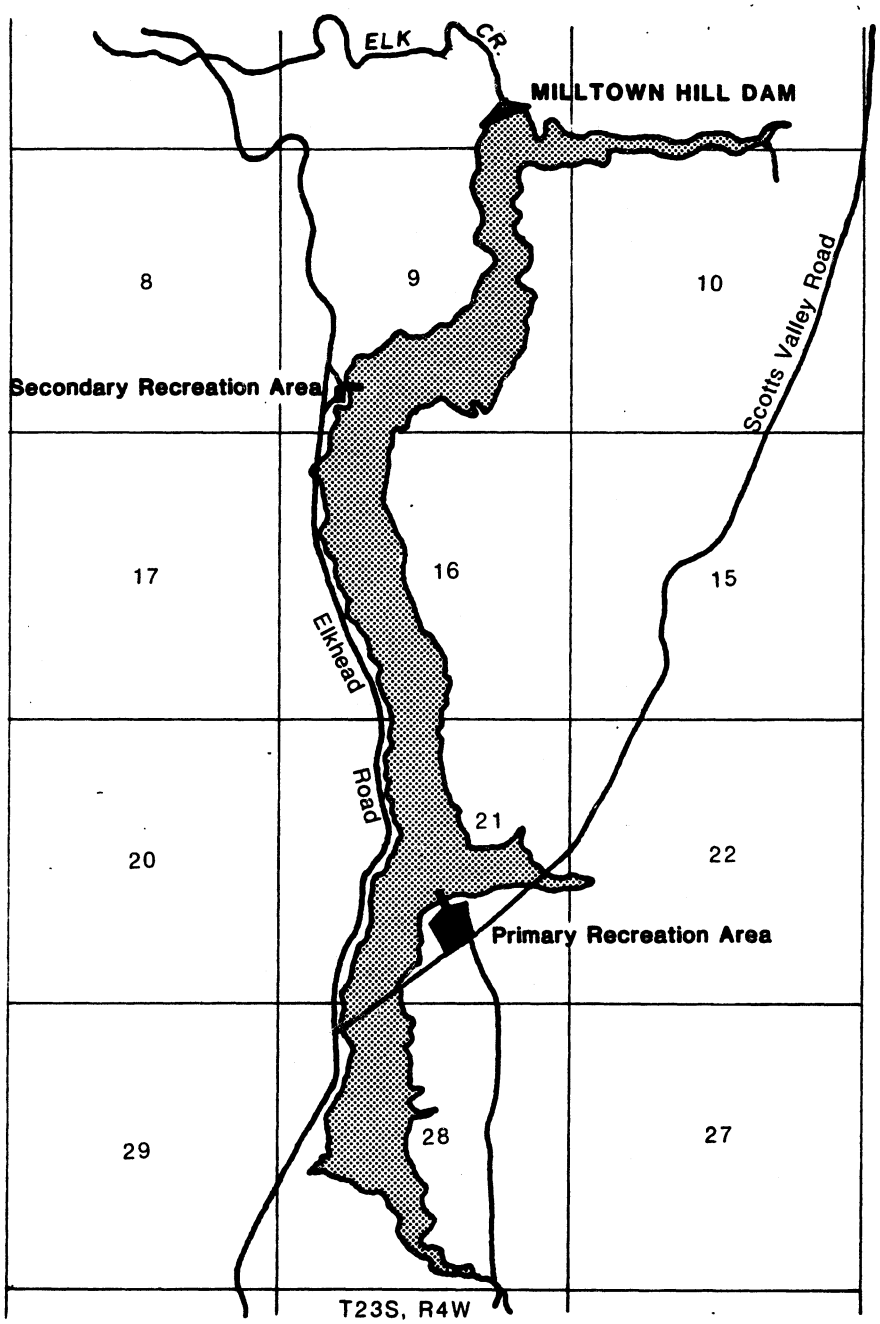
MILLTOWN HILL PROJECT

DOUGLAS COUNTY, OREGON

FINAL

ENVIRONMENTAL IMPACT STATEMENT



DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

FINAL

ENVIRONMENTAL IMPACT STATEMENT

MILLTOWN HILL PROJECT
ELK CREEK SUBBASIN, UMPQUA RIVER BASIN
DOUGLAS COUNTY, OREGON

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION
IN COOPERATION WITH
THE ROSEBURG DISTRICT BUREAU OF LAND MANAGEMENT
THE PORTLAND DISTRICT U.S. ARMY CORPS OF ENGINEERS

Under provisions of the Small Reclamation Projects Act (Public Law 84-984, as amended), Douglas County has applied to the Bureau of Reclamation for a Federal loan to develop a dam, reservoir, and related facilities at the Milltown Hill site on Elk Creek.

This Environmental Impact Statement addresses the construction and operation of the proposed Milltown Hill Project. The project consists of a 186-foot high dam and 24,143-acre foot reservoir on Elk Creek which would provide regulated flows of water for irrigation of up to 4,661 acres of arable land, storage and distribution of water to the cities of Drain and Yoncalla and the community of Rice Hill, allow municipal expansion and industrial diversification, provide a reliable source of water for rural domestic use, provide opportunities to improve fish and wildlife habitat, improve water quality, and provide new water-related recreational facilities. It would also provide limited flood control in and near the city of Drain, and provide the opportunity to secure 767 additional acres of habitat for the Columbian white-tailed deer as a project mitigation measure. A portion of the stored water would be released directly into Elk Creek to enhance water quality and anadromous fish habitat, and to meet the out-of-stream needs of municipal, industrial, and agricultural users. The remainder of the stored water would be released into a pipeline distribution system which would improve municipal, industrial and irrigation water supplies to Scotts Valley and Yoncalla Valley, and provide an additional water supply for rural domestic use in these areas.

The draft environmental impact statement was filed with the Environmental Protection Agency and made available to the public on December 11, 1991 (DES 91-33). The draft statement was also used to obtain public review and comment on wetlands protection (Executive Order 11990) and floodplain management (Executive Order 11988).

The final environmental impact statement incorporates updates in impact and economic analyses and presents the results of agency and public review of the draft environmental impact statement. Based on that review, it has been determined that (1) no significant changes are required in the proposed project and (2) the analyses presented in the draft environmental impact statement remain valid as updated in the final statement.

Federal decision on the proposed project will not be made until at least 30 days after this final environmental statement has been filed with the Environmental Protection Agency and the "Notice of Availability" has appeared in the Federal Register. During that 30-day period, written comments on the content of the final environmental impact statement will be accepted at the address shown below. These comments will be considered in the Federal decision process.

For further information regarding the processing or content of this document, contact:

Regional Environmental Officer
U.S. Bureau of Reclamation
Box 043 550 West Fort Street
Boise, Idaho 83724

(208) 334-9442

Statement Number: FES 92-19

Filing Date: August 14, 1992

TABLE OF CONTENTS

Page

SUMMARY. S-1

1.0 PURPOSE AND NEED 1-1

1.1 Purpose 1-1
1.2 Need 1-1

1.2.1 Socio-economic 1-3
1.2.2 Anadromous Fish 1-3
1.2.3 Wildlife Habitat 1-4
1.2.4 Ground Water Quality 1-5
1.2.5 Ground Water Availability 1-5
1.2.6 Surface Water Quality 1-5
1.2.7 Municipal Water 1-7
1.2.8 Rural Domestic Water 1-7
1.2.9 Industrial Water 1-8
1.2.10 Irrigation 1-8
1.2.11 Outdoor Recreation 1-9
1.2.12 Flood Control 1-9
1.2.13 Wetlands 1-10

1.3 Summary 1-10

2.0 ALTERNATIVES 2-1

2.1 Alternative Selection Process 2-1
2.2 Preferred Alternative 2-4

2.2.1 Purpose. 2-4
2.2.2 Description. 2-4

2.2.2.1 Dam 2-4
2.2.2.2 Storage Allocations 2-5
2.2.2.3 Intake Structure 2-5
2.2.2.4 Outlet Works 2-6
2.2.2.5 Water Distribution System 2-6
2.2.2.6 Drainage System 2-7
2.2.2.7 Roads 2-8
2.2.2.8 Utilities 2-9
2.2.2.9 Microwave Tower 2-10
2.2.2.10 Recreation Facilities 2-10
2.2.2.11 Other Facilities. 2-11

2.2.2.11.1 Quarry 2-11
2.2.2.11.2 Contractor Work Area . . . 2-11
2.2.2.11.3 Staging Area 2-11
2.2.2.11.4 Construction Haul Road . . 2-12

2.2.2.11.5 Elk Creek Crossings 2-12
2.2.2.11.6 Recreation Area 2-12
2.2.2.11.7 Causeways for County Road #8 2-12
2.2.2.11.8 Transmission Line Island . 2-13

2.2.2.12 Land Acquisition 2-13
2.2.2.13 Mitigation of Impacts to Biological Resources 2-14

2.2.2.13.1 Reservoir Area Wildlife Habitat 2-14
2.2.2.13.2 Wetlands 2-15
2.2.2.13.3 Habitat for Black-tailed Deer and Turkey 2-15
2.2.2.13.4 Cultural Resources 2-15

2.2.2.14 Enhancements to Biological Resources 2-16

2.2.2.14.1 Stream Flow Improvements for Fisheries Resources . 2-16
2.2.2.14.2 Instream Fish Habitat Improvements 2-16
2.2.2.14.3 Reservoir Fish Habitat Improvements 2-17
2.2.2.14.4 Riparian Habitat 2-17

2.2.2.15 Construction Schedule and Work Sequence 2-17
2.2.2.16 Project Costs 2-19

2.2.2.16.1 Projected Future Costs . . . 2-20
2.2.2.16.2 Land Acquisition and Rights of Way. 2-20
2.2.2.16.3 Engineering and Administration 2-20
2.2.2.16.4 Estimated Direct Cost of Project Facilities. . . 2-21
2.2.2.16.5 Loan Application Reports and Special Studies. . . . 2-21
2.2.2.16.6 Bureau of Reclamation Costs. 2-21
2.2.2.16.7 Reimbursable Interest During Construction (IDC). 2-21
2.2.2.16.8 Operation, Maintenance and Replacement Costs. . . 2-22

2.3 Compliance with Applicable Laws, Regulations, and Executive Orders 2-24

2.3.1 Reviews, Permits, and Licenses. 2-24

2.3.2 Compliance with Executive Orders for Flood Plain Management #11988 and Protection of Wetlands #11990 2-24

2.4 Other Alternatives Considered but Excluded from Detailed Study. 2-26

2.4.1 Structural Alternatives Investigated. . . 2-26

2.4.1.1 Tributaries to Elk Creek 2-26
2.4.1.2 Elk Creek Mainstem 2-27

2.4.2 Other Structural Alternatives 2-28
2.4.3 Non-structural Alternatives 2-28

2.5 Comparison of Environmental Impacts of Alternatives. 2-29

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES 3-1

3.1 Preferred Alternative 3-1

3.1.1 Topography 3-3

3.1.1.1 Existing Topography. 3-3
3.1.1.2 Topography Impacts 3-3

3.1.1.2.1 Construction 3-3
3.1.1.2.2 Operation 3-4

3.1.1.3 Mitigation of Topography Impacts . 3-4

3.1.2 Geology and Seismicity 3-4

3.1.2.1 Existing Conditions 3-4
3.1.2.2 Impacts of Geology and Seismicity . 3-6
3.1.2.3 Mitigation of Geologic Hazards and Seismic Conditions 3-6

3.1.3 Soils and Land Classification 3-7

3.1.3.1 Existing Soils and Land Classification 3-7
3.1.3.2 Impacts to Soils and Land. 3-11

3.1.3.2.1 Construction 3-11
3.1.3.2.2 Operation 3-11

3.1.3.3 Mitigation of Impacts to Soils and Land 3-11

3.1.4 Mineral and Aggregate Resources 3-12

3.1.4.1 Existing Mineral and Aggregate Resources 3-12
3.1.4.2 Impacts to Mineral and Aggregate Resources 3-14
3.1.4.3 Mitigation of Impacts to Mineral and Aggregate Resources 3-15

3.1.5 Climate 3-15

3.1.5.1 Existing Climatic Conditions . . 3-15
3.1.5.2 Impacts on Climate 3-17
3.1.5.3 Mitigation 3-17

3.1.6 Air Quality 3-17

3.1.6.1 Existing Air Quality 3-17
3.1.6.2 Impacts to Air Quality 3-18

3.1.6.2.1 Construction 3-18
3.1.6.2.2 Operation 3-18

3.1.6.3 Mitigation of Air Quality Impacts 3-18

3.1.7 Noise 3-19

3.1.7.1 Existing Noise Conditions 3-19
3.1.7.2 Noise Impacts 3-19

3.1.7.2.1 Construction 3-19
3.1.7.2.2 Operation 3-20

3.1.7.3 Mitigation of Noise Impacts . . . 3-20

3.1.8 Surface Water Quantity 3-20

3.1.8.1 Existing Surface Water Quantity . 3-20
3.1.8.2 Impacts to Surface Water Quantity 3-24

3.1.8.2.1 Construction 3-24
3.1.8.2.2 Operation 3-24

3.1.8.3 Mitigation of Impacts to Surface Water Quantity 3-27

3.1.9 Surface Water Quality 3-27

3.1.9.1 Existing Water Quality 3-27
3.1.9.2 Impacts to Water Quality 3-31

3.1.9.2.1 Construction 3-31

3.1.9.2.2 Operation 3-32

3.1.9.3 Mitigation of Water Quality Impacts 3-35

3.1.10 Ground Water 3-38

3.1.10.1 Existing Ground Water Conditions 3-38
3.1.10.2 Ground Water Impacts 3-39

3.1.10.2.1 Construction 3-39
3.1.10.2.2 Operation 3-39

3.1.10.3 Mitigation of Ground Water Impacts 3-40

3.1.11 Vegetation 3-40

3.1.11.1 Existing Vegetation 3-40

3.1.11.1.1 Uplands 3-40
3.1.11.1.2 Riparian and Wetlands . . 3-41

3.1.11.2 Impacts to Vegetation 3-42

3.1.11.2.1 Construction 3-42
3.1.11.2.2 Operation. 3-43

3.1.11.3 Mitigation of Impacts to Vegetation. 3-43

3.1.12 Agriculture 3-44

3.1.12.1 Existing Agricultural Conditions 3-44
3.1.12.2 Impacts to Agriculture 3-45

3.1.12.2.1 Construction 3-45
3.1.12.2.2 Operation 3-45

3.1.12.3 Mitigation of Impacts to Agriculture 3-46

3.1.13 Timber Resources 3-46

3.1.13.1 Existing Timber Resources . . . 3-46
3.1.13.2 Impacts to Timber Resources . . 3-47

3.1.13.2.1 Construction 3-47
3.1.13.2.2 Operation 3-47

3.1.13.3 Mitigation of Impacts to Timber Resources 3-47

3.1.14 Wildlife Resources 3-48

3.1.14.1 Existing Wildlife Conditions . . 3-48
3.1.14.2 Impacts to Wildlife Habitat . . 3-50

3.1.14.2.1 Construction 3-50
3.1.14.2.2 Operation 3-51

3.1.14.3 Mitigation of Impacts to Wildlife 3-52

3.1.15 Fisheries Resources 3-55

3.1.15.1 Existing Fisheries Resources . . 3-55
3.1.15.2 Impacts to Fisheries Resources and Habitat 3-56

3.1.15.2.1 Construction 3-56
3.1.15.2.2 Operation 3-57

3.1.15.3 Mitigation of Impacts to Fisheries Resources 3-62

3.1.16 Threatened and Endangered Species. . . . 3-63

3.1.16.1 Listed Species. 3-64

3.1.16.1.2 Columbian White-tailed Deer 3-64
3.1.16.1.3 Bald Eagle 3-65
3.1.16.1.4 Northern Spotted Owl . . . 3-65

3.1.16.2 Biological Assessment. 3-65
3.1.16.3 Unlisted and Candidate Species . . 3-66

3.1.16.3.1 Plants. 3-66
3.1.16.3.2 Umpqua Chub 3-66
3.1.16.3.3 Western Pond Turtle 3-67

3.1.17 Recreation. 3-67

3.1.17.1 Existing Recreation Conditions . . 3-67
3.1.17.2 Impacts to Recreation. 3-68
3.1.17.3 Mitigation 3-69

3.1.18 Cultural Resources. 3-69

3.1.18.1 Existing Cultural Resources. . . . 3-69
3.1.18.2 Impacts to Cultural Resources. . . 3-72
3.1.18.3 Mitigation of Impacts to Cultural Resources 3-73

3.1.19 Visual Resources. 3-74

3.1.19.1 Existing Visual Resources. 3-74
3.1.19.2 Impacts to Visual Resources. 3-75

3.1.19.2.1 Construction. 3-75
3.1.19.2.2 Operation 3-75

3.1.19.3 Mitigation of Visual Quality Impacts. 3-76

3.1.20 Land Use 3-76

3.1.20.1 Existing Land Use. 3-76
3.1.20.2 Impacts to Land Use. 3-77

3.1.20.2.1 Construction. 3-77
3.1.20.2.2 Operation 3-78

3.1.20.3 Mitigation of Land Use Impacts . . . 3-78

3.1.21 Socio-Economic Conditions. 3-79

3.1.21.1 Existing Conditions. 3-79

3.1.21.1.1 Population Characteristics. . 3-79
3.1.21.1.2 Industry. 3-80
3.1.21.1.3 Employment. 3-82
3.1.21.1.4 Income. 3-83
3.1.21.1.5 Water Supplies and Demands. . 3-84

3.1.21.2 Impacts to Socio-economic Conditions 3-91

3.1.21.2.1 Construction Impacts. 3-91

3.1.21.2.1.1 Construction Schedule 3-91
3.1.21.2.1.2 Property Acquisition. 3-92
3.1.21.2.1.3 Construction Labor Force and Salaries . . 3-92

3.1.21.2.2 Operation Impacts 3-93

3.1.21.2.2.1 Annual Benefits. . . . 3-93
3.1.21.2.2.2 Increased Farm Income. 3-93
3.1.21.2.2.3 New Industries 3-93
3.1.21.2.2.4 Commercial and Sports Anadromous Fisheries. 3-94
3.1.21.2.2.5 Reservoir Recreation Benefits. 3-95
3.1.21.2.2.6 Reduction of Flood Damage. 3-96

3.1.21.2.2.7 Reduction of Treated Effluent Costs. 3-96

3.1.21.2.3 Mitigation of Impacts to Socio-economic Conditions. . . 3-97

3.1.22 Transportation 3-97

3.1.22.1 Existing Transportation Conditions. 3-97
3.1.22.2 Impacts to Transportation 3-98

3.1.22.2.1 Construction Impacts 3-98
3.1.22.2.2 Operation Impacts. 3-98

3.1.22.3 Mitigation of Transportation Impacts. 3-99

3.1.23 Police Protection 3-99

3.1.23.1 Existing Police Protection. 3-99
3.1.23.2 Impacts to Police Protection. 3-100
3.1.23.3 Mitigation of Police Protection Impacts 3-100

3.1.24 Fire Protection 3-100

3.1.24.1 Existing Fire Protection. 3-100
3.1.24.2 Impacts to Fire Protection. 3-100
3.1.24.3 Mitigation of Fire Protection Impacts 3-100

3.1.25 Schools 3-100

3.1.25.1 Existing School Conditions. 3-100
3.1.25.2 Impacts to School Conditions. 3-101
3.1.25.3 Mitigation of Impact to Schools . . .3-101

3.1.26 Health Facilities 3-101

3.1.26.1 Existing Health Facilities. 3-101
3.1.26.2 Impacts to Health Facilities. 3-101
3.1.26.3 Mitigation of Impacts to Health Facilities. 3-101

3.1.27 Energy. 3-102

3.1.27.1 Existing Energy Conditions. 3-102
3.1.27.2 Impacts to Energy 3-102
3.1.27.3 Mitigation of Energy Impacts. 3-102

3.1.28 Indirect Impacts. 3-102

3.1.29 Cumulative Impacts. 3-104

3.1.30 Residual and Unavoidable Adverse Impacts . .3-105

3.1.30.1 Air Quality, Noise, and Visual Quality 3-105
3.1.30.2 Vegetation. 3-105
3.1.30.3 Fish and Wildlife 3-106
3.1.30.4 Social Conditions 3-106
3.1.30.5 Water Quality 3-106

3.1.31 Relationship Between Short-term Uses of the Environment and Long-term Productivity . . .3-107

3.1.32 Irreversible and Irretrievable Commitment of Resources. 3-108

3.2 Environmental Consequences of the No-Action Alternative 3-109

3.2.1 Land Use 3-109
3.2.2 Public Water Supply. 3-110
3.2.3 Surface Water Quantity 3-110
3.2.4 Surface Water Quality. 3-110
3.2.5 Ground Water 3-110
3.2.6 Anadromous Fish Habitat. 3-110
3.2.7 Population 3-111
3.2.8 Economic Growth. 3-111
3.2.9 Flooding 3-112

4.0 CONSULTATION AND COORDINATION 4-1

4.1 Introduction 4-1
4.2 Chronology of Consultation and Coordination . . . 4-2

5.0 LIST OF PREPARERS 5-1

6.0 LITERATURE CITED. 6-1

INDEX

APPENDICES

Appendix A General Plan Profiles and Details

Appendix B Environmental Commitments

Appendix C Bureau of Reclamation Responses to Recommendations made by Fish and Wildlife Service in Review of the Status Report and Environmental Analysis

Appendix D Notice of Intent and Oregon A-95 Clearing House Reponses

Appendix E Distribution List for the DEIS

Appendix F Threatened and Endangered Species

Appendix G Comments and Reponses to the Draft Environmental Impact Statement

Appendix H Acronyms

LIST OF TABLES

		Near Page
S-1	Structural and Non-structural Alternatives Investigated	S-3
S-2	Summary Comparison of the Impacts of a No-action Alternative and the Preferred Alternative	S-14
2-1	Description of Milltown Hill Dam and Related Facilities	2-4
2-2	Summary of Estimated Project Costs	2-19
2-3	Reviews, Permits, and Licenses Required by Federal, State, and Local Agencies	2-24
2-4	Structural and Non-structural Alternatives Investigated	2-26
3-2-1	Geologic Time Chart to 70 Million Years Before Present	3-5
3-3-1	Summary of Arable Land Class Specification	3-7
3-3-2	Arable Lands	3-8
3-3-3	Summary of Estimated Drainage Costs per Acre	3-10
3-8-1	Elk Creek 50% and 80% Exceedence Flows at Gage #14-3220.00 near Drain, Oregon	3-21
3-8-2	Water Rights for Irrigation, Domestic Use, Stock Water, and Log Ponds	3-22
3-8-3	Flood Frequency and Summary of Discharges for Elk Creek Near Drain	3-23
3-8-4	Flood Damage Summary, Elk Creek	3-24
3-8-5	Average Annual Flood Damages Along Elk Creek	3-24
3-8-6	Flows at Selected Locations in Elk Creek for a Low Water Year (1977-78) with and without Milltown Hill Reservoir	3-25
3-8-7	Flows at Selected Locations in Elk Creek for an Average Water Year (1957-58) with and without Milltown Hill Reservoir	3-25

3-8-8 Cumulative Irrigation Return Flow and Average Flow in Elk Creek at the Stream Gage near Drain (14-3220.00) and at the Mouth of Elk Creek 3-27

3-9-1 Mean and Maximum Concentrations of Chemical Constituents and Water Quality Criteria Elk Creek near Elkhead, Oregon 3-28

3-9-2 Waste Discharge in Elk Creek Subbasin 3-29

3-9-3 Summary of Color and Turbidity Data, Elk Creek . . 3-30

3-9-4 Results of Water, Sediment, and Fish Tissue Analysis for Mercury from Elk Creek 3-31

3-12-1 Summary of Land Use in Elk Creek Subbasin 3-45

3-14-1 Species and Cover Type Association and Acreages for Baseline HEP Conditions, Milltown Hill Reservoir 3-50

3-14-2 Acres of Available Habitat, Baseline Conditions . 3-50

3-14-3 Net Changes in Average Annual Habitat Units (AAHU's) for the Milltown Hill Project 3-52

3-14-4 Net Results on the On-site Mitigation Actions . . 3-54

3-15-1 Fish Species Reported in Elk Creek 3-56

3-15-2 Estimated Increased Spawning Escapement of Anadromous Fish With the Milltown Hill Project. . .3-61

3-15-3 Estimated Commercial and Sport Fishery Harvest. . .3-62

3-17-1 Anticipated Reservoir Recreation Use 3-69

3-20-1 Land Use and Ownership Within the Watershed of the Proposed Milltown Hill Dam 3-76

3-21-1 Population Estimates for 1980, 1987, and 1988 . . 3-80

3-21-2 Distribution of Population by Age 3-80

3-21-3 Population Projections, Incorporated Cities . . . 3-86

3-21-4 Rural Diversion Demand (acre-feet) 3-89

3-21-5 Elk Creek, Irrigated Acreage and Water Rights . . 3-90

3-21-6 Summary of Potentially Arable Lands. 3-91

3-21-7 Estimated Salaries for On-site Labor and Number of On-site Jobs 3-92

3-21-8 Annual Benefits from Project Operation 3-93

3-21-9 Annual Commercial Anadromous Fishery Value . . . 3-94

3-21-10 Annual Sport Anadromous Fishery Value 3-94

3-21-11 Annual Recreation Benefits 3-96

4-1 Environmental Concerns and Action taken to Evaluate Concerns for the Proposed Milltown Hill Project. . . 4-1

LIST OF FIGURES

		Near Page
S-1	Location Map.	S-1
S-2	Milltown Hill Project Alternative Damsite Locations	S-3
S-3	Project Features	S-3
S-4	Pipeline System.	S-4
1-1	Comparison of Historic Flow with 1980 and 2030 Demands	1-11
2-1	Milltown Hill Watershed	2-4
2-2	Project Features.	2-4
2-3	Pipeline System	2-7
2-4	Recreation Facilities	2-10
2-5	Wildlife and Fisheries Mitigation	2-14
2-6	Proposed Wetlands Area South of Road Causeway	2-15
2-7	Fisheries Enhancement	2-16
2-8	Construction and Operation Schedules for Milltown Hill Project	2-17
2-9	Alternative Damsite Locations	2-26
3-2-1	Geology of the Project Area	3-5
3-3-1	Land Classification	3-8
3-3-2	Drainage Facilities	3-9
3-3-3	Drainage Facilities	3-9
3-3-4	Prime Farmlands	3-10
3-4-1	Location Map of Past and Present Mineral Exploration and Development Activity.	3-12
3-4-2	Federally Owned Mineral Estate and Mineral Resource Potential.	3-12
3-4-3	Location of Elkhead Mine.	3-13

3-8-1 Comparison of Average Flow and Water Rights 3-22

3-8-2 Natural and Regulated Flows at the Damsite. 3-24

3-8-3 Natural and Regulated Flows at Drain. 3-24

3-8-4 Natural and Regulated Flows at Elkton 3-24

3-8-5 Storage Exceedence Curves for Total Storage, Fish storage, and Consumptive Use 3-25

3-8-6 Comparison of Flow Duration Curves at Dam Before and After Project Construction 3-25

3-8-7 Comparison of Flow Duration Curves at the Mouth of Elk Creek Before and After Construction . . 3-25

3-8-8 Comparison of Flow Duration at Boswell Springs . . . 3-26

3-9-1 Mean Monthly Temperature (1986-1987) 3-30

3-9-2 Mean Monthly Temperature (1987-1988) 3-30

3-9-3 Mean Monthly Temperature (1988-1989) 3-30

3-9-4 Mean Monthly Temperature (1989-1990) 3-30

3-9-5 Water Temperature in Elk Creek During Spot Measurements made in 1990. 3-31

3-9-6 Average Water Temperatures of Reservoir Release Water. 3-34

3-9-7 Predicted Stream Water Temperature for June 15 . . . 3-34

3-9-8 Predicted Stream Water Temperature for July 15 . . . 3-34

3-9-9 Predicted Stream Water Temperature for August 15 . . 3-34

3-9-10 Predicted Stream Water Temperature for September 15 3-34

3-11-1 General Vegetation Types 3-41

3-11-2 Potential Arable Lands and Wetlands (Upper Elk Creek). 3-41

3-11-3 Potential Arable Lands and Wetlands (Lower Elk Creek). 3-41

3-19-1 740 Feet Average Drawdown and 775 Feet Full Pool. 3-75

3-19-2 690 Feet Maximum Drawdown and 775 Feet Full Pool. 3-75

3-20-1 Land Ownership 3-77

3-21-1 Population Growth. 3-79

3-21-2 Employment by Industry 3-82

3-21-3 Earnings by Major Industry 3-83