

CONTENTS

| | | |
|-----------|---|------------|
| 1. | Introduction | 1-1 |
| 1.1 | Basin Planning Program Description | 1-1 |
| 1.2 | Mid-Puyallup Basin Plan..... | 1-3 |
| 1.2.1 | Study Area..... | 1-3 |
| 1.2.2 | Description of Mid-Puyallup Subbasins..... | 1-5 |
| 1.2.3 | Key Elements of the Mid-Puyallup Basin Plan..... | 1-5 |
| 1.3 | Statement of Purpose..... | 1-6 |
| 1.4 | Goals, Objectives, and Strategies | 1-6 |
| 2. | Applicable Regulations, Policies & Programs | 2-1 |
| 2.1 | Federal Clean Water Act | 2-1 |
| 2.1.1 | Section 303(d) List and TMDL's..... | 2-2 |
| 2.1.2 | Section 404 Wetland Fill Permits..... | 2-3 |
| 2.2 | Federal Endangered Species Act..... | 2-3 |
| 2.3 | National Flood Insurance Program..... | 2-4 |
| 2.3.1 | NFIP | 2-5 |
| 2.3.2 | Community Rating System (CRS) | 2-5 |
| 2.4 | Settlement Agreement with the Puyallup Tribe | 2-6 |
| 2.5 | State Quality Water Standards..... | 2-8 |
| 2.6 | Safe Drinking Water Act of 1974..... | 2-4 |
| 2.7 | The Growth Management Act and Pierce County Comprehensive Plan | 2-8 |
| 2.7.1 | Growth Management Act..... | 2-8 |
| 2.7.2 | Pierce County Comprehensive Plan..... | 2-5 |
| 2.8 | Shoreline Management Act | 2-10 |
| 2.9 | State Hydraulic Code..... | 2-10 |
| 2.10 | The Nonpoint Rule | 2-11 |
| 2.11 | Pierce County Drainage & Surface Water Management Master Plan (1991)..... | 2-11 |
| 2.12 | 1997 Rate Structure Study..... | 2-12 |
| 2.13 | Army Corps of Engineers General Investigation New Start Program | 2-12 |
| 2.14 | Existing Reports and Studies..... | 2-13 |
| 3. | Stakeholders' Involvement | 3-1 |
| 3.1 | Stakeholders and Relationship to Basin Plan | 3-1 |
| 3.1.1 | Community Planning Groups..... | 3-2 |
| 3.1.2 | Pierce County Planning and Land Services (PALS)..... | 3-4 |

TABLE OF CONTENTS

3.1.3 Cities within the Mid-Puyallup Basin 3-4

3.1.4 Washington State Department of Ecology (Ecology)..... 3-6

3.1.5 Washington State Department of Fish & Wildlife (WDFW)..... 3-7

3.1.6 PuyallupTribe of Indians 3-7

3.1.7 Muckleshoot Indian Tribe 3-8

3.1.8 Puyallup River Watershed Council 3-8

3.1.9 Pierce Conservation District 3-10

3.1.10 Citizens within the Mid-Puyallup Basin 3-10

3.2 Roles and Responsibilities 3-11

4. Current Conditions 4-1

4.1 Mid-Puyallup Basin..... 4-1

4.2 Topography and Planning Units..... 4-1

4.2.1 Topography 4-1

4.2.2 Subbasins (the Planning Units) 4-2

4.3 Land Use 4-6

4.3.1 Existing Land Use 4-6

4.3.2 Future Land Use 4-16

4.4 Soils 4-16

4.4.1 Natural Drainage System 4-19

4.4.2 Constructed Drainage System 4-25

4.5 Aquatic and Riparian Habitats 4-27

4.5.1 Habitat Assessment of Principal Fish-Bearing Streams..... 4-29

4.5.2 Wetland Habitat 4-34

4.6 Upland Habitats..... 4-34

4.7 Water Quality 4-34

4.7.1 Water Quality Impairment 4-34

4.7.2 Water Quality Investigations..... 4-37

4.6.3 Wetland Habitat 4-54

5. Identification of Problems 5-1

5.1 Problem Definitions 5-1

5.2 Flooding 5-1

5.3 Water Quality Problems 5-10

5.4 Fish abitat Limiting Factors 5-13

| | | |
|-----------|--|------------|
| 6. | Flooding Problems..... | 6-1 |
| 6.1 | Modeling and Analysis..... | 6-1 |
| 6.1.1 | Hydrologic Modeling..... | 6-1 |
| 6.1.2 | Hydraulic Modeling..... | 6-2 |
| 6.2 | Flood and Drainage Problems within the Basin..... | 6-13 |
| 6.2.1 | Problem Identification Codes..... | 6-13 |
| 6.3 | Flooding Problems and Conceptual Solutions..... | 6-15 |
| 6.3.1 | Culvert Flooding as Shown in Hydraulic Modeling..... | 6-15 |
| 6.3.2 | Neighborhood Flooding along Pioneer Way (A1-RF01)..... | 6-16 |
| 6.3.3 | Ball Creek Crossing at 106th Street E (BC1-C07)..... | 6-22 |
| 6.3.4 | Ball Creek Crossing at Pioneer Way (BC1-C08)..... | 6-23 |
| 6.3.5 | McCutcheon Road Flooding at Fennel Creek (FC1-BRG01)..... | 6-24 |
| 6.3.6 | Fennel Creek Crossing at Kelly Lake Road (FC3-BRG02)..... | 6-25 |
| 6.3.7 | Fir Ridge Pond Overtopping (FC5-DP01)..... | 6-25 |
| 6.3.8 | Road Flooding at 114th Street cul-de-sac (FC8-RF01)..... | 6-28 |
| 6.3.9 | Horsehaven Creek Crossing at 150th Avenue E (HH4-C05)..... | 6-29 |
| 6.3.10 | Horsehaven Creek Crossing at 188th Street E (HH5-C07)..... | 6-30 |
| 6.3.11 | Flooding along Jansky Road (HH8-RST02)..... | 6-31 |
| 6.3.12 | Flooded Properties along 149th Avenue E (D1-AC01)..... | 6-31 |
| 6.3.13 | 21411 Jansky Road Flooding (D6-RF01)..... | 6-32 |
| 6.3.14 | Neighborhood Flooding along Freeman Road E (D17-RF03)..... | 6-33 |
| 6.4 | Sites to be Monitored for Future Flooding..... | 6-33 |
| 6.4.1 | Stormwater Ponds along Angeline Road (FC1-DP04)..... | 6-34 |
| 6.4.2 | Roadway Flooding at Intersection of 96th Street E and 233rd Avenue E (FC4-RF05)..... | 6-34 |
| 6.4.3 | Road Flooding at culvert under Old Sumner-Buckley Highway (FC4-C04)..... | 6-35 |
| 6.5 | Potential Small Works Projects..... | 6-36 |
| 7. | Water Quality Problems..... | 7-1 |
| 7.1 | Site-Specific Issues..... | 7-1 |
| 7.1.1 | Iron Bacteria in Alderton Creek, WQ-1..... | 7-1 |
| 7.1.2 | Commercial Landfill, WQ-2..... | 7-2 |
| 7.1.3 | Copper Contamination in Fennel Creek, WQ-3..... | 7-3 |
| 7.1.4 | Fish Hatchery and Rearing Facility, WQ-4..... | 7-3 |

TABLE OF CONTENTS

7.1.5 Potential Untreated Sewage from Trailer Park 7-4

7.2 Basin Wide Issues 7-4

7.2.1 Failing On-Site Septic Systems Above High Groundwater, WQ-5 7-4

7.2.2 Bank Erosion, WQ-6 7-5

7.2.3 Land Use Impacts, WQ-7 7-6

7.2.4 Elevated Temperatures, WQ-8 7-8

7.2.5 Trash Dumping, WQ-9 7-8

7.2.6 Fecal Coliform Bacteria, WQ-10 7-9

8. Fish Habitat Problems 8-1

8.1 Alderton Creek 8-1

8.2 Van Ogles Creek 8-2

8.2.1 Sparse or Absent Riparian Corridors 8-2

8.2.2 Fine Sediment Burying Streambed Gravel 8-3

8.2.3 Low Channel Complexity 8-5

8.2.4 Fish Barrier Culvert VO1-C01 8-5

8.2.5 Fish Barrier Culvert VO1-C04 8-6

8.2.6 Fish Barrier Culvert VO1-C06 8-6

8.2.7 Undetermined Fish Barriers 8-7

8.3 Ball Creek 8-8

8.3.1 Fish Blockage at Mouth 8-9

8.3.2 Potential Property Acquisition 8-9

8.3.3 Sparse or Absent Riparian Corridors 8-9

8.3.4 Fine Sediment Burying Streambed Gravel 8-10

8.3.5 Low Channel Complexity 8-11

8.3.6 Fish Barrier Culvert BC2-C05 8-11

8.3.7 Fish Barrier Culvert BC1-C07 8-12

8.3.8 Fish Barrier Culvert BC1-C08 8-13

8.3.9 Fish Barrier Culvert BC1-C09 8-14

8.3.10 Undetermined Fish Barriers 8-14

8.4 Fennel Creek 8-15

8.4.1 Sparse or Absent Riparian Corridors 8-16

8.4.2 Low Channel Complexity 8-16

8.5 Canyon Falls Creek 8-17

8.5.1 Fish Barrier Culvert CFC1-C01 8-17

TABLE OF CONTENTS

8.6 Horsehaven Creek 8-18

 8.6.1 Sparse or Absent Riparian Corridors..... 8-18

 8.6.2 Sediment Accumulation in Lower Reaches 8-18

 8.6.3 Stream Bank Damage from Livestock 8-19

 8.6.4 Fine Sediment Burying Streambed Gravel..... 8-19

 8.6.5 Low Channel Complexity 8-20

 8.6.6 Fish Barrier Culvert HH4-C05 8-20

 8.6.7 Fish Barrier Culvert HH5-C10 8-21

 8.6.8 Fish Barrier Culvert HH5-C13 8-21

 8.6.9 Unknown Fish Barriers 8-22

8.7 Coordination with Pierce Conservation District..... 8-23

9. Basin Plan..... 9-1

 9.1 Plan Summary 9-1

 9.1.1 Capital Improvement Projects 9-2

 9.1.2 Programmatic Recommendations..... 9-2

 9.1.3 Additional Studies 9-3

 9.1.4 Implementation Strategy 9-5

 9.2 Discussion of Basin Needs 9-6

 9.2.1 Stormwater Impact Mitigation through Low Impact Development..... 9-6

 9.2.2 Fish Protection of Habitat From Adverse Effects of Urban Stormwater Runoff 9-8

 9.2.3 Conservation of Flood Hazard Areas 9-8

 9.2.4 Public Education and Public Involvement 9-9

 9.2.5 Flood Hazard Management 9-10

 9.2.6 Water Quality Management 9-11

 9.2.7 Riparian Corridor Management..... 9-12

 9.2.8 In-stream Habitat Improvement 9-12

 9.2.9 Livestock/Riparian Interactions 9-13

 9.2.10 Filling Information Gaps 9-13

 9.2.11 Continuing Stakeholder Involvement..... 9-14

 9.2.12 Project Identification Codes 9-14

 9.2.13 Capital Improvement Projects 9-15

 9.2.14 Programmic Measures 9-28

 9.2.15 Additional Studies Recommended 9-35

TABLE OF CONTENTS

| | |
|---|---|
| 10. Environmental Impact Statement..... | 10-1 |
| 10.1 Fact Sheet | 10-1 |
| 10.2 Summary of DSEIS | 10-3 |
| 10.3 Alternatives, Including the Proposed Action | 10-8 |
| 10.4 Affected Environment, Significant Impacts, and Mitigation Measures | 10-16 |
| 10.4.1 Water Resources..... | 10-16 |
| 10.4.2 Fishery Resources | 10-21 |
| 10.4.3 Vegetation | 10-24 |
| 10.4.4 Wildlife..... | 10-25 |
| 10.4.5 Land Use | 10-26 |
| 10.4.6 Aesthetic, Historic, and Cultural Resources..... | 10-27 |
| 10.4.7 Public Services and Utilities | 10-28 |
| 10.4.8 Soils..... | 10-29 |
| | |
| 11. References | 11-1 |
| Appendices | |
| A | Washington State Water Quality Standards |
| B | Public Survey, Memorandum and Sample Questionnaire |
| C | Details of Public Meetings |
| D | Impervious Surface Calculations |
| E | Stage and Temperature Data |
| F | Mid-Puyallup Basin Fisheries and Habitat Characterization Part 1: Pre-Field Assessment Report |
| G | Mid-Puyallup Basin Fisheries and Habitat Characterization Part 2: Field Assessment Report |
| H | Puyallup Tribe Water Quality Data |
| I | Initial List of Complaints |
| J | Capital Improvement Projects Prioritization, Estimates, and Sketches |
| K | Programmatic Measures Prioritization |

LIST OF TABLES

| | | |
|-------|---|------|
| 1-1. | Goals of Mid-Puyallup Basin Plan | 1-7 |
| 2-1. | Federal and State Laws and Regulations and Corresponding Mid-Puyallup Program ... | 2-6 |
| 3-1. | Areas of Local Governments in Mid-Puyallup Basin | 3-4 |
| 4-1. | Mid-Puyallup Subbasin Areas | 4-3 |
| 4-2. | Drainage Pathway Boundaries and DNR Classification | 4-4 |
| 4-3. | Existing Land Use Percent Identified by Type and Subbasin | 4-8 |
| 4-4. | General Land Use Categories and Associated Total Percent Impervious Values..... | 4-13 |
| 4-5. | Low-Density Residential Percent Impervious Values by Lot Size | 4-14 |
| 4-6. | Existing Total Percent Impervious Values for Mid-Puyallup Subbasins | 4-15 |
| 4-7. | Future Total Percent Impervious Values for Mid-Puyallup Subbasins..... | 4-17 |
| 4-8. | Mid-Puyallup Flow Gauges..... | 4-23 |
| 4-9. | Puyallup River Outfalls | 4-27 |
| 4-10. | Summary of In-Stream Habitat Assessment..... | 4-31 |
| 4-11. | Water Quality measurements During Summer Low Flow | 4-39 |
| 4-12. | Fennel Creek at Sumner-Buckley Highway | 4-39 |
| 4-13. | Grab Samples Collected for Basin Characterization | 4-41 |
| 4-14. | Temperature Summary from Basin Planning Gauges | 4-42 |
| 4-15. | Water Quality Values from Fennel Creek Environmental Assessment | 4-43 |
| 4-16. | Canyon Falls Creek Water Quality Monitoring from Cascadia Development..... | 4-45 |
| 4-17. | Puyallup Tribe Water Quality Data for Canyon Falls Creek | 4-47 |
| 4-18. | Puyallup Tribe Water Quality Data for Fennel Creek..... | 4-48 |
| 4-19. | Exceedances of State Water Quality Standards in Recent Studies of Mid-Puyallup Tributaries | 4-49 |
| 5-1. | Preliminary Flooding and Drainage Problems | 5-3 |
| 5-2. | Basin-wide Water Quality Problems | 5-11 |

TABLE OF CONTENTS

5-3. Effective Impervious Area in Tributary Basins of Mid-Puyallup.....5-13

5-4. Fish Passage Barriers in the Mid-Puyallup Basin5-15

6-1. HSPF Modeled Peak Flow Frequencies for Mid-Puyallup Basin.....6-3

6-2. Culverts on Mid-Puyallup Tributaries.....6-5

6-3. Water Surface Elevations from HEC-RAS Models for Existing Conditions and Future Landuse with Proposed Culverts.....6-9

6-4. Water Velocities from HEC-RAS Models for Existing Conditions and Future Landuse6-12

6-5. Resolved Flooding Problems and Problems on Private Property6-14

6-6. Recommended Replacements for Tributary Culverts6-17

6-7. Fir Ridge Pond Available Storage.....6-27

6-8. Small Works Drainage Issues Identified for Mid-Puyallup Subbasins.....6-37

8-1. Private Property Culvert/Fish Barrier Issues.....8-24

9-1. Summary Recommendations.....9-3

10-1. Comparison of Impacts10-5

10-2. Long-Term Goals of the 1991 Plan.....10-10

10-3. Comparison of Alternatives' Features10-15

LIST OF FIGURES

1-1. Relationship of Mid-Puyallup Basin to Other Basins in Pierce County1-2

1-2. Study Area.....1-4

3-1. Relationship to Community Planning Areas.....3-3

3-2. Local Governments in the Mid-Puyallup Basin.....3-9

3-3. Communications with Public & Other Agencies3-12

4-1. Topography4-2

4-2. Subbasins.....4-2

TABLE OF CONTENTS

4-3. Principal Drainage Pathways..... 4-2

4-4. Existing Land Use 4-7

4-5. Zoning..... 4-17

4-6. Soils 4-19

4-7. Flood Zones 4-23

4-8. Stream Gauges..... 4-25

4-9. Well Locations..... 4-27

4-10. Outfalls 4-27

4-11. Fish Habitat 4-31

4-12. Wetlands 4-35

4-13. Water Quality Sampling Sites 4-39

5-1. Drainage Problem Areas..... 5-3

5-2. Water Quality Problem Areas 5-11

5-3. Fish Barriers 5-15

6-1. Tributary Culverts 6-5

6-2. Drainage Investigation Sites..... 6-15

6-3. Examples of Fish Passable Culverts with Baffles 6-30

7-1. Examples of Degraded Stream Banks on Ball and Horsehaven Creeks 7-5

8-1. Fish Habitat and Barriers..... 8-5

9-1. Capital Improvement Project Locations 9-17

9-2. Recommended Monitoring Sites 9-35

9-3. Wapato Tributary Basin 9-39