

Table of Contents

ACRONYMS..... INSIDE COVERS

VOLUME 1: DRAFT EIS; APPENDICES A THROUGH G

COVER SHEET

TABLE OF CONTENTS

SUMMARY

1.0 Background	S-1
2.0 Purpose And Need For Action	S-5
2.1 Agency Coordination and Public Involvement.....	S-6
2.2 Public Involvement.....	S-7
2.3 Key Tools	S-8
3.0 Alternatives Evaluated In Detail	S-8
3.1 No Action Alternative	S-8
3.1.1 Action Alternatives.....	S-10
4.0 Summary Of Environmental Consequences Analyzed.....	S-12
4.1 Preferred Alternative	S-14
4.2 Cumulative Impacts.....	S-15
4.3 Adaptive Management.....	S-17
4.3.1 Future Adaptive Management Activities.....	S-17

CHAPTER 1—BACKGROUND

1.1 Introduction	1-1
1.2 Purpose and Need	1-1
1.3 Cooperating Agencies.....	1-2
1.4 Major Issues Affecting Water Operations	1-6
1.5 Special Considerations	1-6
1.5.1 Assumptions and Limitations of the Review and EIS.....	1-6
1.5.2 Programmatic EISs, Tiering, and Site-Specific Impacts	1-7
1.6 Related Projects and Activities.....	1-8
1.6.1 Authorized and Ongoing Actions.....	1-8
1.6.2 Foreseeable Future Projects.....	1-9

1.7 Compliance with Applicable Laws and Regulations 1-10

 1.7.1 Federal Environmental Laws..... 1-10

 1.7.2 Laws Specific to the Rio Grande..... 1-10

 1.7.3 Federal Trust Responsibilities to Pueblos and Tribes 1-12

1.8 Organization of Document 1-12

CHAPTER 2—DEVELOPMENT OF ACTION ALTERNATIVES

2.1 Planning for Positive Benefits 2-1

2.2 Key Tools 2-1

 2.2.1 URGWOM Planning Version..... 2-2

 2.2.2 Stochastic 40-Year Hydrologic Sequence 2-2

 2.2.3 FLO-2D Hydraulic Models 2-3

 2.2.4 RMA-2 Hydraulic Model/Aquatic Habitat Model 2-3

 2.2.5 San Acacia Reach Surface Water/Ground Water Model..... 2-3

 2.2.6 Geographic Information System (GIS) Spatial Analysis 2-4

 2.2.7 Decision Support System 2-4

 2.2.8 Data Quality Database 2-4

2.3 Description of No Action..... 2-4

 2.3.1 The No Action Alternative and How It Was Derived 2-4

2.4 Description of Action Alternatives 2-7

 2.4.1 Significant Issues Identified During Scoping..... 2-7

 2.4.2 Description of Alternatives for Detailed Analysis 2-8

 2.4.3 Description of Operational Flexibilities and Preliminary Screening..... 2-10

 2.4.4 Considered but Eliminated from Detailed Analysis 2-11

2.5 Preferred Alternative 2-16

2.6 Comparison of Impacts under Each Alternative..... 2-16

CHAPTER 3 EXISTING CONDITIONS IN THE AFFECTED ENVIRONMENT

3.1 Introduction 3-1

 3.1.1 Setting..... 3-1

 3.1.2 Resources Considered 3-2

3.2 Existing Hydrology and Geomorphology 3-2

 3.2.1 Hydrology..... 3-2

 3.2.2 Geomorphology 3-9

3.2.3 Sediment Supply and Transport 3-11

3.2.4 Local Controls and the Integrated Effects on Morphology 3-13

3.3 Existing Biological Conditions..... 3-16

3.3.1 Aquatic Habitats 3-16

3.3.2 Riparian and Wetland Habitats..... 3-22

3.3.3 Threatened, Endangered, and Special Status Species..... 3-37

3.3.4 Biodiversity 3-43

3.4 Water Quality 3-43

3.4.1 Regulations Protecting Water Quality 3-43

3.4.2 Water Quality Assessment 3-44

3.4.3 Trends in Water Quality Conditions..... 3-44

3.5 Indian Trust Assets 3-48

3.6 Cultural Resources..... 3-48

3.6.1 Types of Cultural Resources 3-48

3.7 Agriculture..... 3-53

3.7.1 Irrigated Agriculture..... 3-54

3.7.2 Irrigation Water Source 3-56

3.8 Land Use..... 3-56

3.8.1 Land Status (Ownership)..... 3-56

3.8.2 Generalized Land Use 3-58

3.8.3 Future Land Use Trends 3-59

3.9 Recreation..... 3-59

3.9.1 River Recreation Sites and Activities..... 3-59

3.9.2 Reservoir Recreation Sites and Activities 3-61

3.10 Flood Control..... 3-62

3.10.1 Relevant Affected Geographic Area and Historical Flooding..... 3-63

3.11 Hydropower 3-64

3.12 Socioeconomics 3-64

3.12.1 Demographics..... 3-65

3.12.2 Economics 3-65

3.13 Environmental Justice..... 3-70

3.14 Other Resources Considered..... 3-73

3.14.1 Air Quality..... 3-73

3.14.2 Noise..... 3-74
3.14.3 Toxic or Hazardous Materials 3-75
3.14.4 Seismicity 3-75

CHAPTER 4—IMPACTS OF WATER OPERATIONS ALTERNATIVES

4.1 Introduction 4-1
4.2 Methods, Tools, and General Assumptions 4-1
4.3 Scope of Analysis 4-4
4.4 Affected Resources 4-5
 4.4.1 Hydrology and Geomorphology 4-6
 4.4.2 Biological Resources 4-23
 4.4.3 Water Quality 4-57
 4.4.4 Indian Trust Assets and Cultural Resources 4-61
 4.4.5 Agriculture, Land Use, and Recreation 4-64
 4.4.6 Flood Control 4-72
 4.4.7 Hydropower..... 4-77
 4.4.8 Economics 4-80
 4.4.9 Environmental Justice 4-82
4.5 Selecting the Preferred Alternative..... 4-84
 4.5.1 Method..... 4-84
 4.5.2 Discussion 4-84
 4.5.3 Results 4-87
4.6 Cumulative Impacts 4-91
 4.6.1 Hydrology and Geomorphology 4-95
 4.6.2 Biological Resources 4-96
 4.6.3 Water Quality 4-97
 4.6.4 Indian Trust Assets and Cultural Resources 4-97
 4.6.5 Agriculture, Land Use, and Recreation 4-98
 4.6.6 Flood Control and Hydropower..... 4-98
 4.6.7 Economics 4-98
 4.6.8 Environmental Justice 4-98
 4.6.9 Summary of Cumulative Impacts 4-98

4.7 Short- and Long-Term Impacts 4-98

4.8 Unavoidable Adverse Impacts..... 4-99

4.9 Irreversible or Irretrievable Commitments 4-99

 4.9.1 Environmental Commitments..... 4-99

4.10 Adaptive Management..... 4-100

 4.10.1 Summary 4-100

 4.10.2 Goals and Objectives..... 4-101

 4.10.3 Process..... 4-101

 4.10.4 Future Adaptive Management Activities..... 4-101

CHAPTER 5—PUBLIC INVOLVEMENT, CONSULTATION, AND COORDINATION

5.1 Cooperating Agencies..... 5-1

5.2 Public Involvement..... 5-1

 5.2.1 Public Scoping..... 5-2

 5.2.2 Public Input for Alternatives Development..... 5-2

 5.2.3 Public Review of the Draft EIS 5-4

5.3 Consultation with U.S. Fish and Wildlife Service..... 5-5

5.4 Tribal Consultation and Coordination 5-6

CHAPTER 6—ACTIONS IDENTIFIED BUT OUTSIDE THE SCOPE OF THE REVIEW AND EIS

6.1 Introduction 6-1

6.2 Within Existing Authorities But Outside Scope—No laws Need to Be Changed..... 6-1

 6.2.1 Greater Utilization of Abiquiu Reservoir (Wet Water Bank)..... 6-1

 6.2.2 Improving Watershed Conditions to improve water quality and quantity 6-3

 6.2.3 Coordinate Water Supply Operations at Elephant Butte Reservoir and Caballo Reservoir With the Middle Rio Grande..... 6-4

6.3 Actions Outside Existing Laws, Authorizations, And Regulations..... 6-5

 6.3.1 Storage of Rio Grande Water in Heron Reservoir..... 6-5

 6.3.2 Use of Cochiti Lake for Other than Authorized Purposes..... 6-5

 6.3.3 Use of Abuquiu Reservoir for other than Authorized Purposes 6-6

 6.3.4 Use of Jemez Canyon Dam for other than Authorized Purposes 6-6

CHAPTER 7—LIST OF PREPARERS AND CONTRIBUTORS

INDEX

APPENDIX A—REFERENCES

APPENDIX B—QUALITY ASSURANCE

APPENDIX C—GLOSSARY

APPENDIX D—MEMORANDUM OF AGREEMENT

APPENDIX E—PUBLIC INVOLVEMENT

APPENDIX F—COMMENTS ON DEIS WITH RESPONSES

APPENDIX G—APPLICABLE LAWS AND REGULATIONS

VOLUME 2: TECHNICAL TEAM REPORTS

APPENDIX H—RIVER MECHANICS AND GEOMORPHOLOGY

APPENDIX I—WATER OPERATIONS

**APPENDIX J—HYDROLOGY AND HYDRAULICS MODELS: FLO-2D AND
SURFACE WATER/GROUNDWATER MODELS**

APPENDIX K—AQUATIC HABITAT MODEL

APPENDIX L—BIOLOGICAL RESOURCES

APPENDIX M—WATER QUALITY

**APPENDIX N—AGRICULTURE, LAND USE, FLOOD CONTROL, RECREATION,
ECONOMICS**

APPENDIX O—CULTURAL RESOURCES

APPENDIX P—DECISION SUPPORT PROCESS AND DATA QUALITY