Institutional Issues for Landfill Siting in Viet Nam: Practical Recommendations for Improvement

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Abstract

Waste and its associated environmental problems have raised significant concerns for both the Vietnamese government and the public. Environmental protection is now one of the goals that are being given the highest priority, parallel to economic growth in the development policies set out by the government. Among the many methods of solid waste management, the government has paid particular attention to landfilling. This method of waste disposal is considered the cheapest and most prevalent solution in Vietnam and most other developing countries as well. In order to build landfills that meet environmental requirements, the selection of landfill location plays an important role. Correctly choosing the landfill site helps to not only prevent environmental impacts but also reduce construction costs. However, properly selecting landfill locations is a challenging task in Vietnam.

Besides limited financial, technical, and human resources, organizational barriers, overlapping responsibilities, inadequate coordination between government agencies, top-down approaches, noble ambitious regulations for the short term, and the generality and ambiguity of legal documents are some of the barriers that hinder effective landfill siting. The purpose of this research is to propose a set of practical recommendations for removing these barriers. This research provides insight into landfill siting in Vietnam with respect to institutional factors. These issues include legal texts, criteria, the landfill siting process, urban planning, coordination, information sharing, and public participation. Corresponding to each issue, a number of recommendations are given for improving landfill siting in Vietnam.

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ABBREVIATIONS

Government Agencies:

CAO:	Chief Architect Office
CRURE:	Centre for Research on Urban and Rural Environment
DAPM:	Department of Architecture and Planning Management
DARD:	Department of Agriculture and Rural Development
DFP:	Department of Finance and Pricing
DGM:	Department of Geology and Minerals
NIURP:	National Institute for Urban and Rural Planning
DOI:	Department of Industry
DOC:	Department of Construction
DNRE:	Department of Natural Resources and Environment
DPI:	Department of Planning and Investment
DURP:	Division of Urban and Rural Planning
HMSC:	Hydrological and Meteorological Service Centre
MARD:	Ministry of Agriculture and Rural Development
MCI:	Ministry of Culture and Information
MOC:	Ministry of Construction
MOF:	Ministry of Finance
MOH:	Ministry of Health
MOI:	Ministry of Industry
MNRE:	Ministry of Natural Resources and Environment
MPI:	Ministry of Planning and Investment
NEA:	National Environmental Agency
NIURP:	National Institute for Urban and Rural Planning
PC:	People's Committee
TUPWS:	Transport and Urban Public Works Service
URENCO:	Urban Environment Company

Others:

EIA:	Environmental Impact Assessment
FS:	Feasibility Study

1. INTRODUCTION

During the last decade, the development of the market economy in Vietnam has increased the need for environmental protection and management. The amount of waste generated in Vietnam has been rapidly increasing in recent years. Waste and its associated environmental problems have raised significant concerns for both the Vietnamese government and the public. Environmental protection is now one of the goals that are being given the highest priority, parallel to economic growth in the development policies set out by the government. However, being a developing country in the process of shifting from a centralized to an open–market economy, Vietnam is now facing many difficulties in terms of finance, trained personnel and appropriate institutional frameworks to achieve these goals. With the support of many international organizations in terms of funding and training, the Vietnamese government has been implementing a number of measures to resolve these problems. Solid waste management has been attracting a lot of attention from many international governments in the last 20 years and it has just recently become a concern for the Vietnamese government. The Vietnamese government's attention to solid waste management can be seen clearly in a series of legal texts promulgated by the government starting from the *Law on Environmental Protection* issued in 1994 to the *Joint Circular on Landfill Siting, Design, and Operation* issued in 2001.

Among the many methods of solid waste management, the government has paid particular attention to landfilling. This method of waste disposal is considered the cheapest and most prevalent solution in Asia and other developing countries (IETC 1996). This is embodied in the implementation of a separate set of landfill regulations on a wide array of issues from landfill siting to construction and operation. However, the regulations are not always effectively enforced in practice. There are many reasons for this inefficiency and one of the major causes may be the lack of an effective institutional framework for solid waste management in general and in landfill siting in particular. The institutional framework in landfill siting refers primarily to the organizational structure of agencies involved as well as to other relevant issues such as legal texts related to landfill siting and the landfill siting process itself.

Recently in Vietnam, there has been a tendency to apply waste management technologies, regulations, and standards from developed countries. This can easily be understood as

Vietnam and other developing countries still lack much experience in the field in order to develop and set up adequate measures on their own. However, such technologies and standards from outside of the country need to be modified and adapted to take into account the local conditions since there are significant differences between developed and developing countries in terms of waste characteristics, climate conditions, operational capacity, technical resources, financial situation, environmental awareness, and so on (Diaz & Savage 2002). One of the most striking examples for this lack of consideration of local conditions is the Gocat landfill project in Hochiminh city. This landfill was built with financial and technical support from the Dutch government. The technology and equipment used for leachate treatment was also imported, installed and operated by Dutch experts. However, the leachate treatment system stopped working after only ten days of operation due to technical break-downs, which resulted from the incompatibility between the technology used and the characteristics of waste in Vietnam. Such a mistake is obviously a waste of money and time for all parties involved. Moreover, as a consequence, it led to severe environmental pollution in terms of odor and water contamination due to the amount of untreated leachate kept in reservoirs at the landfill while waiting for repair. The case of the Gocat landfill is a precious lesson from which decision-makers in Vietnam should learn.

An effective institutional framework is vital for the development of a country. It can be considered as a factor of production which supplements the national capital stock of human, physical, and natural resources of a country (UNDP 1995). However, the barriers standing in the way of development in Vietnam and many other developing countries are more often institutional than technical in nature. With the support from international organizations, it is not too difficult to deal with technical issues such as a trained workforce or finance, whereas strengthening and assessing the institutional framework is a more difficult task since it is embedded in and related to many social and cultural issues. It is even more difficult to improve and strengthen the institutional framework in Vietnam, a country currently in a transition period, as the institutional framework always changes and evolves in response to the changing economic, social, and political forces (UNDP 1995). In this context, the institutional framework and coordination between agencies involved is also an important factor that plays a crucial role in the landfill siting process, without which the process cannot successfully be carried out. The reason for this lies in the nature of the landfill siting process itself. Landfill siting is usually the responsibility of governmental institutions since it is part of waste management, which is considered one of the national agendas on the environmental

protection of a country. Thus, an appropriate organizational structure that includes all relevant institutions will facilitate the landfill siting process by exploiting and utilizing all available resources with respect to finance, personnel, data and information, and technology. Moreover, the coordination between those governmental institutions and the distribution of responsibility among them in data sharing and collection, determining requirements of the landfill project, setting up criteria and constraints, screening suitable areas, assessing candidate sites, and selecting the most appropriate site also play a vital role as another aspect of the institutional framework.

Like in many other countries, the national institutional framework for local solid waste management in Vietnam designates the responsibility for solid waste management to the localities. There has been a tendency in Vietnam that the legislation for municipal solid waste management only specifies the municipal obligation of removing waste in order to satisfy general public hygiene standards rather than dealing with solid waste management in all of its environmental aspects. In order to achieve the latter, the legislation should provide specific objectives and standards that are suitable for financial and human resources to be available at the local level (Jorgensen and Jakobsen 1994). Failing to do this will cause frustration and even neglect in implementing the legislation from both municipal government agencies and the public. Inappropriate or inadequate legislation and enforcement measures are considered one of the primary causes for most of the major problems in waste management practices in developing countries, along with the lack of both technical and financial resources and a deficient management structure (Campbell 1999).

In spite of the importance of institutional frameworks in landfill siting, it is surprising that there has been almost no research on this issue. The reason for this neglect may be that it is discussed elsewhere in the literature of political science but not focused on waste management and landfill siting in particular. Therefore, all discussions on institutional issues in landfill siting in this project are mostly based on information and data collected from interviews at government agencies, landfill project reports, and personal observations. Besides the institutional framework, other issues such as legal texts, criteria used, procedures, the relationship between landfill siting and urban planning, and public participation are also discussed in order to give a broad picture of the landfill siting practice in Vietnam.

This research has been conducted as part of the Waste-Econ program *(Making Waste for the Economy in Vietnam, Cambodia and Laos)* at the University of Toronto, funded by the Canadian International Development Agency (CIDA). Most of the information and data on landfill siting was collected in Vietnam during the summer 2002. The overall objective of this project is to propose a set of practical recommendations on how to improve the landfill siting process in Vietnam with respect to all of the issues relevant to landfill siting including legal texts, criteria, siting processes, organizational structure and coordination among agencies, and public participation. In doing this, three sub-objectives have been set out. The first is to review the whole process of landfill siting from landfill location selection to technical design, which has been in use in various cities during the last decade, thereby identifying problems with the existing process. The second sub-objective is to provide insight into the existing institutional framework in landfill siting and to identify its shortcomings. And the third sub-objective is to give a comprehensive view of the relationships between landfill siting and relevant issues such as urban planning and public participation. Based on the analyses given, a set of practical recommendations on how to improve the landfill siting process in Vietnam with a focus on strengthening the institutional framework will be proposed.

This report is structured as follows: Chapter 1 is for the introduction and research methodologies employed. Chapter 2 is a general description of Vietnam and relevant issues in landfill siting in Vietnam. Chapter 3 includes detailed descriptions on current practices as well as discussions and analyses on every issue in landfill siting. Based on these analyses, suggestions on how to improve the landfill siting process with respect to every issue will be given at the end of each subheading. Chapter 4 is recommendations and implementation. Most practical recommendations on how to improve the landfill siting process in Vietnam are given based on suggestions proposed in Chapter 3. Furthermore, an order for implementing these recommendations is also included at the end of chapter 4.

1.1 Research Methodology

Most of the information for this research was collected in two main ways: through interviews with officials at government agencies at both levels, local and national, and through official documents publicly published on various projects related to solid waste management and landfills in different areas in Vietnam, including Hanoi, Hochiminh City, Danang, and Viettri (Phutho Province). There are a number of reasons for choosing these four cities. Hanoi is

the capital of Vietnam where most national agencies are located and which has the largest sanitary landfill in operation in Vietnam, namely the Namson landfill. Hochiminh City is the largest city in Vietnam in terms of population, size, and economic development. For this reason, the city has been attracting a lot of investments in its solid waste management system from both international and national sources. Indeed, the author was greatly impressed by the number of landfill and waste treatment facility projects that Hochiminh City has been carrying out. Danang is a class-2 city (Hanoi and Hochiminh city are the only class-1 cities in Vietnam), which has recently finished a landfill siting process for a new landfill. Viettri (Phutho Province) is now developing a landfill project that will be the largest one in Vietnam once it is completed.

Thirty-one people were interviewed in three months (May, June, and July 2002): four of them are national officials at MOC and MNRE; nineteen are officials at various local agencies in 4 provinces (Hanoi, Hochiminh, Danang, and Phutho); five are professors and researchers at 2 universities in Hanoi and Hochiminh City; and three are working at consulting companies. A list of government agencies and institutions interviewed is provided in Appendix A.

The interviews with officials at government agencies were conducted in a semi-structured format with open-ended questions that allowed the interviewees to answer in their most comfortable way. Information obtained from the interviews is mostly factual data and professional opinions. Participants were informed of the purpose of the research, and the intended use of the information at the beginning of the interview. The following interview protocol has been adopted in agreement with the interviewees. Names and position titles of interviewees will remain confidential and are not listed in this report. Affiliations of those interviewed are given generally enough so that they cannot be identified (e.g. Engineer at MOC). Participants were free not to answer questions they did not feel comfortable answering, or to indicate if they do not want their position to be identified in connection with any statements. Notes from the interviews that identify participants will not be released, or accessible to others.

At local government agencies, the interviewees were asked questions that center around a number of issues: their responsibility and jurisdiction in solid waste management in general and in the landfill siting process in particular, their cooperation and coordination with other

agencies in landfill siting, landfill siting practices in their locality, regulations and legal texts relating to solid waste management and landfill siting, criteria used to select landfill sites, sources of information and data collected for choosing landfill sites, landfill design and operation practices, community concerns about environmental impacts posed by landfills, and sources of funding for landfill projects. At national agencies, the questions also included those for local agencies but were broadened and focused on macro issues such as policy implementation, management, responsibility and jurisdictional distribution, institutional framework, cooperation and coordination among the agencies involved, regulations and standards, the reliability and availability of information and data serving landfill siting, and budget for landfill projects.

Legal texts and documents related to landfill siting and reports on various landfill projects have also been collected through government agencies and consulting companies which are often hired for carrying out reports on landfill projects such as Environmental Impact Assessment, Pre-feasibility and Feasibility Study, and Concept and Technical Design. Sixteen reports on landfill projects in 7 provinces were collected. Since most large and sanitary landfills in Vietnam are located in large provinces and since 9 of the 16 reports collected are on landfill projects in the 3 largest cities in Vietnam - namely Hanoi, Hochiminh City, and Danang – these 16 reports were considered to be representative of landfill siting reports throughout the country. A list of these reports is given in Appendix G.

It is necessary to note that this research has been conducted simultaneously with the research on *Protection of Water Resources in Landfill Siting in Vietnam* by McNally (2003). Therefore, some parts of this report refer to McNally's report as the two authors conducted most interviews and collected information together. Furthermore, in order to avoid duplication, several important parts that should be included in this report, such as a literature review on landfill siting, will not be discussed here and can be found in the above mentioned research.

Since the author is on staff at the Vietnam Ministry of Construction, significant input for this research has been drawn from the author's working experience in the field, especially with respect to construction and urban planning domains. Although the author has tried to be objective in this research, biases may be unavoidable since some parts touched on are, to a certain extent, related to his work in the MOC.

2. OVERVIEW OF VIETNAM

2.1 Basic Facts

The Socialist Republic of Vietnam occupies a land area of 331,114 square kilometers, with a coastline of 3,444 kilometers in length. There is a population of about 80 million, (2002 estimate) which is concentrated mainly in the rural areas, with only 25 percent of the people living in urban areas. The largest cities are Hochiminh City (population of 4 million), the national capital Hanoi (population of 2.5 million), the port city of Haiphong (population 1.5 million), and the central city of Danang (population of 1 million). The economy is largely agricultural, and major exports include rice, crude oil and natural gas, marine products, textiles and garments, and manufactured goods. Vietnam's per capita gross domestic is US$441 in 2002 (UNDP 2003).

In the past twenty years, Vietnam's socio-economic development has been characterized by a shift from a centrally-planned economy to a market-oriented one. The adoption of the *doi moi* (renovation) policy has resulted in rapid industrialization, political and economic liberalization and the influx of foreign investment into Vietnam. In the process of economic development, Vietnam is increasingly facing problems commonly associated with a developing country's move toward industrialization. These include the exhaustion of the natural resource base and the degradation of the natural environment. Together with the environmental destruction caused by years of war, these problems have highlighted to the Vietnamese government the critical need to pursue its developmental policies in a manner compatible with the principle of sustainable development (Tan 2003).

2.2 Government Structure

Since the promulgation of the 1992 Constitution, the division of power in Vietnam is often analyzed as a "triumvirate" of the President, the Prime Minister and the Secretary-General of the Communist Party (Tan 2003). The President is the Head of State, and leads the Office of State. The Prime Minister is the head of the Government. The Secretary-General of the Communist Party in turn has an important role in policy formulation. The National Assembly is the supreme law-making body which also elects senior governmental figures, including the

President and the Prime Minister. Executive powers are vested largely in the Prime Minister, the Ministers and other officials of ministerial rank.

The structure of national governance consists of the central government in Hanoi and the subsidiary levels of government at the local levels. At the provincial level, the People's Committees are the effective organs which implement and enforce laws. There is a substantial amount of provincial autonomy, even though the central government has recently, following the emphasis on the rule of law, reasserted centralized policy formulation through the use of legislation. The government structure is illustrated in Appendix B.

2.3 Urban Administrative Structure

According to the 1992 Constitution, there are basically four levels of state administration in Vietnam:

- The Central Government, including the National Assembly, the President, the Government, the Prime Minister, and the Ministries and State Committees
- Fifty seven provinces and four cities directly under the control of the Central Government. The four cities are Hanoi, Hochiminh City, Haiphong, and Danang.
- The provinces are sub-divided into the provincial-capital cities and towns, townlets, and rural districts while the centrally administered cities are sub-divided into urban and rural districts (see Appendix C).
- The provincial cities and towns are sub-divided into wards and communes; the urban districts are sub-divided into wards; while rural districts are sub-divided into communes and townlets.

The urban areas in Vietnam are classified according to two distinct but parallel systems, the so-called administrative unit (described above) and the hierarchy of urban class. The hierarchy of urban class has five classes; ranging from one to five with class one referring to only the two largest cities in Vietnam: Hanoi and Hochiminh City.

The hierarchy of administrative units has significant influences on the province, city, or town in terms of resources allocation. This is even true for the units at the same level of the hierarchy. For example, at the level of provincial cities and towns, the provincial capital, which is also a town, often receives more attention compared to other provincial towns

regarding the allocation of resources. This means that provincial towns usually lag behind the provincial capital town in terms of investment in urban development (Le and Luu 1997).

2.4 Procedure of Landfill Project Execution

Environmental management in Vietnam is carried out based on the two structures introduced above, namely the government structure and the urban administrative structure. This top-down and centralized framework helps the central government directly manage local activities through its representatives at localities. A description of all agencies concerning waste management in general can be found in Appendix D. The organizational structure of the agencies currently involved in waste management and landfill siting and the relationships among them are illustrated in Figure 1.

Like many other countries, landfill projects are considered as part of solid waste management. They are carried out mostly by the governmental agencies responsible for solid waste management at both levels: national and local. The two major national agencies directly involved in waste management are the Ministry of Natural Resources and Environment (MNRE) and the Ministry of Construction (MOC). The main responsibilities of these two national ministries in waste management include formulating policies, drafting legal documents, elaborating national long-term strategies, and guiding and supervising waste management activities at the local level, with a focus on the protection of the environment (UNDP 1995). Apart from these two ministries, other ministries such as the Ministry of Health and Ministry of Industry are also related to solid waste management in terms of being responsible for the waste discharged by institutions and establishments in their sector such as industrial and hospital wastes. At the local level, the Department of Natural Resources and Environment (DNRE) and the Department of Construction (DOC), which are representatives of the MNRE and MOC respectively, are the two main local agencies in charge of waste management. These two agencies directly supervise waste management activities in the province or city under the administrative control of the People's Committee (PC). All waste management activities in the province must be approved and permitted by the PC, based on the advice and agreement of the DNRE and DOC and in compliance with national standards, regulations, policies, and strategies set out by the MNRE and MOC, with the supreme task being to reduce the negative effects posed by waste management activities to human health and the environment. Another agency at the local level that is

FIGURE 1: GOVERNMENT STRUCTURE AND INSTITUTIONS INVOLVED IN WASTE MANAGEMENT

directly responsible for waste management activities in the municipality is the Urban Environment Service Company (URENCO). This company also works under the control of the PC but has no direct relationship with either the DNRE or DOC. Its responsibilities include managing and operating the municipal waste management system and collecting tipping fees.

In this context, landfill projects as part of municipal solid waste management involve all the mentioned agencies at both national and local levels. Currently, before it is constructed, a landfill project in Vietnam has to go through a three-step procedure: the selection of a landfill location, the withdrawal from and handover of the site, and the carrying out of technical reports.

Step 1: Selection of landfill location

In this step, the DOC and DNRE are the two local agencies officially responsible for carrying out the landfill siting process. Realizing the need of a new landfill in the province, the PC assigns the DOC and DNRE to look for the location of the new landfill. In doing this, the DOC and DNRE must collect all relevant data and information. Other national, regional, and local agencies may also be consulted for available data. If particular data or information is not available, DOC and DNRE may conduct a site survey or investigation if necessary. The collected data and information should include: waste generation and composition, natural characteristics, local socio-economic conditions, land use, distances, and compensation policies. According to the current regulations on landfill siting, the landfill site must be selected based on the urban master planning project. This urban planning project is considered as a precursor of the landfill siting process, in which potential areas or candidate sites have already been proposed. The urban master planning project is carried out by either the National Institute for Urban and Rural Planning (NIURP) under the MOC or the Division of Urban and Rural Planning (DURP) under the DOC with the approval of the Prime Minister of the Government. The proposed location of the landfill must meet all national regulations as well as provincial requirements, if any, on relevant issues such as distance to surrounding sites, landfill size, operation time, and environmental protection. In this regard, there have been a number of legal documents related to landfill issues, among which, the latest regulations, namely the Joint Circular No.01/2001 issued in 2001 on *"Guiding the regulations on environmental protection for the selection of location for the construction and operation of solid waste and burial sites",* is considered the most comprehensive one. The final result of

this step is a report executed by the DOC in coordination with the DNRE, proposing the most appropriate site for building the landfill. This report will then be submitted to the PC for consideration and approval. Further studies or revision may need to be done if the PC requires so.

It was indicated in the interviews with officials at national and local agencies that the most important criteria currently used in landfill siting in Vietnam are environmental protection, the use of non-agricultural and low-productivity land, suitable soil for landfill liner, and appropriate distances to surrounding sites. Among these criteria, the one on appropriate distances is most achievable because it is clearly visible while drafting urban planning drawings and because it does not require detailed and special surveying or investigation.

Unlike North America and other Western countries, the landfill siting process in Vietnam does not include public participation. Public hearings or surveys on public opinion during the landfill siting phase do not exist. Neither the public nor the government agencies pay enough attention to the public's role in the process. Besides, none of the legal documents on landfill-related issues mentions the participation of the public as a mandatory component of the landfill siting process. Furthermore, since the land in Vietnam is a national asset and not citizens' property according to the Vietnam Constitution, the public's voice in opposing the siting of noxious facilities has not held significant weight. All these factors make landfill siting in Vietnam much easier than in Western countries. However, the public's opposition to landfills has recently been increasing rapidly due to operational failures of certain landfills throughout the country, which has been causing severely negative impacts on the local environment, thereby posing significant risks to the community's health.

Step 2: Withdrawal and handover of site

After the landfill location has been selected and approved by the provincial PC, the site needs to be withdrawn from the present owner. As landfill sites are often located in suburban or remote areas, the land tends to be low-productive agricultural land. Before the landfill can be built, site clearance, resettlement of local residents, and compensation work need to be done as part of the site withdrawal. Once the site is cleared, it is handed over to the owner of the landfill project. The provincial PC appoints the URENCO to be the project owner since the URENCO is always the municipal agency in charge of managing and operating the whole waste management system in the municipality, which includes landfills.

From this phase on, the URENCO will be responsible for all the work related to the landfill project on behalf of the PC. Hence, the DNRE and DOC are no longer directly involved in the project development and they now turn back to their original role as state management agencies. However, their further assistance to the URENCO may still be needed when necessary in terms of transferring and conveying the ideas incorporated in the landfill siting process that may relate to subsequent phases including the design and construction of the landfill.

Step 3: Carrying out of technical reports

There are a number of technical reports that a landfill project must have in order to get approval for its construction and operation. These include the Feasibility Study, Environmental Impact Assessment, Detailed Planning, and Design. Being the project owner, the URENCO is responsible for carrying out all of these studies. However, although the URENCO is a municipal company operating in the waste management field, it does not have professionals who are capable of doing those studies. Thus, the provincial PC often allocates a certain amount of budget to the URENCO for hiring consulting companies to do this work. The local consulting companies often have a better chance to get the job. However, in some cases, when the local companies are not capable of doing the work, due to a lack of experience in the field or due to the complicated nature of the study, other regional or national companies may be invited. In the process of carrying out these studies, the consulting companies often have to contact local government agencies such as the DOC and DNRE for collecting data and information that may be available at these agencies. Once all of the reports are completed, they are submitted to the authorized government agencies for appraisal and assessment. The DOC is the agency solely responsible for appraisal of Detailed Planning and Design of the landfill. The DNRE is in charge of appraising the Environmental Impact Assessment report. The Feasibility Study is assessed by a committee chaired by the PC and consisting of several provincial agencies, such as the DOC, DNRE, Department of Planning and Investment, and Department of Finance and Pricing because the Feasibility Study involves the economic and financial aspects of the project. When the appraisal and assessment of all these reports is completed with the necessary revisions, they will be submitted to the provincial PC for decision-making. The PC will make the final approval and issue permits based on the advice and agreement of the responsible agencies before the landfill construction commences.

3. LANDFILL SITING AND RELEVANT ISSUES

This chapter examines current landfill siting practices in Vietnam and discusses a number of key issues directly or indirectly related to landfill siting. Shortcomings of current practices are identified and recommendations to improve current practices are proposed. Each section is structured into three parts: the first subsection reviews current practices; the second discusses and analyzes these practices; and the third includes recommendations for improvement.

3.1 Legal Texts

3.1.1 Current Practices

There have been approximately 15 Vietnamese national legal documents directly or indirectly related to landfill issues to date. A full list of Vietnamese legal texts and documents relating to landfill design and siting is provided in Appendix E. These legal documents are in various forms such as circular, inter-circular, directives, decisions, regulations, standards, official letters, and guidelines. There appears to be some confusion among these terms but no matter what form they take, they should all be understood as mandatory national regulations that all landfill projects in the country must comply with, except when it is clearly stated in the texts that the content given is for consultation only. All of these legal texts have been issued by the following three legislative bodies separately or in coordination with each other: the national government chaired by the Prime Minister; the MOC chaired by the Minister of Construction; and the MNRE chaired by the Minister of Natural Resource and Environment. Apart from these national legal texts, numerous municipalities also have their own legal documents on waste management applied within their administrative borders. However, it was discovered in the interviews with provincial agencies that there have been almost no local legal texts specifically for landfill issues, since the provincial agencies responsible for waste management often do not have enough experience in the field to be able to draft such documents. The reason for this is simply because the majority of landfills currently in operation are uncontrolled, and engineered landfills are still new in Vietnam.

The 15 national legal documents on landfill issues, which have been issued by the 3 agencies, are quite fragmented and difficult to collect. There is no unified document that

synthesizes all the documents on landfill issues. Indeed, the author had significant difficulties in collecting those documents since some of them belong to urban planning design standards or construction standards and others are under environmental texts, all of which are different domains that only practitioners working in both fields know about. Although all of these legal texts are, to a certain extent, related to landfill siting, only four of them focus on landfill issues. They are as follows:

1. Vietnam Standards TCVN 4449 : 1987 - *"Urban Planning – Design Standards"*
2. Construction Standards – December 1996.
3. Vietnam Construction Standards TCXDVN 261 : 2001 - *"Solid waste landfills – Design standard"*
4. Joint Circular No.01/2001/TTLT-BKHCNMT-BXD, 18th January 2001 - *"Guiding the regulations on environmental protection for the selection of location for the construction and operation of solid waste and burial sites".*

Among these four legal texts, the first three are regulations issued solely by the Ministry of Construction for the construction and urban planning field. The first two documents are very primitive and simple with only several sentences mentioning appropriate distances from the landfill to surrounding sites. The last two are the latest ones issued in the year 2001, and are basically the same in terms of content. However, as the Vietnam Construction Standards TCXDVN 261 (numbered 3) is for the construction field, it focuses on design and construction standards and does not mention the landfill siting process. Thus, the last one, numbered 4, is the most comprehensive legal text directly related to landfill siting.

3.1.2 Discussion

3.1.2.1 Lack of Knowledge about Relevant Legal Texts

The fact that many officials at government agencies involved in landfill siting projects did not know about the existence of important legal texts on landfill issues emerged during the interviews. Among the fifteen officials asked, only two of them know about the first two regulations introduced above. Six of them know about the third regulation, and thirteen of them are aware of the forth regulation. This raises the question of how key officials can make decisions on the location of a proposed landfill site without knowledge about the

newest regulations on landfill siting and design that have been issued by the Government. This lack of knowledge often happens in smaller provinces or cities, but not in large cities such as Hanoi and Hochiminh City, since the capability and size of the staff at the agencies in larger cities are often greater than those of the smaller cities. Agencies in larger cities often have a more rational organizational structure in which specific tasks are clearly assigned to the appropriate personnel so that they can adequately handle the job. In contrast, agencies in smaller cities, often lacking financial resources, have simpler and smaller organizational structures where each person is responsible for many tasks. This may lead to an overload of responsibilities, making it more difficult for agencies' staff to fully understand and implement regulations.

Another cause of the lack of knowledge about relevant legal texts is due to the fact that there has not been any national legal documentation synthesizing all relevant texts on landfills. The practitioners at local agencies do not know about the existence of many of the legal texts simply because they are issued in various forms of legal documents and by different national agencies. As an example, it is natural that an official at the DNRE, who often has a background in environmental studies, would not know or care about a legal document promulgated by the MOC for the construction field. This issue will be discussed further later in this section.

3.1.2.2 Affordability of Localities

Although the new regulations, namely Joint Circular No.01/2001, is considered the most comprehensive legal text on landfill siting, operation, and design to date, it sets up a series of very stringent standards with specific specifications for landfill components without taking into consideration the local conditions of provinces and cities throughout the country. Indeed, many officials interviewed at various local government agencies stated that it is very difficult for their province or city to build landfills in compliance with the regulations in terms of both technical and financial aspects. Moreover, some officials stated that their province or city needs at least five years to be able to meet the regulations. The new regulations on landfills lack a realistic and prioritized implementation approach. They seem to be overly ambitious in the short term, as Vietnam right now has only several engineered landfills and the rest are uncontrolled dumps. Such noble ambitious long-term regulations implemented for the short term through legally binding government directives are not only unrealistic; much worse, they

institutionalize an acceptance of non-compliance with government environmental requirements and create resentment and frustration at the local level (Jorgensen and Jakobsen 1994).

Ideally, objectives for landfilling in low-income countries and small cities should be the same as those in high-income countries and large cities (Blight 1996). However, small cities or low-income countries cannot afford to apply standards equal to those applied in large cities or high-income countries. Thus, it is often the case in practice that many national environmental standards are relaxed or completely ignored. Such ignorance or relaxation without a full understanding of technical aspects may cause irreversible effects on the environment that would be very costly or impossible to remedy. As such, a set of graded or minimum acceptable landfill standards similar to the one introduced in Blight (1996) and Rushbrook and Pugh (1999) should be established in Vietnam taking into account the affordability of different provinces. It is necessary to emphasize that doing this does not mean a compromise with the national objectives of environmental protection, but rather a rational manner of dealing with obstacles and constraints within the locality.

As mentioned previously, the hierarchy of the urban classes in Vietnam ranges from one to five with class 1 referring to only the two largest cities: Hanoi and Hochiminh City. It is suggested that a set of graded and minimum acceptable landfill standards used throughout the country should be established based on this hierarchy of urban classes. Doing this has a number of advantages. First, it would help provinces and cities to carry out landfill projects meeting environmental protection requirements according to their ability. Second, it would facilitate submission and approval, as proposed projects are screened out by minimum standards. Third, it would ensure that provinces receive adequate financial resources for environmental protection for landfill projects from the central government because they are distributed to provinces and cities based on this hierarchy of urban classes. This set of graded and minimum acceptable standards can be issued in the form of subsequent guidelines following up the Joint Circular of 01/2001.

3.1.2.3 Generality and Ambiguity

One common point of most legal texts on waste management in Vietnam is the generality and ambiguity of the wording. For example, the Inter-circular of 01/2001 stipulated that “the

location selection must be based on the natural, economic and social factors as well as the technical infrastructure systems in the areas planned for the landfill construction". However, the regulations did not point out at which level these factors should be taken into account, how they can be implemented in practice by practitioners, what the indicators for such considerations are, or what the minimum acceptable level of the consideration is, except for some factors on distances to surrounding sites. All these issues may not necessarily be covered in the same texts, but other follow-up guidelines should be issued as well. If such guidelines cannot be issued simultaneously with the main texts in the form of attached documents, they should be given shortly afterward. Otherwise, as is often the case in Vietnam, their late issuing will result in significant difficulties in understanding and implementing them in practice. This is especially true at the local level where it is often difficult to receive guidance and instructions on a particular issue in a timely manner from the central legislative bodies who release relevant legal texts.

One of the reasons for the generality and ambiguity in legal texts is perhaps the lack of experience and relevant knowledge in compiling the legal texts. In many cases, this may be due to an inadequate coordination between the government body drafting the texts and experts in the field. In other words, the legal documents are sometimes not drafted by the experts in the domain. It is necessary to get the experts involved as early as possible in drafting legal texts as their input would contribute considerably to the success of the legal texts once they are issued and implemented in practice.

3.1.2.4 Overlaps, Conflicts and Fragmentation

It is necessary to mention that the fifteen legal texts listed in Appendix E are only the ones issued by the national agencies. Each province or city at the local level may have other texts relating to landfill issues. Although there have been many legal texts on landfill-related issues, several among them conflict or overlap one another in terms of the requirements given. One example for this is the distance to residential areas given in the two regulations mentioned earlier: *Vietnam Standards TCVN 4449:1987* and *Construction Standards-December 1996.* The former stipulates a distance of 1,000 meters whereas the latter stipulates 2,000 meters. Such a conflict is inevitable in a changing and progressing country's legislative system but the latter regulations should clearly state which one should be followed.

Even when one regulation is based on a previous one, the former is not referred to as the reference or consulting document; or it is not indicated in the latter which document prevails. The similarity between *the Joint Circular 01/2001* and the *Vietnam Construction Standards TCXDVN 261:2001* is an example. This leads to a situation where there are two or more legal texts on the same issue existing in parallel. This situation would be acceptable if there was a document that collects and synthesizes all legal texts on landfill issues in it; however, there has not been such a document for landfills to date. The inconsistency in legal texts has caused difficulties for local authorities in implementing them in their province or city as they do not know which regulation should be applied and followed. For example, an official at Hanoi Chief Architect Office stated that he was not sure which regulation among the two, *Vietnam Standards TCVN 4449:1987* and *Construction Standards-December 1996*, should be followed when siting landfills since the former stipulates a minimal distance to residential areas of 1,000 meters, whereas it is 2,000 meters in the latter. As a consequence, this hinders a smooth and quick process for landfill project execution in terms of acquiring permits and approvals. More harmfully, it creates gaps in the legislation framework that some parties involved may take advantage of.

Regulations should be few in number, transparent, unambiguous, easily understood and equitable. Furthermore, they should be conceived with regard to their contribution to urban physical and economic development (Schubeler 1996). Instead of promulgating a number of various and fragmented texts, governments at both the national and provincial levels should unify legal texts on the issue. An overall document that synthesizes all legal texts related to the landfills of the country or the province should be issued. Regulations should be complemented by a policy document, and by technical guidelines developed for their implementation.

3.1.3 Recommendations

The following are recommendations to address current problems related to legal requirements for landfill siting:

3.1.3.1 An overall document synthesizing all legal texts related to landfills should be issued. Policy documents and technical guidelines for the implementation of these legal texts should be attached therewith.

3.1.3.2 The experts in various fields, including construction, urban planning, environment, hydrology, geology, and architecture, should be adequately consulted in drafting legal documents on landfill-related issues, as their input that can contribute considerably to the success of the legal texts once they are issued and implemented in practice.

3.1.3.3 The language used in legal texts should be clear and specific whenever possible. Generality and ambiguity should be avoided.

3.1.3.4 A set of graded and minimum acceptable landfill standards should be established based on the hierarchy of urban classes from one to five. This set of graded and minimum acceptable standards can be issued in the form of subsequent guidelines following up the Joint Circular of 01/2001.

3.2 Landfill Siting Criteria

3.2.1 Current Practices

Before the new regulations, namely Inter-circular 01, were issued in 2001, there were very few guidelines for landfill design and siting. It was indicated in the interviews with officials at national and local agencies that the most important criteria used in landfill siting in Vietnam are as follows:

- Minimum distance to residential areas is 1km
- Sites with low-productivity lands receive higher priority
- Utilize uncultivated land and minimize using agricultural land for landfill sites
- Sites should have a minimal impact on surface and ground water
- Sites should have suitable soil for landfill liner

Although all of the above criteria have been put into practice, most of them were not stipulated in any legal texts. Only the first one is mentioned in two legal documents, namely *Vietnam Standards TCVN 4449:1987 and Construction Standards–December 1996*. In other words, these criteria were set up by the people who were involved in landfill siting projects in different provinces in Vietnam based on their experience. It was indicated during the interviews that the reason for this was simply because there were not any guidelines regarding criteria for landfill siting that they could put into practice. Among these criteria, the one on appropriate distances is most achievable because it is clearly visible while drafting urban planning drawings and because it does not require detailed and special surveying and investigation. Thus, it can be seen that there was neither a systematic nor formal approach for selecting criteria for landfill siting before the year 2001.

Most of the officials interviewed expressed significant concern about the negative impacts of landfills on human health and the environment. However, they had no legal tools or bases with specific criteria to tackle the issue. Realizing this void, the MOC and MOSTE issued Joint Circular No.01/2001 on *"Guiding the regulations on environmental protection for the selection of location for the construction and operation of solid waste and burial sites"*, which is much more detailed than previous legal texts in terms of criteria and specifications given.

This Circular stipulates that the selection of landfill locations must meet the following requirements:

- Landfill locations must be consistent with those determined in urban planning that have already been approved by the government.
- The distances from the landfill site to nearby sites such as urban centers, airports, industrial zones, seaports, and ground water use areas must comply with the constraints for distances stipulated in Appendix 1 of the Circular.
- Landfill sizes corresponding to classes of urban population are also stipulated in Appendix 4 of the Circular.
- The landfill siting process must take into account natural, socio-economic, technical, and infrastructure conditions of the area (e.g. population, waste generation and characteristics, urban development orientation, economic growth, hydro-geological conditions, etc., all of which are listed under their respective categories in the appendices of the circular).
- The operation duration of a landfill should be at least 5 years and a period of 25 years or more is encouraged.

Also, the type of data and information needed to be collected for the landfill siting process is provided in Appendix 5 of the Circular.

In 2001, in addition to the above Circular, the MOC issued an addendum to the Vietnam Construction Standards TCXDVN 261: 2001 on *Design standards for Solid waste landfills.* This new set of design standards gives specific guidelines for landfill design and construction with detailed specifications for most of the main items in a landfill project such as leachate and gas collection and treatment systems, landfilling areas, drainage systems, monitoring systems, internal roads, waste storage and separation areas, and other supporting buildings. This new standard and the Circular mentioned above are indeed landmarks in the history of waste management in Vietnam. The officials at various government agencies involved in landfill projects now have legal tools and bases with specific guidelines to carry out landfill projects, most importantly, to make appropriate decisions on the location of landfill sites.

3.2.2 Discussion

3.2.2.1 Generality and Lack of Social and Economic Criteria

The five primary criteria used in landfill siting in Vietnam - namely environmental protection (e.g. avoiding the risk of groundwater and surface water contamination), the use of non-agricultural land, the use of low-productivity land, suitable soil for landfill liner, and appropriate distances to surrounding sites - are important and basic criteria employed in any landfill siting process worldwide. However, these five general criteria are neither comprehensive nor detailed enough to successfully choose landfill sites. For example, other criteria regarding the economic and social impacts that landfills may have on local communities also need to be set up. Also, a criterion such as "minimize risk of groundwater contamination" is too general, as there are many factors involved in such contamination. This criterion should rather be considered as an objective that the landfill siting process needs to achieve. Thus, sub-objectives, which are often so-called criteria (Shah 2000), need to be broken down from the main objective to measure how well the sites meet the objectives. For example, the objective "minimize risk of groundwater contamination" should be concretized by setting up a list of criteria to achieve it including: maximizing the depth to the water table, minimizing the permeability of the underlying geology, maximizing the distance to faults and fractures, minimizing the effects on aquifers, maximizing the distance to water supply sources, and so on. These detailed criteria, however, have not been in use in landfill siting in Vietnam.

3.2.2.2 Constraints and Minimum Acceptable Standards

Although the new regulations, namely Joint Circular 01/2001, have mentioned some important issues such as the steps necessary to be employed in carrying out a landfill siting process, they did not fully touch on the issue of criteria. The Circular listed a number of criteria that should be taken into account in Appendix 2. These criteria are categorized into four classes: natural factors, socio-economic factors, infrastructure factors, and appropriate distances. However, all these criteria were given quite generally without full explanations on how they can be employed. Also, restrictive or exclusionary criteria - so-called constraints that are often a minimum or maximum allowable level of a criterion stipulated in national or local regulations (Rushbrook and Pugh 1999) - were not fully given in these new regulations

except for those about distances to surrounding sites provided in the appendices of the regulations. For example, under category 1, *Natural factors,* in Appendix 2 of the Circular, hydrology was given as a criterion for choosing landfill sites. However, since hydrology includes both groundwater and surface water, it should have been classified into these two criteria. And then, under each criterion, groundwater or surface water, a number of other sub-criteria should have been given as the previous example of "minimize risk of groundwater contamination". Corresponding to each of these sub-criteria, constraints with specific indications such as "the minimum acceptable distance from the landfill to the nearest fault or fracture is X m," should have also been provided. Where such a specific and detailed constraint cannot be given in national regulations due to the variation of local conditions in terms of both natural characteristics and regulatory requirements, the Circular should also clearly state that the constraint is only a suggested one and it needs to be modified given local conditions. Visual illustration of this example can be found in Table 1.

3.2.2.3 Achievability

As discussed previously, appropriate distances were raised as an important and most achievable criterion in carrying out landfill siting projects but at which level and how it should be dealt with is still a question. For example, interviewees indicated that the criterion "sites should be close to the main road" is quite often used but when they are asked how far that distance is and what the acceptable maximum distance should be, the answers become unclear as there are no legal documents stipulating this. Another problem of landfill siting criteria given in legal texts lies in the fact that a number of them are not realistic or difficult to apply. One instance for this is the regulations in the *Inter-Ministerial Circular between MOSTE and MOC, No.1590/1997.* This Circular stipulated that the planned area of a landfill site for class 1-urban centers (Hanoi and Hochiminh City) must range between 100 and 150 hectares. In reality, it is extremely difficult, if not impossible, to find such a large area within the administrative boundary of Hanoi and Hochiminh City, which are the most densely populated cities in Vietnam. As a matter of fact, there has not been such a large landfill in Vietnam to date. It needs to be emphasized that those large areas can still be found outside of the city if inter-municipal landfills are adopted. The term inter-municipal landfill refers to a landfill serving one or more municipalities that is located beyond the administrative boundary of at least one of the municipalities (Jorgensen and Jakobsen 1994). Yet, this concept has

not been applied in Vietnam. Further discussion on this issue will be given later under section *3.4 Landfill Siting and Urban Planning*.

3.2.2.4 Full Set of Objectives, Criteria, and Constraints

It follows that a full set of objectives, criteria, and possible constraints should be set up and incorporated into legal documents in order to help landfill siting practitioners at local levels in choosing landfill sites. Doing this will also create a standard for landfill siting practices which would help achieve a systematic and consistent approach throughout the country. Furthermore, this will facilitate the management by the national government of landfill-related issues by enhancing the consistency between long-term national solid waste management strategies and short-term local practices. The criteria given in this set will help the practitioners know what important factors need to be taken into consideration when selecting the site, and thereby to determine appropriate mitigation measures in both the siting and design phases to minimize or eliminate the negative impacts associated with landfills (Noble 1992). The constraints introduced in this set are also very useful as they point out minimum or maximum acceptable levels of criteria. Some of the constraints may be taken from regulations in the field enforced by the national government as fixed and mandatory constraints that all landfills in the country must comply with, thereby enabling practitioners to exclude some areas or sites that do not meet these constraints in the early phases of the siting process. This helps cut down the costs of further investigation and study on those areas or sites. Others may be suggested constraints with a certain flexibility, so that the local governments can decide later on the consistency with local regulations and suitability with local conditions. For example, the minimum distance from the landfill to industrial zones is a mandatory constraint since it has already been stipulated in the government regulations whereas the minimum depth from the base of the landfill to the water table can be a suggested constraint with the depth being indicated X m, so that the local governments can decide themselves as the water table level varies seasonably from locality to locality. Also, sources of data and information need to be introduced in this set for two reasons. First, it helps local practitioners know the type of data they need to collect to assess how well the site meets the criteria and objectives set out. Second, it implicitly provides indicators for this assessment process as well as for comparing the suitability of candidate sites.

Such a set of objectives, criteria, constraints, and data types for use in landfill siting in Vietnam is suggested in Table 1. This set is taken from the notes of a workshop on landfill siting in Vietnam given by Byer, McNally, and Cuong in 2003 in Vietnam, which are themselves adapted from a set developed by McNally (2003). It is noteworthy that this set is by no means exhaustive. Other objectives, criteria, or constraints can be added when necessary once local agencies carry out landfill siting projects. Also, some criteria or constraints may be relaxed or modified in order to make them suitable for local regulations and conditions. However, currently, the constraints stipulated in the Joint Circular 01/2001 must be complied with nationally as a legal basis, although some of them may need to be reconsidered or amended due to the problem of inappropriateness discussed previously. Those constraints or minimum acceptable standards should be strictly followed until other follow-up regulations are issued in order to ensure consistency in implementing the regulations throughout the country. For this reason, every current constraint is given in the set introduced below under the column heading of "Vietnam Regulation Requirements", corresponding to the respective criterion it refers to. In applying this set in localities, it is necessary to emphasize that the number of objectives introduced should not be reduced, if not increased, as they are important, essential, and applicable worldwide, especially for developing countries.

3.2.3 Recommendations

The following are recommendations to resolve current problems related to criteria used in landfill siting:

3.2.3.1 A full set of objectives, criteria, and possible constraints introduced should be set up and incorporated into legal documents in order to help landfill siting practitioners at the local level in choosing landfill sites.

3.2.3.2 Objectives and criteria set out by the national government should be realistic and achievable.

3.2.3.3 Flexibility should be given to the local governments so that they can add more criteria or modify given criteria to make them suitable for local conditions. However, several national objectives or national constraints should still be strictly followed. The regulations should

clearly point out which objectives, criteria, or constraints can be modified at the local level and which cannot.

TABLE 1

SET OF OBJECTIVES, CRITERIA, CONSTRAINTS, AND DATA TYPES

(Source: Byer, McNally, and Cuong 2003; McNally 2003)

Objective	Criteria	Possible Constraints	Vietnam Regulation Requirements	Data
O1.Minimize Risk of Groundwater Contaminati-on	1.1 Maximize depth to the water table	The seasonable high water table must be XX m below the base of the landfill		depth to ground water table and seasonal fluctuations
	1.2 Minimize permeability of underlying geology	Landfills should not be constructed in areas with fractured bedrock, karst topography, etc. to ensure groundwater protection	VOR 01/2001, Appendix 1: for sites with limestone bedrock and large underlying aquifers, a minimum of 1 m of low permeability soil ($k < 1 \times 10^{-7}$ cm/s) and a leachate collection and treatment system is required	soil characteristics: soil type, permeability, porosity, density, organic content, vertical profile; presence of and depth to fractured or porous rock
	1.3 Maximize distance to faults and fractures	There should be no faults or significantly fractured geological structures within X m of landfill boundary		location of faults and fractures
	1.4 Minimize effect on aquifers	Landfills should not be located in the X-year groundwater recharge area for existing or pending water supply.		location of aquifers, soil permeability and sorption capacity, slope of the groundwater table, groundwater quality, areas of salt water intrusion
	1.5 Maximize distance to water supply sources and minimize the number of sources in the area	Minimum distances are required by local regulation	VOR 01/2001, Appendix 1 Minimum distance to wells from landfill site	location of wells, future use of groundwater in the area
O2. Minimize Effects on Surface Water and Sensitive Areas	2.1 Maximize distance to surface water bodies and protected areas (rivers, lakes, wetlands, protected forests, etc.)	Areas with water bodies (lakes, streams, wetlands, etc.) or protected areas are not suitable for landfill development. Landfills should be a minimum of X meters from lakes, wetlands, etc.	National Wetland Inventory - regulates and protects large ecologically sensitive wetlands	location of surface water bodies, wetlands, protected areas

	2.2 Minimize risk of flooding by maximizing the distance from flood plains and avoiding areas susceptible to flooding	Landfills should not be located in a 10-year floodplain. If the landfill is in areas subject to a 100-year flood, it must be amenable to an economic design which would eliminate the potential for washout		flood plain mapping, flood frequency record
	2.3 Maximize distance to downstream water supply sources, and minimize number of sources	Landfills should not be located upstream of water supply sources, especially if there is no other source available in the event of contamination		use of surface water in the area, future water supply sources
O3. Minimize Construction and Operation Costs	3.1 Maximize suitability of native soil for landfill liner material. If native soil is not suitable, minimize distance to sites with borrowed material	Areas with complex geology are not suitable, as it will be difficult to monitor and implement contingency plans	TCXDVN 261:2001 - Solid Waste Landfill Design Standards - Sites that have natural soil with permeability less than 10^{-7}cm/s with a thickness greater than 1m do not need HDPE liner. Sites that are built at natural holes, such as mines or mountain creeks with bottom elevation higher than ground water level and natural soil having permeability less than $1.5x10^{-8}m^3/m^2$/day do not need impermeable liner.	soil type and permeability; location of and distance to potential borrowing site
	3.2 Minimize surface water diversion requirements			catchment area, location of surface water bodies, average slope of the site
	3.3 Maximize use of existing topography to reduce earth moving requirements			average slope of the site
	3.4 Minimize cost and maximize ease of leachate collection, treatment, and discharge		VOR 01/2001 - Sec III-3 - There must be two monitoring stations for surface water bodies receiving wastewater discharged from the site. One station must be 15 to 20 m upstream of the discharge and the other 15 to 20 m downstream of the discharge point. If there is a reservoir within 1000 m of the discharge, there must be a monitoring station at the reservoir.	leachate treatment standards for leachate discharge near the site; underlying geology - soil type, permeability, sorption capacity, location of fractures; monitoring requirements for surface water bodies where leachate is discharged; estimate of the cost of treating leachate at the site

			Standard # TCVN 5945:1995 provides wastewater discharge standards. Note that there are three levels for maximum allowable concentration depending on the use of the receiving water.	(should include the long term cost of leachate treatment - i.e. for the period of landfill operation and post closure)
	3.5 Maximize ease of implementing a monitoring system by avoiding areas with complex geology		VOR 01/2001 - Sec III-3 - There must 4 boreholes (one upstream and three downstream) for monitoring the groundwater around the landfill site, as well as one borehole in each village near the site.	characteristics of underlying geology, sources of groundwater contamination in the area
	3.6 Minimize risk of landfill failure due to natural hazards (e.g. floods, typhoons, earthquakes, landslides, etc.)	Landfill should not be constructed in the floodplain of a river or other areas susceptible to frequent flooding, or in unstable areas.		flood plain mapping; dates and magnitudes of past natural hazards (hurricanes, typhoons, floods, tornadoes, etc.) locations of faults, past occurrences of earthquakes, seismic risk; topography, past occurrences of landslides, earthquakes, etc.
O4. Minimize Social Impacts	4.1 Maximize distance to residential areas and minimize number of residents in area	Minimum distances from populations, as stated in regulation		population density and characteristics
	4.2 Maximize distance from historical, cultural or tourist sites	Minimum distance of 1 km from site		the number and location of historic relics in surrounding areas (e.g. within 1km) the possibility of future extension of those sites
	4.3 Maximize community acceptance			local government opinions
05. Minimize Impacts on Local Economy and Land Use	5.1 Minimize impact on economic growth	Minimum distances to industrial zones, as stated in Appendix 1		income per capita of the region Industrial distribution in the region Potential industries and products
	5.2 Maximize distance from military zones			number, locations, and distances from the site to military zones nearby (
	5.3 Maximize post closure use			local government intention in using site after closure Future land use plans
	5.4 Minimize land use changes and compensation requirements			Current land use (e.g. farming, forest, etc.) Compensation requirements, property values

O6. Minimize cost of infrastructure	6.1 Minimize telecommunication set up costs			Distance to telecommunication line
	6.2 Minimize construction costs of water supply for site			Distance to main pipe of local water supply system Current capacity of systems
	6.3 Minimize construction costs of electricity networks to serve the site			Distance to main line of local electricity networks Current capacity of networks
	6.4 Minimize distance to access road	Maximum distance of XX meter from suitable access road		Possible location for access road, distance from suitable main road
	6.5 Minimize travel distance from city	Maximum distance of X km from city boundary		

3.3 Landfill Siting Process

Before engaging in discussions about landfill siting, it is necessary to clarify the difference between two terms used throughout this report. "Procedure of landfill project execution" refers to the overall process of carrying out landfill projects before the landfill construction starts. It includes three steps mentioned at the beginning of this paper, namely *selection of landfill location, withdrawal and handover of site, and carrying out of technical reports.* "Landfill siting process" refers to only the selection of landfill location, which is the first of the three steps of the landfill project execution procedure mentioned above.

3.3.1 Current Practices

3.3.1.1 Overall Procedure

According to landfill siting project' reports collected (see Appendix G for the list of reports), officials interviewed, and personal observations, the current procedure for landfill projects can be described as follows:

1. The People's Committee of the province/city, recognizing the need to build a new landfill serving the waste management activities of the locality, assigns the DNRE and DOC in coordination with each other to carry out the landfill project.

2. The DNRE and DOC collect data and information on the requirements of the landfill project with regard to its suitability for local conditions, such as population, waste generation and characteristics, urban development, etc., in order to determine the required size of the landfill and other basic requirements. Specifically, the DOC proposes candidate landfill sites based on urban planning projects that have been approved by the PC while the DNRE is in charge of collecting and analyzing the natural characteristics of those candidate sites. Natural characteristics include climatic, hydro-geological, topographical, ecological, and water resources conditions. If the needed data are not available for comparing and assessing the candidate sites, site visit observations will be adopted. Data and information are often collected from available sources at government agencies or by site visits and surveys. These two key agencies work in coordination with each other to produce a report assessing and

analyzing all candidate sites, and proposing the selection of the most appropriate site. Other factors such as socio-economic conditions, land use, distances to residential areas, compensation, willingness of the community, and buffer zone, are supposed to be taken into account in this report. The report is then submitted to the PC for approval of the site selection. In some provinces, this report is prepared by a consulting company, which should be capable of doing the work and have much experience in the field. In this case, the DNRE and DOC are responsible for reviewing and assessing the report before submitting it to the PC for approval.

3. The PC approves the landfill site based on the recommendations of the DOC and DNRE. The land used for the landfill project is then handed over to the URENCO, which is often considered the project owner on behalf of the PC. From this step on, the URENCO is responsible to the PC for all follow-up work on the project.

4. The URENCO hires one or several consulting companies, which are capable of doing the reports on the following: EIA, Detailed Planning for the landfill project and EIA for it, Feasibility Study, and Technical Design. Each of these reports is then submitted to the respective authorized agency (the DOC or DNRE) for assessment. The consulting company may have to make necessary revisions or modifications after receiving feedback from the DOC and DNRE. The revised reports are then submitted to the PC for approval.

Among these four steps, the first two belong to the step of *selection of landfill location* described in section 2.4. Step 3 is the step of *withdrawal and handover of site*, and step 4 is *carrying out of technical reports.* The above procedure is illustrated in Figure 2.

3.3.1.2 Landfill Siting Process

Before the year 2001, there was not any systematic and standard landfill siting process used in Vietnam. Landfill siting was carried out in different ways varying from province to province. The government agencies in charge executed the landfill siting process based on their own experience without any national guidelines on how to sequence the process or what issues needing to be taken into account. In 2001, the government for the first time issued a

FIGURE 2: CURRENT PROCEDURE OF LANDFILL PROJECT EXECUTION

guideline on the landfill siting process in the Circular 01/2001. From that time on, this guideline forms the legal basis for landfill siting practices in Vietnam. The process introduced in the Circular has four basic steps as follows:

1. Gather information and data on the requirements of the future landfill site, such as the current waste volume and future projections.
2. Identify candidate sites based on the natural conditions of the areas (e.g. topographical, geological, hydro-geological, land use, and population distribution maps are used for analyzing the availability and suitability of the candidate sites).
3. Compare and evaluate the candidate sites identified, using technical, social, and economic factors to select the most appropriate site.
4. Set up a plan for the selected site.

Other guidelines for landfill design, operation, construction, monitoring, and post-closure use are also stipulated in the Circular. The type of data and information needed to be collected for the landfill siting process is provided in Appendix 5 of the Circular. Appendix 2 of the Circular also provides factors that need to be taken into consideration when siting landfills. Appendix 1 stipulates appropriate distances from landfills to surrounding sites.

3.3.2 Discussion

3.3.2.1 Subjective Assessment

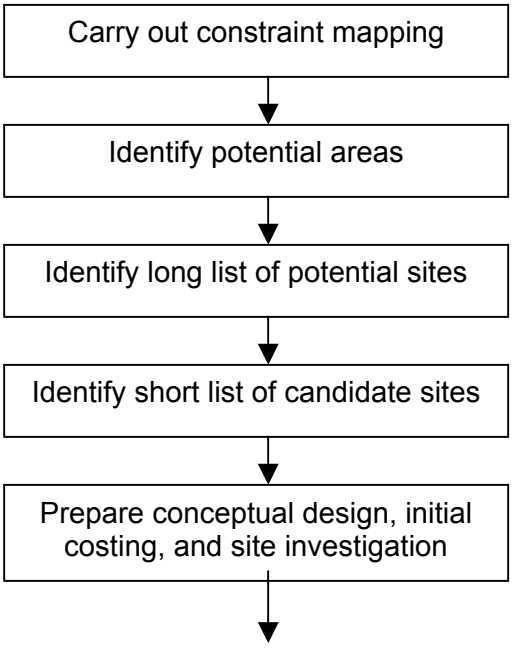
The current procedure of landfill project execution appears to be appropriate and sound. However, in practice, it does not always run smoothly or is significantly influenced by external factors. One of the common problems lies in the first step of this top-down process when the PC assigns the DOC and DNRE to carry out the landfill siting report. In some cases, according to some interviewees, the key officials at the PC have already subjectively had in mind several locations that they consider as good sites for the landfill project, and therefore they may consciously or unconsciously direct the DOC and DNRE to those locations right at the beginning of the project. Such subjective ideas may then be brought into the assessment report of candidate sites as a “lodestar”, which may result in subjective or even unfair assessment in comparison among candidate sites, or missing a good location for consideration as a candidate site, and thereby leading to an influentially inappropriate

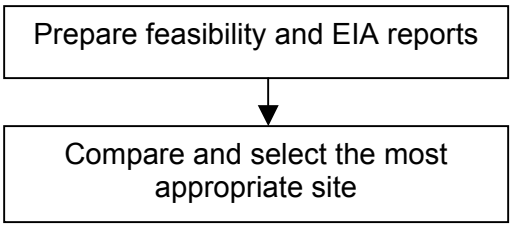
selection of the most suitable site. This phenomenon in landfill siting has also been known of in Canada in a similar form as a misleading way of artificially defining study areas (Lawrence 1996). One way to avoid this pitfall is adopting more open landfill siting processes through employing a greater number of stakeholders.

As mentioned above, the landfill siting process is executed mostly in Step 2 of the overall procedure described in section 3.3.1.1, by the DNRE, DOC, and PC. It was indicated in the interviews that the DNRE and DOC often do not have experts in the domains of geology and hydrology. Therefore, it is impossible for them alone to effectively carry out landfill siting processes. Thus, it is suggested that consulting companies, which often have experts in various disciplines, should be involved early in the process as the ones responsible for executing landfill siting reports. In this case, the DNRE and DOC only play a role of state management in the field, providing access to data sources, financial resources, and support for those consulting companies doing the work.

3.3.2.2 Siting Process

In discussing the shortcomings of the current landfill siting process guided by the government in the new regulations, a process introduced by Rushbrook and Pugh (1999) for middle and lower income countries has been taken as a template for comparison purposes. Detailed descriptions for each step can be found in Rushbrook and Pugh (1999). A diagram briefly describing the main steps in their process is given below:





The landfill siting process introduced in the Vietnamese regulations does not have the step *identifying potential areas*. This lack of an explicit and important step in the landfill siting process is likely to result in an oversight of one or more good locations that should also be considered as candidate sites. However, in practice, the step *identifying potential areas* is sometimes combined with the next step, *identifying candidate sites,* and therefore, it does not appear clearly in the process. Based on a review of 16 official reports on various landfill projects, it is observed that even when this is the case, the descriptions and analyses on the landfill siting process used to choose the landfill location in those reports are quite short and general. In many cases, they occupy only a couple of pages in the entire report and do not give detailed explanations on how the landfill location has been selected in terms of criteria used, data sources, assessment methods, and constraints. There have been very few reports that mention these issues. However, most descriptions and analyses in those reports are ambiguous and qualitative. There were rarely quantitative assessments with detailed specifications given.

One of the reasons the step *identifying potential areas* is missing is the fact that it is often implicitly carried out in urban planning projects conducted by national agencies, and therefore is not repeated in the landfill siting process executed at the local level. Further discussion on this issue can be found in the next section on *Landfill Siting and Urban Planning*.

In practice, it may not be too difficult to identify potential areas or free spaces for locating a landfill in a city where land use is clearly divided and distributed (e.g. agricultural, industrial and residential lands are separated with clear borders), which is often the case for new urban areas or extended cities. On the other hand, in cities where different land uses combine or interpose with each other, identifying potential areas for landfills can be a very difficult task since many exclusionary criteria may conflict with one another. In such cases, trade-offs would need to be made to find the most appropriate areas, along with sacrificing some initial

objectives, not only environmental goals set out for the landfill, but also the development orientation of the whole city. Thus, *identifying potential areas* may not be a simple step, although it is the very first step in the landfill siting process where a great deal of information and data has not yet been taken into assessment. Any mistake in choosing potential areas, since it is the beginning of the process, may lead the subsequent steps in a wrong direction; or the practitioners may have to go back to this step during later phases when realizing that the study areas need to be redefined. It is noteworthy that iterative processes in siting landfills are ordinary and necessary, but they should be minimized in Vietnam, where the budget for landfill siting projects is always limited.

Comparing the process introduced by Rushbrook and Pugh (1999) and the Vietnamese process illustrated in Figure 2, it can be seen that the conceptual design, feasibility study, and EIA are part of the landfill siting process in Rushbrook and Pugh's process while they are carried out much later in the Vietnamese process, after the landfill site has already been selected. The main purpose of incorporating the conceptual design, feasibility study and EIA into the landfill siting process is to estimate initial costs as well as to anticipate impacts on the environment of each of the candidate sites (Rushbrook and Pugh 1999). The results of these reports are then used for comparing the candidate sites in the last step, namely c*omparing and selecting the most appropriate site,* and serve as influential factors in choosing the most preferred site. A number of conceptual design alternatives for each site can also be carried out to set up a range of site suitability. This would facilitate the process of making tradeoffs between the level of design, cost and the level of environmental protection (McNally 2003).

Due to the late execution of the conceptual design, feasibility study, and EIA in the Vietnamese landfill siting process, construction costs and environmental impacts have not been fully taken into consideration as criteria for selecting the site. This is obviously a void that needs to be filled. In other words, all these works need to be moved up to the earlier phases in the landfill siting process. However, these studies should be conducted with reasonable level of detail, so-called preliminary studies, only for the purpose of screening out candidate sites, because carrying out these studies in detail imposes a burden on the national and local budget. Further studies such as detailed and technical designs, detailed feasibility studies, and detailed EIAs for the chosen site can then be conducted in the later phases of the project development before the landfill is constructed.

Thus, the process introduced in the Joint Circular No.01/2001 is a good starting point in improving landfill siting in Vietnam but there is still an urgent need for improving that process with additional steps and more detailed guidance, taking into account the resources and constraints of the government agencies and consultants involved (Lane and McDonald). McNally (2003) also discusses a systematic approach for landfill siting specifically for conditions in Vietnam. This approach should be applied to landfill siting practices in Vietnam as a useful starting point. However, further research on methods of weighting criteria and ranking candidate sites, taking into consideration local conditions, needs to be conducted in order to provide a full set of working tools for Vietnamese landfill siting practitioners.

3.3.2.3 Role of Consultants

Since the conceptual design, FS, and EIA are often carried out by consulting companies and since the landfill siting process is executed by only two agencies, the DOC and DNRE, in the current process, adding these works to the early phases of the landfill siting process will bring the consulting companies into the landfill siting process as shown in Figure 3. This should help lessen subjective assessments by the two government agencies and increase alternative views. Also, as the DOC and DNRE often lack interdisciplinary specialists and consulting companies often have experts in various disciplines, interaction between the DOC and DNRE's staff and consultants should help the staff improve their expertise. It is necessary to stress that this does not necessarily mean that consulting companies are better in terms of their expertise in comparison to staff at the DOC and DNRE. According to the author's observation, consulting companies often have experts in various disciplines because they tend to employ personnel with different backgrounds so that they can cover a broader area and gain more contracts. On the contrary, the DOC and DNRE tend to employ personnel that are specialized in the field corresponding to their mandated work. For example, most of the DOC's employees have background in architecture, construction, or infrastructure design. Among the many local DOCs interviewed, none of them have environmental experts. The above suggested change is summarized below:

- Consulting companies directly carry out the landfill siting process.
- The DOC and DNRE manage the process rather than directly execute landfill siting.
- The responsibilities of the DOC and DNRE: provide data and information on the requirements of the landfill, suggest potential areas based on urban planning

FIGURE 3: SUGGESTED PROCEDURE OF LANDFILL PROJECT EXECUTION (FIRST)

projects, provide access to data sources, and support consulting companies in doing the work.

- The preliminary FS, conceptual design, and preliminary EIA are incorporated as part of the siting process and used in comparing candidate sites.

One or more consulting companies can be employed to do this work depending on their capability and experience in the respective field. In choosing consulting companies, local ones should be given higher priorities than national or foreign ones, if they have enough experience and expertise, as local companies are often more familiar with local characteristics. Only when local companies are not capable of doing the work, should national or foreign agencies be employed.

3.3.2.4 Available Resources

In order to incorporate conceptual design, feasibility study, and EIA into the landfill siting process, significant attention needs to be paid to the ability of local agencies with respect to financial and technical resources in carrying out these reports. More financial resources would need to be distributed to government agencies in order for them to have a sufficient budget to undertake the contracts signed with the consulting companies. The level of detail of these reports as well as the number of candidate sites and data requirements needed to meet environmental regulations will affect the financial resources that are needed. The issue of legislation in assigning more responsibilities to the DOC and DNRE as well as the issue of strengthening their staff's capability so that they can manage and supervise the contracts signed, also need to be addressed.

3.3.3 Recommendations

The following are recommendations to resolve current problems related to the landfill siting process:

3.3.3.1 A systematic approach similar to the one introduced in McNally (2003) should be employed in landfill siting. This should include the identification of potential areas.

3.3.3.2 Detailed guidelines on the tasks of each step in the landfill siting process should be developed taking into account economic and technical constraints.

3.3.3.3 The conceptual design, preliminary FS, and preliminary EIA should be incorporated into the siting phase in order to identify construction costs and environmental impacts which should be included as criteria for comparing candidate sites. Further studies with greater levels of detail can be conducted in the later phases before the landfill is constructed.

3.3.3.4 Methods of weighting criteria and ranking candidate sites, taking into consideration local conditions, should be developed and introduced in legal documents in order to provide guidance to landfill siting practitioners.

3.3.3.5 More open landfill siting processes through employing a greater number of stakeholders should be adopted in order to reduce subjective assessment and increase alternative views in comparing candidate sites.

3.3.3.6 Consulting companies should be responsible for carrying out the landfill project and involved as early as possible in the landfill siting process. The DNRE and DOC play a role of state management. Their responsibilities should only be giving access to data sources, providing financial resources, and supporting consulting companies in doing the work.

3.3.3.7 In choosing consulting companies, local ones should be given higher priority than national ones, if they have enough experience and capacity, as local companies are often more familiar with local characteristics. Only when local companies are not capable of doing the work, should national agencies be employed.

3.4 Landfill Siting and Urban Planning

3.4.1 Current Practices

As mentioned previously, urban planning projects are considered as the precursor of landfill siting projects. According to the Vietnamese standards for urban planning, all existing and proposed locations for landfills must be presented in urban planning drawings as part of the urban development orientation of the province or city (Vietnam Standards TCVN 4449:1987, Design Standards in Urban Planning). The two primary criteria for choosing landfill locations in urban planning are distances to surrounding sites and land use functionality. Other natural factors such as hydrology and geology are rarely taken into account. Also, systematic approaches, such as the landfill siting process, constraint mapping, and Geographic Information Systems (GIS), have not been in use in choosing landfill sites by urban planners.

Landfill locations, as part of master urban planning projects, must be submitted to the Prime Minister for approval and once they are approved, any later changes of any components of the project proposed by the local government need to be submitted to the Prime Minister for approval again.

3.4.2 Discussion

The fact that landfill sites are proposed in master urban planning projects does not seem to be a good approach for two reasons. First, the landfill sites are proposed without a systematic process and the people at the NIRUP or DOCs, who carry out this work, often do not have sufficient knowledge on relevant fields such as groundwater, hydrology, and geology. Second, any subsequent changes on landfill size or location not consistent with the urban planning project approved by the central government have to go through a complicated and time-consuming procedure. Below are discussions on these two issues.

3.4.2.1 Lack of Information and Relevant Knowledge

According to the Joint Circular No.01/2001, the selection of landfill locations must be consistent with the urban planning of the city or province. The urban planning project chooses candidate sites based on mostly urban development orientation. Natural factors

such as hydrology and geology are rarely taken into account for two reasons. First, there are often not enough information and data on natural factors as they are not considered a major component in urban planning, which tends to deal with the surface issues of urban development only. For example, land use purposes, types of houses, and the number of houses are of interest to urban planner, but not the structure, composition, or characteristics of the underground. Second, as most urban planners have backgrounds in architecture, urban design, or infrastructure design, they do not have enough knowledge on other environmental fields such as hydrology or geology. Therefore, even when they have information on those fields, the information and data may not be adequately analyzed or correctly interpreted. Moreover, there has not been any systematic process for screening out potential areas adopted by these urban planners. Neither effective tools like constraint mapping nor a full set of criteria are used. Thus, the first step in the landfill siting process, namely *selecting potential areas,* is often carried out improperly. This may lead to choosing inappropriate areas or missing potentially suitable areas.

It is evident that the selection of landfill locations in Vietnam is highly dependent on urban planning. Landfills, as part of the built environment, should be planned in harmony with other land uses, and their location should be consistent with urban development orientation. However, the fact that urban planning projects can propose candidate sites or even the most suitable site without carrying out proper landfill siting processes is quite harmful. This is an arbitrary approach that prevents further consideration of alternative sites in latter phases of the project development. It may also result in the selection of totally inappropriate sites, which calls for extremely large investments in landfill construction so that landfills will meet the requirements and standards on environmental protection.

3.4.2.2 Time-consuming Decision-Making Process

It is stipulated in the Vietnamese regulations that all master urban planning projects must be submitted to the Prime Minister for approval, and once they are approved, any later changes to any components of the project proposed by the local government need to be submitted to the Prime Minister for approval again. In this context, landfill locations are also subject to the Prime Minister's approval whenever the local government wants to choose a site different from what has already been approved in the master urban planning project, or even when the local government wants to adjust the size of the landfill. This strict rule is good in the

sense that the central government can directly manage and control the urban development orientation of the locality, and thereby be able to issue timely social, economic, and especially environmental policies with respect to landfill projects for the locality. However, in practice, this rule appears to be a cumbersome procedure. It was indicated in the interviews that this process, in many cases, may take one to two years, because there are many local and national agencies involved in this process, before the Prime Minister is able to make a final decision based on those agencies' advice.

As the pace of urban development in Vietnam is quite fast since the open-market mechanism was established in 1986, by the time the Prime Minister's approval for landfill-related issues reaches the local government, local economic and social conditions where the landfill is located may have already changed significantly from what was submitted to the Prime Minister one or two years before. As a result, this late approval may not be suitable for the landfill project anymore. For example, one international organization may commit to invest in a landfill project but later on withdraw its commitment due to the late decision-making process from the central government. This may result in the cancellation of the project or significant delays because the project owner has to look for other financial resources.

3.4.2.3 Ways to Address Current Problems

There are two ways to resolve these problems. The first way is keeping the landfill siting process as part of the master urban planning projects, but strengthening the capability of the NIURP and DOCs' staff so that they are capable of carrying out any appropriate and systematic landfill siting processes. Other experts from the MNRE, NEA, or local DNREs would be consulted on technical issues when necessary. This calls for strong coordination between all agencies operating in both fields, urban planning and environment, at both levels, national and local. However, this measure is not able to resolve the time-consuming approval of the central government on landfill locations and size, because the selection of landfill locations still relies on urban planning.

The second way is relaxing requirements on landfill locations in urban planning projects. In other words, proposed landfill sites in urban planning projects should not be considered as fixed and mandatory locations, but rather suggested sites, taking into account only urban development orientation and distances as criteria for screening out purposes. Also, it may

be more reasonable for urban planners to stop at the first step of a landfill siting process, namely *identifying potential areas,* rather than going further to the steps of *identifying candidate sites* or *selecting the preferred site,* since they are not capable of doing that. Even when this is the case, the potential areas identified should still be considered as suggested areas that can be changed or modified when the landfill siting process is properly carried out at the local level by the DNREs and DOCs. This solution seems to be more comprehensive and feasible than the first one. It can even resolve the issue of approval of the central government on landfill locations and size, because the selection of landfill sites is now left open to the agencies at the local level and therefore there will be no need for "compliance with the master urban planning project". Indeed, urban planning projects would no longer have the responsibility of proposing landfill sites.

The modified procedure of landfill project execution suggested previously in Figure 3 in section *3.3 Landfill Siting Process* could also help resolve the problems of the current procedure, including the complicated and time-consuming process of submission and approval, and the heavy reliance on urban planning in the landfill siting process. In this recommended procedure, none of the three agencies, the DOC, DNRE and NIURP, has to carry out the landfill siting report. Instead, consulting companies, which are more likely to be capable of doing it, take over this work. Urban planning projects would no longer play decisive roles in landfill location selection, but rather would suggest potential areas. The DOC and DNRE's responsibilities would only be to support consulting companies and provide access to data sources.

3.4.2.4 Inter-municipal Landfills

Another issue that should be considered in urban planning as well as in waste management policies is the use of inter-municipal landfill projects. This issue has not received significant attention from the government agencies in charge of waste management activities. Although the concept has been widely applied in many countries, it is still new in Vietnam. The only legal text that has ever mentioned this issue is an official letter on *"Construction Management and Infrastructure Development"* dated 14 October 1999 from the MOC to the PCs in provinces throughout the country. It was found in the interviews with officials working in the waste management field that none of them know about this letter and most of them are not aware of the fact that landfills can serve more than one locality. Few of those, who know

about this issue, consider inter-municipal landfills to be an infeasible solution due to managerial and administrative constraints. There are no inter-municipal landfills in Vietnam to date, although the benefits of such landfills are significant. These potential benefits include reducing initial investment and operational and personnel costs, minimizing the amount of land required for landfill projects, and reducing the risks posed by landfills to human health and the environment. These rewards may be greater for Vietnam than for many other countries since Vietnam has more than 600 urban municipalities, a very high population density, and limited financial and human resources, and most of the land is used for agricultural purposes.

Experience and practice in North America and Europe have proven that administrative borders are not always the optimum delimitation for solid waste management activities (Jorgensen and Jakobsen 1994). However, one needs to take into account a number of issues that may be the barriers to inter-municipal landfills: waste collection and transport within the co-operating municipalities, management capacity of the municipalities for a larger and more complex landfill, responsibility distribution and roles among the municipalities and so on. Jorgensen and Jakobsen (1994) pointed out two key enabling factors for the success of inter-municipal cooperation: first, “the establishment of the cooperation has to be voluntary, building on a jointly perceived need”; and second, “the institutional set-up is effective with a clear division of roles between the inter-municipal secretariat (as the political management forum) and the municipal solid waste management company (as the operational outlet of the cooperation)”. It is obvious that the issue of inter-municipal landfill projects needs to be taken into consideration in waste management in general and in landfill siting in particular due to its benefits. To do this, the relevant national government agencies such as the MOC, MNRE, and NEA would need to issue specific guidelines to direct local agencies, taking into account the administrative, institutional, economic, social, and technical aspects of the issue.

3.4.3 Recommendations

The following are recommendations to help resolve current problems related to urban palnning and landfill siting:

3.4.3.1 Urban planning projects should only be responsible for proposing potential areas or sites. These potential areas or sites should be considered as suggested ones that can be changed or modified when the landfill siting process is carried out in practice at the local level. Therefore, the phrase “Landfill locations must be selected in compliance with the urban master planning project” should be removed from the regulations.

3.4.3.2 Inter-municipal landfill projects should be taken into consideration in landfill siting due to their benefits. Barriers to such projects should be removed and decision-makers’ perception of difficulties should be changed. The national government should issue specific guidelines on the issue to direct local agencies, taking into account administrative, institutional, economic, social, and technical aspects.

3.5 Responsibilities, Coordination, and Information Sharing between Government Agencies

3.5.1 Current Practices

The institutional framework and coordination between agencies play crucial roles in the landfill siting process. In Vietnam, where landfill siting is the responsibility of governmental institutions, an appropriate institutional framework that includes all relevant agencies will help facilitate the landfill siting process. Coordination and distribution of responsibility among these governmental institutions are essential in data sharing and collection, determining requirements of the landfill project, setting up criteria and constraints, screening suitable areas, assessing candidate sites, and selecting the most appropriate site.

Table 2 describes the types of data and information available at a number of main agencies at the local level. The first three agencies, the DOC, DNRE, and URENCO, are currently involved in landfill siting but the last three agencies, the DARD, HMSC, and DGM have not yet been employed.

TABLE 2

LOCAL AGENCIES AND TYPES OF DATA AVAILABLE

(Adapted from McNally 2003)

Agency	Data
Department of Construction (DOC) – Division of Urban and Rural Planning	▪ Land use plans ▪ Urban development plans
Department of Natural Resources and Environment (DNRE)	▪ Environmental status – environmental parameters: air, water, and ground quality
Urban Environment Company (URENCO)	▪ Waste generation and composition
Department of Agriculture and Rural Development (DARD)	▪ Well locations (greater than 15m deep) ▪ Future water resources plans ▪ Hydrogeological surveys ▪ Topographic maps
Hydrometerological Service Centre (HMSC)	▪ Meteorological data – rainfall, temperature, wind, air and rain water quality ▪ Record of past major storm events ▪ Data from river monitoring stations – flow rates, temperature
Department of Geology and Minerals (DGM) - Division of Geological and Mineral Resources Survey	▪ Geological data – soil and rock type, location of faults and fractures ▪ Groundwater data

As discussed earlier, the MOC and MNRE are the two agencies that are directly involved in landfill projects at the national level. Accordingly, the DOCs and DNREs are directly responsible for carrying out landfill projects and landfill siting processes at the local level. However, the distribution of responsibility and jurisdiction between these agencies at both levels in landfill-related issues has not been clearly defined. Moreover, there are also many overlaps between them. Table 3 describes the responsibilities of the MNRE and MOC relating to landfill issues and shows the overlaps between them (the overlapping responsibilities are written in italics). Since the DOC and DNRE are the representatives of the MOC and MNRE respectively, at the provincial level, the overlaps of responsibility and jurisdiction distribution between these agencies are similar to those between the MOC and MNRE. Thus, the MOC and MNRE have been taken as an example for discussions on this issue.

TABLE 3

RESPONSIBILITIES OF MNRE AND MOC ON LANDFILL ISSUES

(Adapted from Directive No.199, 1997; Joint Circular No.01, 2001; Inter-ministerial Circular No.1590, 1997; and UNDP 1995)

MNRE's responsibilities	**MOC's responsibilities**
- Issue guidelines, regulations, and standards on waste management issues	*- Issue procedures, norms, guidelines, guiding documents, and technical design standards for waste collection, transport, and treatment systems*
- Draft annual and long-term waste management plans, supervising waste management activities	*- Draft national strategies for solid waste management in the country*
- Inspect the operation of waste treatment facilities and supervise waste management activities - Appraise and approve EIAs for waste treatment projects - Plan and allocate budgets for research and development relating to waste treatment projects	*- Direct and supervise urban management including waste collection, transport, treatment, and landfilling* - Issue guiding documents, and draw up plans for the arrangements of landfill sites in urban areas and industrial zones - Direct provincial and municipal DOCs in drawing up planning and plans for construction of landfills

3.5.2 Discussion

3.5.2.1 Responsibilities, Coordination, and Cooperation

It can be seen from Table 3 that the MOC and MNRE have a number of overlapping responsibilities concerning waste management in general and landfill-related issues in particular, which causes significant confusion in practice. For example, the MNRE is mandated to issue guidelines, regulations, and standards on waste management issues, which include landfill projects, whereas the MOC is in charge of issuing procedures, norms, guidelines, guiding documents, and technical design standards for waste collection, transport, and treatment systems, which also include landfill projects. This overlapping responsibility has resulted in the issuance of various and fragmented regulations on landfill-related issues by both the MNRE and MOC, several of them conflicting one another in terms of the content. Some examples of this have been given previously under section *3.1 Legal Texts*. As a consequence, this hinders a smooth and quick process for landfill project execution in terms of acquiring permits and approvals. More harmfully, it may create gaps in the legislation framework that some parties involved may take advantage of. It is worth noting that the issue of confusion and duplication between national and/or municipal government departments concerning waste management has also been encountered in many other developing countries, and it is often attributed to the heavy-loaded responsibilities that these agencies have to undertake for various waste management functions (Campbell 1999).

Although most legal texts on waste management designate the MOC and MNRE to be the two main national ministries responsible for relevant issues in the field in coordination with each other, there is still a lack of coordination and cooperation between them. There often appears to be the case that one ministry is not aware of the other's work in the same area. It was found during the interviews with the officials at the MNRE that some of them do not know about the existence of regulations and standards on landfill siting previously issued by the MOC, who is supposed to be their main coordinator. Thus, a mechanism for information and data sharing needs to be established not only to improve the coordination between relevant agencies but also to facilitate landfill siting processes, specifically with respect to the collection of data and information serving the process.

Since the DOCs and DNREs are the representatives of the MOC and MNRE respectively, at the local level, similar overlaps and inappropriate division of tasks exist between them as well. Although many officials interviewed acknowledged that the DOC often has a prevalent role over the DNRE in landfill siting, their relative importance is not clearly defined. The relationship between these two local agencies is often determined in legal documents by the word “coordination”, which is very ambiguous, as no specific assignment for each agency’s tasks in landfill siting is given. This ambiguity not only impedes an effective landfill siting process but also makes it difficult to find out which agency is the responsible one when something wrong occurs in the process. Furthermore, the absence of clear jurisdictions may lead to controversies, ineffectiveness, and/or inaction, undermining the political sustainability of the system (Schubeler 1996). An explicit division of responsibilities and well-defined roles would result in the agencies being more proactive and responsible, thereby reducing stagnation, reliance and dependence of one on the other. Thus, it is necessary to clarify the role of each agency in the landfill siting process and to designate the lead agency between the DOC and DNRE.

It is suggested that the DOC be mandated to be the main agency responsible for any issues related to landfill location selection at the local level, while the DNRE plays a secondary role as a consulting and supporting agency in terms of providing access to data and information and giving advice on environment-related issues. There are two reasons for this suggestion. First, since the DOC has a prevalent role over the DNRE in current landfill siting practices, this change is actually a way to formalize the DOC’s prevalent role and to clearly redefine the relative importance of these two agencies based on current practices that would not significantly affect the existing jurisdiction structure. Second, since the DOC is the only agency at the local level in charge of urban planning, with which landfill siting must be consistent, it seems more appropriate for the DOC to be mainly responsible because their knowledge on urban planning would facilitate landfill siting. Hence, the DOC should also be responsible for selecting consulting companies to carry out technical reports, signing contracts with them and supervising the execution of contracts with respect to quality and schedule. Extra financial resource for the execution of these contracts should then be adequately allocated to the DOC through the provincial budget. This recommendation is illustrated in Figure 4 as an addition to Figure 3 introduced previously. If the national government believes that there is a need for further consideration about who would serve as the lead agency, there should be further discussion between the MOC and MNRE, and

between the DOC and DNRE, about this and what should be the lead agency's responsibilities.

In order to get the above agencies effectively and efficiently involved in the landfill siting process, an appropriate framework for their involvement is needed. Thus, a framework that includes all relevant government agencies in an official way should be set up. An *ad hoc* advisory committee for landfill siting projects may be an appropriate method as it can contribute to an independent and focused planning process (Lawrence 1996). Indeed, *ad hoc* advisory committees have been widely employed in North America and have proven to be an effective method. This committee is established only when necessary and dismissed when it has accomplished its tasks. Such an *ad hoc* committee should consist of various representatives from all directly relevant agencies, including the DOC, DNRE, DARD, HMSC, DGM, as well as other indirectly relevant agencies such as the Department of Planning and Investment (DPI) and Department of Finance and Pricing (DFP), which do not play a significant role in the landfill siting process but are of importance in the subsequent phases of the project development because they are responsible for all financial and economic issues related to the project. This committee would perhaps work best if chaired by the DOC under guidance and control of the provincial PC, if the DOC, as recommended earlier, is the main responsible agency for all landfill siting issues. All the work on landfill siting executed by consulting companies needs to be reviewed by this committee before being submitted to the PC for approval. This committee would also be responsible for periodically reporting the progress of the project to the PC. This suggestion is illustrated in Figure 4 as an addition to Figure 3 given earlier.

In order to make the changes suggested so far, the most important prerequisite is that personnel in government agencies relevant to landfill siting within national, regional, and local authorities must be willing to make modifications to existing institutional structures, be fully involved in making recommendations, and take appropriate decisions leading to their implementation (Rushbrook 1999, Rushbrook and Pugh 1999, and Campbell 1999). Inevitable obstacles standing in the way of these changes, such as local procedures and customs associated with the recruitment and retention of local government personnel, also need to be addressed. It can be anticipated that "any recommendations that seek to alter institutional structures involving the acquisition of staff, particularly where re-deployment may deplete an existing department work force or its functions, may meet with substantial

FIGURE 4: SUGGESTED PROCEDURE OF LANDFILL PROJECT EXECUTION (SECOND)

resistance" (Campbell 1999:2). However, such resistance is inherent and should be resolved adequately in a gradual, step-by-step process without the perception that they are insurmountable barriers.

3.5.2.2 Information Sharing

As delineated in Figure 2, the DOC, DNRE, and URENCO are often the only local agencies involved in landfill siting processes. However, a proper landfill siting process requires a large amount of technical data and information on the following fields: topography, geology, hydrology, hydrogeology, and meteorology, most of which are beyond the capacity of these three agencies in terms of expertise and available sources. Such information and data are often available at some other agencies at local or regional levels. For example, information on groundwater, flood, and future use of water resources is often kept at the local Department of Agriculture and Rural Development (DARD). Information on climate, past storm events, and surface water is available at the regional Hydrometerological Services Centre (HMSC). The local Department of Geology and Minerals (DGM) often has reasonable information on geological data such as soil and rock type and location of faults and fractures. However, those agencies are often not involved in landfill siting projects. Even when they are involved, their contribution to the process is quite limited in the sense that their responsibilities are considered merely as providing data and information. They are not informed about how the data and information they provide are to be interpreted or analyzed. Their lack of involvement in the process not only impedes the success of the process but also may impose more costs on the landfill siting project's budget, as some types of data may be re-collected.

It was indicated during the interviews with the DARD, HMSC, and DGM in several provinces that there has been almost no coordination between these agencies and the three primary ones, namely the DOC, DNRE, and URENCO, in landfill siting projects. Some officials at the DARD and HMSC in Danang expressed significant interest and enthusiasm in getting involved in landfill siting projects, as they are aware of the role and the importance of technical data and information in a successful landfill siting process. Nevertheless, they are rarely asked or often ignored. The lack of involvement and input from these agencies is obviously another factor hindering successful landfill siting processes carried out in Vietnam.

3.5.2.3 Consultant Costs

As illustrated in Figure 2, in the current procedure of landfill project execution, consulting companies are often hired by the URENCO to carry out a number of specific reports including FS, EIA, and Design. In order to execute these reports, especially the EIA, information and data on hydrology, geology, and climate are needed. Therefore, the consulting companies often have to ask the DARD, DGM, or HMSC, who are considered the formal and most reliable data sources, to provide such information. However, since consulting companies are not governmental agencies and their relationship with those agencies is a contractual relation, which is defined and determined by the monetary value of the contracts, the DARD, DGM, or HMSC tends to charge the consulting companies a certain fee for providing data and information. In other words, paradoxically, these governmental agencies now play a role as subcontractors for the consulting companies. The fees paid for these "governmental subcontractors" are obviously taken from and/or added in the contracts that the consulting companies signed with the URENCO, whose budget comes from the provincial budget through the national budget. This situation is a nonsensical circle in which the government has to pay for its agencies to have already-inhouse data and information that those agencies are responsible to collect. This causes a waste of money in the national budget and a waste of time for all parties involved.

If, however, needed data and information are not available at those agencies or if the level of detail of data is not high enough for the purpose of siting landfills, consulting companies should pay government agencies to collect the needed data and information. This actually happens quite often in practice since available data at those government agencies are usually collected for other purposes related to their mandated work. For example, the Department of Agriculture and Rural Development (DARD) tends to collect data and information on groundwater related to agricultural activities, and therefore, those data and information may not be appropriate for landfill siting. Also, due to limited financial resources, government agencies tend not to conduct detailed investigations but rather collect general information that can be used for many purposes.

3.5.3 Recommendations

The following are recommendations to address current problems related to responsibilities, coordination and information sharing in landfill siting:

3.5.3.1 The DOC should be mandated to be the main agency responsible for landfill siting at the local level. The DNRE should play only a secondary role as a consulting and supporting agency in terms of providing access to data and information and giving advice on environment-related issues. The DOC's responsibilities should include selecting consulting companies to carry out technical reports and signing contracts with them and supervising contracts execution with respect to quality and schedule.

3.5.3.2 The role of each relevant agency in the landfill siting process should be well defined. The distribution of responsibilities and jurisdictions among them should be clearly mandated and overlaps should be avoided. Whenever the term "coordination" is used in legal texts to describe the relationship between two or more relevant agencies, it should be clearly defined.

3.5.3.3 Existing overlapping responsibilities between the MOC and MNRE and between the DOC and DNRE should be removed.

3.5.3.4 *Ad hoc* advisory committees for landfill siting projects should be adopted. This committee should consist of the representatives of all relevant agencies. It should be established when necessary and dismissed when it has accomplished its tasks. The committee should be chaired by the DOC under the guidance and control of the provincial PC. Also, the committee should be responsible for reviewing all project reports before submission to the PC for approval.

3.6 Public Participation in the Landfill Siting Process

3.6.1 Current Practices

While Western countries have been increasingly faced with vigorous public opposition towards attempts at siting landfills (Opaluch et. al. 1993), it has not yet been the case in Vietnam. Also, in many cases in developed countries, siting conflicts have focussed less on technical aspects but more on social issues (Rabe 1994, Gerrard 1994) whereas it is the reverse in Vietnam. Since the People's Committee (PC), the superior governmental body at the local level, is elected by the citizens, it can be considered as the representative of local people. In landfill siting, as the PC is the one that has highest authority and power in decision-making at the local level, it can be stated that public participation, to a certain extent, exists in the process. Other than this, there is almost no local public participation in landfill siting in Vietnam. Except for the PC, the local communities are rarely asked for their opinions when siting landfills in their area. Public participation, including methods such as public hearings, workshops, and information meetings, has not been incorporated into the landfill siting process, perhaps since none of the present environmental legal texts requires public participation as a mandatory input in carrying out environmental activities. Thus, it can be concluded that there is neither legal grounds for nor the practice of public participation in landfill siting in Vietnam.

3.6.2 Discussion

3.6.2.1 Benefits of Public Participation

The benefits of community participation in noxious facilities siting include: gaining stakeholder trust and the community's acceptance of the facility (Gregory et. al. 1991), bringing about positive emotional effects such as residents' increased pride in themselves and their communities as a result of their involvement in the siting process (Wakefield and Elliott, 2000), facilitating a successful operation of the facility (Zeiss and Lianne 1995), contributing to fair and competent decisions as well as supporting the development of democracy (Webler et. al. 1995, Baxter et. al. 1999), and leading to a high probability of facility siting success (Armour 1992). Realizing these benefits and the important role of

public participation, industrialized countries have applied it as an essential ingredient in landfill siting processes to resolve siting impasses (Romano).

3.6.2.2 Reasons for the Lack of Public Participation

Three key reasons for the lack of public participation in landfill siting in Vietnam are: low environmental awareness of the public, lack of private property right to land, and lack of requirement for public participation in environmental regulations.

It is not too difficult to understand why the public's environmental awareness in Vietnam is still low, considering that the National Law of Environmental Protection was just recently issued in 1994. Before this year, environmental issues did not receive sufficient attention from either the government or the public. Besides, there have been only a few engineered or controlled landfills in Vietnam to date and the rest are still open-dumped or uncontrolled. Landfill siting is also a new concept that has just recently been applied for only those controlled landfills. For this reason, both the public and government agencies pay little attention to the public's role in the landfill siting process. Indeed, many local residents are not aware of the negative impacts that the landfill may have on their community. This is especially true for remote areas where landfills are often located and where people's education level is not high. In larger cities, like Hanoi and Hochiminh City, the public recently seems to be more aware of the risks that landfills pose to the community. Even some controlled landfills like the Namson landfill in Hanoi and the Gocat landfill in Hochiminh city have experienced very strong opposition from the public. This opposition is actually a result of many failures of landfill operation and siting. For example, the Namson landfill in Hanoi, the first sanitary landfill in Vietnam, has not succeeded in treating leachate, which results in a large amount of leachate kept in reservoirs that disturbs the communities nearby with odor and groundwater contamination. The same problem of unsuccessful treatment of leachate also occurs with the Gocat landfill in Hochiminh city. It is worth noting that most public opposition experienced at the mentioned landfills only started during the operation phase of the landfill, when operational failures at the landfill had already occurred. No significant opposition was recorded during the siting phase of these landfills. This may also be the case for other landfills throughout the country.

The second reason for the lack of public participation in the landfill siting process in Vietnam is rooted in the Vietnam Constitution and the Land Law. These two fundamental legal documents stipulate that the land in the country is a national asset and not citizens' property. People can use lands for their purposes but not possess them. For this reason, siting a landfill in Vietnam can be much easier than in western countries where lands are people's property, as long as the landfill is constructed meeting environmental protection requirements and as long as compensation and settlement policies are tackled properly in accordance with the local residents' acceptable aspirations. However, this is not the case in reality as most of the sanitary landfills built in Vietnam so far have had technical failures in operation. Therefore, the public is now more alert to the government agencies' promise of a safe and sanitary landfill located in the proximity of the community. The loss of trust between project proponents and host communities stems from failures in landfill design and operation. For example, since the waste in Vietnam often has high organic content, most landfill regulations require that wastes must be covered at the end of the day. However, the waste is often left exposed and covered only once every two or three days. As a consequence, most landfills cause serious nuisances to the local community in terms of odor and insects, leading to strong public opposition during the operation phase. One example for this is the case of the Namson landfill in Hanoi. In 1999 and 2001, local residents stopped the trucks from entering the landfill by lying across the access road because of severe environmental pollution that the landfill operation causes in the area. This resulted in a huge amount of accumulated wastes in Hanoi streets for several days (Nguyen 2002). Hence, public opposition has recently been increasing rapidly, which has made it more difficult to site landfills in Vietnam as compared to the past. In Western countries, the public opposes the landfill project right at the beginning, during the siting phase, whereas in Vietnam, the project proponent can easily gain the public acceptance in siting but then lose it during the operation phase (Nguyen 2002).

The third reason for the lack of public participation is that no environmental regulations require public involvement in any environmental activities. Thus, public participation is not mandatory to landfill project proponents, who are actually the provincial governments. This is perhaps a result of the top-down approach in decision-making in Vietnam. Although this approach has been changed in North America for two decades (Kuhn and Ballard 1998), it is still dominant in Vietnam. Indeed, this top-down form facilitates the landfill siting process but

may result in serious consequences in terms of extremely strong public opposition during the operation phase if technical breakdowns occur.

3.6.2.3 Public Participation Framework

The involvement of the public in the selection of landfill locations in Vietnam is becoming more necessary as public opposition is increasing along with the development of the whole country in all respects including environmental awareness. To effectively incorporate public participation into landfill siting, a framework for public participation should be established. Although such a framework needs to take into account country-specific economic, social, technical, political, and cultural characteristics, methods used in North America should be useful with some modifications. The most important factor in implementing public participation is a shift in the decision-makers' way of thinking with respect to long-term educational policies regarding environmental protection and changing perceptions about the role of the public. In this regard, employing public participation as part of the landfill siting process is also a way to help educate people thereby enhancing the public's environmental awareness.

The research on "Citizen and local official involvement in waste management facility siting" by Romano proposed a framework for public participation for North America. This framework includes the following:

- Timeline identifying projected submittal dates, regulatory agency review times and required public involvement activities.
- Schedule of public involvement activities fitted to overall project schedule.
- Listing of target audiences including key contact persons and organizations: local elected officials, media representatives, public interest groups, community leaders, appropriate local employees, and industry leaders.
- Projected staff, budget and other resources.

Romano also introduced a structure for the facility review process by the public divided into several stages as follows:

Phase 1: Project planning and site selection

This phase precedes identification of the site or sites chosen for detailed subsurface investigation. Activities focus on:

- Waste management technology and the need for the proposed facility.
- Early planning work and regional suitability analysis/site selection criteria used to identify candidate sites.
- Gaining an understanding of local values and potential concerns as they relate to siting criteria.
- Explaining opportunities for public involvement that will be provided throughout the process.

Phase 2: Site investigation and proposal development

This phase begins when specific sites are identified. Public interest will expand appreciably at this time. Activities focus on:

- Site investigation work and input on site selection decisions.
- Permit review process.
- Seeking local input on early site design options, and refining the design to be more responsive to local needs and desires.

Phase 3: Permit review and licensing requirements

This phase begins when the proposal is received by the regulatory agency and there is notice for a hearing. Citizens and local officials will likely have a stance on the proposal: for it, against it, or reserving judgement pending agency review and prospective compensation agreements. While continuing public information may be useful, activities focus on conflict resolution mechanisms including negotiations with local representatives, litigation, or applicable statutory remedies such as overriding or binding arbitration.

In discussing the application of the above framework to landfill siting in Vietnam, the procedure suggested in Figure 4 is taken as a template. The assumption made here is that comprehensive public participation programs should be implemented only when there is a proper landfill siting process as recommended earlier. The three phases introduced above can actually fit well in the recommended procedure. A visual illustration of the incorporation of the above framework into the procedure suggested in Figure 4 is given in Figure 5 and briefly described below:

- Since phase 1 in Romano's framework focuses on gaining an understanding of local input regarding the need of the project, potential concerns, community values, and siting criteria, it can be incorporated into the pre-project planning phase and continue until the long list of candidate sites is identified.
- Activities in phase 2 focus on seeking local input in site investigations, permit review processes, and design options. Therefore, this phase can start at the step of identifying the short list of candidate sites, in parallel with the carrying out of the preliminary FS, conceptual design, and preliminary EIA.
- As phase 3 focuses on making the final decision, reviewing permits and requirements, and resolving conflicts, it can begin when the *ad hoc* advisory committee receives and starts reviewing project reports and end when the most appropriate site is approved by the People's Committee.

In adapting the above framework, the characteristics of Vietnam need to be taken into account. For example, the key community concerns about landfill impacts in Vietnam may be different from those in North America and other Western countries. A number of studies in North America such as Nieves et al (1992) and Bacot et al. (1994) showed that economic and social impacts such as property devaluation, fairness and equity, and slow development in the area where the landfill is located, are often ranked high in the list of community concerns; in Vietnam, on the other hand, environmental and human health impacts such as odor, water contamination, noise, dust, and diseases are often the most significant concerns (Nguyen 2002). One of the reasons for this difference is perhaps because technical issues are often well tackled in landfill operation and construction in developed countries, while they are not properly dealt with in Vietnam due to economic and technical constraints. Thus, the public in Vietnam tends to be more concerned about the landfill impacts that directly and immediately affect their daily life. Public participation programs in landfill siting in Vietnam must address these basic concerns if they are to be implemented. In order to apply this framework in Vietnam, it is also necessary to formalize the role of the public in landfill siting through mandatory requirements on public participation in landfill regulations. In doing this, the issue of financial resources for activities related to public participation programs also needs to be addressed.

FIGURE 5: INCORPORATION OF PUBLIC PARTICIPATION INTO LANDFILL SITING PROCESS

3.6.2.4 Public Involvement Techniques

In applying the framework introduced above, the techniques that should be employed to effectively get the public involved are important. Romano stated that "the key to effective public involvement planning is identifying a flexible mix of techniques based on public awareness levels, the degree of controversy likely to surround the proposal and availability of resources and then undertaking specific activities at the appropriate time". He also introduced a set of techniques being used in North America, which can be found in Appendix F with detailed descriptions. Among these techniques – namely, media relations, information meetings, advisory committees, newsletter, public hearings, site visits, survey and mail-cards, and workshops - the first two are probably most appropriate for Vietnam at the present time due to their advantages compared to other techniques. These two techniques require reasonable financial and technical resources, are familiar to people, and are able to reach a large number of community representatives. It is worth noting that although these two traditional techniques have had limited success in satisfying local concerns (Romano), and there has been a tendency to shift from these two techniques to others in North America, they would be appropriate and applicable for Vietnam as a starting point since community concerns in Vietnam are quite basic and the public awareness level is not yet as high as that in North America.

3.6.2.5 Compensation

Another important aspect that needs close attention is the issue of compensation. Again, this is another difference between landfill siting in North America and Vietnam. Compensation has been acknowledged in North America as a useful tool for reducing public opposition to landfills (O'Hare et al. 1983, Portney 1985, Bacot et al. 1994, Kunreuther et al. 1996). Nevertheless, it has not been effectively and efficiently used in Vietnam. The essential reason for this is that most compensation offers have been perceived as too little by local residents. They often claim that the amount of money that the government pays them for removing their houses is not enough for them to resettle or to compensate their loss in terms of life interruption (Nguyen 2002). It should be noted that since there is no private land, the price of land is not accounted for in the compensation package. Compensation is decided solely by the government without any prior negotiation over the amount and type with local residents (Nguyen 2002). Thus, the issue of compensation needs to be taken into

consideration in designing public participation programs as a key issue that often causes significant controversies.

3.6.3 Recommendations

The following are recommendations to have a greater public involvement in landfill siting:

3.6.3.1 Public participation should be incorporated into the landfill siting process through mandatory requirements in landfill regulations.

3.6.3.2 Public participation programs should adequately address the basic concerns of the community about landfill impacts.

3.6.3.3 A framework for public involvement as described above should be adopted. Specific objectives, adequate financial and technical resources, and appropriate schedules should be established in applying this framework.

3.6.3.4 Specific public involvement techniques should be employed. Among various techniques introduced in Appendix F, information meetings and media relations are probably the most appropriate ones for Vietnam as a starting point.

3.6.3.5 The issue of compensation should receive adequate attention in resolving conflicts between the government and the public, although this is a complicated issue that will take time to resolve.

4. SUMMARY OF RECOMMENDATIONS AND IMPLEMENTATION

Properly selecting landfill locations is a challenging task in developing countries. In Vietnam, besides limited financial, technical, and human resources, inadequate organizational structures with overlapping responsibilities, inadequate coordination, top-down approaches, noble ambitious regulations for the short term, and the generality and ambiguity of legal documents are some of the barriers that hinder effective and efficient landfill siting. The main purpose of this research was to propose a set of practical recommendations for removing these barriers. In removing them, a gradual process should be employed as most of the problems cannot be changed overnight and some changes, if implemented improperly, may not bring about the expected positive results but the reverse.

This research provides insight into landfill siting in Vietnam with respect to all relevant issues. These issues include legal texts, criteria, the landfill siting process, urban planning, coordination, information sharing, and public participation. Corresponding to each issue, a number of recommendations are given for improving landfill siting in Vietnam. The full set of recommendations is given below:

1. Legal Texts

1.1 An overall document synthesizing all legal texts related to landfill should be issued. Policy documents and technical guidelines guiding the implementation of these legal texts should be attached therewith.

1.2 The experts in various fields including construction, urban planning, environment, hydrology, geology, and architecture should be adequately consulted in drafting legal documents on landfill-related issues as important input that can considerably contribute to the success of the legal texts once they are issued and implemented in practice.

1.3 The language used in legal texts should be clear and specific whenever possible. Generality and ambiguity should be avoided.

1.4 A set of graded and minimum acceptable landfill standards should be established based on the hierarchy of urban classes from one to five. This set of graded and minimum

acceptable standards can be issued in the form of subsequent guidelines following up the Inter-circular 01/2001.

2. Landfill Siting Criteria

2.1 A full set of objectives, criteria, and possible constraints introduced should be set up and incorporated into legal documents in order to help landfill siting practitioners at the local level in choosing landfill sites.

2.2 Objectives and criteria set out by the national government should be realistic and achievable.

2.3 Flexibility should be given to the local governments so that they can add or modify certain criteria to make them suitable for local conditions. However, several national objectives or national constraints should still be strictly followed. The regulations should clearly point out which objectives, criteria, or constraints can be modified at the local level and which cannot.

3. Landfill Siting Process

3.1 A systematic approach similar to the one introduced in McNally (2003) should be employed in landfill siting. This should include the identification of potential areas.

3.2 Detailed guidelines on the tasks of each step in the landfill siting process should be developed taking into account economic and technical constraints.

3.3 The conceptual design, preliminary FS, and preliminary EIA should be incorporated into the siting phase in order to identify construction costs and environmental impacts which should be included as criteria for comparing candidate sites. Further studies with greater levels of detail can be conducted in the later phases before the landfill is constructed.

3.4 Methods of weighting criteria and ranking candidate sites, taking into consideration local conditions, should be developed and introduced in legal documents in order to provide guidance to landfill siting practitioners.

3.5 More open landfill siting processes through employing a greater number of stakeholders should be adopted in order to reduce subjective assessment and increase alternative views in comparing candidate sites.

3.6 Consulting companies should be responsible for carrying out the landfill project and involved as early as possible in the landfill siting process. The DNRE and DOC play a role of state management. Their responsibilities should only be giving access to data sources, providing financial resources, and supporting consulting companies in doing the work.

3.7 In choosing consulting companies, local ones should be given higher priority than national ones, if they have enough experience and capacity, as local companies are often more familiar with local characteristics. Only when local companies are not capable of doing the work, should national agencies be employed.

4. Urban Planning

4.1 Urban planning projects should only be responsible for proposing potential areas or sites. These potential areas or sites should be considered as suggested ones that can be changed or modified when the landfill siting process is carried out in practice at the local level. Therefore, the phrase "Landfill locations must be selected in compliance with the urban master planning project" should be removed from the regulations.

4.2 Inter-municipal landfill projects should be taken into consideration in landfill siting due to their benefits. Barriers to such projects should be removed and decision-makers' perception of difficulties should be changed. The national government should issue specific guidelines on the issue to direct local agencies, taking into account administrative, institutional, economic, social, and technical aspects.

5. Responsibilities, Coordination and Information Sharing

5.1 The DOC should be mandated to be the main agency responsible for landfill siting at the local level. The DNRE should play only a secondary role as a consulting and supporting agency in terms of providing access to data and information and giving advice on environment-related issues. The DOC's responsibilities should include selecting consulting

companies to carry out technical reports and signing contracts with them and supervising contracts execution with respect to quality and schedule.

5.2 The role of each relevant agency in the landfill siting process should be well defined. The distribution of responsibilities and jurisdictions among them should be clearly mandated and overlaps should be avoided. Whenever the term “coordination” is used in legal texts to describe the relationship between two or more relevant agencies, it should be clearly defined.

5.3 Existing overlapping responsibilities between the MOC and MNRE and between the DOC and DNRE should be removed.

5.4 *Ad hoc* advisory committees for landfill siting projects should be adopted. This committee should consist of the representatives of all relevant agencies. It should be established when necessary and dismissed when it has accomplished its tasks. The committee should be chaired by the DOC under the guidance and control of the provincial PC. Also, the committee should be responsible for reviewing all project reports before submission to the PC for approval.

6. Public Participation in Landfill Siting

6.1 Public participation should be incorporated into the landfill siting process through mandatory requirements in landfill regulations.

6.2 Public participation programs should adequately address the basic concerns of the community about landfill impacts.

6.3 A framework for public involvement as described above should be adopted. Specific objectives, adequate financial and technical resources, and appropriate schedules should be established in applying this framework.

6.4 Specific public involvement techniques should be employed. Among various techniques, information meetings and media relations are probably the most appropriate ones for Vietnam as a starting point.

6.5 The issue of compensation should receive adequate attention in resolving conflicts between the government and the public, although this is a complicated issue that will take time to resolve.

Proposed Implementation Process for Improvements

The most important prerequisite for removing current obstacles is that decision-makers at government agencies relevant to landfill siting at all levels need to be willing to make modification to existing institutional structures. In doing so, any substantial resistance or perception that the barriers are insurmountable should be removed.

An order of implementation for all of the changes needs to be established. Some of the changes may receive higher priority because they are more urgent in the short term or are easier to implement. Others may be developed later because they call for significant resources or have anticipative significant difficulties in administration, which can often be achieved only in the long term. A suggested order of implementation for the recommendations is shown in Table 4. The first column of the table gives a proposed order of priority for implementing the recommendations. Where the number appears twice, it means that the two recommendations should be implemented at the same time because they are interdependent with each other. The second column states the recommendation numbers and issue. The third column summarizes the recommendations.

Among the six mentioned areas relevant to landfill siting in Vietnam – namely, Legal Texts, Criteria, Landfill Siting Process, Urban Planning, Responsibilities, Coordination and Information Sharing, and Public Participation - in general, the recommendations on Criteria should be implemented first as they are technical ones that can be made if experienced officials and experts in the various domains are adequately consulted. The recommendations on Legal Texts can be implemented in the next step, or in parallel with those on Criteria, since they are also basically technical in nature. One of the reasons for implementing the recommendations on Criteria and Legal Texts early in the process is to create a proper legal ground for other changes that should be made in the subsequent phases. The recommendations on Urban Planning can be done next, as they are within the urban planning field and do not significantly influence other areas. The next step may be to implement the recommendations on the Landfill Siting Process, as they do not significantly

TABLE 4

ORDER OF IMPLEMENTATION FOR IMPROVEMENTS

Order of Implem-entation	**Recommendation Issue & Numbers**	**Recommendation** (summary)
1	Criteria 2.1, 2.2, 2.3	Establish a full set of objectives, criteria and constraints in the form of regulations following up VR 01/2001
2	Legal Texts 1.1, 1.3	Issue an overall document synthesizing all legal texts related to landfill
3	Landfill Siting Process 3.1, 3.2	Add the step of *identifying potential areas* to VR 01/2001. Provide detailed guidelines on the tasks of each step in the process
4	Legal Texts 1.2, 1.4	Establish a set of graded and minimum acceptable landfill standards based on the hierarchy of urban classes from one to five and in the form of subsequent guidelines following up VR 01/2001.
5	Urban Planning 4.2	Start considering inter-municipal landfills and issue relevant guidelines
6	Urban Planning 4.1	Relax requirements for and responsibilities of landfill locations in urban planning projects; and remove the phrase “Landfill locations must be selected in compliance with the urban master planning project” in regulations
7	Landfill Siting Process 3.1	Issue guidelines on the methods of carrying out landfill siting projects based on the approach introduced by McNally (2003)
8	Landfill Siting Process 3.4	Issue guidelines on the methods of weighting criteria and ranking candidate sites
9	Landfill Siting Process 3.3	Issue regulations that require a conceptual design, preliminary FS and preliminary EIA as part of the landfill siting process
10	Landfill Siting Process 3.5, 3.6, 3.7	Get consulting companies involved early in the landfill siting process as the ones that directly carry out landfill siting and technical reports
10	Responsibilities, Coordination & Information Sharing 5.1	Mandate the DOC to be the main agency responsible for any landfill siting issues
11	Responsibilities, Coordination & Information Sharing 5.2, 5.3	Redefine the roles and responsibilities of the MOC, MNRE, DOC, DNRE in landfill siting; and remove existing overlaps
12	Responsibilities, Coordination & Information Sharing 5.4	Adopt an *ad hoc* advisory committee, which is chaired by the DOC and under direct control of the PC
13	Public Participation 6.1	Issue regulations that require public participation in landfill siting
14	Public Participation 6.2, 6.3, 6.4	Adopt a practical framework for public participation
14	Public Participation 6.5	Employ public involvement techniques

affect the existing organizational structure. Only when all of the changes in Criteria, Legal Texts, Urban Planning, and Landfill Siting Process have been made as a preparation, should the recommendations on Coordination and Information Sharing be implemented, because this step in the implementation process would cause changes to the existing organizational structure of the government agencies involved in terms of both political and economic issues. For example, by assigning the DOC to be the only agency responsible for landfill siting issues, some of the jurisdiction and political power of the DNRE will be taken away, which may be contrary to the DNRE's aspiration. Moreover, in doing so, more financial resources need to be allocated to the DOC in order for it to carry out the contracts on landfill siting and technical reports signed with consulting companies. This is an issue that the provincial government has to adequately address, considering the limited local budget.

Last but not least, recommendations on Public Participation should be implemented in order to comprehensively improve the whole procedure landfill siting in Vietnam. However, since most of the barriers to implementing public participation programs are rooted in the fundamental laws of the country such as the Constitution, the Environmental Law, and the Land Law, a greater participation of the public in landfill siting processes is a goal for the long term. Yet, a step-by-step process for getting the public involved in the landfill siting process still needs to be adopted in order to gradually change the decision-makers' perceptions about the public role. Again, the most important prerequisite in doing this is the willingness of decision-makers to change because they are the very people that decide whether or not such a gradual process should be employed.

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APPENDICES

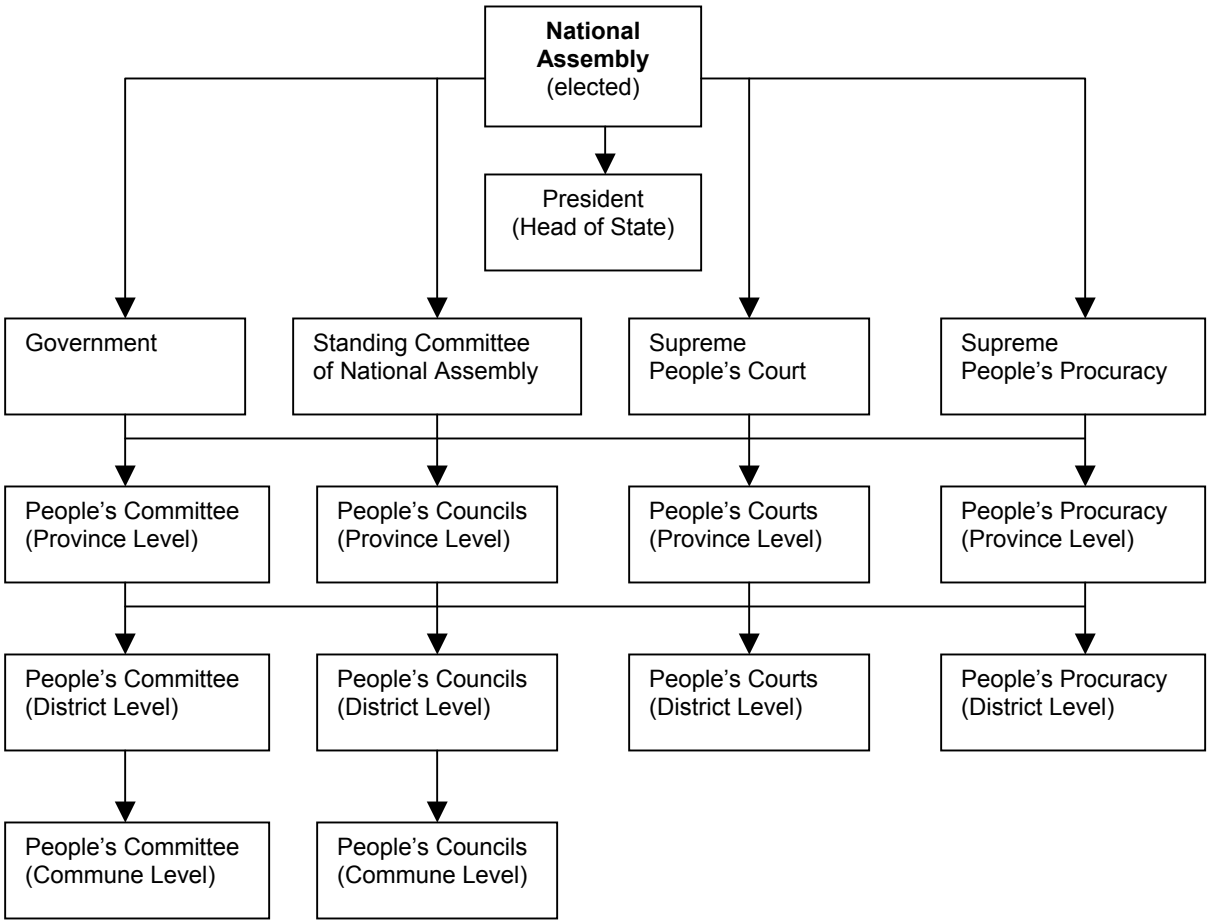
APPENDIX A

LIST OF GOVERNMENT AGENCIES AND INSTITUTIONS INTERVIEWED

Date of Interview	Name
27 May 2002	DAPM – MOC
28 May 2002	Division of Pollution Control, Environmental Incidents and Waste Management - NEA - MNRE
29 May 2002	CRURE - MOC
30 May 2002	Vietnam Consulting Company - MOC
5 June 2002	Hanoi CAO
6 June 2002	URENCO Viettri, Phutho Province
6 June 2002	Phutho DNRE
7 June 2002	Hanoi University of Civil Engineering
22 June 2002	Environment Protection Research Center - University of Danang
26 June 2002	Danang Department of Land Administration
26 June 2002	Danang IURP - Danang DOC
27 June 2002	Flooding Prevention and Water Management Board - Danang DARD
1 July 2002	URENCO Danang
4 July 2002	Division of Environmental Management - Danang DNRE
6 July 2002	Hydrometeorological Service for Central Area of Vietnam
15 July 2002	Institute for Environment and Natural Resources - National University of Hochiminh City
16 July 2002	Centre for Technology and Environmental Management Application - Hochiminh City
16 July 2002	Team Leader of Dongthanh Landfill - Hochiminh City
17 July 2002	Division of Environmental Management - Hochiminh City DNRE
17 July 2002	URENCO Hochiminh City - Hochiminh City TUPWS
18 July 2002	Department of Environment - Hochiminh City University of Polytechnique
19 July 2002	Hochiminh City IURP - Hochiminh City CAO

APPENDIX B

STRUCTURE OF GOVERNMENT IN VIETNAM
(Source: UNDP 1995)



APPENDIX C

URBAN ADMINISTRATIVE STRUCTURE

APPENDIX D

GOVERNMENT AGENCIES INVOLVED IN WASTE MANAGEMENT

1. Agencies at National Level

Ministry of Natural Resources and Environment (MNRE): a central agency in charge of environmental management and protection in Vietnam. Its role in waste management is to issue guidelines, regulations, and standards on waste management in coordination with other ministries, compile annual and long-term waste management plans, formulate policies and strategies, plan and allocate budgets for research and development relating to waste treatment projects, supervise waste management activities, inspect the operation of waste treatment facilities, and appraise and approve EIAs for waste treatment projects (UNDP 1995). It is noteworthy that this ministry has just been formed recently in August 2002. Its precursor is the Ministry of Science, Technology and Environment (MOSTE). The former MOSTE was separated into two new ministries: Ministry of Natural Resources and Environment, and Ministry of Science and Technology.

National Environment Agency (NEA): the environmental arm of MNRE specifically tasked with the environmental protection mandate, whose responsibilities are stipulated by MNRE. Its duties concerning waste management are formulating policies, strategies, regulations, and guidance all of which are then approved and issued by MNRE; setting up, managing and monitoring systems throughout the country; appraising EIAs for waste treatment projects; and organizing and guiding public activities and participations in environmental protection through training, educating, and enhancing the public's environmental awareness (UNDP 1995).

Ministry of Construction (MOC): a central ministry with the highest authority in solid waste management and landfill siting. Its responsibilities and jurisdiction in solid waste management are diverse as follows:

- Direct the inspection and supervision of the drawing up and implementation of the urban planning and development of localities under the environment protection standards, issue guiding documents, and draw up plans for the arrangements of landfill sites in urban areas and industrial zones (Directive No.199, 1997 and Join Circular No.01, 2001).
- Direct provincial and municipal DOCs in drawing up planning and plans for construction of landfills and submitting them to PCs for approval (Inter-ministerial Circular No.1590, 1997).
- Coordinate with provinces, cities and MNRE in directing and supervising urban management with special attention paid to waste collection, transport, treatment, and landfilling in a way that ensure environment standards (Inter-ministerial Circular No.1590, 1997).
- Issue procedures, norms, guidance, guiding documents, and technical design standards for waste collection, transport, and treatment systems (Inter-ministerial Circular No.1590, 1997).
- Compile national strategies for solid waste management in the country in conjunction with MNRE.

National Institute for Urban and Rural Planning (NIURP): a key agency for urban planning in Vietnam operating under control and direction of MOC. It is responsible for: draw up

regional, city, and detailed plans for urban and suburban areas, give priorities for urban development projects, control land use according to approved planning and regulations, and take responsibility for the quality of urban architecture, landscape and environment (Le and Luu 1997). Regarding waste management and landfill siting, the institute plays a crucial role because all proposed landfill locations should be introduced and shown in urban master plans that it draws up. Those urban master plans are the basis and precursor for any landfill projects following up.

Department of Architecture and Planning Management (DAPM): another key agency in urban planning and management in Vietnam together with NIURP, operating under MOC. It has the function of supporting the Minister of Construction in state management of architecture, planning, construction, land use, and urban and rural public works. The responsibilities of the department with respect to landfill siting are slightly different from those of NIURP: involving in management issues while NIURP directly draws up urban plans. It is considered as a consultant for the Minister in making decisions on the selection of landfill locations.

Center for Research and Planning on Urban and Rural Environment (CRURE): under NIURP with the following responsibilities: research and prepare planning and environmental projects in urban and rural areas, observe and monitor urban and rural environmental pollution, conduct EIAs for construction projects, and provide consulting services on environmental and construction projects (Le and Luu 1997). CRURE contributes to solid waste management and landfill siting in two main ways: conducting national and ministerial scientific reports on solid waste management and preparing waste management strategies for various urban areas, whose results are then taken into account as basis for promulgating regulations, directives, or decisions of the Minister of Construction on solid waste management issues; and providing specific consulting services such as undertaking EIA, feasibility study, concept and technical design for waste treatment facilities and especially helping local organization carry out landfill siting projects.

Ministry of Industry (MOI): with respect to waste management, this ministry is concerned mostly with industrial waste. Its responsibilities are: direct, inspect, supervise, and take measures to force businesses and establishments to strictly comply with regulations on industrial waste managements; and coordinate with waste disposal units in disposal of industrial waste (Directive No.199, 1997).

Ministry of Health (MOH): similar to MOI, MOH involves in only hospital waste. Its responsibilities in terms of waste management are basically inspecting and supervising hospital waste treatment activities (Directive No.199, 1997).

Ministry of Planning and Investment (MPI): the most influential policy maker at the ministry level because its main task is to propose to the Government for approval of the overall national allocation of state budget. Regarding waste management, MPI together with MOF consider and provide funding and financial sources for other ministries, government agencies, and localities to implement waste management plans based on their annual and long-term waste management plans (Directive No.199, 1997). Furthermore, MPI in coordination with MOF also issue economic incentives to facilitate waste management activities.

Ministry of Finance (MOF): together with MPI allocate budgets for waste management activities. However, it focuses more specifically on financial and pricing issues (Directive No.199, 1997).

Ministry of Culture and Information (MCI): direct the dissemination and popularization of legal documents on waste management in order to raise awareness and responsibility of the public (Directive No.199, 1997).

2 Agencies at Local Level

People's Council: the local representative of state authority. It is elected by local people and has highest authority at local levels (Le and Luu 1997).

People's Committee (PPC): the executive branch of the People's Council, responsible for state administration at the local level (Le and Luu 1997). PPC directly exercise their environmental management function under the national government. Its responsibilities in waste management are as follows:

- Implement state management regulations on environmental protection in their respective localities, direct their functional agencies in organizing, coordinating with the functional agencies of the central level in working out annual and long-term plans for waste management, and taking measures to help their localities well perform their tasks for environmental hygiene (Directive No.199, 1997).
- Make approval of waste treatment projects in their localities based on demographic, socio-economic, and industrial conditions of each locality (Inter-ministerial Circular No.1590, 1997).
- Mobilize investment capital from various sources for the construction of landfills and work out mechanisms to encourage non-governmental organizations to take part in waste management activities (Inter-ministerial Circular No.1590, 1997).
- Direct the provincial/municipal DNRE and DOC in carrying out waste treatment projects in terms of design, construction, monitoring, EIA, etc., according to Vietnam's environmental and construction standards (Inter-ministerial Circular No.1590, 1997).
- Direct the provincial/municipal TUPWS and URENCO in organizing waste collection, transport, and treatment activities and make approval of waste collection and treatment fees based on recommendations of provincial/municipal DFP (Inter-ministerial Circular No.1590, 1997).

Chief Architect Office (CAO): the main agency responsible for spatial planning in the two largest cities in Vietnam: Hanoi and Hochiminh City. There are currently only 2 CAOs in the country, namely Hanoi Chief Architect Office and Hochiminh City Architect Office. Other provinces and cities do not have this kind of office. Instead, they have Institutes for Urban and Rural Planning (IURP) operating under Departments of Construction (DOC), which are responsible for spatial planning of the province or city. Under Hanoi and Hochiminh City CAOs, there are also IURPs operating as the consultants for CAOs in drawing up urban master plans that should help to avoid or reduce urban environmental problems. Such urban master plans should indicate locations of waste treatment projects such as waste transfer stations and landfill sites. Apart from CAO and IURP under it, Hanoi and Hochiminh City also have their DOCs. These DOCs work independently from CAOs in terms of spatial planning and focus more specifically on housing and construction issues.

Department of Construction (DOC): an agency at the provincial level, operating under influences of both PPC and MOC. Its responsibilities in waste management and landfill siting are: supervising the implementation of urban master plans of the province or city that have been carried out by NIURP and approved by the Prime Minister, organizing the designing and construction of landfill projects according to environmental and construction standards, supporting PPC in making decisions on waste treatment facility projects, and reporting and proposing appropriate landfill sites to PPC for approval in coordination with DNRE.

Institute for Urban and Rural Planning (IURP): a planning arm of DOC, focuses specifically on spatial planning of the province or city. It has responsibilities for drawing up detailed plans for areas in the province or city. However, urban master plans, which indicate proposed landfill sites, are often carried out by NIURP with approval of the national government.

Department of Natural Resources and Environment (DNRE): similar to DOC, it also operates under the influences of both parties: PPC in terms of administrative and political relations and MNRE in terms of collaboration, support, and technical guidance. DNRE plays an important role in waste management with respect to monitoring environmental quality, managing and implementing waste management policies and regulations issued by MNRE and PPC, appraising EIAs for waste treatment projects, and coordinating with DOC and URENCO in considering and choosing candidate landfill sites, all of which are then proposed to PPC for approval of the most appropriate site.

Urban Environment Company (URENCO): the main company in charge of waste collection, transport, and treatment in the province or city. The name URENCO varies from province to province and from city to city. For example, in Hanoi, its official name is URENCO; in Viettri (Phutho Province), it is called Urban Environment Services Company; and in Hochiminh City, it is named Waste Disposal Company. However, no matter how the name of the company varies, it is always the only company directly responsible for waste management activities. For this reason, the term URENCO will be used to refer to the same agency in different provinces or cities throughout this report. It is worth noting that in Hanoi and Hochiminh city, URENCO operates under and agency named Transport and Urban Public Works Service (TUPWS). In other provinces and cities, URENCO is an independent agency. Regarding landfill projects, URENCO is often assigned to be the only agency being the owner of the landfill project, who then also manages and operates the landfill over its operation life. Nevertheless, URENCO has no responsibility for choosing landfill sites except for facilitating and hiring consulting companies to carry out landfill siting projects. It is necessary to emphasize that the agency that directly executes landfill siting process varies from province to province. In many provinces, consulting companies are often hired to do landfill siting process and the result of that process will be submitted to DOC, DNRE, and PPC for approval. In other larger provinces/cities, like Hanoi and Hochiminh City, the landfill siting process may be carried out by DOC and DNRE themselves.

APPENDIX E

VIETNAMESE LEGAL TEXTS RELATED TO LANDFILL DESIGN AND SITING

1. Vietnam Standards TCVN 4449 : 1987 - *"Urban Planning – Design Standards"*

2. *The Law on Environmental Protection*
Passed on 27th December 1993, went into effect on 10th January 1994.

3. Decree No.91/CP, issued by the Government, 17th August 1994 - *"Regulation on urban planning management".*

4. Decree No.175/CP, issued by the Government, 18th October 1994 - *"Guiding the implementation of the law on environmental protection".*

5. Guidance No.1420/QD-MTg, issued by MOSTE, 26th December 1994 - *"Instruction for guiding environmental impact assessment to the operating units".*

6. Circular No.715/MTg, issued by MOSTE, 3rd April 1995 - *"Guiding the setting up and appraisal of assessment report on environmental impact".*

7. Construction Standards – December 1996.

8. Directive No.199-TTg, issued by the Prime Minister, 3rd April 1997 - *"Urgent measures to manage solid waste in urban areas and industrial zones".*

9. Inter-Ministerial Circular between MOSTE and MOC, No.1590/1997/TTLT-BKHCNMT-BXD, 17th October 1997 - *"Guiding the implementation of directive No.199-TTg 3rd April 1997 of the Prime Minister on urgent measures to manage solid waste in urban areas and industrial parks".*

10. Decision No.152/1999/QD-TTg, issued by the Prime Minister, 10th July 1999 - *"Ratifying the strategy for management of solid waste in Vietnamese cities and industrial parks till the year 2020".*

11. Official Letter from MOC to People's Committees No.2788/BXD-KTQH, 14th October 1999 - *"Construction management and infrastructure development".*

12. Joint Circular No.01/2001/TTLT-BKHCNMT-BXD, 18th January 2001 - *"Guiding the regulations on environmental protection for the selection of location for the construction and operation of solid waste and burial sites".*

13. Vietnam Construction Standards TCXDVN 261 : 2001 - *"Solid waste landfills – Design standard".*

14. *Guideline for carrying out EIA for infrastructure projects* (including solid waste management projects) is being compiled by CRURE and will be submitted to MOC in 2003 for approval (according to CRURE).

15. *Guideline for carrying out EIA for landfill and solid waste management projects* is being developed by NEA and will be submitted to MNRE in 2003 for approval (according to NEA).

APPENDIX F

PUBLIC INVOLVEMENT TECHNIQUES

(Adapted from a research on "Citizen and local official involvement in waste management facility siting" by Romano)

1. Advisory Committees

Advisory committees are formally appointed representative groups established to study lay and professional concerns and to make recommendations for action. At the outset of formation, members must clearly understand the committee's charges and responsibilities, its membership, what time commitments are anticipated, how advice is to be delivered and how responses will be indicated. An odd-numbered group no larger than 9 or 11 individuals is felt to work best. Scheduled meetings run by a self-selected chairperson from a formal agenda are suggested. A committee workplan identifying key tasks, written products and deadlines may also prove valuable. The committee should be formed as early as it can be useful and dissolve when it feels its tasks are completed.

Advantages	*Disadvantages*
- Involve responsible group early in process; bridge for later discussions and negotiations - Can contribute to feeling of local problem and solution ownership - May assist in gaining community support for proposal - Provides warning signal on key problems and concerns - Helps establish validity of factual information related to proposal, and dispels false rumors - Reduces need for community meetings by continuos two way communication with representative group	- Can be time-consuming - Can be expensive - Local representatives may fear being co-opted or perceived as "window dressing" - Public may mistake role of committee and consider them decision-makers - Developer may fear unreasonable demands, hostile atmosphere with no issue resolution - Minority opinions may be suppressed leading to later problems - Representatives do not necessarily speak or vote for their constituency

2. Hearings

Hearings are formal public meetings usually required by law to discuss a proposal subject to agency review.

Advantages	*Disadvantages*
- New information about the proposal's impacts may be provided - Opportunity for public to ask questions and voice opinions - Traditional technique familiar to many citizens - Lends legitimacy to permit review process	- Ventilation of highly developed positions in public forum; no compromise likely - Often too little, too late to influence proposal or review - Does not usually allow two way communication - Citizens may be hesitant to appear at formal proceeding

3. Information Meetings

Public information meetings are less formal gatherings designed to provide basic information, answer questions, and generate discussion of key issues. Graphics and maps enhance verbal presentations. Meetings may be broken down into discussion groups depending on attendance and whether the focus is on information provision or discussion. Meeting should be well publicized. In addition to newspaper ads and radio or television spots, mailing to key organizations and local influentials is also effective. At meetings, repeat important information even if this is repetitious for some. This is especially important when specific sites are identified, and newcomers are unaware of earlier planning and site selection work. Information meetings also provide a good opportunity to identify contact persons, document repositories and future public involvement activities.

Advantages	*Disadvantages*
- Provide factual information to large groups - Dispel false rumors - Gain input for site selection criteria or refining proposal - Chance for citizens to ask questions and voice concerns - Explain project early in the process; avoid charges of clandestine work	- Lack of good two way communication leads to apathy - Little interest until sites selected, then attitude may be primarily hostile - Extensive announcements can be expensive

4. Newsletter

Newsletters are distributed publications discussing project progress, key issues and points of information. The name, address and phone number of a contact person should be identified. The mailing list might include elected officials, key business and community leaders, public interest and civic groups, the media, information meeting attendees, and anyone else considered valuable to inform. Attractive color stock, photos and graphics are helpful.

Advantages	*Disadvantages*
- Effective way to reach wide audience from a distance - Reaches people who may not have time, or wish to appear at a meeting or hearing - Provides factual information, dispels rumors - Opportunity to demonstrate responsiveness to local concerns, explain positions on key issues	- Can be expensive, depending on distribution and quality of the publication - Glib, slick material may provoke negative reactions; sales job issue - Can be time-consuming

5. Site Visits

Site visits are field trips to proposed sites, or closed or existing facilities to help sensitize participants to potential project impacts. Bus tours might be arranged for an advisory committee, local decision-makers, or abutters to the proposed site. Arrange tours in advance and choose destinations carefully. A visit to a poorly operated facility can undo months or progress.

Advantages	*Disadvantages*
- Visual understanding of project is invaluable - May reduce skepticism about ability to operate facility properly	- Time-consuming and expensive, especially where sites are distant - Project opponents can usually find a bad example to visit

6. Surveys and Mail-Cards

Surveys or mail-cards can request information regarding public attitudes and opinions. Surveys should include a cover letter explaining how the information will be used, and identifying the survey sponsor. Post card or telephone follow-ups or replacement questionaires can be used to improve response rates.

Advantages	*Disadvantages*
- Gain public comments and concerns at early stage, or gauge level of opposition at later stage - Anonymous responses tend to be candid	- Can be expensive - Difficult to achieve statistically significant return rate without follow-up

7. Workshops

Workshops are structured sessions run by trained facilitators in which participants explore key issues, and identify potential problems and solutions. Individuals should wear name tags and introduce themselves, explaining their reasons for involvement. The approach encourages “hands on” experience with maps and engineering plan sheets. Ideas can be recorded on flipcharts and summarized periodically. A nominal group exercise may prove effective in reaching group closure on specific tasks within tight time constraints. Facilitators may also be used as “shills” to float ideas others feel uncomfortable presenting.

Advantages	*Disadvantages*
- Excellent two way communication; everyone learns - Structured setting promotes task accomplishment - Opportunity for participants to re-examine views and change outlook based on group experience - Brainstorming and spontaneity are encouraged	- Requires careful preparation and well-trained leaders to be effective - Preparation and conduct can be time-consuming - Difficult personality can disrupt session

8. Media Relations

While not a specific technique, media relations can contribute heavily to the success or failure of a proposal. It is critical that local media is kept informed throughout the siting process with timely press releases and briefings that are honest, accurate and factual. It may be valuable to arrange a special session for local media at the outset of a project to describe background work and future directions and to provide factsheets and other information materials. Technical jargon should be avoided, and controversies should be dealt with explicitly. Answer questions carefully and thoroughly whenever possible. Evasive, circuitous responses can be especially damaging.

APPENDIX G

LIST OF COLLECTED REPORTS ON LANDFILL PROJECTS IN VIETNAM

Hanoi:

1. Japan International Cooperation Agency (JICA). 1999. *The Study on Environmental Improvement for Hanoi City: Interim Report. Vol.3. Nam Son Landfill.* Hanoi People's Committee.

2. Japan International Cooperation Agency (JICA). 1999. *Feasibility Study Report: Solid Waste Treatment Complex Nam Son, Hanoi up to 2020.* Hanoi People's Committee.

3. Japan International Cooperation Agency (JICA). 1999. *Solid Waste Collection and Sorting – Planning for Transfer Stations in Hanoi up to 2020.* Hanoi People's Committee.

Phu tho:

4. Centre for Research and Planning on Urban and Rural Environment (CRURE). 2001. *EIA, Feasibility Study, and Detailed Plan for Tramthan Industrial Waste Treatment Complex.* Phutho People's Committee.

5. National Institute for Urban and Rural Planning (NIURP). 2000. *Viet Tri Urban Master Plan.* Phutho People's Committee.

Danang:

6. Australian Agency for International Development (AusAID). 1998. *Danang Sanitation Project: Environmental Report – Solid Waste.* Danang Environment Company.

7. National Institute for Urban and Rural Planning (NIURP). 1998. *Danang Urban Master Plan.* Danang People's Committee.

Ho Chi Minh City:

8. CENTEMA. 1997. *Residential Solid Waste Management in Hochiminh City.* Hochiminh City Department of Science, Technology, and Environment.

9. Hochiminh City Institute for Urban and Rural Planning. 1997. *Master Plan for Solid Waste Management in HCM City up to 2020.* Hochiminh City People's Committee.

10. CENTEMA. 2001. *EIA and Feasibility Study Report : Da Phuoc Solid Waste Treatment Complex.* HOWADICO.

11. CENTEMA. 2000. *EIA Report: Upgrading Quality Solid Waste Project Gocal Landfill.* HOWADICO.

Long An:

12. Institute for Environment and Resources – Hochiminh City Natural University. 2002. *Assessment on Existing Status and Recommendations on Solid Waste Management in Long An Province.* Long An Department of Science, Technology, and Environment.

13. Tropical Technology Centre. 1998. *Feasibility Study Report: Duc Hoa Landfill.* Long An Department of Science, Technology, and Environment.

14. Environmental Technology Centre. 1998. *Feasibility Study and Planning Report: Benluc Industrial Waste Landfill.* Long An Department of Science, Technology, and Environment.

Binh Phuoc:

15. CENTEMA. 1999. *Plan for Landfills for Residential and Industrial Waste in Binh Phuoc Province – Technical Design for A Landfill in Dong Xoai Town.* Binh Phuoc Department of Science, Technology, and Environment.

Bac Ninh:

16. Centre for Research and Planning on Urban and Rural Environment (CRURE). 2002. *Integrated Solid Waste Planning for Inter-municipalities in Bac Ninh Province up to 2020.* Bac Ninh People's Committee.