

TABLE OF CONTENTS

PREFACE	9
ACKNOWLEDGEMENTS	11
ACRONYMS AND ABBREVIATIONS	12
CHAPTER 1 - SUMMARY OF EVACUARFLORESTA PROJECT	15
CHAPTER 2 - INTRODUCTION	19
2.1. Introduction	19
CHAPTER 3 - OVERVIEW OF THE EMERGENCY AND EVACUATION PLANNING AND TERRITORIAL MANAGING	23
3.1. Introduction	23
3.2. Portuguese Context	25
3.2.1. Operational Structure – Strategies Associated with Evacuation Actions	25
3.2.2. Current Forest Management Policies in Portugal	30
3.2.3. Safe Village, Safe People Program (Aldeia Segura, Pessoas Seguras)	32
3.3. Human Losses in Rural Fires	37
3.3.1. Data from Portugal	37
3.3.2. Analysis of Fatalities in the 2017 Wildfires in Portugal	39
3.4. Evacuation Actions – Historical Cases	42
3.4.1. Worldwide Examples	42
3.4.2. Evacuation Actions in Portugal	43
3.4.3. Previously Adopted Policies	45
3.5. Concepts and Methodologies	47
3.6. Regional Case Studies in the Evacuarfloresta Project	51
CHAPTER 4 - HUMAN BEHAVIOUR UNDER THE THREAT OF WILDFIRE.....	55
4.1. Introduction	55
4.2. Fieldwork and Data Collection Activities	58
4.2.1. Socio-Territorial Profile in Lousã	59
4.2.2. Socio-Territorial Profile in Sertã	61

4.2.3. Socio-Territorial Profile in Cabanões (Lousã)	62
4.2.4. Socio-Territorial Profile in Boque (Lousã)	63
4.2.5. Socio-Territorial profile in Cerdeira (Lousã)	64
4.2.6. Socio-Territorial Profile in Vale do Laço (Sertã)	65
4.2.7. Socio-Territorial Profile in Trízio (Sertã)	66
4.3. Interviews and Surveys	67
4.3.1. Metodology	67
4.3.2. Results and Discussion	69
4.3.3. Conclusion	73
CHAPTER 5 - EVACUATION RISK ASSESSMENT	75
5.1. Introduction	75
5.2. Study Area	78
5.3. Methodology	80
5.3.1. Wildfire Risk Assessment in Support of Evacuation	81
5.3.2. Modelling Travel Time to Refuges and Shelters	83
5.4. Results	84
5.4.1. Spatial Variability in Wildfire Hazards	84
5.4.2. Spatial Distribution of Social Vulnerability	85
5.4.3. Wildfire Risk in Support of Evacuation	85
5.4.4. Travelling Time to the Nearest Refuge/Shelter	86
5.4.5. Correlating the Wildfire Risk with Evacuation Time	88
5.5. Discussion	89
5.6. Conclusions	92
CHAPTER 6 - WILDFIRE EVACUATION MODELLING AND SIMULATION	95
6.1. Simulation Techniques and Management Tools	95
6.1.1. Historical Context and Challenges	95
6.1.2. Advanced Computational Tools for Wildfire Simulation	100
6.2. Comparison of Three Simulation Software Tools	100
6.2.1. Software Descriptions	100
6.2.2. Test Case Scenarios	105
6.2.3. Results – Scenario 1	107
6.2.4. Discussion of Results	109
6.3. Wildfire Simulation Using Satellite Data and Rate of Spread Adjustment ...	115
6.3.1. Introduction	115
6.3.2. Methods	116

6.3.3. Results and Discussion	124
6.3.4. Conclusion	136
6.4. Evacuation Simulation Research Overview	137
6.4.1. Introduction	137
6.4.2. Warning Systems and Region Division	137
6.4.3. Evacuation Model Design	138
6.4.4. Computational Tools for Evacuation Modeling	142
6.4.5. Gaps and Future Directions	145
6.5. Evacuation Simulation under Wildfire Threats Using AnyLogic	147
6.5.1. Introduction	147
6.5.2. Wildfire Behaviour modeling	148
6.5.3. Agent-Based Evacuation Modeling in AnyLogic	150
6.5.4. Behavioral Factors in Evacuation Decisions.....	151
6.5.5. Evacuation Logistics and Route Planning.....	153
6.5.6. Proposed Application and Expected Results.....	154
6.5.7. Conclusion	155
CHAPTER 7 - UTILITY OF SHELTERS IN WILDFIRE EVACUATIONS AND DECISION OF THEIR LOCATION IN ARTICULATION WITH THE TERRITORIAL PLANS	157
7.1. Introduction	157
7.2. Case studies	159
7.2.1. Methodology and Data Collection	160
7.2.2. Results and Discussion.....	161
7.3. Conclusions from evacuation exercises	168
CHAPTER 8 - EVACUATION PLANS AND RECOMMENDATIONS	171
8.1. Emergency Management at the Parish Level	171
8.1.1. Introduction.....	171
8.1.2. Proposed Approach.....	172
8.2. Relevant National Legislation and framework for actions on emergency evacuations	175
8.3. Legal Aspects of Evacuation Planning in Wildfire Scenarios	177
8.3.1. Legal framework for evacuation planning in wildfire scenarios in Portugal	178
8.3.2. International Regulatory Strategies	181
8.3.3. International perspectives on evacuation planning	189
8.4. Summary of Key Evacuation Procedures	193
REFERENCES.....	197