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Redeveloping Brownfields

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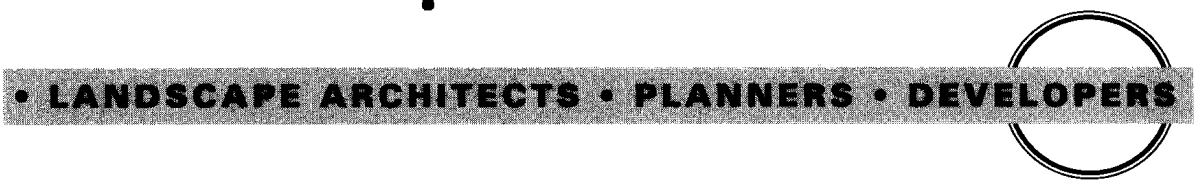
THOMAS H. RUSS

Redeveloping Brownfields



Thomas H. Russ, ASLA, REM

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Introduction

Planning and Redeveloping Brownfields has been written to meet the needs of landscape architects, engineers, and site planners familiar with site design issues but unfamiliar with the issues encountered on contaminated or previously developed properties. From this book, the site design professional may become familiar with the environmental site assessment process and protocols and able to incorporate the work of the environmental professional into his or her own work. The book will also help the site designer understand and communicate the environmental issues to others in the role as lead project professional.

Brownfields are defined as properties that are underutilized or abandoned because of the presence or perception of environmental contamination. In the past, site designers could assume when they began their work that a site was clean or would be when construction began. Environmental contamination was a condition that would be addressed by other professionals and need not be a significant consideration in the new site design. Brownfield redevelopment is an emerging area of practice, and as such, there are opportunities as the body of knowledge and state of the practice are defined. There are few organized specific resources available for site designers working on brownfield sites; thus the purpose of this book is to begin to respond to that need and to begin the conversation about what works. And what doesn't.

It has been my experience that there are substantial advantages to be gained by incorporating the environmental issues into the site planning on many brownfield sites. It has also been my experience that the environmental work and site design processes are usually performed in nearly complete isolation from one another.

Changes in public policy, concern about suburban sprawl, and urban undercrowding have led to new opportunities for site design professionals in cities of all sizes. The redevelopment of contaminated sites is an emerging area of practice that will require landscape architects and site engineers to work closer with environmental professionals than has been the case in the past. Unlike the environmental professional, the site design professional has historically taken the lead in the development of land and, as such, can embrace the requirements of the practice of brownfield redevelopment more immediately than the environmental professional can learn land planning. The incorporation of the issues of stakeholders has been a routine part of the site professional's practice. With some notable exceptions, the methods used on brownfield sites are more often modifications of familiar land development practices than entirely new technology. Even new technologies such as phytoremediation employ some knowledge and techniques familiar to site designers. Site designers need to acquire the language of site redevelopment and gain an understanding of the methods of the environmental professional to be effective project leaders on redevelopment projects.

The policies and laws that comprise the history of the brownfield issue and the state of current policy and law that influence the practice of redevelopment are summarized in Chapter 1. The history of brownfields is in part a history of environmental law in the United States. The major pieces of legislation are discussed as well as more recent federal and state policy tends. The importance of the public policy to the site designer is in the principles of environmental law and regulations that continue to shape the use of impacted

sites even after redevelopment in some cases. A working knowledge of these principles is critical if the design professional is to represent the client's interests in this arena and communicate effectively with environmental professionals and to understand how changes in public policy may affect one's practice.

The methods employed by environmental professionals have their own well-defined nomenclature and principles. To fully appreciate and assess the work of the environmental professional, the site professional will also need to acquire a working knowledge of the methods and nomenclature. Chapter 2 outlines the environmental site assessment process from the Phase I through to the planning and implementation of the Phase II. The limits and scope of the environmental site assessment are important elements of the early work the site designer must incorporate into the site design. Understanding the limits of a site assessment is critically important when evaluating the risk assessment data for a site. There are a number of site assessment methods and protocols, but the most widely used standard is the standard published by the American Society of Testing and Materials (ASTM). Chapter 2 gives an overview of the ASTM key site assessment guidance documents including discussion of key terms and underlying assumptions built into the standards. Other standards are mentioned to provide the reader with a glimpse into the variety of methods and practices relied upon by the environmental professional. Chapter 2 also provides an introduction into the planning and methods employed in environmental sampling. The design professional should have an understanding of these methods and the associated terms in order to better communicate and understand the work of other professionals.

Once a site assessment is completed, it is the site designer who must work the data into the proposed site redevelopment program. The reader is introduced to the concept of risk assessment and risk-based decision making. Guidelines

to the communication process are included in a section on risk communication. Finally, Chapter 2 lists and describes the major or most common contaminants and briefly describes the sources and health effects. The chapter provides the site professional with an introduction to the language of the environmental site assessment process.

Chapter 3 focuses on the broad range of planning issues facing the site planner. Chief among these concerns is interaction with the various stakeholders or parties with an interest in a given project. Stakeholders range from landowners and developers, to lenders and regulatory agencies, to public officials and neighbors. Most site planners have experience in addressing the concerns of stakeholders and are familiar with preparing for and conducting public hearings and meetings. Brownfield projects differ from these projects primarily because of the issues of contamination associated with the site. Site professionals must become adept at discussing the environmental and health risks associated with their projects and relating these risks to the design proposal. Chapter 3 expands the discussion of risk assessment introduced in Chapter 2 and explores the concept of environmental risk. The relationship between risk and exposure and the differences between lifestyle risks and environmental risks are discussed. The use of contaminated material in the design and construction of the redeveloped site is also discussed in the contexts of material handling and the general engineering properties of soils.

Chapter 3 outlines the range of possible redevelopment strategies available for brownfield projects. The discussion on redevelopment includes a description of the advantages and disadvantages of the strategies as well as some of the cost implications. Remediation technology is also outlined in this chapter to provide the design professional with a grounding in the terms and types of technology used most often on brownfield sites. Introductory discussions of bioremediation and phytoremediation are included. Finally Chapter 3 outlines the concept of life cycle assessment, which is of con-

cern to the brownfield site designer. The nature of contaminated sites may require designers to rethink concepts of design life and project costs. The question of the costs of obsolescence may be a new consideration for designers and developers but may be extremely important on some projects.

Managing storm water on the redevelopment site is a critical element in site design and a particular challenge to designers. While there are often issues of contamination, many brownfield sites were originally developed without storm water controls or facilities and are located in urban settings that offer precious little extra space to develop new facilities. Chapter 4 addresses many of the challenges designers may face on such difficult sites. Strategies for sites with impermeable caps are discussed as well as infiltration systems and the treatment characteristics of each system. The adaptation of best management practices to fit site constraints is discussed. The anticipated impact of the NPDES Phase II rules due to be enforced in the year 2000 is also addressed. Different types of impermeable and permeable caps used on brownfield sites are described, and storm water management strategies for each are discussed. The chapter focuses on the use of infiltration as the first-choice approach but recognizes that conditions on some brownfield sites are such that infiltration is to be discouraged. The design of storm water facilities with the greatest capability for improving water quality is of particular importance on brownfield sites, and a variety of methods and their relative capabilities are presented in Chapter 4.

Chapter 5 is concerned with the use of plants on the brownfield site. In many cases it is considered that the presence of the cap precludes the use of significant vegetation on these sites; in other cases the levels of contamination may inhibit plant vigor. These and other conditions common to brownfields are discussed, and suggested design solutions are offered for the reader's consideration. Particular attention is paid to improving soil quality and saving existing veg-

etation as well as suggesting plants with tolerances that may make them suitable to brownfield sites. A discussion of phytoremediation includes the advantages and disadvantages of phytoremediation. The use of genetically engineered materials is also discussed.

The site design must include a consideration of the conditions on the site during construction, and Chapter 6 outlines some areas of concern. While site professionals are familiar with the design of erosion and sediment controls, brownfield sites include the added element of potentially contaminated sediment. The integrity of the erosion and sediment control plan is a critical everyday concern on the disturbed brownfield site. The principles of erosion and sediment control are described in the context of brownfield site issues. The discussion includes issues of site management that may fall beyond the design professional's responsibilities but that should be built into the site design and erosion and sediment control planning. The development and use of a preparedness, prevention, and contingency plan as described in the NPDES nonpoint source program regulations is also described to provide the designer preparing the erosion plan on a brownfield with a description of the additional elements that could be anticipated.

The impact of expanding a professional practice to include brownfield work is the subject of Chapter 7. The pollution exclusion contained in most professional errors and omissions insurance and how it might affect the practice is addressed early in the chapter. The risks to the firm in expanding their relationship or in taking an equity position on a brownfield project are also described. Much of Chapter 7 is concerned with the development of health and safety plans for the design staff and the communication of risk to staff and readers of the final plans. The aspects of a health and safety plan are included in the text. Finally, the chapter discusses the hiring and managing of the design professional as a subcontractor and evaluating the work of the environmental professional.

The appendix lists the current *risk-based concentrations* (RBC) prepared by the EPA, Region 3. This RBC list provides the reader with an easy reference with which to compare environmental reports. Also included is a glossary of terms used throughout the book.

Redeveloping Brownfields offers a broad view of the state of the practice as it is today. As we continue to learn more and as the redevelopment of impacted sites becomes more common, we may expect new methods and innovative approaches to develop as more design professionals are faced with the problems of brownfields. We should expect more collaborations with environmental professionals, expanding to include biotechnology professionals, as landscape architects and site engineers begin to include the considerations of remediation and the functions of microflora and microfauna in their designs.

Thomas H. Russ

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Contents

Legal Environment of Brownfields

Brownfields are generally defined as abandoned and underutilized industrial properties that are known or suspected to be contaminated. Various researchers estimate that from 25,000 to 400,000 sites across the United States may be considered brownfields. While these properties are generally considered a legacy of the urban-industrial past, brownfields are also found in small towns and rural areas throughout the United States. Increasing competition and global economic forces have been largely responsible for the redistribution of industrial resources, and the attendant devaluation of environmentally suspect industrial and commercial property. The existing large inventory of such properties has been the unintended consequence of environmental public policy and real estate market responses. Thus brownfields stand as both an opportunity for recovering urban land and as a reminder of the harmful and wasteful practices of the past.

Brownfields

Brownfields have come to present a major challenge to communities across the United States, representing simultaneously the vestige of former industrial employers, lost tax revenues, and costly environmental problems. A study of the brownfields in 200 cities with populations greater than 30,000 was conducted by the U.S. Conference of Mayors in January 1996. The 39 cities that responded said they did have brownfields; in fact, together they reported that there were more than 20,000 such properties. The impacted area from 36 of these cities totaled more than 43,000 acres. The estimates of total annual tax losses among 33 of these cities ranged from $121 million to $386 million. The study found that city size was not a relevant factor in predicting where brownfields were located: Half of all cities responding to the study had a population under 100,000. The mayors used this study to leverage awareness of the scale and impact of the brownfield issue in urban areas already struggling with lowered revenues and resources.

Until the 1990s the challenge to redevelop contaminated properties was restrained by problematic public policy, reluctant lenders, and significant financial risks. Since then, however, the opportunities for redevelopment have improved dramatically. Currently 35 states have some type of voluntary cleanup program, and the federal and state governments have enabled a variety of incentives to encourage redevelopment by the public sector. The purpose of these voluntary cleanup programs is to make redevelopment of these sites attractive to private investors so that they will assume all or part of the burden of stabilizing or mitigating the environmental problems on the sites. While these changes are encouraging, the redevelopment of environmentally impacted or contaminated properties is still very much an emerging area of professional practice for landscape architects and site designers.

Brownfields may present a designer with a wide range of unfamiliar site restrictions and conditions. Foremost among these is the realization that the site is contaminated to some degree. Site designs must account for the mitigation of contamination to protect the users and the environment. Normal practices of landscape planting and storm water management may be severely restricted on such sites. On the other hand, landscape architects may find on such sites the opportunity to design landscapes that actually improve the environmental conditions. These sites require new combinations of design and plant materials, which may require designers to work closely with other professionals and scientists.

Site designers in the past have had the luxury of presuming that a site was "clean" unless otherwise informed. In the event of redevelopment of an impacted site, the designer was usually not involved in the remedial action design; sites were cleaned up, and then the redevelopment occurred as if on a clean site. As private money is attracted into the redevelopment of impacted sites, the opportunities and need for creative solutions emerge. As in any emerging area of practice, there are innumerable circumstances for innovation. Each situation advances the individual practice as well as the scope of the profession. To be effective participants in a brownfield project, landscape architects and site engineers should consult an environmental professional who understands the value and limitations of the site assessment process. This collaboration will ensure that the most up-to-date and innovative site remediation technologies are utilized.

Historical Approach to Land Use and Planning

The history of land use in the United States reflects the social and political history of the country. During colonial times, land use was governed by the principles of common

law and the founding fathers' belief that property rights are "natural rights," or rights intrinsic to the individual. The framers of the Constitution believed that certain rights are natural—that is, they are neither derived from nor given by government. Representative government is based on the premise that the state's rights are not greater than the individual's rights. Property rights are a natural right. When the activities of government or of individuals encroach upon the rights of an individual, the individual has a right to compensation. Furthermore, the return on the encroachment, or taking, must be greater than the cost to the individual. Thus, in the colonial period, efforts to control the use of land as private property were unpopular and rarely successful—after all, the country was young, and there was a seemingly limitless supply of land. The mood of the times was better described by the concept of Manifest Destiny than by local zoning regulations.

Innovation in land use and land planning was accepted slowly. Incremental changes in people's expectations and values evolved over time, with experience. As towns grew and industry developed, popular opinion began to favor some types of controls, and the Supreme Court reflected this attitudinal change when it agreed in 1924 that private property is subject to control. In *Euclid v. Ambler Realty,* the Supreme Court decided that local government had the right to regulate land use in districts and to direct growth within their districts. This decision essentially extended the power of government to an important role beyond the existing common law controls. The decision still favored landowners to the extent that the burden of proof was on a municipality to show why a regulation should be enforced. If challenged, the municipality would have to demonstrate specific harm that would be mitigated by the regulation. In cases after *Euclid,* governments were given wider authority and power to regulate and control land use and development.