

TABLE OF CONTENTS

LIST OF TABLES	v
LIST OF FIGURES	x
LIST OF APPENDICES	xiii
LIST OF ACRONYMS	xv
DWR “REVIEW FOR COMPLETENESS FORM” CHECKLIST	xvii
EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	8
1.1 Municipal Water District of Orange County’s Urban Water Management Plan	8
1.1.1 Purpose of the Urban Water Management Plan.....	9
1.1.2 Coordination with Appropriate Agencies in the Preparation of the Plan	10
1.1.3 Public Community Involvement.....	13
1.1.4 Department of Water Resource Role and Guidance for Urban Water Management Plan	17
1.1.5 Organization of this Plan.....	18
1.2 Municipal Water District of Orange County	18
1.2.1 Formation and Purpose.....	18
1.2.2 Role of the Municipal Water District of Orange County	19
1.2.3 Service Area.....	21
1.2.3.1 Current and Projected Population	23
1.2.3.2 Climate and Rainfall.....	23
1.2.3.3 Other Demographic Factors	24
1.2.4 Member Agencies.....	25
1.2.5 Water Service Organization in MWDOC Service Area.....	26
1.2.6 Board of Directors.....	27
2.0 WATER SERVICE.....	29
2.1 Water Demand	29
2.1.1 Overview – Orange County Level	29
2.1.2 Demographic Trends in the MWDOC Service Area – Past, Present, and Future.....	30
2.1.2.1 Population.....	30
2.1.2.2 Employment.....	31
2.1.2.3 Residential Consumers	32
2.1.3 Water Demand Trends in the MWDOC Service Area– Past, Present, and Future.....	33
2.1.3.1 Direct Use and Indirect Use of Water Demand.....	33
2.1.3.2 Historical Demand	34
2.1.3.3 Future Demand	37
2.1.3.3.1 Municipal and Industrial Demand Forecast	37
2.1.3.3.2 Agriculture Demand Forecast	43
2.1.3.3.3 Demand Forecast for Replenishment for Storage and Saline Barriers ..	44
2.1.3.4 Conclusion	45
2.1.3.5 Forecast Variability in Demand Due to Weather	46
2.2 Water Supply.....	47
2.2.1 Current and Planned Water Supplies.....	47
2.2.1.1 Groundwater	51
2.2.1.1.1 Lower Santa Ana River Basin (Orange County Basin).....	52

2.2.1.1.2	San Juan Basin	87
2.2.1.1.3	La Habra Basin	91
2.2.1.1.4	San Mateo Basin.....	95
2.2.1.1.5	Laguna Canyon Basin.....	95
2.2.1.2	Surface Water.....	96
2.2.1.3	Recycled Water	97
2.2.1.4	Imported Water	99
2.2.1.5	Transfer and Exchange	105
2.2.1.6	Desalination	106
2.2.2	Reliability of Water Supply.....	113
2.2.2.1	Basis of Water Year Data.....	113
2.2.2.2	Supply Reliability in Normal, Single Dry, and Multiple-Dry Water Years	115
2.2.3	Planned Water Supply Projects and Programs	118
2.3	Water Service Reliability	126
2.3.1	Normal Water Year	127
2.3.2	Single-Dry Water Year.....	130
2.3.3	Multiple Dry Water Years	134
3.0	WATER QUALITY IMPACTS ON RELIABILITY.....	151
3.1	Introduction.....	151
3.2	Groundwater Supply from Orange County Water District	153
3.2.1	Groundwater Quality Issues	153
3.2.1.1	Contaminant Exceeding a Primary Drinking Water Standard Maximum Contaminant Level (MCL).....	154
3.2.1.1.1	Nitrate Management.....	154
3.2.1.1.2	Volatile Organic Compounds	155
3.2.1.1.3	Methyl Tertiary-Butyl Ether (MTBE)	155
3.2.1.2	Contaminants Exceeding a Secondary Drinking Water Standard MCL ...	156
3.2.1.2.1	Total Dissolved Solids Management.....	156
3.2.1.2.2	Colored Groundwater Management	157
3.2.1.3	Contaminant Exceeding an Unregulated “Notification Level”	157
3.2.1.3.1	Pharmaceuticals, Personal Care Products, and Endocrine Disruptors	157
3.2.1.3.2	N-nitrosodimethylamine.....	158
3.2.2	Groundwater Restoration Projects	158
3.2.3	Groundwater Quality Impacts on Supply Reliability	160
3.3	Imported Supply From Metropolitan	160
3.3.1	Metropolitan Water Quality Issues.....	161
3.3.1.1	Total Dissolved Solids Management.....	161
3.3.1.2	Perchlorate Management	163
3.3.1.3	Total Organic Carbon and Bromide Management.....	164
3.3.1.4	Other Contaminants of Concern	165
3.3.2	Water Quality Protection Programs	167
3.3.3	Imported Water Quality Impacts on Supply Reliability	167
3.4	Local Projects.....	168
3.4.1	City of Brea.....	168
3.4.2	City of La Habra	168
3.4.3	Santiago County Water District	168
3.4.4	Moulton Niguel Water District.....	169
3.4.5	El Toro Water District.....	169

3.4.6	City of San Juan Capistrano	169
3.4.7	City of San Clemente	169
3.4.8	Trabuco Canyon Water District.....	170
3.4.9	Santa Margarita Water District	170
3.4.10	Irvine Ranch Water District	170
4.0	PLANNING FOR THE FUTURE.....	172
4.1	Programs to Maximize Resources and Minimize Imported Supplies.....	172
4.1.1	Integrated Regional Water Management Plan	172
4.1.2	Water Use Efficiency Program	173
4.1.3	Orange County Water Reliability Plan.....	175
4.1.4	South Orange County Water Reliability Study	178
4.1.5	Assist Member Agencies to Participate in Metropolitan’s Incentive Program for Local Supply Development	180
4.1.6	Cooperative Agreement with Orange County Water District.....	182
4.1.7	Role in Ocean Water Desalination Feasibility Investigation	184
4.1.8	Southern California Comprehensive Water Reclamation and Re-use Study	185
5.0	WATER DEMAND MANAGEMENT PROGRAMS.....	189
5.1	Best Management Practice (BMP) Activity Reports (2000 through 2004).....	189
5.2	Best Management Practice (BMP) Coverage Report	189
5.3	Council Coverage Calculator and Best Management Practice Cost-effectiveness Forms	189
5.4	MWDOC’s Accomplishment in Conservation Programs Since 2000	189
5.4.1	Role of BMPs in MWDOC Service Area	190
5.4.2	Review of MWDOC Conservation Programs as Described in 2000 Urban Water Management Plan	192
5.4.3	BMP Implementation in MWDOC Service Area	194
6.0	WASTEWATER MANAGEMENT AND WATER RECYCLING	212
6.1	Agency Participation in Recycled Water Planning.....	212
6.2	Wastewater Collection and Treatment Systems	214
6.2.1	Orange County Sanitation District	216
6.2.2	South Orange County Wastewater Authority.....	219
6.2.3	Irvine Ranch Water District	224
6.3	Current and Projected Uses of Recycled Water	224
6.3.1	Green Acres Project.....	228
6.3.2	Initial 5 MGD Groundwater Replenishment System	229
6.3.3	Groundwater Replenishment System	229
6.3.4	Irvine Ranch Water District Water Reclamation.....	230
6.3.5	Other Water Reclamation Projects.....	230
6.4	Comparison of 2000 Projected Recycled Water Use with 2005 Actual Use	231
6.5	Potential Uses of Recycled Water and the Feasibility of Serving those Users	232
6.5.1	Southern California Comprehensive Water Reclamation and Reuse Study	232
6.5.2	Potential Recycled Water Use in the MWDOC Service Area.....	239
6.5.3	Barriers to Expansion of Existing Recycled Water Users.....	240
6.6	Encouraging Recycled Water Use	244
6.6.1	Funding	244
6.6.2	Partnerships to Encourage Water Recycling	246
6.6.3	Regulatory Issues	246
6.6.4	Brine Line Construction.....	247

6.6.5	Research to Encourage Recycling Use	247
6.7	Optimizing Recycled Water Use.....	247
7.0	WATER SHORTAGE CONTINGENCY PLAN	253
7.1	Introduction.....	253
7.2	Stages of Drought Action.....	253
7.3	Three-Year Minimum Water Supply.....	256
7.4	Catastrophic Supply Interruption Plan.....	257
7.5	Water Reduction Mechanisms.....	260
7.5.1	Mandatory Water Use Prohibitions	260
7.5.2	Water Reduction Methods	260
7.5.3	Penalties for Excessive Water Use.....	261
7.6	Water Reduction Impacts on Revenues and Expenditures	261
7.7	Water Shortage Contingency Ordinance.....	262
7.8	Methods to Determine Water Consumption Reductions	263
8.0	URBAN WATER MANAGEMENT PLAN (UWMP) ADOPTION AND IMPLEMENTATION	265
8.1	UWMP adoption process.....	265
8.2	Review the Implementation of Water Conservation and Water Recycling Programs in 2000 Plan	267
8.2.1	Comparison of 2000 Planned Water Conservation Programs with 2005 Actual Programs.....	267
8.2.2	Comparison of 2000 Projected Recycled Water Use with 2005 Actual Use ...	267

LIST OF TABLES

Table 1-1-2-A: Coordination with Appropriate Agencies in Preparation of this Plan 11

Table 1-2-3-2-A: Climate Characteristics in MWDOC’s Service Area 24

Table 2-1-2-1-A: Historic and Projected Population in MWDOC’s Service Area 31

Table 2-1-2-2-A: Historical and Projected Employment in MWDOC’s Service Area 32

Table 2-1-2-3-A: Historical and Projected Occupied Households in MWDOC’s Service Area..... 33

Table 2-1-3-2-A: Historical Water Demands for Direct Consumption in MWDOC’s Service Area
..... 34

Table 2-1-3-2-B: Historical Water Demands for Indirect Consumption in MWDOC’s Service Area
..... 36

Table 2-1-3-3-1-A: MWD-MAIN Relationships by Demand Sector 38

Table 2-1-3-3-1-B: MWD-MAIN Forecast of Municipal and Industrial (M&I) Water Demands in
MWDOC’s Service Area 40

Table 2-1-3-3-1-C: MWDOC Member Agencies Forecast of Municipal and Industrial (M&I)
Water Demands..... 41

Table 2-1-3-3-2-A: MWDOC Member Agencies Forecasts of Agricultural Water Demands in
MWDOC’s Service Area 44

Table 2-1-3-3-3-A: Projected Demand for Indirect Use in MWDOC’s Service Area –
Replenishment for Storage and Saline Barriers 45

Table 2-1-3-4-A: Summary Table of Water Demand in MWDOC’s Service Area – Past, Present,
Future 46

Table 2-2-1-A: Current and Planned Water Supplies for Direct Consumption in MWDOC’s
Service Area..... 48

Table 2-2-1-B: Current and Planned Water Supplies for Indirect Consumption in MWDOC’s
Service Area- Groundwater Replenishment and Saline Barrier 49

Table 2-2-1-1-1-A: Historical Production in Orange County Basin..... 59

Table 2-2-1-1-1-B: Projected Groundwater Production in Orange County Basin – Based on
Normal Water Year..... 67

Table 2-2-1-1-1- C: Four Main Systems of OCWD Percolation Program 74

Table 2-2-1-1-1-D: Current and Projected Water Supplies for Groundwater Replenishment and
Saline Barrier in Orange County Basin 81

Table 2-2-1-1-1-E: Sources of Recharge Water Supplies for Orange County Basin 85

Table 2-2-1-1-2-A: Historical Groundwater Production in San Juan Basin..... 90

Table 2-2-1-1-2-B: Projected Groundwater Production in San Juan Basin..... 90

LIST OF TABLES

Table 2-2-1-1-3-A: Historical Groundwater Extraction in La Habra Basin 94

Table 2-2-1-1-3-B: Projected Production in La Habra Basin 95

Table 2-2-1-2-A: Projected Surface Water Production in MWDOC’s Service Area 97

Table 2-2-1-3-A: Current Recycled Water Supplies in MWDOC’s Service Area 98

Table 2-2-1-3-B: Projected Recycled Water Supplies in MWDOC’s Service Area 98

Table 2-2-1-4-A: Projected Imported Water Demand in MWDOC’s Service Area 103

Table 2-2-1-6-A: Groundwater Recovery Projects in MWDOC’s Service Area 109

Table 2-2-2-1-A: Basis of Water Year Data in MWDOC’s Service Area 113

Table 2-2-2-2-A: Supply Reliability for Retail Consumption in MWDOC’s Service Area 115

Table 2-2-2-2-B: Supply Reliability for Groundwater Replenishment & Saline Barrier in MWDOC’s Service Area 117

Table 2-2-3-A: Planned Water Supply Projects in MWDOC’s Service Area 125

Table 2-3-A: Summary of Water Service Reliability in MWDOC’s Service Area 126

Table 2-3-1-A: Projected Supply for Direct Consumption in MWDOC’s Service Area – Normal Water Year Condition 127

Table 2-3-1-B: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Normal Water Year Condition 128

Table 2-3-1-C: Projected Demand for Direct Consumption in MWDOC’s Service Area – Normal Water Year Condition 129

Table 2-3-1-D: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Normal Water Year Condition 129

Table 2-3-1-E: Comparison of Supply and Demand for Direct Consumption in MWDOC’s Service Area – Normal Water Year Condition 130

Table 2-3-1-F: Comparison of Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Normal Water Year Condition 130

Table 2-3-2-A: Projected Supply for Direct Consumption in MWDOC’s Service Area – Single-Dry Water Year 131

Table 2-3-2-B: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Single-Dry Water Year 131

Table 2-3-2-C: Projected Demand for Direct Consumption in MWDOC’s Service Area – Single-Dry Water Year 133

Table 2-3-2-D: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Single-Dry Water Year 133

Table 2-3-2-E: Comparison of Supply and Demand for Direct Consumption in MWDOC’s Service Area – Single-Dry Water Year 133

LIST OF TABLES

Table 2-3-2-F: Comparison of Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Single-Dry Water Year..... 133

Table 2-3-3-A: Projected Supply for Direct Consumption in MWDOC’s Service Area – Multiple-Dry Water Years Ending 2010..... 135

Table 2-3-3-B: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2010..... 136

Table 2-3-3-C: Projected Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Year Ending 2010 136

Table 2-3-3-D: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2010..... 137

Table 2-3-3-E: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2010..... 137

Table 2-3-3-F: Comparison of Projected Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2010..... 137

Table 2-3-3-G: Projected Supply for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2015..... 138

Table 2-3-3-H: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Year Ending 2015..... 139

Table 2-3-3-I: Projected Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2015..... 139

Table 2-3-3-J: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2015 140

Table 2-3-3-K: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2015 140

Table 2-3-3-L: Comparison of Projected Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2015 140

Table 2-3-3-M: Projected Supply for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2020..... 141

Table 2-3-3-N: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2020..... 142

Table 2-3-3-O: Projected Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2020..... 142

Table 2-3-3-P: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2020..... 143

Table 2-3-3-Q: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2020..... 143

Table 2-3-3-R: Comparison of Projected Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2020..... 143

Table 2-3-3-S: Projected Supply for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2025..... 144

Table 2-3-3-T: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2025 145

Table 2-3-3-U: Projected Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2025..... 145

Table 2-3-3-V: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2025 145

LIST OF TABLES

Table 2-3-3-W: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2025 146

Table 2-3-3-X: Comparison of Projected Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2025 146

Table 2-3-3-Y: Projected Supply for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2030..... 147

Table 2-3-3-Z: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2030 148

Table 2-3-3-AA: Projected Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2030 148

Table 2-3-3-BB: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC’s Service Area – Multiple-dry Water Years Ending 2030 148

Table 2-3-3-CC: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2030 149

Table 2-3-3-DD: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC’s Service Area – Multiple-dry Water Years Ending 2030 149

Table 3-1-A: Current and Projected Water Supply Change in MWDOC’s Service Area Due to Water Quality 152

Table 4-1-2-A: Memorandum of Understanding Best Management Practices Implementation Responsibility and Regional Programs in Orange County 175

Table 4-1-5-A: Local Supply Projects within MWDOC’s Service Area that Have Been Awarded with Metropolitan’s Financial Incentive Program Contracts..... 182

Table 5-4-1-A: Memorandum of Understanding Signatory Agencies and Organizations in Orange County 190

Table 5-4-1-B: Memorandum of Understanding BMP Implementation Responsibility and Regional Programs in Orange County..... 192

Table 5-4-3-A: Protector Del Agua Irrigation Management Training Residential Participation Summary 195

Table 5-4-3-B: Portector Del Agua Irrigation Management Training Professional Participation Summary 197

Table 5-4-3-C: Landscape Performance Certification Program 198

Table 5-4-3-D: Clothes Washers Replaced by Agency 202

Table 5-4-3-E: Implementation Summary for MWDOC School Education Program 205

Table 5-4-3-F: Retrofit Devices and Rebate Amounts Available Under the “Save Water – Save a Buck!” Program 206

Table 5-4-3-G: Commercial, Industrial, Institutional (CII) Retrofit Devices Replaced by Agency 207

Table 5-4-3-H: Summary of Rate Structure Types Used in Orange County 208

Table 5-4-3-I: Toilets Replaced by Agency..... 210

Table 6-1-A: Recycling Plan Agency Coordination 213

LIST OF TABLES

Table 6-1-B: Agencies Contacted for Recycled Water Planning 214

Table 6-2-A: Wastewater Collection and Treatment in MWDOC’s Service Area 214

Table 6-2-B: Disposal of Non-Recycled Wastewater in MWDOC’s Service Area 215

Table 6-3-A: 2005 Recycled Water Uses (Actual) in MWDOC’s Service Area 225

Table 6-3-B: Projected Future Use of Recycled Water in MWDOC’s Service Area..... 226

Table 6-4-A: Recycled Water Uses in MWDOC’s Service Area – 2000 Projection Compared with 2005 Actual..... 231

Table 6-5-2- A: Orange County Potential Recycled Water Uses 240

Table 6-6-1-A: Metropolitan Financial Incentive Funding 245

Table 7-2-A: Water Supply Shortage Stages and Conditions (Metropolitan’s Water Surplus and Drought Management Plan)..... 254

Table 7-2-B: Examples of Water Shortage Stage and Action, Irvine Ranch Water District and Santa Margarita Water District 256

Table 7-3-A: Three-Year Estimated Minimum Water Supply for Direct Consumption in MWDOC’s Service Area– Based on Multiple Dry Years 257

Table 7-4-A: Preparation Actions for a Catastrophe 259

Table 8-2-2-A: Recycled Water Uses in MWDOC’s Service Area– 2000 Projection Compared with 2005 Actual..... 268

LIST OF FIGURES

Figure 1-2-3-A: MWDOC’s Service Area and Its Member Agencies	22
Figure 1-2-3-1-A: Historical and Projected Population in MWDOC’s Service Area	23
Figure 1-2-3-2-A: Annual Rainfall Record in Orange County	24
Figure 1-2-5-A: Water Service Organization in MWDOC’s Service Area.....	27
Figure 2-1-1-A: Percent of Population Growth in the Southern California Association of Government Region, by County	30
Figure 2-1-2-1-A: Historical and Projected Population in MWDOC’s Service Area	31
Figure 2-1-2-2-A: Historical and Projected Employment in MWDOC’s Service Area.....	32
Figure 2-1-2-3-A: Historical and Projected Occupied House in MWDOC’s Service Area.....	33
Figure 2-1-3-2-A: Historical Water Demands for Direct Consumption in MWDOC’s Service Area	34
Figure 2-1-3-2-B: Historical Per Capita Water Use in MWDOC’s Service Area.....	35
Figure 2-1-3-2-C: Historical Water Demand for Indirect Consumption	36
Figure 2-1-3-3-1-A: Comparison of Projections for Direct Consumed M&I Demand in MWDOC’s Service Area.....	42
Figure 2-1-3-5-A: Retail Demand Projection with Weather Variation in MWDOC’s Service Area	47
Figure 2-2-1-A: Schematic of Water Supply Sources in Orange County.....	50
Figure 2-2-1- B: Orange County Existing Local Water Facilities	51
Figure 2-2-1-1-1-A: Map of the Orange County Groundwater Basin	53
Figure 2-2-1-1-1-B: Geologic Cross Section through Orange County Basin.....	56
Figure 2-2-1-1-1-C: Historical Groundwater Production from Orange County Basin.....	57
Figure 2-2-1-1-1-D: Historical Assigned Groundwater BPP and Actual Groundwater BPP Achieved	58
Figure 2-2-1-1-1-E: Location of Groundwater Pumped in Orange County Basin in 2000	60
Figure 2-2-1-1-1-F: Location of Groundwater Pumped in Orange County Basin in 2001	61
Figure 2-2-1-1-1-G: Location of Groundwater Pumped in Orange County Basin in 2002.....	62
Figure 2-2-1-1-1-H: Location of Groundwater Pumped in Orange County Basin in 2003.....	63

LIST OF FIGURES

Figure 2-2-1-1-1-I: Location of Groundwater Pumped in Orange County Basin in 2004	64
Figure 2-2-1-1-1-J: Orange County Groundwater Elevation Contour Map Measured as of November 2004.....	65
Figure 2-2-1-1-1- K: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 1 in 2010	68
Figure 2-2-1-1-1-L: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 2 in 2010	69
Figure 2-2-1-1-1-M: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 3 in 2010	70
Figure 2-2-1-1-1-N: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 1 in 2025	71
Figure 2-2-1-1-1-O: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 2 in 2025	72
Figure 2-2-1-1-1-P: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 3 in 2025	73
Figure 2-2-1-1-1-Q: Historical Sources of Replenishment and Total Groundwater Production in Orange County Basin.....	76
Figure 2-2-1-1-1-R: Santa Ana River Baseflow at Prado Dam	78
Figure 2-2-1-1-1-S: Santa Ana River Stormflow at Prado Dam.....	79
Figure 2-2-1-1-1-T: Accumulated Basin Overdraft in Orange County Basin	84
Figure 2-2-1-1-1- U: Recommended Basin Refill Rate for Orange County Basin.....	86
Figure 2-2-1-1-2-A: Map of San Juan Creek Basin.....	88
Figure 2-2-1-1-3-A: Cross-section of La Habra Basin	92
Figure 2-2-1-4-A: Major Aqueducts Bringing Water to Southern California	100
Figure 2-2-1-4-B: Metropolitan Feeders and Transmission Main Serving Orange County.....	101
Figure 2-2-1-4-C: Imported Demand in MWDOC’s Service Area	104
Figure 4-1-3-A: Recommended Reliability Improvements	177
Figure 5-4-3-A: An Example of an Irrigation Performance Report	200
Figure 6-2-1-A: Facilities within Jurisdiction of Orange County Sanitation District	217
Figure 6-2-2-A: Facilities within South Orange County Wastewater Authority’s Jurisdiction	220
Figure 6-3-A: Current and Projected Resource Mix in MWDOC’s Service Area for Direct Consumption.....	227

LIST OF FIGURES

Figure 6-3-B: Current and Projected Resource Mix in MWDOC’s Service Area for Groundwater Replenishment and Saline Barriers.....	227
Figure 6-3-C: Current and Projected Percentage of Recycled and Disposed Wastewater in MWDOC’s Service Area	228
Figure 6-3-D: Current and Projected Recycled and Disposed Wastewater in MWDOC’s Service Area.....	228
Figure 6-5-1-A: Area of Potential Demand for Recycled Water within Orange County Region..	234

LIST OF APPENDICES

- 1-A Copy of the Urban Water Management Plan Act (January 2005)
- 1-B Documentation and presentation for the Coordination Workshops with Metropolitan and MWDOC member agencies
- 1-C Informational Package Prepared for Each of MWDOC member agencies
- 1-D(i) Generic letter prepared by MWDOC for its member agencies to notify cities and county for the update of the Urban Water Management Plan
- 1-D(ii) Copies of the letters sent by MWDOC member agencies for notifying cities and county for the update of the Urban Water Management Plans
- 1-E Letter that MWDOC sent to notify Metropolitan of the amount of water MWDOC, on behalf of its member agencies, wishes to purchase over the next 25 years
- 1-F(i) Copies of display ads announcing the two community information meetings
- 1-F(ii) Record (attendance, presentation, and videotape) of the community information meetings
- 1-G MWDOC 2005 Urban Water Management Plan Review for Completeness Form
- 2-A(i) Outputs of MWDOC “Water Balance” Model – baseline run (without annexation)
- 2-A(ii) Outputs of MWDOC “Water Balance” Model – Supplemental run (assume annexations occur in 2006-07 for Irvine Ranch Water District and City of Anaheim)
- 2-B Copy of Orange County Water District Groundwater Management Plan
- 2-C(i) Copy of California State Water Resource Control Board Permit that granted 9,227 acre-feet per year to San Juan Basin Authority for diversion and use from San Juan Basin
- 2-C(ii) Copy of California State Water Resource Control Board Permit that granted 976 acre-feet to South Coast Water District for diversion and use from San Juan Basin
- 2-D Copy of San Juan Basin Groundwater Management and Facility Plan
- 2-E Copy of Metropolitan’s 2005 Regional Urban Water Management Plan (September 2005)
See Metropolitan Website:
<http://www.mwdh2o.com/mwdh2o/pages/yourwater/ywater02.html>
- 5-A California Urban Water Conservation Council BMP Implementation Reports 2000 through 2004 (Fiscal Years 1999-2000 through 2003-2004) for MWDOC
- 5-B California Urban Water Conservation Council BMP Coverage Reports

LIST OF APPENDICIES

- 7-A Memorandum of Understanding Between MWDOC and IEUA for Exchange of MWD Drought allocation
- 7-B Irvine Ranch Water District – Water Shortage Contingency Plan
- 7-C Copy of Resolution for MWDOC Water Shortage Contingency Plan in 1991 (Resolution No. 1433)
- 8-A(i) Notice of Public Hearing
- 8-A(ii) Records (attendance, presentation, and videotape) of the Public Hearing
- 8-B Copy of Resolution Approving Municipal Water District of Orange County 2005 Urban Water Management Plan

LIST OF ACRONYMS

ACRONYMS	DEFINITION
AH/NR	Average Hydrology/Normal Replenishment
AOP	Advanced Oxidation Processes
AWT	Advanced Water Treatment
BEA	Basin Equity Assessment
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BPP	Basin Production Percentage
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
DATS	Deep Aquifer Treatment System
DBPs	Disinfection Byproducts
DHS	Department of Health Services
DOE	Department of Energy
DRIP	Desalination Research and Innovation Partnership
DWR	Department of Water Resources
DWSAPP	Drinking Water Source Assessment and Protection Program
EDCs	Endocrine Disrupting Compounds
GERA	Gobernadora Ecological Resource Area
gpcd	Gallon per capita (person) per day
gpm	Gallon per minute
GWR System	Groundwater Replenishment System
IDP	Irvine Desalter Project
IRP	Integrated Resource Plan
IRPP	Infrastructure Reliability and Protection Program
IRWD	Irvine Ranch Water District
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
IX	Iron Exchange
LRP	Local Resource Projects – Metropolitan’s incentive program for developing local supplies
M&I	Municipal and Industrial
MCL	Maximum Contaminant Level
Metropolitan	Metropolitan Water District of Southern California
MF	Microfiltration
mg/L	Milligram Per Liter (10^{-3} gram per liter)
MOU	Memorandum of Understanding
MWDOC	Municipal Water District of Orange County
MTBE	Methyl Tertiary-Butyl Ether
NDMA	N-nitrosodimethylamine
OCS	Orange County Sanitation District
OCWD	Orange County Water District
PCE	Tetrachloroethene
pCi/L	Picocuries Per Liter (A unit of measure of levels of radon gas)

LIST OF ACRONYMS

ACRONYMS	DEFINITION
PPCPs	Pharmaceuticals and Personal Care Products
RA	Replenishment Assessment
RO	Reverse Osmosis
RUWMP	Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SARI	Santa Ana River Interceptor
SAWPA	Santa Ana Watershed Project Authority
SCAG	Southern California Association of Governments
SDCWA	San Diego County Water Authority
SFWPA	South Feather Water and Power Agency
SWP	State Water Project
TCE	Trichloroethylene
TDS	Total Dissolved Solid
Title 22	California Title 22 Drinking Water Standards
TOC	Total Organic Carbon
µg/L	Microgram Per Liter (10 ⁻⁶ gram per liter)
ULFT	Ultra Low Flush Toilet
USEPA	United States Environmental Protection Agency
UV	Ultraviolet Light
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compounds
WRP	Water Recycling Plant

DWR “REVIEW FOR COMPLETENESS FORM” CHECKLIST

UWMP ACT CODE	REFERENCE IN MWDOC 2005 UWMP
Water Code §10620(d)(1)(2) – Agency Coordination	
Describe the coordination of the plan preparation and anticipated benefits.	Section 1.1.1, Section 1.1.2, and Section 1.1.3 Table 1-1-2-A
Water Code §10620(f) – Resource Maximization Tool	
Describe water management tools/options maximize resources & minimize need to import	Section 4.1
Water Code §10621(a) – Plan Update and File	
Date updated and adopted the plan	Section 8.1 (Date expected to file = 12/22/05)
Water Code §10621(b) – City and County Notification and Participation	
City and County notification and participation	Section 1.1.2
Water Code §10631(a) – Service Area Information	
Service area information, including population, climate, and other demographic factors	Sections 1.2.3 and 2.1.2 Tables 1-2-3-2-A, 2-1-2-1-A, 2-1-2-2-A, and 2-1-2-3-A
Water Code §10631(b) – Water Sources	
Identify and quantify existing and planned water supply sources	Section 2.2.1 Tables 2-2-1-A and 2-2-1-B
Water Code §10631(b)(1-4) – Groundwater Identified as Existing or Planned Source	
Describe basin management plan, attach management plan, describe groundwater basins, describe plan to eliminate overdraft, analyze location, amount, and sufficient of production of last 5 years, and analyze location and amount projected in next 25 years	Section 2.2.1.1 Tables 2-2-1-1-1-A, 2-2-1-1-1-B, 2-2-1-1-2-A, 2-2-1-1-2-B, 2-2-1-1-3-A, and 2-2-1-1-3-B Appendix 2-B and Appendix 2-D
Water Code §10631(c)(1-3) – Reliability of Supply	
Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage	Section 2.2.2 Tables 2-2-2-1-A, 2-2-2-2-A, and 2-2-2-2-B
Water Code §10631(c) – Water Resources Not Available on a Consistent Basis	
Describe reliability/vulnerability of the water supply to seasonal or climatic shortage	Section 2.2.2.2 Tables 2-2-2-1-A, 2-2-2-2-A, and 2-2-2-2-B
Water Code §10631(d) – Transfer or Exchange Opportunities	
Describe short term and long term exchange or transfer opportunities	Section 2.2.1.5
Water Code §10631(e)(1)(2) – Water Use Provision	
Quantify past, current and future water use by sectors	Section 2.1.3 Table 2-1-3-4-A
Water Code §10631(f)(g) – Demand Management	
	Section 5
Water Code §10631(h) – Planned Water Supply Projects and Programs	
Detail description of expected future supply projects and programs	Section 2.2.3 Table 2-2-3-A
Water Code §10631(l) – Opportunities for Development of Desalinated Water	
Describe opportunities for development of desalinated water	Section 2.2.1.6

DWR “REVIEW FOR COMPLETENESS FORM” CHECKLIST

UWMP ACT CODE	REFERENCE IN MWDOC 2005 UWMP
Water Code §10631(j) – District is a CUWCC signatory	
Agency is a CUWCC member, attach 2003-04 annual updates	Sections 5.1, 5.2, 5.3 Appendix 5-A and Appendix 5-B
Water Code §10631(k) – if Supplier Receives or will Receive Water from a Wholesale Supplier	
Provide written demand projections to wholesaler, and wholesaler provides written water availability to agency	Section 2.2.1.4 Table 2-2-1-4-A
Water Code §10632, 10632(a) – Water Shortage Contingency Plan and Stage of Action	
Provide stages of action, include plan for shortage	Section 7.0 Tables 7-2-A
Water Code §10632(b) – Water Shortage Contingency Plan and Stage of Action	
Identify driest 3-year period, quantify minimum water supply available by source for the next three years	Section 7.3 Table 7-3-A
Water Code §10632(c) – Preparation for Catastrophic Water Supply Interruption	
Provide catastrophic supply interruption plan	Section 7.4 Table 7-4-A
Water Code §10632(d) – Prohibitions	
List the mandatory prohibition against specific water use practice during shortage	Section 7.5.1
Water Code §10632(e) – Consumption Reduction	
List consumption reduction method	Section 7.5.2
Water Code §10632(f) – Penalties	
List excessive use penalties or charges for excessive use	Section 7.5.3
Water Code §10632(g) – Revenue and Expenditure Impact	
Describe impacts to revenue and expenditure, and describe measures to overcome them	Section 7.6
Water Code §10632(h) – Water Shortage Contingency Ordinance/Resolution	
Attach a copy of the draft water shortage contingency resolution or ordinance	Section 7.7 Appendix 7-A
Water Code §10632(i) – Reduction Measuring Mechanism	
Providing mechanism for determining actual reduction	Section 7.8
Water Code §10633 – Recycling Plan Agency Coordination	
Describe agency coordination for the recycling plan	Section 6.1 Tables 6-1-A and 6-1-B
Water Code §10633(a) – Wastewater System Description	
Describe and quantify wastewater collection and treatment	Section 6.2 Table 6-2-A
Water Code §10633(a-d) – Wastewater Disposal and Recycled Water Uses	
Describe method of wastewater disposal, describe uses of recycling water, quantify and describe potential uses for recycling	Sections 6.2, 6.3, and 6.5 Tables 6-2-B, 6-3-A, 6-3-B, and 6-5-2-A

DWR “REVIEW FOR COMPLETENESS FORM” CHECKLIST

UWMP ACT CODE	REFERENCE IN MWDOC 2005 UWMP
Water Code §10633(e) – Projected Uses of Recycled Water	
Projected use of recycled water, compare UWMP 2000 projections with UWMP 2005 actual	Section 6.4 Tables 6-3-A and 6-3-B
Water Code §10633(e) – Plan to Optimize Use of Recycled Water	
Describe action to encourage recycled water uses	Sections 6.6 and 6.7
Water Code §10634– Water Quality Impacts on Availability of Supply	
Describe water impacts upon water management strategies	Section 3 Table 3-1-A
Water Code §10635(a)– Supply and Demand Comparison to 25 Years	
Compare the projected supply to projected water use under normal, single-dry, and multiple dry water years	Section 2.3 Tables 2-3-1-A to 2-3-1-F Tables 2-3-2-A to 2-3-2-B Tables 2-3-3-A to 2-3-3-DD
Water Code §10635(b)– Provision of Water Service Reliability to Cities and Counties	
Provide water service reliability section of UWMP to cities and counties within supplier’s service area	Section 8.1
Water Code §10642– Does the Plan Include Public Participation and Plan Adoption	
Encourage involvement of social, cultural, & economic community group, provide plan for public review, provide proof of public hearing, attach a copy of adoption resolution, provide meeting notice to local government	Sections 8.1 and 1.1.3 Appendix 8-B Appendix 8-A(i) Appendix 8-A (ii)
Water Code §10643– Review of Implementation of 2000 UWMP	
Review implementation of 2000 UWMP	Section 8.2
Water Code §10644(a)– Provision of 2005 UWMP to local government	
Provide 2005 UWMP to DWR, cities, and counties within 30 days of adoption	Section 8.1
Water Code §10645– Does the Plan or Correspondence Accompanying it show where it is available for public review	
Does UWMP shows where it is available for public review	Section 8.1