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Introduction

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1.1 Valuation and Environmental Attributes

Over the years it has become apparent that valuers¹ have experienced problems in determining the impact of high-voltage overhead power transmission lines (HVOTLs), cell towers and wind turbines on the value of proximate residential property. This book attempts to provide the best of current knowledge on the subject, and to lay out options for valuers based on the authors' own personal research together with studies undertaken by others.

Valuation is a valuer's opinion of the value of a particular interest in a property, on a specified date for a specified purpose. The process of valuation 'requires the valuer to make impartial judgements as to the reliance to be given to different factual data or assumptions in arriving at a conclusion. For a valuation to be credible, it is important that those judgements can be seen to have been made in an environment that promotes transparency and minimises the influence of any subjective factors on the process' (IVSC 2011; now also contained within RICS 2012, p.15).

A valuation is therefore a valuer's written opinion of a property's value, taking account of the purpose for which it is required as expressed in the terms of engagement. Investigations and enquiries undertaken to arrive at an appropriate figure will include an examination of the state of the market and analysis of any relevant comparable evidence. The valuer is therefore not simply concerned with the physical property when coming up with a value; the valuer is seeking to interpret a range of data about the property including its structure, size, location and market in order to advise a client with an opinion of value.

Property value is therefore not determined from a straightforward spreadsheet calculation, and it is not neatly incorporated into a rational model. There is a considerable amount of interpretation of facts from client, property, environment and market which has to be undertaken in order to enable the valuer to offer a professional opinion. In such circumstances, 'a valuation is not a fact, it is an estimate. The degree of subjectivity involved will inevitably vary from case to case, as will the degree of certainty, or probability, that the valuer's opinion of market value would exactly coincide with the price achieved were there an actual sale at the valuation date' (RICS 2012, p. 87).

This book sets out to consider specific circumstances where a valuer's opinion is sought. These circumstances include the impact on the value of homes that are proximate to HVOTLs, cell towers and wind turbine installations. While the impact from these structures on property values has been widely debated and researched, there is still uncertainty around their measurement and quantification. This book aims to provide guidance to valuers (and property/real estate appraisal students) around the world with defensible tools that are becoming widely accepted to assess these impacts whether on freehold owners or leaseholders. The authors have been undertaking research in this area for many years and believe that their experience and that of others who have contributed to this book will assist practitioners and their clients.

The book focuses on HVOTLs, cell towers and wind turbines partly because the siting of these environmental features has become controversial at various times in different countries and has consequently given rise to research. The process of researching these structures and their impacts has also helped to establish a methodology which can be universally applied across a much larger range of environmental factors.

When considering the impact of general locational factors on the value of any real estate development, there are certain overarching criteria which will influence the level of value impact of specific factors. These will range from the nature of the market at any one point in time, geographic location, physical structures, the prevailing sentiment towards these factors and, to some degree, the methodologies used to evaluate the impact of these factors. This introductory chapter therefore attempts to set a general context within which a valuer will have to evaluate the impact of perceived environmental detriments on specific properties.

1.2 Risk and Stigma

The valuation of properties impacted by disamenities is partly affected by the perceptions of risk and stigma of the various stakeholders in the buying/selling process, both of which can be influenced by media coverage. In any valuation exercise it is therefore important to have some understanding of what these two factors are (in the context of the valuation exercise) and how they may be perceived as influencing value.

1.2.1 Risk

One important aspect in considering the impact of HVOTLs, cell towers and wind turbines on individual property values is the level of risk that an individual perceives as existing in a set of circumstances. This will vary according to the parties within prospective markets. For instance, the business sector might not be as concerned about some negative environmental externalities (e.g. HVOTLs) as home buyers. But even a price reduction may not be sufficient to persuade a lending institution to finance the purchase. It may be that the reluctance towards lending on residential units that are underneath or in close proximity to HVOTLs shown by some lending institutions in the UK, for example, is due to the still unknown potential health risks from exposure to residential Electrical Magnetic Fields (EMFs) produced by such structures.

In 1996, the Royal Institution of Chartered Surveyors (RICS) introduced Practice Statement (PS) 3.7 to its Appraisal and Valuation Manual (the Red Book²) instructing valuers that, while there was no clear evidence of a link between living near HVOTLs and a number of adverse health effects, ‘...public perception may, however, affect marketability and future value of the property’(RICS 1995). This PS provided professional guidance to RICS members when undertaking the valuation of property near a HVOTL; however, no additional advice was provided to aid valuers when they determine the likely impact of negative public perception on house price. This Practice Statement has been omitted from the Red Book since May 2003 and, instead, advice to valuers is now included in the RICS Practice Standard Contamination, the Environment and Sustainability (RICS 2010).³ This suggests that, ‘if, when a valuation is carried out, there is a cause for concern over the strength of a field, an appropriate specialist or chartered environmental surveyor should be consulted’ (p. 42). However, unlike PS 3.7, this Practice Standard does not impose a duty on valuers when surveying this type of property to instruct clients that HVOTLs may affect future value due to negative public perception.

1.2.2 Stigma

The effect on property values of stigma from the presence of structures that are the focus of this book – HVOTLs, cell towers and wind turbines – is related to numerous factors. These include:

- the type of structure;
- the proximity of the structure to the property;
- visibility/audibility;
- prevailing market sentiment;
- ongoing media attention; and
- the current state of the property market.

These aspects of both risk and stigma and their meaning and potential impact on the value of individual properties are examined in more detail throughout the book.

1.3 Media Impact

Media attention alone can play a major role in influencing the degree of stigma and risk (real or perceived) associated with property affected by proximity to the above-mentioned structures.

During the mid-1990s, for example, media attention highlighted a potential relationship between living near HVOTLs and childhood cancer. The resulting publicity stigmatised homes near power lines and subsequently had a negative impact on the desirability and value of this type of residential property (Sims and Dent 2005). Similarly, an example of the impact of media attention was evident in the UK in 2000 with regard to cell towers. In this case, the UK Government responded by commissioning an Independent Expert Group on Mobile Phones (IEGMP) to assess the possible health risks. This resulted in the Stewart Report (IEGMP 2000; principally about handsets) which was highly publicised in the media. Subsequently, the public began to object to the siting of cell towers near their homes. This led to a number of cases where phone providers were refused planning permission to erect cell towers due to public concerns. This type of negative media coverage and public response has been mirrored around the world, with the perceived risks of cell phone towers regularly highlighted. For example, public concern was expressed in New Zealand and clauses to address those concerns and 'protect' the public were inserted into the Resource Management Act (2008).

With the recent growth in renewable energy production to help combat climate change, public concern has focused on wind turbine location (particularly before and during the construction phase). However, public negativity towards environmental features viewed as 'unpleasant' is not a new phenomenon or limited to HVOTLs, cell towers and wind turbines. For example, other environmental features viewed as unpleasant include landfill sites (Clark 2004), household waste incinerators (BBC 2002), opencast mines (McLaughlin 2009), airports (Nelson 2004), power plants (Bobseine 2008) and nuclear facilities (Lean 2009).

The risks and stigma of perceived 'unpleasant' land uses near homes can be measured via impacts to property values, which serve as a somewhat unbiased proxy of the true effects on a surrounding community. That notwithstanding, accurately determining the impact on property values of these perceived detrimental conditions and environmental features remains one of the most challenging aspects of property valuation. Previous studies have established that public perception of non-physical contamination such as visual, noise and odour pollution can influence the value and marketability of residential property, especially when there is an association with a possible health risk (e.g. Fischhoff 1985; Slovic 1987; McClelland et al. 1990; Slovic et al. 1991; Krinsky and Golding 1992; Mundy 1992;

Chalmers and Roehr 1993; Syms 1996, 1997; Bell 1999; Gallimore and Jayne 1999; Jayne 2000). This in turn has led to uncertainty, fear and, occasionally, a diminution of house prices (e.g. Bond and Beamish 2005; Sims and Dent 2005). These and other studies will be used to explore the issues in more detail in Chapters 4 and 7.

1.4 Methodologies

As market value is a valuer's opinion as to the price that a buyer would be willing to pay and a seller would be prepared to accept for a property at a specific point in time, when quantifying the degree to which property values are likely to be affected by environmental features it is useful to start by surveying the attitudes of the stakeholders involved, i.e. buyers, sellers, agents and valuers. However, modelling the actual impact on property prices requires a far more complex methodology.

Such methodologies are covered in more detail in Chapter 2 of this book. However, as an introduction it might be useful here to provide an overview of the two accepted methods of assessing value diminution.

The first approach involves surveying market participants. The initial survey approach, known as 'contingent valuation', involves the use of interviews or questionnaires and attempts to predict willingness to pay. However, this method only produces a hypothetical valuation based on buyers' stated preference rather than actual behaviour as evidenced by transaction data; the result is therefore not based on an analysis of real property transactions and as such it is not necessarily an accurate reflection of likely property value impacts. The dichotomy between public opinion and actual behaviour when faced with a real situation has, in the past, been one of the major criticisms of qualitative analysis as a reliable determinant of likely public response to environmental features (e.g. Kroll and Priestley 1992; Slovic 1987; Whitehead et al. 2008). This led to the use of psychometric testing (Slovic 1987) which identified a number of factors or 'heuristics' that could account for this dichotomy.⁴ This technique has been used to explore public and professional perceptions of a variety of environmental factors (Coy 1989; Slovic et al. 1991) including the siting of HVOTLs in proximity to residential property (Arens 1997).

Such surveys have generally been used to determine market sentiment, assess the monetary value impact of a detriment and estimate property values (Mitchell et al. 1993). These attitude studies generally involve surveying market participants about their perceptions or feelings towards particular environmental features and may also ask questions about the perceived impact of such a feature on property value. In the area of the impact of HVOTLs on adjoining residential property, such surveys have generally compared property professionals' attitudes and opinions (in particular valuers and real estate agents) to those of homeowners in an attempt to determine the likely market resistance from buyers and the degree to which valuers perceived such market resistance would impact on value. While attitudes were generally negative, this approach often highlights

differences in perception between residents and professionals (Bond 1995; Dent and Sims 1999; Bond and Hopkins 2000). More recently, discrete choice using conjoint analysis has been adopted to allow for simulation of a hedonic price dataset, but doing so with the use of a survey (e.g. Louviere et al. 2000).

The second approach to assessing value diminution from environmental factors is to analyse actual house sales transaction data using a hedonic pricing model. In outline, this model assumes that the price of a property is determined by a number of key physical characteristics of the house (e.g. house size, number of bedrooms, layout, construction materials, age and condition, etc.) as well as significant characteristics present in the local environment (e.g. accessibility to schools, shops and local amenities; presence and level of any soil, water or air pollution; crime levels, etc). The model is used to estimate the extent to which each factor affects the price. Since each transaction reflects the value placed on the particular set of locational and physical attributes associated with that property, the implicit price placed on each attribute (characteristic) is not observed. Breaking down a property into its main characteristics allows the influence of each attribute on the total price to be determined.

This approach has been used to determine the impacts on property values of many different environmental features including: cell towers (Bond 2007; Filoppova and Rehm 2011); HVOTLs (Priestley and Ignelzi 1990; Bond and Hopkins 2000; Des Rosiers 2002; Sims and Dent 2005); and wind farms (Hoen 2006; Sims et al. 2008; Hoen et al. 2009). It is the accepted method of conducting a robust analysis of the impact of environmental features on house prices where sufficient property-specific data are available (Sims et al. 2009; Kauko 2002; Rossini et al. 2002). These and other studies will be used to examine value impacts throughout this book (e.g. Chapters 4, 7 and 10).

The data required for this type of analysis can be broken down into three categories as follows:

1. House-specific characteristics: address, sale price, date of sale, house type, number of bedrooms, land/site size, view from house, etc.
2. Neighbourhood characteristics: for example, location relative to natural features (sea, rivers, countryside) and facilities (major roads, schools, public transport, central business district).
3. Environmental feature characteristics: physical distance, visual impact, noise, etc. to/from for example HVOTLs, wind turbines or cell towers.

This enables a regression analysis to be undertaken for houses sold ‘near’ and ‘not near’ or with a ‘view’ or ‘no view’ of an environmental feature to calculate statistically the impact of a particular feature on the transaction price. Geographic Information Systems (GIS) is a modern tool that enables actual distance from each house to these features to be calculated and factored into the regression model.

These two approaches – *surveying stakeholders* and *analysis of sales transaction data using a hedonic pricing model* – are quite different from the traditional approaches of sales comparison, cost and income approaches

used by valuers. The second of the two approaches, hedonic modelling, uses econometrics that provide a sophisticated statistical tool for practical use. This is easily understood in practice and is robust enough to withstand detailed scrutiny under examination.

1.5 Book Structure

Following an overview of the methods used in the book to assess property value impacts (Chapter 2) and an introductory chapter on risk and behaviour to set the context for all of the subsequent studies (Chapter 3), the remainder of the book is divided into three main parts.

Part I focuses on HVOTLs using case studies in the United Kingdom (Chapter 4), New Zealand (Chapter 5) and North America (Chapter 6). The introduction to Part I considers the nature of electromagnetic fields and background information on power distribution and legislative control. Chapters 4–6 provide an overview of how HVOTLs are legally sited on land in different countries. Relevant literature and research studies are used to highlight current thinking on the impact of HVOTLs and towers on adjacent property values.

A similar approach is adopted for Part II, which examines potential impacts on property values of cell phone towers. In this part, case study material from New Zealand (Chapter 7), the United States (Chapter 8) and the UK (Chapter 9) is used to illustrate the issues.

Part III of the book considers wind turbines that are being developed as part of the renewable energy solution to climate change. Case studies in the same three countries (Chapters 10–12) are used to examine the concerns raised by nearby property owners regarding the impacts of wind farm proximity on neighbourhood aesthetics, noise, loss of bird life and reduction in property values. In addition to the main case study countries, other examples from around the world are used to illustrate how such issues are being considered under differing circumstances and legal and cultural systems.

The final chapter attempts to bring together the findings from the range of research studies discussed in this book. It provides both a reflection on the current state of knowledge and emphasises the need to continue to analyse and interpret activities in the market.

A crucial aspect of the book is its practical nature in supporting practitioners and property students to recognise the issues identified and to respond in an appropriate way to provide a professional service to their clients. As such, the authors have provided guidance through models and templates on the ‘how’ to deal with these more complex valuation issues as well as the ‘why’.

Notes

- 1 The term valuer is used throughout this work to denote those who professionally value property. In different countries different terms are used to describe this activity. The term here is therefore used as synonymous with ‘real estate appraiser’, ‘valuation surveyor’, etc.

- 2 The majority of residential valuations within the UK are undertaken by Chartered Surveyors (also known as valuers or appraisers) who are also members of the RICS and, as such, have a mandatory requirement to follow the Valuation Standards (VS) within the Red Book. Failure to comply would constitute a breach of the RICS byelaws and regulations. Valuers are further advised to follow the Guidance Notes (GN) as a matter of good professional practice.
- 3 Similar standards operate in New Zealand: API and PINZ (2009), Australia and New Zealand Property Standards (specifically, the NZ Real Property Guidance Note 1 or NZRPGN 1), Valuation of contaminated land, and, in the US, Appraisal Institute (2012), Guide Note 6 to the Standards of Professional Appraisal Practice, 'Consideration of Hazardous Substances in the Appraisal Process'. The relevant International Standards Committee Guidance Note is IVGN 7, 'Consideration of Hazardous and Toxic Substances in Valuation'.
- 4 Paul Slovic was largely responsible for the use of psychometric testing to determine public perceptions of risk. This has evolved into two distinct paradigms: one based on the behaviour of individuals (psychometric theory) and the other on the behaviour of groups (cultural theory).

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