

**Contaminated Land Valuation
And
The Problem of Stigma**

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Summary

This dissertation is about the valuation of contaminated land and the problem of stigma. The value of contaminated land is to a large extent affected by statutory regulations. Stigma, if it exists, is another factor that has significant impact on contaminated land value. This thesis looks at the relevant laws governing contaminated land in Australia. It also introduces an alternative method to assess the stigma factor.


Contaminated land is a major environmental problem. Apart from causing actual or potential threats to human health and the environment, contaminated land also leads to legal liabilities and financial losses to the landowner. Regarding financial losses, they may be costs to meet legal requirements in relation to clean up and long term monitoring expenses. In addition, they may be losses due to a drop in market value and/or rental of the property, longer vacancy periods, high remediation and monitoring costs. In the extreme case, the property may lose marketability completely.

Regarding valuation methods, most valuers use traditional valuation methods with arbitrary adjustments. The most straightforward method is the impaired value (affected value) approach. It requires the valuer to assess the property on a clean land basis. From the unimpaired (clean) value, other financial losses due to contamination, remediation costs and stigma value loss are deducted to get the impaired value. The most difficult part is to quantify stigma impact. The existing stigma assessment methods are not satisfactory. Alternative and non-traditional methods are available. However they are academic and are not suitable for day-to-day operation of a valuer. This thesis suggests a multi-criteria decision-making model to assess stigma impact. The target stigma factor is obtained by processing the relevant criteria with the Analytic Hierarchy Process (AHP) method. The best alternative from the model is the reasonable stigma factor for the property.

Certificate of Original Work and Disclaimer

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All reasonable care has been taken in the preparation of information in this thesis. However, I expressly disclaim any liability for the accuracy and sufficiency of the information and under no circumstances shall I be liable in negligence or otherwise in and arising out of the preparation or supply of the information in the thesis.



Hok Kee Nelson CHAN

Preface

In recent years, contaminated land has formed a niche market in the property industry. Despite the potential legal and financial encumbrances, the shortage of building land in urban areas has seen more and more investors buying contaminated land for redevelopment. As investors know more about land contamination issues, they are more willing to include contaminated properties in their investment portfolio. Accordingly, valuers are from time to time instructed to value contaminated properties. Unfortunately, most of the valuers do not have experience in valuing contaminated land. Further, contaminated land valuation is not a subject in property courses.

As far as the valuation method is concerned, valuers mainly assess contaminated land value by conventional valuation methods with arbitrary adjustment. These approaches are not satisfactory and less defensible. There are alternative valuation methods. However these methods are either too academic or they require specific conditions to operate. For example, large amount of contaminated land transaction data is needed for the hedonic pricing method (multiple regression analysis). It is difficult for a valuer to apply these methods for day-to-day operation. Hence there is a need to research for a valuation method that is reliable and practical for operational use.

Being a real property academic, I think that students should be taught a reliable and practical contaminated land valuation method for their future career. Unfortunately this method is not available at present. This inspires me to carry out this research to fill the gap. While there is no intention to change the world, I hope the research results will benefit both the students and the property industry as well. On the other hand, the research also gives me an opportunity to learn more about contaminated land issues. In March 1999, I was invited to join a committee of the Australian Property Institute to revise the Guide Notes on Contaminated Land in the Professional Practice 1999. It gives me a sense of personal achievement and also impetus to complete this research.

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This thesis was made possible with the help of a number of people. The first person I would like to thank is my supervisor Associate Professor Richard Cardew. Richard is a learned scholar and has given me a lot of inspiration to the contents and structure of my thesis. He has spent a lot of time in reading the draft of different chapters of the thesis and given me valuable feedback. The second person is my colleague Professor Graeme Newell at the University of Western Sydney, Hawkesbury. Graeme has given me great support throughout my PhD study. I would also like to thank my colleague Associate Professor Diana Kincaid for her time and support to proof read this thesis. Above all, I would like to thank my wife Anita and the two children, Gerald and Catherine, for their support and patience during this PhD research.

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Introduction

Background

Australia is generally seen as a clean country with a vast land area that is full of natural beauty. In reality, she also has land contamination problems like other countries. Although the problem may not be as serious as major industrial countries, the number of potentially contaminated sites is considerable and has been estimated to range from 10,000 to over 60,000 (ANAO 1996 p.3). Depending on the scale of socio-economic developments, the number of contaminated sites in each State and Territory is different.

Contaminated land may cause legal liabilities and financial losses to the occupiers or landowners. If a choice is available, an investor will avoid investing in any contaminated property. Likewise, financiers are unwilling to accept contaminated property as a security for loan applications. In recent years, there is a change in this negative attitude towards contaminated land. The enactment of relevant environmental laws by State and Territory governments (see Chapter 2) has made clearer the legal position of landowners and other stakeholders. In addition, there is more understanding of the nature of land contamination. There is also significant technological progress in clean up methods in recent years. Developers and investors are now more confident about taking up contaminated or potentially contaminated land for development and/or investment.

The pro-active attitude of government is also important to the increasing interest in contaminated land. In recent years, there has been increasing support from the government for recycling contaminated land. Apart from enforcing the relevant environmental laws, the environmental protection authority in each State and Territory also makes necessary information of remediation requirements and methods available to landowners and developers and is willing to discuss with them about the issues. Local councils are willing to see contaminated land being cleaned up for alternative beneficial uses and are supportive to relevant redevelopment proposals. Coupled with market demand, there is a niche market for contaminated property. Today, it is not uncommon to see former industrial sites at good location being acquired for redevelopment. Investors are more willing to include mildly to moderately contaminated property into their portfolio. Financial institutions are also willing to finance acquisition or redevelopment of contaminated properties (see examples in Chapters 3, 4 & 6). The change in attitudes of investors and financiers has seen valuers getting more instructions to value contaminated land.

Objectives of the thesis

The value of contaminated land is affected by a number of factors. Statutory regulation and stigma are two major ones. While science can determine the extent of contamination, statutory requirements have the final say on the fate of the land concerned. From the government's point of view, the relevant environmental laws are required to manage contaminated land. In the eyes of the stakeholders, apart from determining responsibilities and liabilities, the relevant laws also determine the alternative uses and whether redevelopment is allowed on the contaminated land. It can be said that it is environmental laws rather than science that determine the value of contaminated land.

Despite the significant impact brought about by the relevant environmental laws, stakeholders such as landowners, occupiers, financiers and valuers, etc. generally do not have adequate knowledge of contaminated land and associated stigma. As far as valuation of contaminated land is concerned, valuers must have, among other things, a thorough understanding of the relevant environmental laws and their impact on the contaminated land value. In addition, the value of contaminated land is very much dependent on the environmental control of the land as well as the attitude of councils (approving authorities).

Regarding valuation methods, there has been no study of how Australian valuers assess contaminated land and whether the methods they use are satisfactory. The old Australian Institute of Valuers and Land Economists' Contaminated Land Practice Standard in 1994 and the current Professional Practice Guidance Note 15 of the Australian Property Institute recommend that members choose from four methods to value contaminated land, namely, the 'unaffected valuation basis'; 'affected valuation approach'; 'environmental balance sheet approach'; and 'comparative approach'. The 'unaffected valuation basis' is useless because it requires the valuer to value the property as if it were clean and to include a qualification to reflect this assumption and recommend the client seek expert advice before relying on the valuation.

The 'affected valuation approach' requires the extent of the contamination be firstly assessed by appropriate environmental consultants who provide costs for various remedy options. The valuer then assesses the discounted value having regard to the liability for remediation cost (including the cost for remediating affected adjoining properties) and influence of stigma. The document does not provide information about how to assess stigma.

The 'environmental balance sheet approach' is essentially the same as the 'affected valuation approach'. The difference is that it requires the valuer to use a balance sheet format to record the positive factors (clean land value) and the negative factors (remediation costs and stigma impacts). Again there is no indication how to assess stigma.

The last method, the 'comparative approach', is about valuing contaminated land with regard to market evidence. Since real properties are heterogeneous and contaminated properties have different degrees and types of contamination, it is difficult to get reliable comparables for reference.

Of the recommended methods, the 'affected valuation approach' and the 'environmental balance sheet approach' are more logical in that they reflect the actual conditions of the contaminated property. However, these two methods require the valuer to assess stigma. An important complication with valuation of contaminated land is that the property may be affected by stigma. Stigma is the market resistance caused by the perception of potential health risks, legal and financial liabilities of the contaminated property. Apart from affecting the contaminated or potentially contaminated property, stigma may also affect clean property, which is close to a contaminated site (see Chapters 1 & 6).

As indicated above, stigma is the product of a number of factors (criteria). At present, these criteria have not yet been systematically investigated in Australia. It is unsure what are the criteria that Australian valuers will consider when assessing stigma. In addition, there is no study of valuers' perceived risks and percentage adjustment for different land uses and industries in Australia. These data are essential for assessing impacts of stigma in Australia.

If there is evidence that the subject property is affected by stigma, the valuation will become more difficult because stigma is difficult to quantify the value loss due to stigma. At present, there are several methods to assess stigma. However, Australian valuers mainly use arbitrary adjustment methods to assess for stigma impacts. It is obvious that the arbitrary methods are difficult to defend and are prone to cause unacceptable margins of error.

As mentioned previously, the current contaminated land valuation methods recommended by the Australian Property Institute are not satisfactory. The 'unaffected valuation basis' is not a valuation method at all and the 'comparative approach' has practical limitations. While the 'affected valuation approach' and the 'environmental balance sheet approach' are sound, there

is no indication how to assess stigma. It is therefore necessary to search for an acceptable stigma assessment method to compliment these valuation methods.

Whilst the aim of this research is to improve methods of stigma assessment, it is evident from the previous discussion that this task must be preceded by establishing the legal framework for valuation, current practice here and internationally, and a review of available methods. Therefore the objectives of the thesis become:

1. to provide a comprehensive overview of the relevant environmental laws and their impact on land values;
2. to investigate how Australian valuers value contaminated land and how they assess stigma;
3. to investigate stigma criteria considered by Australian valuers;
4. to investigate Australian valuers' perceived risks and percentage adjustment for different land uses and industries; and
5. to study how stigma is assessed in other parts of the world, ie drawing on the literature etc.
6. to research for and introduce a structured approach to assess stigma impact and to reduce inconsistency.

Research methodology

As far as research methodology of this research is concerned, the environmental law section of this thesis is based on literature review, examination of existing environmental laws, court rulings, a mail survey and interview of local councils and interview of officers of environment protection authorities. In Australia, in addition to the Commonwealth, there are six States and two Territories. A detailed study of all relevant environmental laws in these jurisdictions is beyond the scope of this thesis. Accordingly the focus is on environmental laws of the federal government and three States – New South Wales, Victoria and Queensland. While there are environmental laws in other States and Territories, it is assumed that the environmental laws in these four jurisdictions can provide a representative profile of land contamination laws in Australia.

Regarding the valuation and stigma sections, the relevant information is obtained from literature review, attending relevant conferences and seminars, mail survey and interview of developers, bank officers, environmental consultants and valuers. The research focuses on conditions in New South Wales, Victoria and Queensland. These three States are chosen because they are most populated, and have more commercial and industries activities than other States and territories in Australia. It is believed that they have more contaminated land and accordingly the valuers there have more experience in valuing contaminated properties. In order to have a better understanding of the remediation process, the former ICI Dulux paint factory site was visited in February 1997 when remediation works were being carried out on the site. First hand information about the remediation work was obtained from the project manager. It is discovered from literature review that the survey of council officers and valuers in this research is the first one in Australia.

In this research, a mail survey was sent to 500 valuers in the three States. This was followed up by an in person interview of 40 willing valuers. It is found that stigma is determined by a number of factors. Accordingly, a multi-criteria decision making (MCDM) approach is used to develop the stigma assessment model. A model based on Analytic Hierarchy Process (AHP) was subsequently developed and then tested with data supplied by valuers. Section 7.3 of Chapter 7 contains a detailed discussion of the methodology used for the development of the stigma assessment model.

Structure of the thesis

Valuation of contaminated land is a cross-disciplinary practice that requires knowledge in economics, environmental law, environmental planning, property management, identification and remediation of contaminated land, and valuation methods. This thesis is prepared according to Macquarie University's 'thesis by publication' guidelines, i.e. the thesis is prepared by compiling a number of published research papers. In this regard, research papers covering the relevant areas of knowledge have been published in journals such as *The Valuer and Land Economist*, *The Australian Property Journal*, *Environmental Planning and Law Journal*, *Australian Land Economics Review* and *The Appraisal Journal*. The papers are also presented at international real estate conferences such as the Pacific Rim Real Estate Society Conference, Asian Real Estate Society Conference and International Real Estate Society Conference prior to publication.

All the publications are my personal work except one: Chan N., Jefferies R.L. & Simons R.A. 1998, Government Regulation of Contamination Land – A Tale Of Three Cities, *Environmental And Planning Law Journal*, 15 (5), pp.321-337. This is a joint paper with two other overseas scholars. Jefferies is a senior lecturer at Auckland University, New Zealand, and Simons is a professor at Cleveland State University, USA. The paper is about land contamination regulation in Sydney, Auckland and Cleveland. I was the leader of the paper. The two co-authors contributed to the sections covering the laws in their country. Besides writing the section about Australian laws, I was responsible for putting everything together by writing the introduction, analysing and comparing the laws in the three countries and writing the conclusion.

All the published results are subsequently incorporated into the chapters of this thesis in the following manner:

Chapter 1 provides an overview of land contamination issues. It covers the causes and dangers of land contamination, the relationship between land contamination and population and economic growth, and how contamination affects land value and stigma impact, etc.

Chapter 2 provides an overview of common law and statutory laws that regulate land contamination. Statutory environmental laws at Federal level and in three States are examined and compared. In addition, relevant environmental laws in major industrial countries are cited for comparison. Chapter 2 also explains how environmental laws affect contaminated land value.

Chapter 3 provides background information on how environmental planning affects contaminated land value. It studies the attitude of local council towards planning application concerning contaminated land. It also examines how environmental planning can help speed up the clean up of contaminated land.

Chapter 4 studies the necessary techniques for contaminated property management. It also covers identification and clean up of contaminated land. Through a case study it demonstrates how property management can help turn a contaminated property into a valuable asset.

Chapter 5 provides an overview of contaminated land valuation methods. Apart from traditional valuation methods, it also looks at alternative methods introduced by economists and property researchers. This chapter also examines how Australian valuers value contaminated land.

Chapter 6 looks at the stigma issues closely. It provides an in depth analysis of the stigma issue and an overview of current stigma assessment methods suggested by researchers and used by practitioners.

Chapter 7 suggests the use of a multi-criteria decision model (MCDM) to assess stigma impact. Based on the 16 criteria from a survey of practicing valuers in three States, a model is developed on the basis of the Analytic Hierarchy Process (AHP). The validity of the model is tested with data supplied by valuers from a contaminated property they had valued before.

Chapter 8 provides a general conclusion to this thesis. It concludes that there is evidence to show that the AHP model has a potential to replace the current 'guesstimation' approach adopted by valuers in the assessment of stigma. It is worthwhile to fund more in depth research to verify the validity of the model before introducing it to the valuation profession.

In this research, it is interesting to note from the mail survey results that the majority of the responding valuers are aware of the contaminated land practice standard published by the Australian Property Institute (API), however, there are 20% - 30% fewer respondents refer to the document when valuing contaminated land. It shows that the (API) needs to revise the document to meet the practical needs of its members. The research also finds that the Australian valuers are more market orientated than their American counterparts in the assessment of stigma. Their perception of stigma adjustment factor is nowhere near 69% reported by Patchin (1994).