

TABLE OF CONTENTS

TITLE	Page
1. INTRODUCTION	1
2. PROCESSES ZONE DESCRIPTION	3
2.1 Background and Study Area	3
2.2 Delineation, Characterization and Mapping of Process Zones	4
2.3 Process Zone Deductions from Geophysics and Soil Surveys	6
2.3.1 Methodology of the Electrical Resistivity Tomography Survey	11
2.3.2 Soil and Geologic Setting	12
2.3.2.1 Soils	12
2.3.2.2 Geology	13
2.3.2.3 Groundwater Setting	15
2.3.3 Electrical Resistivity Results	16
2.3.3.1 Transect W5	16
2.3.3.2 Transect W4	17
2.3.3.3 Transect W2	17
2.3.3.4 Transect W1	18
2.3.3.5 Transect W3	18
2.3.4 Hillslope Hydropedology Transects	19
2.3.4.1 Transects on Avalon hillslopes	20
2.3.4.2 Transects on Glencoe hillslopes	21
2.3.4.3 Transects on Cartref hillslopes	23
2.3.4.4 Transects on Hutton hillslopes	23
2.3.4.5 Longitudinal transects along the river reaches	24
2.4 Process Deductions from Water Isotope Analyses	25
2.4.1 Isotope Time Series	26
2.4.2 Isotope Event Results	31
2.4.3 Isotope Transects	35
3. SEDIMENT SOURCE DETERMINATION	38
3.1 Upland Sediment Sampling and Analysis	38
3.2 Delineation of Geochemical Fingerprints	40
3.3 Source Modeling Procedures	41
3.4 Collection, Sedimentology and Analysis of Sediment Cores	43
3.4.1 WT1-C1	44
3.4.1.1 Core Location and Characteristics	44
3.4.1.2 Source Modeling by Soil Type	44
3.4.1.3 Source Modeling by Land-Use Type	48
3.4.2 WT1-C2	48
3.4.2.1 Core Location and Characteristics	48
3.4.2.2 Source Modeling by Soil Type	48
3.4.2.3 Source Modeling by Land-Use Type	49
3.4.3 WET	49
3.4.3.1 Core Location and Characteristics	49
3.4.3.2 Source Modeling by Soil Type	49
3.4.3.3 Source Modeling by Land-Use Type	50
3.4.4 R1-C1	50
3.4.4.1 Sample Location and Characteristics	50
3.4.4.2 Source Modeling by Soil Type	51
3.4.4.3 Source Modeling by Land-Use	51
4. SEDIMENT DATING	51
5. DISCUSSION: CONNECTIVITY AND CONTROLS ON SEDIMENT SOURCE	53
6. DISCUSSION: CONNECTIVITY AND CONTROLS ON NUTRIENT SOURCE	57
6.1 Nutrient and Suspended Solids Observations	57
6.1.1 Nutrient Time Series Results	57

6.1.2 Nutrient Event Results	60
6.1.3 Nutrient Transects	63
6.2 Nutrient Processes through Trace Element Observations	64
7. CONCLUSIONS AND RECOMMENDATIONS	72