

## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	i
ACKNOWLEDGEMENTS .....	iv
TABLE OF CONTENTS .....	v
LIST OF TABLES .....	vi
LIST OF FIGURES .....	vi
GLOSSARY OF TERMS .....	vii
LIST OF ACRONYMS .....	ix
CHAPTER 1	
1. INTRODUCTION .....	1
1.1 Background .....	1
1.2 Study objectives .....	3
1.3 Report structure .....	4
CHAPTER 2	
2. LEAST COST PLANNING IN DECISION-MAKING .....	5
2.1 Least Cost Planning defined .....	5
2.2 LCP compared with other planning approaches .....	6
2.3 LCP in the various sectors .....	8
2.3.1 LCP in the energy sector .....	8
2.3.2 LCP in transporting planning .....	10
2.3.3 LCP in the water sector .....	12
2.3.4 Summary of LCP experiences .....	14
2.4 The need for LCP in the water sector .....	15
2.5 LCP in the water sector of South Africa .....	16
2.5.1 Institutional Arrangements .....	16
2.5.2 Application of LCP in the water sector .....	18
2.5.3 Project (or system) development feasibility tests .....	20
CHAPTER 3	
3. ECONOMIC EVALUATION IN PLANNING WATER SERVICES	
3.1 Economics in the planning process .....	22
3.2 Opportunity costs in water services development .....	25
3.2.1 Concept of opportunity cost .....	25
3.2.2 Shadow pricing methodology and application .....	26
3.3 Marginal cost pricing principle .....	27
3.4 Rationale behind the marginal cost pricing of water services .....	31
3.5 Life-cycle cost approach in economic analysis .....	32
3.5.1 Life-cycle costing concept .....	32
3.5.2 Life-cycle cost analysis .....	32

3.5.3 Total system life-cycle cost .....	33
3.5.4 Planned and unplanned life-cycle costs .....	34
3.6 Evaluation of restraints and externalities in planning .....	35

#### CHAPTER 4

#### 4. LEAST COST PLANNING FRAMEWORK IN WATER SERVICES

4.1 Conceptual Algorithm for Least Cost Planning .....	37
4.2 LCP Hypothetical Example .....	45

#### CHAPTER 5

5. SUMMARY AND CONCLUSIONS .....	49
----------------------------------	----

REFERENCES .....	51
------------------	----

#### APPENDICES

##### LIST OF FIGURES

Figure 1 : Components of the water services business cycle .....	17
Figure 2 : Most common institutional arrangements for water services in South Africa .....	18
Figure 3 : Opportunity costs in water services development (adapted from OECD, 1987) .....	26
Figure 4 : Analysis of marginal capital costs (adapted from UK Water Industry, 1994) .....	30
Figure 5 : Least Cost Planning procedures (adapted from Mount Baker Region, 2000) .....	37
Figure 6 : Funneling process (adapted from Johnson et al, 2002) .....	39
Figure 7 : Least Cost Planning Process Algorithm .....	41

##### LIST OF TABLES

Table 1 : Comparison between the processes used in planning approaches .....	6
Table 2 : Example of shadow pricing, financial costs and economic costs .....	27
Table 3 : Example of marginal costs (MC) of commodity output determination .....	29
Table 4 : Total system (or product) life-cycle cost breakdown .....	33
Table 5 : Summary of the most significant restraints and externalities in water services provision in South Africa .....	36
Table 6 : Example – Information and assumptions .....	46
Table 7 : Summary of LCP results (ex spreadsheet) .....	48

##### LIST OF BOXES

Box 1 : Water resource characteristics of South Africa .....	1
Box 2 : Generic constraints to the implementation of WC/WDM in South Africa .....	2