

DECLARATION

I declare that this research report is my own unaided work. It has never been submitted for any degree or examination in any University or carried out by any institution before.

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Date:

DEDICATION

To my aunt Gladys Mahlalela and my late uncle H.R.H. Prince Duma.

To all those who still believe in the power of hardwork and are inspired by God's creation and his presence. To all those who bring development yet keep in mind the importance of its sustainability and the improvement of the quality of life.

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Lastly, I would also like to thank the case study landfill operator for allowing me to use their geohydrological assessment reports. They have requested to remain anonymous in this report.

TABLE OF CONTENTS

DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENTS	iii
ABSTRACT	iii
LIST OF APPENDICES	vii
LIST OF TABLES	viii
LIST OF FIGURES	x
1. INTRODUCTION	
1.1 General Introduction	1
1.2 Aims and Objectives	1
1.3 Methodology	2
2. RISK ASSESSMENT	
2.1 Introduction	3
2.2 Protecting the Environment using a Risk Assessment Approach	3
2.3 Risk Assessment for Landfills in South Africa	4
2.4 Landfill Effects on the Environment	5
2.5 General Risk Assessment Process	6
2.6 Conclusion	11
3. WASTE LEGISLATION IN SOUTH AFRICA	
3.1 Introduction	12
3.2 Relevant Legislation	12
3.3 Conclusion	21
4. ENVIRONMENTAL LIABILITY	
4.1 Introduction	22
4.2 Environmental Liability	22

4.3 Categories of Environmental Liability	22
4.4 White Paper on Environmental Liability	24
4.5 Liability in South African Waste Legislation	25
4.6 Conclusion	27
5. AQUIFER CLASSIFICATION IN SOUTH AFRICA	
5.1 Introduction	28
5.2 Aquifer Yield Classification	28
5.3 Flow Mechanism Classification	29
5.4 Potential Value Classification	30
6. DWAF MINIMUM REQUIREMENTS	
6.1 Introduction	31
6.2 Landfill Classification	31
6.3 Landfill Lining System	34
6.4 Water Quality Monitoring System	39
6.5 Conclusion	42
7. CASE STUDY	
7.1 Introduction	44
7.2 Methodology	44
7.3 Landfill X	44
7.4 Review of the Groundwater Monitoring Protocol	49
7.5 Conclusion	57
8. ENVIRONMENTAL LIABILITY PARAMETERS	
8.1 Introduction	58
8.2 Current DWAF Parameters for Monitoring	58
8.3 Monitored Parameters in Case Study	59
8.4 Liability Parameters	62
8.5 Conclusion	62

9. PROPOSED RISK MANAGEMENT APPROACH	
9.1 Introduction	63
9.2 Initial Investigation Phase	63
9.3 Operational Phase (Pollution Not Detected)	67
9.4 Operational Phase (Pollution Detected)	67
9.5 Incentives Programme	70
10. CONCLUSION	71
REFERENCES	73
APPENDIX	80

LIST OF APPENDICES

A – List of VOC’s measured at Landfill X	81
B – List of SVOC’s measured at Landfill X	82
C – Current Process of obtaining Landfill Operating Permit	83
D – Sequential Steps for the Design of a Water Quality Monitoring System	84
E - Proposed Environmental Liability & Risk Management Methodology for Initial Phase	85
F - Proposed Environmental Liability & Risk Management Methodology for Operational Phase	86
G – Environmental Consequences of Liner Failure to Groundwater Response Action Plan	87
H – Minimum Requirements for Landfill Operation Monitoring	88
I – Minimum Requirements for Water Quality Monitoring at a Landfill	89
J – Aquifer Yield and Significance Table	90
K – Landfill Liner Design Layers	91

LIST OF TABLES

Table 5.1: Aquifer Potential Yield Classification	30
Table 5.2: Aquifer Potential Significance Classification	30
Table 6.1: Landfill Size Classification	33
Table 6.2: Landfill Liner System Design Requirements	35
Table 6.3: Landfill Liner System Design Requirements	36
Table 6.4: Water Quality Monitoring System Requirements	40
Table 6.5: Selected minimum monitoring requirements	42
Table 7.1: Landfill X Monitoring Borehole Depths	46
Table 7.2: Guidelines for Domestic Water Use	47
Table 7.3: Landfill X Organic Constituents	48
Table 8.1: DWAFF Parameters for Detection Monitoring	59
Table 8.2: DWAFF Parameters for Background and Investigative Monitoring	59
Table 8.3: Inorganic Parameters Monitored	60
Table 8.4: Volatile Organic Parameters Monitored	60
Table 8.5: Semi Volatile Organic Parameters Monitored	61
Table 9.2: Monthly Costs Fund Fee Structure	66

LIST OF FIGURES

Figure 2.1: Environmental Impacts of Landfill as Addressed by risk assessment	5
Figure 2.2: Groundwater contamination from a landfill	6
Figure 6.1: Water Balance Factors	33
Figure 6.2: Climatic Water Balance Determination Graph	34
Figure 6.3: Construction of Weltevreden Landfill Liners in Gauteng	37
Figure 6.4: Liners - G:S:B+ Landfills	37
Figure 6.5: Liners- G:M:B+ and G:L:B+ Landfills	38
Figure 6.6: Liners - H:h Landfills	38
Figure 6.7: Liners - H:H Landfills	39
Figure 6.8: Sequential Steps for a Water Quality Monitoring System Design	41
Figure 7.1: Location of Landfill X, Johannesburg	45
Figure 7.2: Selected Geological Strata Distribution in South Africa	46
Figure 7.3: Regional Geology	50
Figure 7.4: North-South Geological Profile through the Landfill	51
Figure 7.5: Relationship between Topography and GW Table	52
Figure 7.6: Groundwater Flow Paths	55
Figure 7.7: Deviation in Groundwater Flow due to Landfill Lining	56
Figure 9.1: Initial Investigation Phase of Proposed Methodology	63
Figure 9.2: Operational Phase of Proposed Methodology	68

ABSTRACT

Governments and companies are continually faced with a challenge to effectively manage all risks so as to protect their assets, financial health, property, reputation, constituents, and natural resources. “Risk management is the decision-making process whereby a policy or regulation is developed after a risk has been identified and is integrated with other issues including political, social, historical, and economic factors” (Zondi, 2000).

In South Africa, environmental risk (i.e. risks associated with environmental damage and compliance) in waste management is currently considered in the setting of standards for landfill siting, design and water quality monitoring. It is the author’s opinion that this current approach has been poorly managed because potential sources of major environmental liability have not been identified and quantified (DWAF, 1998).

Environmental liability is defined as the obligation to compensate or restore the environmental damage caused by the past, use, release, or threatened release of a particular substance; or by other activities that adversely affect the environment and/or human health (ICMA, 2001).

The author looks at a case study of a landfill in Johannesburg highlighting their implementation of the water quality monitoring plan and proposes that the monitoring plan be integrated into a proposed environmental liability and risk management approach to managing ground water pollution from landfill sites.

As not every landfill is the same as the other, a comprehensive analysis as stated in the Department of Water Affairs and Forestry (DWAF) Minimum Requirements (1998) is used to gather a list of relevant parameters for that landfill. The comprehensive analysis constitutes macro-constituents and all other constituents likely to be present in quantities higher than the normal background values or to contaminate the groundwater storage (aquifer) in the future. Once done, the landfill operator can then discuss with the Department of Environmental Affairs and Tourism (DEAT) on how to prioritise the parameters. They would also decide which

parameters are to be used for the regular indicator analysis when monitoring because of cost reasons. All the parameters above background value are to be used as environmental liability parameters for that landfill site.

The indicator analysis constitutes measurement of the most likely parameters that would, at an early stage, indicate the possibility of groundwater pollution. It is to be used in the regular monitoring exercises at the landfill by the operator. If an indicator parameter exceeds standards, a full comprehensive analysis must be performed and reported to DEAT.

Each environmental liability parameter will be assigned a penalty charge and weight depending on a number of factors including:

- Location of the landfill i.e. distance to aquifer and GW level
- Geology of area
- Type of aquifer
- Type of landfill i.e. General of Hazardous
- Risk level of that parameter to human health i.e. Health Risk Assessment

The author proposes the introduction of an environmental liability costs fund with a compulsory monthly fee, which will be set up by both the landfill operator and the relevant government department. The water quality monitoring protocol will not differ much from the present structure. If pollution is shown during detection monitoring and a further detailed investigation indicates that exposure is higher than allowable limits, then a combined environmental liability penalty will be evaluated and the monetary value will be charged into the landfill operator's account in the liability costs fund, although the landfill operator and DEAT can decide to use another method to determine the environmental liability e.g. liability insurance assessors. If the penalty required exceeds what has been accumulated in the liability fund account, then the difference will be demanded directly from the landfill operator. If the quarterly monitoring reports compiled by the operators show no mitigation claims into the liability fund then the money accumulates in their account and a certain percentage will be paid back to the landfill operator as an incentive.