RISKS IINDUCED BY THE LAND USE OF WASTE LANDFILL SITE AND ITS EVALUATION

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1. INTRODUCTION

Waste landfill sites are expected to create new land space after its closure. However, they have been used only as park or recreational areas, since the waste material continues to have the potential of environmental pollution (landfill gas, leachate) even after the landfill sites are closed, and their physical properties are unknown due to their heterogeneity and variation. In 2004, Japanese legislation on waste disposal regulated that waste landfill site after its closure is registered to the database and should be well controlled in its land use according to several criteria to achieve the compatibilities between promoting the further utilization and controlling the risks induced by the land use. The technical committee published the guideline on the framework on the registration procedure of the closed landfill and the criteria to be followed in their land use. However, further researches are required to establish the risk assessment method on the land use, and promote the advanced use of them, such as the construction of heavy structures. In this research, by reviewing the literatures and previous researches, risks induced by the land use of waste landfill sites are summarized, including the methods for their evaluation and effective reduction. Furthermore, the framework to estimate and control the risks induced is proposed.

2. OUTLINE OF RESULTS

Table 1 shows the risks from environmental and geotechnical viewpoints, which are considered to occur in the case that the surface layer of least-controlled landfill site is utilized. In this research, potential risks associated with the land use of landfill sites are listed based on the previous researches, and they are categorized according to 1) type of landfill site, 2) type of waste material, and 3) purposes of the land-use. Effects of construction works (excavation, construction of base or embankment, pile installation, removal of landfill cover) on these risk values are investigated from physical and biochemical aspects. Also, countermeasures for reducing these risks are summarized, mainly for landfill gas removal and ground improvement technique for waste layer. Finally, risks induced by the land use of landfill for municipal solid waste are discussed considering the types of waste; incinerated ash and organic-rich garbage (Fig. 1).

Table 1. Risks induced by the land use of least-controlled landfill site (Utilization on the surface layer)

Risk	Trigger	Criteria
Dust generation	Excavation, Construction	Wind velocity ≥ 5.5 m/s
Settlement of waste layer	Heavy load Construction of base, embankment Heterogeneity of waste	Not significant differential settlement
		Residual settlement < 10 cm
Insufficient bearing capacity	Heavy load Construction of base, embankment	N-value by SPT: 4~8
		Allowable bearing capacity: 2.5~5 t/m^2

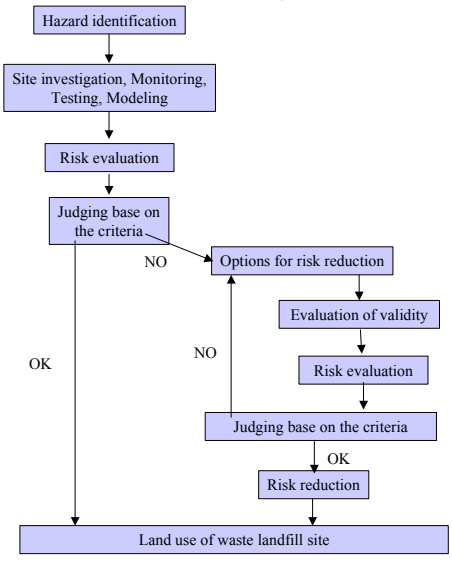

Fig. 1 Framework for the risk control