Contaminated Land in Queensland*, the investigation stages are similar in all States and Territories.

Sampling and analysis are required in both Stage I and Stage 2 investigations. Sampling in a Stage I investigation is a part of the preliminary site assessment that is intended to determine if contamination exists. It is carried out in areas where the site history research shows that possible contaminating activities have been conducted. Sampling in a Stage 2 investigation is more detailed and depends on the findings of the preliminary assessment. The depths and positions of

samples depend on "site history, soil morphology and the need to sample to natural ground where fill material is present." (DoE Qld 1998 p. 27).

The ANZECC Guidelines and the Australian Standard AS4482.1-1997, Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-Volatile and Semi-Volatile Compounds and other guidelines had provided guidance in the investigation and sampling of soil and groundwater for a number of years (Ramsay, 1998). In December 1999, a set of uniform site contamination assessment guidelines known the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEP(ASC)M) was made by the National Environment Protection Council. The Measure provides nationally consistent guidelines for data collection, sample design and reporting, laboratory analysis of potentially contaminated soils, and assessment of groundwater contamination.

Where a health and environmental risk assessment is required, it is carried out in four stages:

- "data collection and evaluation of the chemical condition of the site;
- toxicity assessment of contaminants;
- exposure assessment for the population on or near the site;
- risk characterisation."

Risk characterisation is a process to evaluate the potential for adverse health effects to occur, evaluate uncertainty and summarise risk information (ANZECC & NHMRC 1992 p.30).

The NEP(ASC)M suggests the use of two benchmarks for soil criteria and investigation levels:

1. Health-based Investigation Levels (HILs) -- benchmarks for contamination that may affect human health. HILs for various exposure setting can be found in Table 5-A of Schedule B(1) of the NEP(ASC)M.

2. Ecologically based Investigation Levels (EILs) – benchmarks for contamination that may affect ecological diversity in Australia. It is proposed to develop EILs for regional land use (i.e. to develop Regional Ecologically based Investigation Levels (REILs)). However, the development of these benchmarks is a resource intensive process. It follows that the REILs may not be available for some time. As a temporary measure, EILs for an urban setting and the Environmental Investigation Threshold – (ANZECC B levels) are used for reference.

It should be noted that HILs and EILs are neither cleanup standards nor response levels (the concentration levels that a response is required to provide margin of safety to protect public health and/or the environment). Under the NEP(ASC)M, an investigation level is merely the "concentration of a contaminant above which further appropriate investigation and evaluation will be required".

Very often a site may have some contamination that is acceptable for its existing or less sensitive future uses. If the pre-determined soil criteria are to be strictly adopted as remediation standards, remediation will be overdone at the expense of unnecessary time and cost. Accordingly, the NEP(ASC)M adopts a site-specific approach that recognises the different characteristics of individual sites. The site-specific investigation results lead to a site-specific remediation that is based on "acceptance criteria that will ensure that public health, local amenity and soil, air and water quality are protected." (ANZECC & NHMRC 1992 p.9).

Under most environmental laws in Australia, an environmental audit must be carried out by an environmental auditor. Environmental auditors in New South Wales and Victoria must be accredited or appointed under the relevant environmental laws. In Queensland, there is no accreditation requirement. In general accredited environmental auditors from New South Wales

or Victoria are allowed to practice in Queensland. Unless they possess the necessary qualifications and experience, valuers cannot be an environmental auditor. Since Schedule B(10) of the National Environment Protection (Assessment of Site Contamination) Measurement 1999 has laid down general guideline on "Competencies and Acceptance of Environmental Auditors and Related Professionals", the requirements in this aspect should be similar in other States and Territories. In order to avoid unnecessary financial losses and frustration, where possible and practicable, the stakeholders and property managers should ensure that an accredited/qualified environmental auditor is employed for the job.

4.3.5 Remediation techniques

Environmental risk arises because of the presence of the following factors:

- the hazard of the contaminant source;
- the presence of a receptor (human or the ecosystem); and
- a pathway for disseminating the hazard. (Parker 1996)

Threat to human health and the ecosystem cannot occur unless all the factors are present. Remedial actions, such as restricting access to the contaminant source, reducing exposure time, isolating the contaminant source, removing the contaminant source, etc. are effective measures to deal with environmental risk.

As far as removal of a contaminant source is concerned, there are different methods available (NSW EPA 1995a). The common ones include:

1. On site treatment

The contaminants are destroyed or broken down while the soil remains in-situ or excavated on site. Eg. bioremediation, land farming, vertical mixing and chemical fixation.

On site excavation of contaminated soil at Cabarita, Sydney

A Soil Washing Plant at Cabarita, Sydney

Source: Chan 2000c

2. Off site treatment

The contaminated soil is excavated, removed from the site and taken to a depot for treatment then returned to the site clean. For example, high temperature incineration, soil washing, thermal absorption, particle-size separation, chemical treatment like base-catalysed dechlorination (BCD), ball-mill pulverisation, and super-critical fluid extraction.

3. Off site disposal

The contaminated soil is excavated and removed from the site for disposal at a controlled landfill. Given that it is a controversial issue to allow transport of contaminated soil on public roads, it is unlikely that the authority will approve this remediation method today.

4. Containment on site

This method is to keep the contaminated soil in-situ and to restrict access to it and prevent leaking and leaching by suitable means, such as encapsulation and capping.

In addition to the above, recycling may also be an acceptable remediation method. For example, silver is recovered from recycling silver bromide used in the photo processing industry. However, given the high cost of recycling, this method is feasible only for end products with high value.

The choice of remediation method is dependent on a number of factors such as the type of contaminants, the degree of contamination, the level of remediation to be achieved, the geology of the site, costs involved, government regulation, and opinion of residents nearby, etc. Where necessary, a combination of the mentioned remediation methods may be used. For example, in connection with residential redevelopment of the former Balmain Power Station in Sydney, the relevant factors were seriously considered. A strategy of "relocation of low level contaminated fill material and off-site disposal of material containing higher concentration of contaminants" was adopted. Under this approach, high-level contaminated soil is removed from the site for disposal, whereas low level contaminated soil is used a fill material for an open space and as road base for estate roads. The open area is finally covered with clean soil, and vegetated (Ward, 1998).

4.4 Management skills needed

As mentioned before, the objectives of contaminated property management is to maintain and enhance the value of the property, as well as to mitigate threats to public health and the environment. The former objective relates to usability and marketability of the property, whereas the latter relates to environmental protection. The techniques required for contaminated property management should therefore aim at achieving these objectives.

Apart from being contaminated, a contaminated property is the same as a clean property. The management skills for uncontaminated property still apply. However, the complex nature of contamination makes it necessary for property managers to make themselves familiar with the relevant land contamination laws, the danger, sources and pathway of contaminants and enhance their existing skills accordingly to manage contaminated properties. The extra management work brought about by contaminated properties may increase a property manager's normal workload by 1% to 2% (Mackay, 1998). The following highlights the extra skills required for the management of contaminated properties.

4.4.1 Property inspection

Property managers have a duty to inspect properties under their management. While an environmental audit will help disclose contamination problems, it is not a routine job. Property managers should inspect the properties on a regular basis. Although they are not environmental experts, nevertheless, they could help identify if a property is subject to contamination problems. An examination of the site history is a helpful starting point. The API Guidance Notes 15 contains a list of specific industries and land uses associated with land contamination. A cross-reference of the past land use with the land uses on the list can reveal if the land is potentially contaminated. In addition, the *Suggested Environmental Assessment Checklist* in Appendix 3 of the same document provides helpful guidance to identify potentially contaminated land.

A walkover inspection may discover traces of land contamination. "If you can see it, smell it, or hear it, there will probably be a negative impact on property value." is a helpful rule of thumb for carrying out site inspections (Kinnard 1992). Apart from noting any contamination of soil, building fabric and ground water, attention should be paid to the following indicators:

- any empty chemical containers, tanks, pits, pipelines, drains;
- fill material with disturbed and discoloured areas of soil;
- chemical and/or unusual odour;

- discoloured and poor quality surface water;
- evidence of waste treatment practices;
- differences in vegetative growth [colour] compared with adjacent area, and
- evidence of phytotoxicity.

(Turezynowiez 1991)

Inspection should be carried out before purchasing, upon letting, rent review and at the end of the letting period. During the term of the lease, a property manager should also inspect the property at reasonable intervals. MacKay (1998) suggests that where possible a property manager should inspect the premises once a month to make sure that the tenant has performed its contractual duties, in particular, those regarding environmental protection. This suggestion may seem impractical to some property managers. Where the property manager is unable to carry out the frequent inspections, arrangement should be made to send a trained assistant to inspect the property and report back to the property manager. On-site caretakers, if available, should be required to report all environmental incidents and malpractices to the property manager. This suggestion appears to be a bit over zealous. Unless there is a real risk, the frequent inspections may become evidence that the property manager has actively participated in the tenant's business and may be held partly liable of a land contamination incident occurs.

4.4.2 Tenant selection and lease preparation

The current environmental laws generally adopt the 'polluter pays' principle for site remediation liability. If the property is owner-occupied, the owner is responsible for the remediation. If the property is a rental property and the polluter tenant is insolvent or disappears, the landlord is likely to be held liable for the remediation (see Section 2.8a in Chapter 2). To safeguard the landlord's interest, it is necessary to select tenants carefully. In this regard, apart from the usual credential check of the incoming tenant, it is also necessary to study its track record of environmental performance at the tenant's previous premises (Chan 2000c)

The landlord or property manager of the previous premises can provide valuable information about the past environmental performance of that tenant. It will be beneficial as well to check with the appropriate environment protection authority to see if investigation or clean up notices have been issued to that tenant. Samples of EPA records is shown in Figures 4-1a & 4-1b. Sometimes an environmental consultant, who has had previous dealing with that tenant or heard of it, may also comment on its environment performance.

Figure 4 – 1a Sample of Vic EPA Priority Sites Register

Extract of the EPA Priority Sites Register

Environment Protection Authority

The **Priority Sites Register** lists sites which EPA believes present an unacceptable risk to health or to the environment due to contamination. Such sites are subject to an EPA Notice and typically require management or clean up of the contamination to reduce risks to health or the environment.

Docklands Development Site, Melbourne

Site Address: Bounded by North Wharf Rd, Pigott St Footscray Rd and Blyth St alignment Melbourne Victoria 3000

Site Id: 1015
AMG Zone: 55
AMG Easting: 319200
AMG Northing: 5812000

Municipality: Melbourne City Council

Map Reference: Melways **Edition:** 21
Page Coordinates 2E G 7

Owner: Docklands Authority
Level 38 Rialto South Tower
525 Collins Street
MELBOURNE
Victoria 3000

Contaminants:

Polycyclic aromatic hydrocarbons ; Cyanide; Sulphate ;

Phenolic compounds ; Tar; Monocyclic aromatic hydrocarbons ;

Heavy metals

Comments:

Present land use - Disused dockland.
Past land use - Gasworks and dockland (including timber treatment with cresol); more recently has been used for Customs purposes, and as a container yard and for associated freight and dock activities.
The old gasworks site is 12.5 ha in area. A Statement of Environmental Audit was issued by an Environmental Auditor stating that the soil contamination levels exceed those generally considered suitable for residential, open space or commercial use. Acceptance criteria were issued for various beneficial uses of the site and would need to be achieved by clean-up. EPA served a Clean-up Notice on Gas & Fuel Corporation in August 1994, and Gas & Fuel Corporation will work with the Docklands Authority on clean up for redevelopment. The timing and type of clean-up will be dependent on future redevelopment. An environmental audit will be conducted following clean-up.

Source: Courtesy Vic EPA

Figure 4 – 1b Sample List of Certificates of Environmental Audit issued in Victoria

Environment Protection Authority

Date of Printing 27/07/98

List of Certificates of Environmental Audit Issued

Muncipality	Locality	Address	Issue Date
BALLARAT	BALLARAT	NE CNR WENDOUREE PARADE & RIPON STREETS	6/05/94
BALLARAT	BALLARAT	80 - 82 WATER STREET	22/10/92
BALLARAT	BALLARAT	CA 21 & 21A, SEC 210, & LOT 2, PS 83308, OLD MELBOURNE ROAD (VICINITY BRADBURY & ALLANBY STREETS)	11/09/92
BALLARAT	MOUNT CLEAR	LOT 1, V8473 F203, HAYMES ROAD (VICINITY RECREATION ROAD)	3/10/94
BANYULE	BANYULE	FORMER BANYULE HIGH SCHOOL, BUCKINGHAM DRIVE	1/08/97
BANYULE	BUNDOORA	LOT 258, PS84862, ELLERY STREET	3/02/95
BANYULE	BUNDOORA	276 GREENWOOD DRIVE	11/04/95
BANYULE	HEIDELBERG	LOTS 1,2 & 3, 281-305 BANYULE ROAD.	31/03/93
BANYULE	IVANHOE	NW CNR UPPER HEIDELBERG ROAD& KIERNAN AVENUE	13/12/91
BANYULE	IVANHOE	4 TATE STREET	25/10/96
BANYULE	MONTMORENCY	CNR MOUNTAIN VIEW & SHERBOURNE RDS (FORMER MOBIL SERVICE STATION SITE)	14/07/97
BANYULE	WATSONIA	PT V4551 F066 & V6700 F806, EXCLUDING SEC EASEMENT, MELB WATER MAIN DRAIN 4613, & YALLAMBIE CREEK & ITS BANKS (VICINITY GREENSBOROUGH ROADS, YALLAMBIE ROAD & LOWER	24/03/92
BASS COAST	LANG LANG	1 ROSEBERRY STREET	2/11/94
BAYSIDE	BRIGHTON	PT V5085 F978, V8171 F986, 45 COCHRANE STREET	21/04/95
BAYSIDE	BRIGHTON	769 HAMPTON STREET	20/07/95
BAYSIDE	BRIGHTON	95 OUTER CRESCENT	24/05/96
BAYSIDE	EAST BRIGHTON	FORMER BAYSIDE COUNCIL DEPOT, 22-24 CENTRE ROAD	13/12/96
BAYSIDE	ELWOOD	FORMER ELWOOD BUS STATION, CNR HEAD & ST KILDA STS	14/10/97
BAYSIDE	MOORABBIN	PART LOT 8, ELDON COURT (VICINITY DAFF AVENUE & DANE ROAD)	6/07/92
BAYSIDE	SANDRINGHAM	27-31 GEORGE STREET	1/09/94
BAYSIDE	SANDRINGHAM	MERINDAH AVENUE SUBDIVISION, LOTS 1A,1B,2,3,4,5,6A,6B,7&8 SOUTH OF HOLLOWAY ROAD	7/09/95
BAYSIDE	SANDRINGHAM	LOT 9, MERINDAH AVENUE SUBDIVISION	30/01/96
BOROONDARA	BALWYN	LAND IN THE VICINITY BURKE ROAD, GORDON & ABERCROMBIE STREETS (PART V8344 F680)	15/06/94
BOROONDARA	BALWYN NORTH	LOT 66, BALWYN GARDENS, GREYTHORN RD	
BOROONDARA	CAMBERWELL	21 - 23 PROSPECT HILL ROAD	12/12/94
BOROONDARA	HAWTHORN	GLENFERRIE PLACE	5/08/91
BOROONDARA	HAWTHORN	188 RIVERSDALE ROAD	29/11/94
BOROONDARA	HAWTHORN	LOTS 407-411 TOORONGA ROAD (FORMER WAREHOUSE BUILDINGS, 21-23 CATO STREET)	29/04/98
BRIMBANK	DEER PARK	LAND BOUNDED BY MT DERRIMUT, MIDDLE, ROBINSONS & FOLEYS ROADS	26/10/94
BRIMBANK	KEALBA	LOT 7, STENSON ROAD	5/11/97
BRIMBANK	NORTH SUNSHINE	QUARRY, DUKE STREET (ADJOINING MARIBYRNONG RIVER)	29/06/93
BRIMBANK	ST ALBANS	STATION ROAD, FMR ALBION SITE, AREA 1 SUB AREA YELLOW NTH 1	21/12/92
BRIMBANK	ST ALBANS	WESTERN RING ROAD, FMR ALBION SITE, AREAS A, B, D & E (PINK AREA)	22/03/93
BRIMBANK	ST ALBANS	WESTERN RING ROAD, FMR ALBION SITE, AREAS A, B, D & E (PINK AREA)	13/05/93
BRIMBANK	ST ALBANS	FMR ALBION SITE, AREA 1:SUB AREA GREEN STH 1 STATION RD	16/04/93
BRIMBANK	ST ALBANS	FMR ALBION SITE, AREA 1: SUB AREAS, GREEN SOUTH 2 AND 4	30/06/93
BRIMBANK	ST ALBANS	FMR ALBION SITE, AREA 1: SUB AREA GREEN SOUTH 3	26/05/93
BRIMBANK	ST ALBANS	SITE BETWEEN MARGRAVE ST & TAYLORS RD	13/02/97
BRIMBANK	ST ALBANS	FORMER ALBION SITE, YELLOW NORTH 2 SUB-AREA	5/12/94
BRIMBANK	ST ALBANS	FORMER ALBION EXPLOSIVES FACTORY, STATION ROAD - BLUE 4 AREA	2/12/96
BRIMBANK	ST ALBANS	FMR ALBION SITE, AREA 1: SUB AREA YELLOW SOUTH	14/07/93
CAMPASPE	ECHUCA	FORMER WASTEWATER TREATMENT PLANT SITE, MURRAY VALLEY HIGHWAY	21/03/97
CAMPASPE	KYABRAM	TULLOH STREET (LOT 5, SECTION 7, TOWNSHIP OF KYABRAM)	16/02/96
CAMPASPE	KYABRAM	SHIRE DEPOT SITE, LAKE ROAD (BETWEEN CHASTRON & PETTIFER STREETS)	30/12/97
CAMPASPE	TONGALA	SHIRE DEPOT SITE, 71-79 MILLER STREET	31/12/97
CARDINIA	KOO WEE RUP	254 ROSSITER STREET	23/05/91

"V" - Volume Number, "F" - Folio Number, "PS" - Plan of subdivision, "CA - Crown allotment, "CNR" - Corner, "ADJ" - Adjoining

Page C1

Source: Courtesy Vic EPA

In addition to tenant selection, the lease document should be carefully drafted to include separate and specific clauses for environmental responsibilities alongside with the usual repairs and maintenance clauses. The lease should prohibit the tenant from permitting or conducting any activity which will violate, or cause the landlord to be in violation of the relevant environmental laws. Further, there should be clauses that require the lessee to indemnify the lessor and that the lessor has the right to inspect the premises (Kyle & Baird, 1995). The lease should explicitly stipulate the lessor's right to inspect the premises. The lease condition should also allow the lessor to delegate the inspection right to the property manager or his/her assistant to inspect the property. Sample clauses are reproduced in Figure 4-2. Where necessary, the landlord may require the tenant to provide an environmental responsibility bond for extra security. Consideration may also be made to require the tenant to carry out an environmental audit before rent review and expiry of the lease.

Figure 4 – 2 Sample lease conditions

Lessee's environmental responsibility
The Lessee shall not permit or conduct any activity on the premises which would violate, or cause the Lessor to be in violation of applicable laws, statutes, ordinances, rules, regulations, policies, orders and determinations of any governmental authority pertaining to health or the environment (collectively the Applicable Law), including, but not limited to, [the appropriate laws in the country], nor which would cause the presence of any substance or the existence of any condition, or the threatened release of any substance in, on, or under the surface of the premises, or the occurrence of any event in which any substance has been disposed of or released on, in or from the premises in any manner not permitted under Applicable Law such that Applicable Law would require (i) a report or other notices of such condition or event to any federal, state or local governmental agency or (ii) removal, treatment, or other procedures or remedial action with respect to such conditions or event in order to bring the premises into compliance with all Applicable Laws or (iii) contribution by any current or former owner or operator of the premises towards removal, treatment or other procedures or remedial action required by or that may be brought under Applicable Law with respect to the premises or any other sites or location affected by such condition or event.

Lessor indemnified
The Lessee agrees to indemnify and save the Lessor harmless from any and all liabilities, damage, expense, cause of action, suits, claims or demands (unless due to the acts, omissions, negligence or fault of the Lessor) arising from injury to a person or damage to property on the leased premises, or upon the abutting sidewalks or curbs, and to save the Lessor harmless from any and all liabilities arising from the Lessee's failure to perform any of the terms, conditions and covenants of the lease required to be performed by the Lessee.

Inspection of premises
The Lessee agrees to permit the Lessor and its agents, and any mortgagees of the leased premises, to come upon and inspect the premises at all reasonable times, and to come upon the premises if necessary to perform any act which the Lessee has failed to perform as provided in [this lease agreement]

Based on Kyle & Baird 1995.

4.4.3 Environmental Audit

Environmental audits have become an important tool for contaminated property management (Hadley 1994). The property manager's input in this regard is to prepare instructions to environmental auditors and to implement the recommendations from environmental audits. An

environmental audit is not required if there is clear evidence that the property is not subject to contamination. Where land contamination is a concern, an environmental audit should be carried out prior to purchase, letting, rent review or sale, to make sure that the property is not affected by contamination. It is a common practice today that purchasers and local councils invariably require a site investigation (audit) report (Smith 1996).

To avoid loss due to a biased environmental audit report from the vendor, a prospective investor should always arrange for an independent environmental audit report. As far as cost is concerned, the investor may have to pay $A3,500 to $25,000 for a Stage 1 investigation report, depending on the site characteristics (Ramsay 1998). In general, the expense could be from $30,000 to $70,000 for industrial properties and over $100,000 for commercial and retail properties for a full diligence process (MacKay 1998). This is a small amount when compared to the possible millions of dollars liability if the property is purchased without having an independent site audit. It should be noted that the quality of environmental audit reports may vary. A good environmental audit report should contain information such as site history, site inspection, soil sampling program, quality assurance and quality control, data interpretation and recommendation as shown in the checklist in Figure 4-3. It should be noted that a good environmental audit report must include recommendations on how a property can maintain and enhance its value.

Apart from environmental audits arising out of operational needs, the regulating authority may also require an audit. Property managers should note that while site investigation and environmental audit are closely related, they have different statutory meanings and applications. For example, under s. 17 of the Contaminated Land Management Act 1997 (NSW) (CLMA), a site investigation pursuant to an investigation notice is required to report on:

"a) the nature and extent of the harm caused by the contamination of the land,
b) the nature and extent of the harm caused by the contamination,
c) the risk that the contamination will cause such harm."

In contrast, under s. 172 of the Protection of the Environment Operations Act 1997 (NSW) (PEOA), an environmental audit is "a periodic documented evaluation of an activity (including an evaluation of management practices, systems and plant) for either or both of the following purposes:

a) to provide information to the persons managing the activity on compliance with legal requirements, codes of practice and relevant policies relating to the protection of the environment,
b) to enable those persons to determine whether the way the activity is carried on can be improved in order to protect the environment and to minimise waste."

According to the above legal provisions, a site investigation is required in NSW under an investigation notice issued by the EPA under the CLMA. Whereas an environmental audit under the PEOA is a periodic documented evaluation of an activity conducted on the premises. Given the difference in meanings and applications, property managers should make sure what is really required and organise the site investigation or environmental audit accordingly.

Figure 4 – 3 Checklist for an Environmental Audit Report

Items	Considered in Assessment/Report
Site History	
Aerial photographs viewed	
Property title	
Council records	
Site occupants	
Previous environment assessment	
Site inspection	
Description of site	
Underground storage tanks (USTs)	
Other facilities	
Wastes	
Soil Sampling Program	
General site and targeted locations	
Phot-Ionisation Detection (PID)	
Odours/staining described	
Fill considered	
Comprehensive analytical program	
QA/QC	
Field duplicates to primary laboratory (QC)	
Field duplicates to secondary laboratory (QA)	
Accuracy of results considered	
Data Interpretation	
Summarised	
Critically discussed	
Recommendations	
Follows from data in the report	

Source: Ramsay 1998.

4.4.4 Transferring environmental risks

One of the techniques in risk management is to transfer the risks. In this regard, the common approach is to transfer partially or wholly the risks to an insurer. In the USA, pollution liability insurance is available. It is required by law for underground storage tanks, hazardous waste storage or disposal sites, and transportation of hazardous wastes (Kyle & Baird 1995). In Canada, environmental insurance cover is available in the following areas:

- Pollution clean up/pollution legal liability insurance
- Remediation stop loss/cost overrun insurance
- Owner controlled contractors insurance
- Post remediation insurance

(Welsh 1997)

In Australia, similar insurance cover is not yet available. Nevertheless, property managers should consider such insurance when it is available. Although specific pollution liability

insurance cover is not available at present, property managers should still explore if the existing insurance policy covers remediation costs for sudden and accidental environmental damage.

4.5 Advanced Management Concept – Environmental Management System (EMS)

The fact that the property is free from contamination or the condition is acceptable at present does not mean that there will be no problems in the future. In the past, "end of the pipe" treatment was a common approach to deal with wastes. Companies considered environmental compliance and site remediation as a "cost of doing business" (Nestel et al 1996). In recent years, the tide of environmental consciousness coupled with legal obligation has caused companies to pay more attention to their activities on land. As there is increasing consumer demand for green products and services, companies understand that having a good corporate environmental policy and effective contaminated land management program will not only improve their image but also their position in a competitive market as well. For example, the McDonald's Restaurant Group has responded to public appeal to replace polystyrene with paper for packaging of hamburgers.

To help manage current and prevent future environmental problems, an effective property management has to be introduced. This can be done by the incorporation of an Environmental Management System (EMS) into the property management process. An EMS is an environmental management framework prepared under the ISO 14000 series of environmental standards introduced by the International Organisation for Standardisation (ISO) in 1991. It is aimed at helping organisations address environmental problems systematically and improve their environmental performance. The ISO 14000 standards are based on the ISO 9000 series quality management standards (Nestel et al 1994).

With the ISO 9000 standards, companies may ensure products and services meet predetermined standards (Buttle & Jayne 1999). With an effective EMS, companies may:

- create an environmental policy;
- set objectives and targets;
- implement a program to achieve those objectives;
- monitor and measure its effectiveness, correct problems; and
- review the system to improve it and the overall environmental performance.

(Tibor & Feldman 1995)

It should be noted that the ISO 14000 series of environmental standards do not supersede the relevant laws nor confer immunity from prosecution for breaches of relevant laws (Izmir 1996). The standards only provide guidelines for preparing an EMS rather than establish absolute environmental performance requirements. Companies still need to comply with the requirements of relevant environmental laws. Nevertheless, an effective EMS will help companies comply with legal requirements.

Although EMS may appear to be an unfamiliar term, it is actually based on the idea of "prevention is better than cure". It will reduce the "likelihood of environmental incidents occurring in the future" and reduce "the environmental impact of the occupying tenant." (Turner et al 1994). Regarding property management, an EMS is prepared through the cooperation of the property manager and the environmental consultant. The property manager will provide details about the physical conditions of the property and information about tenants of the property. He/she will also advise if suggestions from the environmental consultant are applicable in practice. A typical EMS model is shown in Figure 4 – 4 on the next page.

In the model, an organisation needs to carry out specific tasks in each of the four phases:

"Assessment Phase

- recognise the corporate policy context;
- determine legal compliance requirements; and
- assess environmental risks.

Planning & Development Phase

- develop corporate environmental strategies and performance indicators;
- consider performance in relation to other relevant organisation; and
- gain the commitment of senior management for action.

Implementation Phase

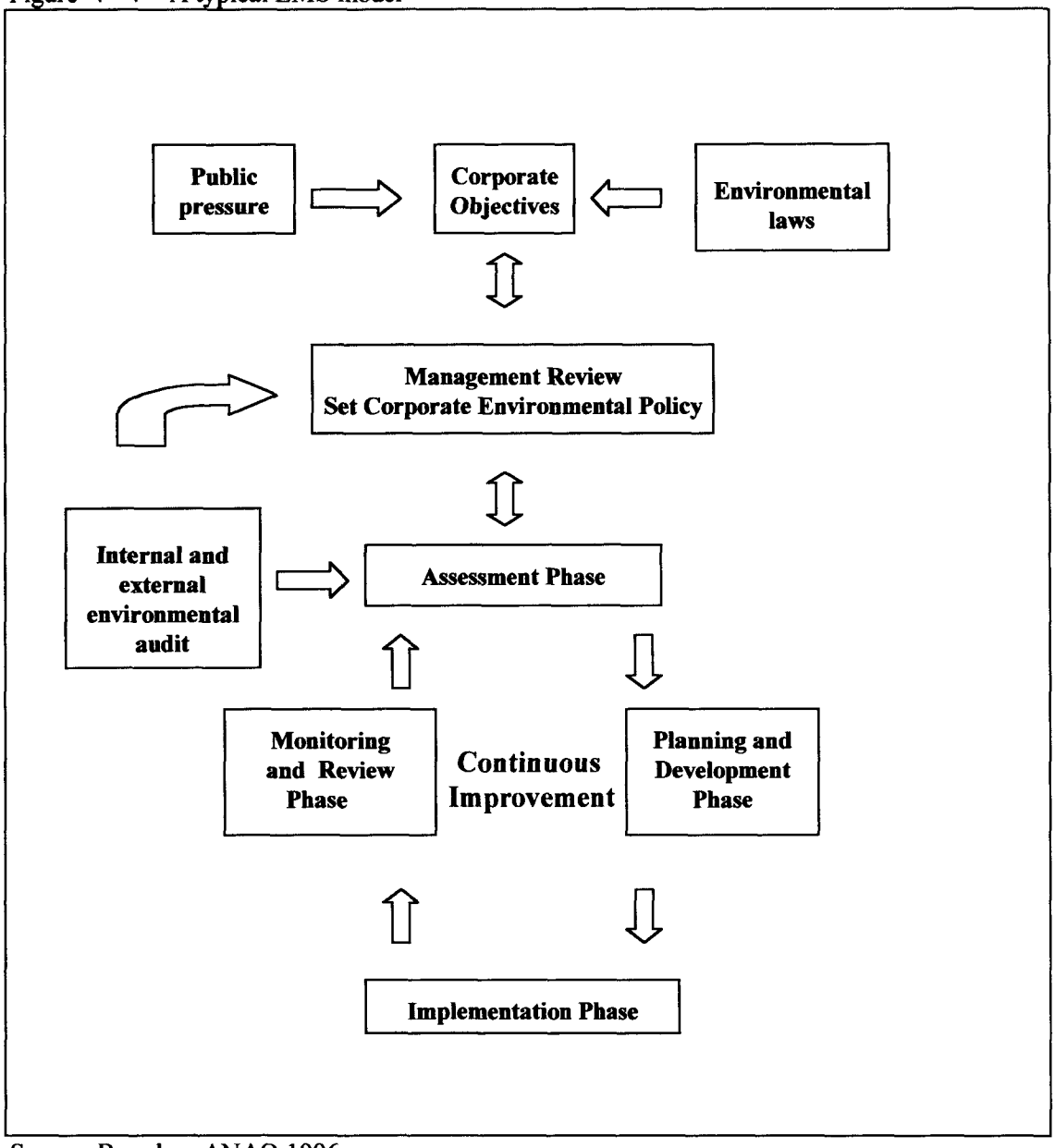
- implement an environmental management strategy;
- allocate resources to balance environmental risks and the costs of potential actions; and
- align and integrate environmental management system with existing management systems.

Monitoring & Review Phase

- measure, monitor and evaluate performance;
- report financial and environmental performance outcomes; and
- implement continuous improvement to maintain best practice."

(ANAO 1996)

Figure 4 - 4 A typical EMS model



Source: Based on ANAO 1996

It can be seen that the EMS provides a systematic framework for identifying contamination, assessing environmental risk, carrying out remediation and long term monitoring. It helps property managers formulate and implement a management plan. Regarding the corporate environmental policy, the contents should contain provisions to achieve the objectives of contaminated property management. It should be noted that a corporate environment policy is no longer a window dressing gimmick of big corporations. The Company Law Review Act 1998 (C'th) has imposed environmental reporting requirements on corporations. If a corporation is subject to any particular and significant environmental regulation, the directors' reports for a financial year are required to contain details of the corporation's performance in relation to the environmental regulations (API, 2000). As far as environmental performance is concerned, property managers should appreciate that it is not a one-off operation. It should be treated as a part of a continuing due diligence policy (Goddard 2000). They should work with environment consultants to meet the continuous improvement requirements.

In the preparation of a contaminated property management plan under the EMS, it should be noted that purely making good existing problems is not sufficient. It is necessary to have plans for the control and prevention of further contamination. Where the property is not owner occupied, it is necessary to mobilise the tenants to participate the management plan. In order to help tenants fulfil their contractual environmental responsibilities, it will be helpful to provide them with information kits and emergency kits (see the case study below). The materials may be arranged through environmental auditors or consultants. It is no doubt a cost at the beginning, it will pay off in the long run if contamination can be controlled or prevented.

4.6 An example of good property management practice

Case study

The PortAir Industrial Estate in Botany Bay, Sydney was built in the 1930s. It has a total lettable area of 75,000m^2. Today, two of the warehouses on site still have 20,000m^2 of corrugated super six asbestos roofing. It was acquired by a major investment fund at the end of 1994. The fund has an in-house property management department to look after its investment properties. It also has a corporate policy to safeguard unit-holders' investments and to comply with environmental protection requirements. Before acquiring the property, the fund had carried out a full due diligence process and commissioned an environmental audit of the property to determine:

PortAir Industrial Estate

Source: Chan 2000c

- what is to be acquired;
- the capital costs required for environmental works;
- the costs to cover environmental expenses over the ownership of the asset;
- the costs on refurbishment or demolition due to the presence of hazardous substances; and
- if there is any value loss of the asset due to the presence of contaminated soil.

The assessment enabled the investor to make an informed decision. The property was eventually purchased at a price of $32.5 million in December 1994. After purchasing the property, the fund carried out a management plan that incorporates the established internal property management strategy and recommendations by the environmental auditor. The internal property management strategy is to achieve the property performance through careful selection of tenants, strictly enforcement of lease conditions and implementation of recommendations from the environmental auditor as outlined below.

The existing environmental laws may hold an innocent landlord responsible for the remediation of a contaminated property if the polluter tenant cannot be found (see Chapter 2). In order to avoid this possible problem, the fund has taken appropriate preventive measures. Apart from advising tenants and contractors of the presence of asbestos, it also issued environmental manual and chemical spill kit to tenants. The manual contains information on exclusion of dangerous goods on the premises; responses to spills and fires; waste management and disposal; asbestos management and "pre and post" lease audits.

The tenants of the property use the premises for storage and light industrial purposes. It is likely that chemicals may be used or stored on the premises. Although the property is known to be contaminated by the asbestos roofing, as a preventive measure, the environmental consultant recommends the issue of chemical spill kit to the tenants to control future contamination due to spill of chemicals. The contents of the chemical spill kit include mini-booms to contain or divert the spill; pillows to contain and absorb the spill; pads to absorb and clean up the spill; particlate (absorbent particles) to absorb the spill; drain cover to stop the spill entering stormwater drains;

disposal bags for placing used absorbents; dust pan and broom to sweep up particulate or spilt liquid, and gloves for handling split chemicals.

A chemical spill kit at PortAir Industrial Estate

A stormwater isolation valve at PortAir Industrial Estate

Source: Chan 2000c

The fund also adopts proper management by using suitable signage and maintaining an asbestos register. Furthermore, on site infrastructure such as truck wash bays, chemical tank bunding, site retention of storm water, and grease traps/triple interceptors are provided for environmental protection. To meet the continuous improvement requirement under an EMS, the conditions on site are closely monitored and tested on a regular basis. The fund has also an on-site caretaker to look after the property and keep an eye on activities on the site. Having carried out the above strategy, the fund is able to retain the existing roof of the property for the medium term. Meanwhile, the money for roof replacement can be used for other investments.

The measures help maintain the value of the asset and give the owner a reasonable return. In June 1998, the property was valued at $49 million, a 12.45% increase in capital value in 3½ years. The property manager claimed that the performance was in line with other uncontaminated properties managed by his firm. Through the implementation of good property management practices, the fund has achieved the objectives of contaminated property management. The property manager of this industrial estate even won the 1997 Property Council of Australia's 'Commercial And Industrial Property Management Award' in NSW (Mackay 1998). This award is "presented to an individual or a team demonstrating excellence and innovation in managing a property or portfolio of properties." (Property Council of Australia 1999).

4.7 Feedback from property manager

In order to clarify if contaminated properties are more problematic and difficult to manage, the property manager of PortAir Industrial Estate was interviewed and he provided the following comments (MacKay 2000):

a) Environmental laws

Although there is an array of environmental laws governing contaminated land, it does not cause any problem to the property manager. In general, a contaminated property will be cleaned up to the satisfaction of the EPA by the vendor prior to the sale or by the investor after the sale. Where remediation can be deferred to a later day, the property is managed according to an environmental protection/management plan which is incorporated into the day to day management of the property. Accordingly, the environmental laws do not cause problems to the management of the property.

b) Notorious contaminated property
Properties of former heavy industry have a notorious reputation. However, investors will not avoid them if there is a good return. Investors will quantify the environmental problems and implement the appropriate remediation and management plan. Once the properties have been satisfactorily cleaned up, they are managed like clean properties. Tenants will find no noticeable physical difference that the property was once contaminated and hence there is no impact on the rental level.

c) Higher costs
Contaminated properties will have higher up front cost due to the remediation action required. There may be extra costs for ongoing monitoring and pollution prevention facilities. However, the extra costs are recovered from tenants as outgoings for occupying the premises. Although theoretically the management costs should be higher than clean properties, in practice, the difference is negligible if a proper environmental management plan is implemented.

d) Performance of contaminated property
Once the property has been properly cleaned up, its performance moves in line with the market. Tenants usually do not care about if the property was formerly contaminated, unless the previous uses of the property were exceptionally noxious. There is generally no difference in the rent paid for a formerly contaminated property. The PortAir Industrial Estate's performance is in line with the market.

(Chan 2000c)

4.8 Conclusion

Contaminated land is generally regarded as a liability rather than an asset. If choices are available, investors and tenants will avoid choosing a contaminated or potentially contaminated property. To restore the utility, marketability, and market value of the property and to reduce legal and financial liabilities, it is necessary to have an effective management program. Conventional property management focuses on maintaining cash flow and maximising the wealth of the owner. Management of contaminated land, however, requires more than that. In addition to cash flow, contaminated property management has to fulfil the extra objective of selecting a socially acceptable and cost effective strategy that minimises threats to, and provides protection for, public health, welfare and the environment.

To achieve all the objectives, conventional property management techniques have to be modified and extended. A property manager needs to look after contaminated land according to an effective management program. Today, an effective contaminated land management program should include identification of land contamination, environmental risk assessment, remedial measures and a long term monitoring process. The lease document should contain appropriate environmental clauses to safeguard the landowner's interest. To further enhance the quality of a management program, consideration should be given to incorporating an EMS under the ISO 14000 series of environmental standards.

Given proper management, even a contaminated, or potentially contaminated, property can be a valuable asset. The Property Council of Australia's 'Commercial and Industrial Property Management Award' to the property manager of PortAir Industrial Estate demonstrates this point. An effective management program may help avoid expensive remediation costs and free up financial resources for more beneficial purposes. Since a proper management strategy cannot be formulated without the help of a good environmental audit report, stakeholders should ensure that an environmental audit report is prepared before any property acquisition and letting. The carrying out of a properly prepared management program will surely enhance the environmental performance of the property. The property value will therefore be maintained and enhanced.

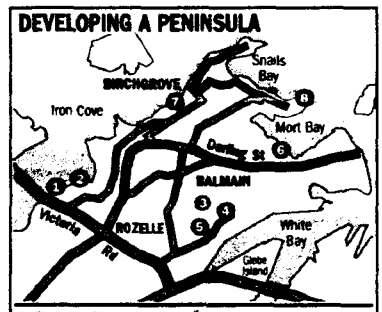
In the course of valuing a contaminated or potentially contaminated property, it is important for a valuer to take note of the quality of management of the property as well. The quality of property management to a large extent determines if contamination on the site has been properly cleaned up, controlled or contained. This is an important consideration when it comes to the assessment of stigma impact on the property. The contaminated property management costs should be an important consideration in the valuation.

Chapter 5

Contaminated Land Valuation Methods – An overview[1]

5.1 Introduction

The potential public health risk, environmental impacts, negative image and legal liabilities have made contaminated land a liability rather than an asset to the owner. Whether for occupation or investment reasons, landowners, vendors, purchasers and financiers are eager to know the value of contaminated land. In recent years, the short supply of development land in urban areas together with the rapid economic development and population expansion have seen landowners and developers look at contaminated land positively, and a niche market for contaminated land is taking shape. For example, in Sydney, eight former industrial sites in the Balmain Peninsula are scheduled for residential and commercial redevelopment (Minogue 1998). Well located old industrial sites in other areas are also being cleaned up for similar purposes. Valuers are frequently appointed to assess the value of contaminated land.



Redevelopment of eight industrial sites in Balmain, Sydney
Source: Minogue, 1998

This chapter aims at providing an overview of contaminated property valuation methods currently used overseas and in Australia. It begins with a discussion of the valuation methods introduced by economists and property researchers. It is then followed by an analysis of the methods used by Australian valuers for contaminated land valuations. It also studies the way Australian valuers treat stigma. It concludes that the difficulty in assessing stigma is probably one of the reasons why valuers have a preference towards using the unimpaired valuation approach in contaminated land valuation. It finds that there is a need for the development of a new model for the assessment of stigma factor as outlined in Chapter 6.

5.2 Meaning of property value

The term "property value" used in this chapter has the same meaning as "market value" defined by The International Assets Valuation Standards Committee (TIAVSC), i.e. "the estimated amount for which an asset should exchange on the date of valuation between a willing buyer and a willing seller in an arm's length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion". The terms 'contaminated land' and "contaminated property' are interchangeable.

Although contaminated land is closely related to the environment, property value is not the same as value of the environment. Value of the environment has a wider scope: it ranges from the "simple use value to the more complex existence value" (NSW EPA 1993 p.18). Use value refers to the value of the services provided by the environment to the user (Perrings 1995), while existence value is the value of altruism, i.e. "caring for other creatures" (NSW EPA 1993).

[1] This chapter is partly based on my refereed paper: Chan, N. 2000, *How Australian Appraisers Assess Contaminated Land*, The Appraisal Journal, LXVIII(4), pp. 432 – 440.

5.3 Impacts of contamination on property values

A number of researchers (Patchin 1988; Olsen 1989; Mundy 1992a, b & c; Chalmers & Roehr 1993; Dixon 1996; Syms 1996a & b, 1997a & b; Neustein & Bell 1998, etc.) have studied the impacts of land contamination on property value. Briefly, contamination affects property values in three ways. Firstly, property values may be reduced due to the presence of contaminants on the property. The contamination may affect the marketability and utility of the property such that it takes longer to let or sell the property and the deal may only be achieved at a lower rent or price in other words. In addition, there may be loss of rent or production during the remediation period. These impacts, together with the clean up cost and possible legal liabilities, will have a negative impact on property value.

Secondly, the value of a clean property may be reduced due to its proximity to a contaminated property. The perceived or real health risk for being close to a contaminated property may cause market resistance to the subject property such that it takes longer to sell or let, and the agreed sale price or rent may be lower than other unaffected comparable properties.

Thirdly, the value of a former contaminated property may not return to its normal level even after remediation. This phenomenon is known as the stigma effect. An introduction of this factor has been given in Chapter 1. The stigma effect arises because potential purchasers or tenants do not believe that the property is completely free from contamination problems even after the clean up. The market resistance thus causes a reduction in property value.

To help members understand more about contaminated land issues, valuation/appraisal professional institutes around the world have published guidelines or practice notes to provide members with the necessary guidance and information. For example, the Australian Institute of Valuers and Land Economists (now the Australian Property Institute) published a Contaminated Land Valuation Practice Standard in 1994 (AIVLE 1994). The document was subsequently incorporated into Guidance Note 15 "Reporting on Contaminated Land" of the API Professional Practice 2000 (API 1999). In the USA, the Appraisal Institute has provided guidance in Guide Note 8 of its Standards of Professional Appraisal Practice (Appraisal Institute 1994). In the United Kingdom, the Royal Institution of Chartered Surveyors has published a guidance note "Contamination and its Implications for Chartered Surveyors" (RICS 1997). In Canada, the Appraisal Institute of Canada gives members similar guidance via Guide Note 5 of its Professional Standards (Dybvig 1992).

These guidelines or practice notes aim at providing valuers with the necessary background information about contaminated land and precautions that should be taken when carrying out a valuation. They are not intended to teach valuers how to value contaminated properties. Valuers are free to use methods that they think appropriate for the job.

5.4 Valuation methods

5.4.1 Methods introduced by economists

The contribution of economists in the development of modern property valuation theory is well documented (Wendt 1974; Burton 1982). For example, the works of Alfred Marshall and Irving Fisher at the turn of the 20th century are still remembered today. In particular, Fisher is regarded as the "father of the income approach" (Burton 1982). With the increasing awareness of environmental problems, economists have again made significant contributions in searching for appropriate methods to value environmental impacts.

Based on the study of welfare economics, economists have introduced the concept of willingness to pay (WTP) and willingness to accept compensation (WTA) to assess the value of environmental impacts. As far as the environment is concerned, economists do not use the

TIAVSC definition of real estate market value. Instead, environmental value is categorised into use value and intrinsic value. A number of methods have been introduced to assess these values. The methods can broadly be divided into three groups:

- Market-based methods
- Surrogate market methods
- Survey-based methods

Background information and application of these methods can be found in a number of publications (such as Perrings 1995, Abelson 1996 and Garrod & Willis 1999). A particularly good overview of these methods can be found in the technical report "Valuation Of Environmental Impacts" published by the NSW EPA (1993).

In short, the market-base methods use observable market prices to "value changes in productivity, operation, and maintenance costs, replacement costs, human health or whatever is affected by a change in environmental quality" (NSW EPA 1993). For example, the increase in productivity as a result of reducing soil degradation can be regarded as the benefit or value of environmental quality. More details may be obtained from the references mentioned above and older references such as Fleming (1981) or Hufschmidt et al (1983).

The surrogate market methods use actual market prices of other related goods to estimate the implicit price for environmental goods. There are different approaches and the major ones include hedonic pricing, wage differentials and travel cost. Of the various approaches, the hedonic pricing approach is closely related to property valuation. It assumes that the price paid for a property reflects the buyer's attitude towards all factors including environmental ones affecting the property. The relationship between the median price of the property and variables including environmental quality can be found by using multivariate regression analysis. More information can be obtained from Willis & Corkindale (1995), Abelson (1996), and Garrod & Willis (1999). A number of property researchers such as Kohlhase (1991), Smolen, Moore and Conway (1992), and Simons, Bowen and Sementelli (1997), etc. have applied this method to study the change of property value with the distance from a contaminated site.

The survey-based methods rely on directly asking consumers their willingness to pay to "value environmental benefits in the absence of data on market prices" (NSW EPA 1993). There are a number of survey approaches. The most prominent ones include the contingent valuation method and the Delphi technique. When applying the contingent valuation method, a hypothetical scenario is set up and survey respondents are asked about their attitude and expectations towards the environmental good in question. This method is very flexible and it can be adapted to a wide range of settings and applied in situations where information is difficult to obtain. It has been used for the valuation of the Kakadu Conservation Zone in Australia (Imber and Wilks 1991). However, it has been found that "the contingent values may not accurately represent actual behaviour for natural recourse issues involving willingness to pay" (Kealy et al 1988).

The Delphi technique is very similar to the contingent valuation method. The difference is that the survey respondents are experts or representatives of a community group instead of the consumers. Basically it is an iterative survey procedure and there are two or more surveys. The responses to the initial survey are statistically analysed and reviewed. In the second survey, the questionnaire is revised in order to get clear consensus. Also questions relating to new issues not mentioned in the first survey can be included. The survey process can be repeated for a number of times until the results cluster around a mean value. More details may be obtained from references such as Cummings, Brookshire and Schulze (1986), Richey (1985).

The above methods are not popular among valuers. There are several reasons for this. Firstly, the methods are developed to value the environment. They are not aimed at assessing the value of contaminated properties. The environmental value to be estimated by these methods is not the same as the real estate market value. In essence real estate value is a use value assessed on the basis of price agreed by a willing but not anxious buyer and a willing but not anxious seller. Environmental value, on the other hand, has a wider scope that encompasses use value and existence value (value to other creatures).

Secondly, some methods need to operate under specific assumptions that are subject to criticisms. For example, the contingent valuation method is based on asking respondents questions of a hypothetical scenario. Answers to hypothetical questions such as how much a respondent is willing to pay for a property near a sewage treatment plant or how much compensation does a respondent require to live next a sewerage treatment plant may not reflect the genuine price paid by a real purchaser. Similarly, the travel cost method has little use in property valuation because property value is determined by the forces of supply and demand. It is inappropriate to use travel cost as a surrogate for property value. In real life, the willingness to pay assumption does not always hold. It is obvious that the compensation demand is not always equal to the willingness to pay. People tend to ask for more compensation than the amount stated in a hypothetical scenario. This problem is known as the asymmetry problem.

Thirdly, some methods need to operate under specific conditions. For example, although the hedonic pricing method can be used to assess the value of a property with regard to its distance from the contaminated site, it requires a substantial amount of data and statistical expertise knowledge not normally possessed by the majority of valuers.

Fourthly, the methods are substantially different from the usual valuation methods used by valuers. The methods do not have a track record in property valuation and valuers are not confident to use them. Having said that, it should not be mistaken that valuers will oppose to new methods. If a new method can win the confidence of valuers, they will be happy to try it (see survey result in Table 6-2).

Finally, there is a time constraint. Very often the valuation report is required within a short time. There is no time for the valuer to carry out a survey or collect sufficient data required by the methods.

5.4.2 Methods introduced by property researchers

Property researchers have not rejected the methods mentioned above. They are interested in searching for all suitable methods for the valuation profession. It has been well accepted that valuation of contaminated property is more than simply deducting the typical remediation cost from the uncontaminated value. Consideration should also be given to factors such as marketability (Mundy 1992b; Wilson 1994), stigma (Patchin 1991; Mundy 1992a, b & c; Roddewig 1996; Neustein & Bell 1998), and possible change of highest and best use (Wilson 1996). Regarding the last factor, it refers to the likely change in zoning of the land and the relevant socioeconomic conditions. If the land is cleaned up to an approved standard, more sensitive and lucrative uses such as residential and commercial may be allowed on a former industrial site.

There are two common approaches to the valuation of contaminated land in Australia. The first one is the unaffected valuation approach (unimpaired value approach). It requires the valuer to value the property as if it were clean. The valuer highlights this assumption in the valuation report and warns the client about the possible impacts of the contamination of the site. This approach is not particularly helpful to the client, as the valuation provided does not reflect the real conditions of the property. The next approach is known as the affected valuation approach

(impaired value approach). It requires the valuer to take into consideration the contaminated state of the property. Using this approach, the valuer firstly values the property as if it were clean. This unimpaired value is determined by any valuation method that the valuer thinks fit. A deduction is then made for any production (income) loss due to the contamination, and loss due to any investigation and remediation cost and stigma factor.

Researchers have put forward a number of impaired value valuation models. Mundy (1992a) has introduced the following model:

$$V_c - V_d = \text{Damage} \qquad \text{Equation 5 – 1}$$

Where V_c = value clean
V_d = value dirty
Damage = sum of the cost to cure plus a stigma effect

Mundy's model is very simple and easy to apply. However, it does not isolate stigma from other damage items. Wilson (1994) later puts forward a more detailed model:

$$I = U - C_{NCP} - C_R - C_F - M_u \qquad \text{Equation 5 – 2}$$

Where I = Impaired value
U = Unimpaired value
C_{NCP} = Cost to implement the NCP-defined remediation plan
(NCP is a National Contingency Plan under the Comprehensive Environmental Response, Compensation and Liability Act 1980 (CERCLA))
C_R = Cost of restrictions on use and/or environmental liability prevention
C_F = Impaired financing cost
M_u = Intangible market factors

Wilson's model is an improvement, however, stigma is again not separately accounted for. It is referred to as "marketplace reaction uncertainty" and is hidden in the term market factors M_u which include other factors like engineering estimates uncertainty, regulatory requirements uncertainty, financial market reaction uncertainty and change of marketplace reaction over time. Dotzour (1997) introduced the following model based on the work of Patchin (1988):

$$\text{Contaminated value} = \text{Uncontaminated value} - \text{Clean up cost} - \text{Public liability} - \text{Stigma} \qquad \text{Equation 5 – 3}$$

This model differs from the other two in that stigma is an individual item in the model. It emphasises that stigma is an important constituent of the model and has to be separately assessed. Based on the above models, the following model was prepared for this research.

$$\mathbf{V_c = V_u - L - C_r - S} \qquad \text{Equation 5 – 4}$$

Where V_c = contaminated value
V_u = uncontaminated value
L = loss due to reduced income/productivity and/or legal liabilities
C_r = remediation and related cost
S = stigma impacts

(Chan 2000b)

This model, like Dotzour's model, explicitly allows for stigma. It takes into consideration financial losses (including public liabilities) due to contamination. In addition, it is flexible in that researchers or practitioners may refine and expand items 'L' and 'C_r' in the model to a detailed list of different income losses or cost deductions due to contamination. As suggested by Kinnard et al (1999), these items should be calculated as the present worth of the anticipated losses and costs. It should be noted that the loss of income/productivity and legal liabilities may not necessarily arise in every case. Depending on the case, it may be a zero figure.

Regarding the remediation cost, Kinnard (1992) points out that it should not be the cost to cure (a complete clean up) because an absolute cure simply may not exist. Instead, it should be the cost to correct, ie, the cost to clean up to the site to the current standards to meet the requirements of the intended use. This idea matches with that proposed in the National Environment Protection (Assessment of Site Contamination) Measure 1999 in Australia. This document suggests adopting a site-specific assessment to determine if unacceptable health risks exist and to ascertain the nature and magnitude of environmental risks based on de-facto clean up or response level.

At present, valuers are mainly using conventional methods to value contaminated properties. They are not alone in this regard. Property researchers also support the use of these methods, for example, the direct comparison method (Patchin 1994), capitalisation method (Patchin 1988; Mundy 1992b & c; Neustein 1992; Dixon 1996), cost approach (Wilson 1994), hypothetical development method/residual method (Simm 1992 and Liang 1992, both cited in Syms 1997) and discounted cash flow method (Fisher, Lentz and Tse 1992; Gronow 1998; Gronow 1999). The use of these methods is not without problems. Firstly, there is a lack of transaction data of contaminated properties. It is thus difficult to rely on market evidence to estimate prices, rents and yields of contaminated properties (Kinnard 1992; Syms 1997b). Secondly, as pointed out by Wilson (1992 p.23), "each environmental problem is as unique as a fingerprint". It is difficult to get true comparables to apply the direct comparison method.

Finally, although the conventional methods may be adapted or modified for the valuation of contaminated land, it is very often that these methods do not have explicit allowance for value loss due to the stigma factor. For example, in the capitalisation approach, stigma is allowed for by using an upward adjustment of capitalisation rate. Syms (1997b) refers to a survey conducted by Richards (1995) in the United Kingdom which shows a range of suggested upward yield adjustment of 0.5% - 5% to the 'all risks yield' [capitalisation rate]. He queries this approach and points out that the adjustment "is at best arbitrary and may lead to a misleading result" (Syms 1997b p.197). Accordingly property practitioners and researchers around the world are continuing to research for suitable methods to value contaminated properties. At present, there are more work done in this area in the United States and the United Kingdom. The following sections highlight the alternative methods introduced in recent years in the United States and the United Kingdom.

USA

- The Environmental Balance Sheet Method

Wilson (1992) suggests that the valuation of a contaminated property should be carried out by way of teamwork. The team should consist of the valuer and other professionals such as accountants, engineers (civil, mechanical, electrical and geotechnical), finance consultants, hydrogeologists, industrial hygienists, management decision science specialists, public relations specialists, environmental law specialists and specialised investigative specialists. Regarding the valuation method, he suggests the use of an environmental balance sheet approach to value the contaminated property.

In essence, it requires the valuer to estimate the unaffected value of the property. The other professionals in the team have to provide figures that constitute the total environmental liabilities. The contaminated property value is estimated as the total owner's impaired position and the environmental liabilities. A sample of the balance sheet is reproduced in Figure 5-1.

Figure 5 – 1 Environmental Balance Sheet

IMPAIRED VALUE OPINION BALANCE SHEET			
UNIMPAIRED VALUE OPINION			$
ENVIRONMENTAL LIABILITIES:			
Cost to Determine Suspect Impairments		$	
Cost to Identify Magnitude of Impairments and Course of Action		$	
Present Value of Action Plan Components:			
Operations and Maintenance Programs	$		
Planned Response Actions	$		
Notification, Training, and Recordkeeping	$		
Emergency Response Actions	$		
SUBTOTAL—Present Value of Action Plan		$	
Estimated Additional CERCLA/SARA Liabilities		$	
Estimated Negative Intangible (Stigma) Impact		$	
TOTAL ENVIRONMENTAL LIABILITIES			$
OWNER'S IMPAIRED POSITION:			
Impaired Property Value Opinion*		$	
Owner's Equity**		$	
TOTAL OWNER'S IMPAIRED POSITION			$
TOTAL OWNER'S IMPAIRED POSITION AND ENVIRONMENTAL LIABILITIES			$

* The *GREATER* of: zero or unimpaired value *less* environmental liabilities.
** The *LESSER* of: zero or unimpaired value *less* environmental liabilities.

Source: Wilson (1992 p.29)

This method is basically the method already used by valuers under the affected valuation approach. Through the environmental balance sheet format it provides valuers with a framework to carry out the valuation. However, the layout of this method is a bit difficult to comprehend. It requires the final entry 'Total Owner's Impaired Position And Environmental Liabilities' to be equal to the unimpaired value at the beginning of the environmental balance

sheet. This entry serves no practical purpose but confuses the reader. Also the concept of having 'Owner's Equity' as a component of the 'Total Owner's Impaired Position' is unclear. Moreover, the balance sheet does not show how the stigma impact is assessed. This approach has been incorporated into Guidance Notes 15 of the API Professional Practice 2000.

- Survey Method

The use of survey methods to assess environmental impacts has attracted a number of property researchers to study if the methods are also suitable for contaminated property valuation. For example, Greenberg and Hughes (1993) use the survey method to obtain the opinion of 567 tax assessors in New Jersey to testify if hazardous waste sites have lowered the appreciation of property values, deterred land uses and affected community plans. They claim that in their study the survey approach is a quick and relatively inexpensive way to obtain the relevant data. However, it cannot replace detailed valuation of individual property. They consider that the survey results can be used to determine which communities may require further in-depth analysis. It should be noted that their first finding is not universal because, depending on the size and design, a survey can be very costly.

Regarding the applicability of survey methods to contaminated property valuation, McLean & Mundy (1998) have carried out a study of the contingent valuation method, conjoint analysis and perceived diminution approach. They find that the contingent valuation method is the most defensible one. This method has "the added benefit of providing behavioural insight to the market approach". Nevertheless, they recommend using this method as a supplement only.

The findings of Greenberg & Hughes and McLean & Mundy show that the survey method cannot replace detailed valuation of individual property. None of the researchers discussed here reveal whether the method can be applied to assess stigma.

- Multiple regression analysis

The multiple regression analysis method is the hedonic pricing approach mentioned earlier. This method has been used by economists to assess environmental impacts for a long time. Property researchers are also interested to find out if this method can also be used to value contaminated properties. In general, they use two common hedonic housing models, the linear and log-linear models, to analyse the impact of contamination on property prices. The former model "implies constant partial effects between housing characteristics and selling price", while the latter "allows for non-linear price effects" (Reichert 1997). For example, Dotzour (1997) has used a multiple linear regression model to find the impact of ground water contamination on residential property values, and Reichert (1997) has used an exponential log-linear functional regression model to assess the impact of a toxic waste Superfund [priority] site on property values. Using the models, they have successfully identified the negative impacts of contamination on property values.

Nevertheless, this method has limited application in day-to-day contaminated land valuation. There reason is the method requires a large amount of market data of the analysis. In real life, it is difficult to meet the market data requirement. While the method may be used to assess stigma, the lack of market data makes the objective difficult to achieve.

- Option Pricing Approach

There have been a number of researches who have considered extending the financial option pricing model to value real property (Capozza & Sick 1991; Williams 1991; Quigg 1991). Lentz & Tse (1995) have extended the idea and applied the method to value contaminated income producing properties. The model assumes a property owner has two options for improving the value of the property. The first option is to clean up the property at the optimal time and the second option is to redevelop the property to a higher and better use at the optimal time. Since

the second option cannot be undertaken without remediation, the first option is a compound option that not only relates to the clean up the property but also releases the opportunity to undertake the second option.

The model uses a complicated mathematical method - differential calculus - to analyse the property's cash flow in the unimpaired and impaired scenarios. It also requires the development of criteria to determine the value maximising strategy. Using the proposed model, Lentz & Tse manage to determine the value-maximising strategy of the contaminated property, ie, whether the redevelopment of the contaminated property is to be accelerated or postponed.

This method is not suitable for day-to-day operation of a valuer. The use of differential calculus is beyond the capacity of most valuers. This method may be used to assess stigma. However, Lentz and Tse do not mention this point in their paper.

- Mortgage – Equity Analysis Approach

In 1959, Leon Ellwood introduced the mortgage – equity analysis technique to value income producing properties. He believed that the capitalisation rate of an income producing property should comprise a rate of return to the mortgagee and the investor respectively. The capitalisation rate is thus an overall rate used to capitalise the net income from the property. Chalmers & Jackson (1996) extend the idea to value contaminated properties.

They see value deduction as a function of the increased risk associated with contamination. Using the mortgage – equity analysis model, they estimate an overall capitalisation rate, which reflects the value reduction due to contamination. For this, it requires adjusting equity and lender requirements such as the equity interest rate, loan-to-value ratio, mortgage interest rate, expected value change over the holding period, expected income change over the holding period and percentage of load paid off during the hold period, etc. The overall capitalisation rate obtained is then used to assess the market value of the contaminated property using the conventional capitalisation method.

This method relies on the accuracy of the overall capitalisation rate. Since the method requires the adjustment of a number of equity and lender requirements, it is difficult to maintain accuracy. Kelly and Mitchell (1995) point out that the Ellwood method has two major flaws, i.e., "the future value of the property and the loan financing depend functionally on its current value. This means that ... the Ellwood rate equation is logically circular in a manner that cannot reflect the situation" and "since the Ellwood equation presumes that he income rate I_o remains level, the notorious J- and K-factors had to be developed to handle situations where the I_o was projected to change in a known pattern" (pp. 285-286). Furthermore, due to the uniqueness of individual contaminated properties, it is difficult to use market data to verify the accuracy and reasonableness of the overall capitalisation rate. Since the overall capitalisation rate is a single rate that reflects all pos and cons (including stigma) of the property, it is difficult to isolate the weighting of stigma from the rate. Hence it is difficult to tell to what extent is the property affected by stigma.

- Monte Carlo-based Method

Ever since William Kinnard introduced the idea of using statistical methods and computers in property valuation in 1966 (Burton 1982), there have been a lot of studies in the use of statistical methods and computer for property valuation. Researchers, such as Phyrr (1973); Mollart (1988); Gain (1990); Byrne (1996) and others, advocate using simulation methods in property valuation. Unlike deterministic approaches such as the multiple regression analysis method, the Monte Carlo simulation method is a probabilistic approach that allows for random variations about a pattern or set of overriding influences. A computer is used to carry out a large

number of repeated calculations based on the random occurrence of an event, and the most likely scenario is finally estimated.

Weber (1997) extends the application of the Monte Carlo simulation method to value contaminated land. By incorporating the Monte Carlo simulation method into a discounted cash flow model, he manages to assess the most likely value of a contaminated property after remediation. He claims that the model can also be used to quantify stigma although he did not show how.

The Monte Carlo method is a statistical means to help the decision maker to tackle uncertainty. It requires the user to set a computational model first. If the model is incorrectly set up, the Monte Carlo method alone cannot return a meaningful answer. Although it has a potential to contribute in stigma assessment, the success is hinged on the availability of a sound model.

United Kingdom

- Expected Utility Model

In view of the general lack of data on contaminated property, Wiltshaw (1996) suggests the use of an expected utility model based on the micro-economic theory of risk and uncertainty to value contaminated properties. Using the model, he demonstrates that the owner of a contaminated property can make a decision as to whether the contaminated property should be sold as it is or after remediation. The model can also indicate if remediation is to be carried out, what is the maximum amount that can be spent to shift liability from the vendor, and under what circumstances will liability be shifted or retained. Based on the model, he concludes that the decision whether to clean up the property prior to sale depends on whether the remediated land value is greater than the expected land value (the market value when it is thought that the subject land is contaminated with a certain probability).

Obviously this finding is not a surprise. It is a common sense that development or redevelopment of a contaminated site will take place when there is a profit to the developer, i.e. when the remediated land value of the site is a reasonably positive figure. Wiltshaw does not mention whether his approach can be used to assess stigma.

- **The Normative Valuation Model**

Richards (1997b) suggests a normative valuation model to assess contaminated properties for investment purpose. The model consists of 3 fundamental components – net income, direct contamination costs and discount rate – which are incorporated into a Discounted Cash Flow (DCF) framework. The net income is obtained by analysing net rental of uncontaminated comparable properties. He suggests using Monte Caro Simulation technique to estimate the most likely figure for the direct contamination costs (such as remediation cost, monitoring cost, relevant professional fees and income losses due to contamination). He accepts the idea of using a risk adjusted discount rate to reflect the impact of stigma. However he considers that it is inappropriate to use a single discount rate over the life of the investment because stigma fades with time.

He suggests using various discount rates over the life of the investment in the DCF model. The discount rates are to be obtained by analysing the time series of discount rate from comparable properties. While this model looks good theoretically, there is a problem to apply it in practice. In the real world, there are not many contaminated properties and it is difficult to get comparable properties that have similar physical characteristics and contamination problems as the subject property. Furthermore, there must be transactions of the comparable properties before the yield (discount rate) can be analysed. This requirement may not be satisfied because it is unlikely to have such comparable evidence for the required time series analysis. It follows that this model is difficult to be applied in practice.

- Explicit Appraisal Model

Capitalisation method is a traditional valuation method. The method assumes the rental income will remain unchanged. The market value of a property is obtained by multiplying the perpetual net rent by a Years' Purchase (YP) – a net income multiplier. The validity of this approach has been criticised by a number of United Kingdom researchers such as Baum & Macgregor (1992), Cadman (1994), Zell (1997), etc. The researchers advocate the use of an explicit approach - the Discounted Cash Flow (DCF) to replace the traditional methods.

In relation to valuation of contaminated land, Gronow (1998 & 1999) suggests an explicit valuation model based on the DCF method should be used. He suggests the model should incorporate the following elements:

1. defined time periods and holding period;
2. fees on purchase, annual management fees and costs, rent review fees, fees on sale and/or reletting fees;
3. rental forecasting based on growth and depreciation;
4. a discount rate explicit as to risk adjustments;
5. remediation costs plus regular monitoring costs;
6. the costs of a Land Quality Statement [ie. an environmental audit statement];
7. an allowance for stigma.

Gronow (1998) claims that the explicit approach is inevitable because clients demand to know what has been taken into consideration, and how this has been accounted for in the valuation. The explicit approach is an improvement to the DCF model used by Chalmers & Roehr (1993) by incorporating the elements listed above. Unfortunately Gronow did not show how to allow for stigma.

In summary, researchers in the United States and United Kingdom have put forward a number of alternative methods to value contaminated land. While there are some innovations, the methods are not practical. The problems are some methods are too academic that requires knowledge in regression analysis, differential calculus, or micro-economic theory of risk and uncertainty etc. Some of them require the availability of a large amount of market data or a suitable computational model. Some of them require the conduct of time-consuming surveys. Accordingly they are not suitable for the day-to-day operation of a valuer.

Regarding the assessment of stigma, none of the alternative methods are designed for this purpose. Methods covering this topic will be discussed in Chapter 6.

5.5 Australian valuation approaches

The above sections outlined the valuation method put forward by economists and property researchers. What about the valuation methods used in real life practice? Study of contaminated property appraisal practice has recently been carried out in the United Kingdom, New Zealand the United States and Canada. In 1996, Kennedy (1997) surveyed 100 preselected valuers (selected from a variety of recommendations and sources) in the United Kingdom and garnered a response rate of 54%. In 1997, Bond (1998) surveyed 15 preselected valuers (those who replied to a call for participation) in New Zealand and achieved a response rate of 47%. In 1998, Kinnard and Worzala (1998 cited in Kinnard et al 1999) surveyed 208 preselected valuers in the United States and Canada (192 in the United States and 16 in Canada) and received a response rate of 46%. These surveys are consolidated in the conference paper "*Comparative Studies of United States, United Kingdom and New Zealand Appraisal Practice: Valuing Contaminated Property*" (Kinnard et al 1999). The authors find that valuers in the respective countries mainly used sales comparison (direct comparison) and income capitalisation method (including discounted cash flow (DCF) method) techniques to value contaminated property. The survey

results from this paper will be compared with the following Australian survey results where appropriate.

To find out how Australian valuers value contaminated properties, including what criteria they have considered when assessing stigma, a mail survey of valuers in New South Wales, Victoria, and Queensland was carried out in April 1998. These three States are selected as study areas because they are more populated and are home to more commercial and industrial activities than other States and Territories. It is logical to assume that they have more contaminated land. It also follows that valuers in these three States have more contact with contaminated properties and therefore more experience in carrying out the relevant valuation.

A questionnaire as shown in Appendix IV was sent to valuers in the three States using a mailing list provided by the divisional office of the Australian Property Institute in New South Wales, Victoria and Queensland. At present, the Institute does not keep a register of valuers specialised in contaminated land valuation. The institute supplied 1368 addresses in New South Wales, but only 19 in Victoria and 28 in Queensland. The divisional office in Victoria and Queensland explained that the valuers recommended were believed to have experience in contaminated property valuation, but similar preselection had not been made by the divisional office in New South Wales.

To keep the survey to a manageable scale, questionnaires were sent to 500 valuers in these three States. Since the number of addresses in Victoria and Queensland was substantially smaller, all were chosen. For those in New South Wales, 453 addresses were selected randomly. A follow up interview of 40 willing valuers (22 in NSW, 7 in Victoria and 11 in Queensland) was subsequently conducted (Chan 2000b). The survey results are summarised in the following tables.

Table 5-1 Feedback of survey

Items	New South Wales	Victoria	Queensland	Total
Questionnaires sent	453	19	28	500
Questionnaires returned	90	7	11	107
Return by State	20%	37%	39%	N/A
Out of total return	18%	1%	2%	21%
Valuers with experience in contaminated land valuation	45	7	11	63
Out of respondents in each State	50%	100%	100%	N/A
Out of total respondents	42%	7%	10%	59%
Valuers without experience	45	0	0	45
Out of respondents in each State	50%	0%	0%	N/A
Out of total respondents	42%	0%	0%	42%
Number of contaminated land valuation done by individual valuers	1 to 100	2 to 30	1 to 50	N/A

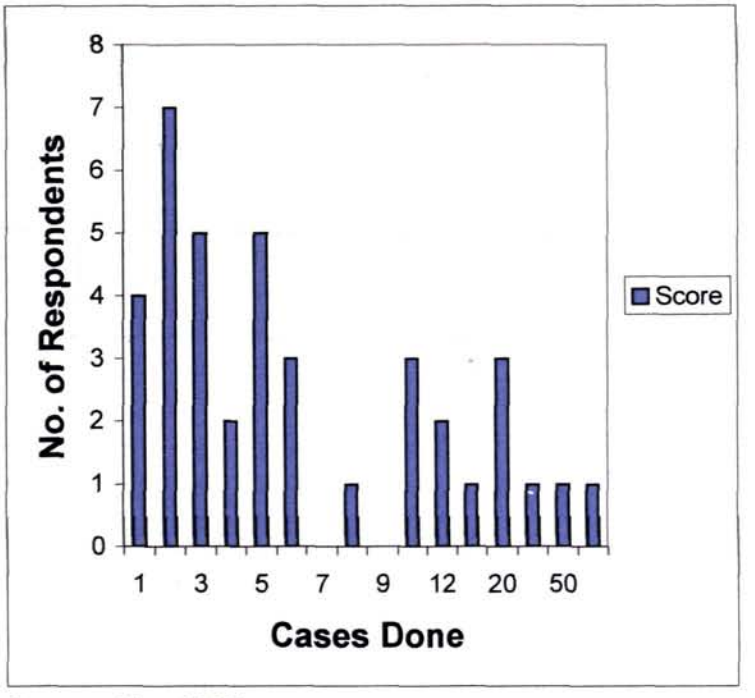
Source: Chan 2000b

It can be seen from Table 5 – 1 that the response rate in Australia was lower than that in the United Kingdom (54%), New Zealand (47%) and the United States (46%). The higher overseas response rate may be due to that the surveyed valuers were preselected and some of them had replied to a call for participation. The small number of valuers recommended in Victoria and Queensland and the low response rate in New South Wale suggests that the majority of valuers in Australia do not have experience in contaminated property valuation. Nevertheless, the survey reveals that some of the respondents have valued up to 100 contaminated properties. It shows that experienced contaminated property valuers do exist in Australia, despite the fact that land contamination is not considered a common problem in the country.

The returns from valuers without experience in contaminated land valuation do not contain useful information for analysis. Accordingly, the analysis in this thesis is carried out using information only from valuers with experience in contaminated land valuation. This produces a sample size of 63. Given the small sample size in Victoria and Queensland and the overall small number of returns, it is inappropriate to carry out a comparison of the results from three States and those from the United Kingdom, New Zealand and the United States.

Based on the return from respondents who have experience in contaminated land valuation, I prepared a distribution graph as shown in Figure 5-1 on the next page. The graph shows that the respondents fall into two distinct groups: a more experienced group (those who have valued six or more contaminated properties) and a less experienced group (those who have valued less than six contaminated properties); there are 31 less experienced respondents and 32 more experienced respondents, sample sizes big enough for meaningful analysis. It should be noted that the less experienced group refers to valuers who have less experience in the valuation of contaminated properties. It does not mean that they are less experienced on the whole.

Figure 5-1 Number of Contaminated Properties Valued by Respondents



Source: Chan 2000b

As mentioned above, the Australian Institute of Valuers and Land Economists published a Contaminated land Practice Standard in 1994 (now replaced by the API Professional Practice

Guidance Note 15) to give members the necessary guidance in relation to contaminated land issues. Table 5-2 below shows the respondents' attitude towards this document.

Table 5-2 Opinion on Contaminated Land Practice Standard

Questions	Less experienced group (%)	More experienced group (%)
Awareness of the "Contaminated Land Practice Standard"? (Yes)	90	91
Referring to the Practice Standard? (Yes)	68	72
Follow suggested valuation approaches in Practice Standard? (Yes)	65	78
Do the suggested valuation approaches reflect real life practice? (Yes)	45	59
Is the document helpful/useful? (Yes)	77	78

Source: Chan 2000b

Table 5-2 shows that about 90% of those surveyed in both groups are aware of the document; the Institute has done a good job introducing the document. However the number of respondents who use the document or follow the guidelines in practice is not as high. This directly correlates with the fact that, as reflected in Table 5-2, a substantial number of respondents do not find the suggested valuation approaches reflect real life practice. The follow up interview revealed that respondents would like the document to provide more information on valuation and the dangers involved in each of the problematic land uses and industries mentioned in the document. The overseas surveys in the United Kingdom, New Zealand and the United States did not include this item, so there is no comparison between surveys on this point.

The 1994 Practice Standard (also the current Guidance Note 15) suggests four contaminated land valuation basis – unaffected valuation basis, affected valuation basis, environmental balance sheet and comparative approach. The respondents were asked if they had used the suggested valuation basis. The feedbacks are summarised in Table 5-3 below:

Table 5-3 Use of Suggested Valuation Basis

Suggested basis	Less experienced group (%)	More experienced group (%)
Unaffected Valuation Basis	55	81
Affected Valuation Basis	52	56
Environmental Balance Sheet	3	13
Comparative Approach	32	38

Source: Chan 2000b

The table shows that in both groups there is a higher preference for using the unaffected (unimpaired) valuation basis over the affected valuation basis. More respondents in the more experienced group use the affected and unaffected valuation basis overall. In the United States, 54% of the respondents claimed they use the unaffected valuation approach; this is approximately the same percentage as it was claimed in the less experienced group in Australia. This question was not included in the United Kingdom and New Zealand surveys; no comparison can be made.

Of the four suggested valuation approaches, the environmental balance sheet approach is the least popular. One reason for this may be that the respondents are not familiar with the balance sheet format used in this method and therefore are not comfortable using it. The overseas surveys did not cover this subject, so there is no comparison.

Table 5-4 below shows the valuation methods used by the respondents in practice. About 80% of both groups use the comparison method in their valuation. It is interesting to note that this result contrasts sharply with the result in Table 5-3 that shows less than 40% of the respondents use this method. This may be because some respondents were not familiar with the contents of the Practice Standard and gave an uninformed answer to this question. In contrast, 80% of the respondents in the United States, 0% in the United Kingdom and 29% in New Zealand reported using this method (Kinnard et al 1999 p. 23).

Table 5-4 Valuation methods used in practice

Questions	Less experienced group (%)	More experienced group (%)
Comparison Method	81	78
Capitalisation Method	52	56
Cost Method	71	59
Hypothetical Development Method	42	52
Accounts Method	16	6
DCF Method	32	16
Applicability of the above methods? (Yes)	77	72
Can/shall the methods be improved? (Yes)	26	44

Source: Chan 2000b

The survey results show that over 50% of the respondents in both groups use the capitalisation method. In comparison, 80% of the respondents in the United States, 100% in the United Kingdom and 100% in New Zealand reported using this method (Kinnard et al 1999 p. 23).

Regarding the cost method, 71% in the less experienced group and 59% in the more experienced group claimed to have used this method. A similar query was not made in the overseas surveys, so there is no comparison possible.

The table shows that 40% to 50% of the respondents in both groups have used the hypothetical development method. Since the hypothetical development method is generally used to assess the development potential of land, it indicates that the highest and best use of the relevant contaminated land is not the current use. This supports the fact that there is a niche market to acquire contaminated land for redevelopment. Again, this method is not reported in the overseas surveys.

In Australia, DCF method is still not widely used and many valuers are unfamiliar with it. The former Australian Institute of Valuers and Land Economists (AIVLE) had to publish a practice standard "Practice Standard – Discounted Cash Flow" in 1996 to guide members to apply this method. In this survey, 32% of the less experienced group and 16% of the more experienced group use this method. In comparison, 64% of respondents in the United States, 7% in the United Kingdom and 29% in New Zealand use this method (Kinnard et al 1999 p. 23), showing that the Australian respondents are more open to this method than their counterpart in the United Kingdom.

As far as the accounts method is concerned, its application by respondents in both groups is relatively low. The use of this method is not reported in the overseas surveys, so there is no

basis for comparison. The subject survey shows that the only methods used to value contaminated land are the methods listed in Table 5-4. In fact, these are the same methods used in valuing clean properties; the only difference is that the respondents need to adjust for the impact of stigma at the end as outlined below.

Over 70% of the respondents reported that the existing methods for valuing contaminated land are suitable for the purpose. Less than 50% of the respondents reported that the methods can/shall be improved, showing that respondents are content with the current methods used. This item is not covered in the overseas surveys so there is no basis for comparison.

5.6 Analysis of Australian valuation approaches

The survey shows that Australian valuers are mainly using conventional valuation methods to value contaminated land. The more innovative alternative methods are rarely used. Apart from conventional valuation methods such as the comparison method and the capitalisation method, Australian valuers also use the cost method, hypothetical development method, and accounts method to value contaminated property. Of all the valuation methods, the accounts method and discounted cash flow (DCF) method are not used frequently; this may be due to the fact that the accounts method is normally used to value specialised properties such as hotels, nursing homes, and pubs, etc. Contamination of these properties is generally not common; accordingly, this method is rarely used. The DCF method is generally used to meet institutional clients' requirement. If given a choice, valuers would rather use the more familiar traditional valuation methods such as the comparison method and direct capitalisation method for the job.

Australian valuers have a higher preference to use the unaffected (unimpaired) valuation basis for valuing contaminated land. The reasons may be that the clients have given instructions to do so or that they do not insist the valuation to be done on an affected basis. The clients may ask for an unaffected basis valuation for specific purposes such as accounting or share floating. Where there is no clear instruction from the clients, valuers are at liberty to use whatever method they think appropriate for the valuation. Some of them may perform an unaffected basis valuation for expedience.

There is also another possible reason for their reluctance to use the affected (impaired) basis. As mentioned above, the assessment of various income and financial losses due to contamination and remediation costs is fairly straightforward. The former losses are based on facts given to them by the client and the latter figures are provided by environmental consultants. Although the remediation costs are also estimates only, valuers are not in a position to query their validity. Under the Code of Ethics of the API and the provision of the Valuers Registration Act 1975 (NSW), valuers are not allowed to accept jobs outside his or her expertise. Accordingly, valuers should not estimate the remediation costs. However, valuers should be able to use information from environmental specialists Jayne (1994). Under the Evidence Act 1995 (both Commonwealth and NSW), information supplied by an independent expert is admissible as evidence. It is reasonable for valuers to rely on the information.

In comparison, it is the assessment of value loss due to stigma impacts that has problems. Since the stigma impacts are assessed by valuers, the valuers are responsible for the reliability of the assessment. Spencer (1993 p.587) points out that "[s]tigma is very difficult to measure when there is a comparative lack of satisfactory evidence related to stigma-affected properties in Australia". This implies that until there are sufficient amounts of reliable sales evidence of contaminated property, it is difficult to deduce the stigma impact from market data.

In comparison, the situation is slightly different in the US. "[M]arket sales transaction data have become sufficiently numerous and available in the US ... for direct market evidence to be utilised in estimating post-remediation 'stigma'"(Kinnard et al 1999 p.6). However, the

availability of more market evidence does not guarantee that stigma can be accurately assessed. Wilson (1992 p.23) argues that even when market data is available, the fact that "each environmental problem is as unique as a fingerprint" makes it not appropriate to solely rely on market evidence to assess contaminated land value.

5.7 Conclusion

A niche market for redeveloping contaminated land has emerged in Australia and other countries in recent years. Valuers are getting more instructions to value contaminated properties. This study finds that valuers in Australia are mainly using conventional valuation methods to value contaminated land. These methods are fine for valuing the unimpaired value of contaminated properties, but because of the lack of transaction data and the uniqueness of individual property, they are not suitable to value the impaired value of the properties. The limitation is due to. Even in the US where there is an increase in the amount of market data of contaminated property, the uniqueness of individual contaminated property casts a shadow over the reliance on market data to accurately assess the impaired value of a contaminated property. The unsatisfactory condition has led to the introduction of a number of alternative methods introduced by property researchers.

The survey shows that there are more Australian valuers using the unaffected approach than the affected approach. While there are many reasons that Australian valuers tend to use the unaffected approach, the difficulty in assessing stigma impacts is likely to be an essential one. At present, the stigma assessment methods used by Australian valuers are unsatisfactory. Stigma is allowed for using arbitrary methods. It is interesting to note that their American counterparts are not much better. There is thus a need to have an acceptable method to assess stigma.

What should the stigma assessment model/method look like? The answer may be found from Trott's comment (1980 cited in Baum & Crosby 1989 p.128) that "[a] valuation technique, if it is to be accepted by the profession, must be easily understood and easy to use. Its theoretical soundness must be matched by a practical application". This view is also shared by Syms (1997b p.197) in his comment "[a]ny proposed model need to conform, so far as is possible, to the procedures recommended by the surveying profession, otherwise it is unlikely to be accepted by practitioners." With these comments in mind, a stigma assessment model is developed in Chapter 7.

This chapter has provided some insight into how Australian valuers value contaminated properties. However, the findings of this chapter are far from conclusive as the survey suffered from the small and unstructured sample size. The availability of larger random sample sizes will no doubt increase the credibility of the findings. Nevertheless this research could be regarded as a stepping-stone for further studies in this area.