

Contents

| | |
|---------------------------------------------------------------------------------|------------|
| Executive summary | i |
| Acknowledgements | iii |
| | |
| 1. Introduction | 1 |
| 2. Methodology for study | 3 |
| 2.1 Location of study area | 4 |
| 2.2 Simple multi-criteria analysis approach | 5 |
| 3. Current hydrological situation | 6 |
| 3.1 Overview of Northern Cape supply | 6 |
| 3.2 Overview of Northern Cape demand | 8 |
| 4. Current climate information for the Northern Cape | 11 |
| 5. Climate variability and scenarios for Northern Cape | 12 |
| 5.1 Introduction to climate change and variability | 12 |
| 5.2 Climate variability in South Africa | 12 |
| 5.2.1 Climate variability in the Northern Cape | 13 |
| 5.3 Projected climate change scenarios for the Northern Cape | 16 |
| 5.3.1 Calvinia | 17 |
| 5.3.2 Leliefontein | 18 |
| 5.3.3 Steinkopf | 19 |
| 5.3.4 Lekkering | 20 |
| 5.3.5 Sutherland | 21 |
| 5.3.6 Pofadder | 22 |
| 5.3.7 Van Wyksvlei | 23 |
| 5.3.8 Kenhardt | 24 |
| 5.3.9 Summary of response | 25 |
| 6. Impact of climate change on water resources, specifically groundwater | 26 |
| 7. Current strategies implemented during climate variability | 27 |
| 7.1 Supply side management strategies | 27 |
| 7.1.1 Planning and management | 27 |
| 7.1.2 Drought relief | 31 |
| 7.1.3 Rainwater harvesting | 32 |
| 7.1.4 Desalination | 32 |
| 7.1.5 Reduction of leaks | 33 |

| | | |
|-----------|---------------------------------------------------------------------------|-----------|
| 7.2 | Demand side management strategies | 33 |
| 7.2.1 | Water restrictions | 34 |
| 7.2.2 | Tariff structures | 34 |
| 7.2.3 | Sanitation systems | 34 |
| 7.2.4 | Water education | 35 |
| 7.2.5 | Re-use of grey water | 35 |
| 7.2.6 | Leak reduction | 35 |
| 7.3 | Other possible strategies not yet implemented in the Northern Cape | 35 |
| 7.3.1 | Dual flush toilets | 35 |
| 7.3.2 | Assistance projects | 35 |
| 7.3.3 | Control of invasive alien vegetation | 35 |
| 7.3.4 | Rainfall enhancement | 36 |
| 8. | Long-term suitability of strategies using multi-criteria analysis | 37 |
| 8.1 | Criteria for analysis | 37 |
| 8.2 | Strategy analysis | 39 |
| 8.2.1 | Analysis of strategy options against each criteria. | 40 |
| 8.2.2 | Analysis of strategies against combined criteria | 50 |
| 8.2.3 | Detailed analysis of the top nine strategies | 51 |
| 8.2.4 | Summary of the top nine strategies | 60 |
| 9. | Key recommendations and conclusions | 61 |
| | References | 63 |
| | Appendix A: Climatological data | 66 |
| | Appendix B: Consolidated tables of the survey results | 74 |
| | Appendix C: Specific information for selected local municipalities | 77 |
| | Appendix D: List of Stakeholders | 81 |