

An Investigation of a GIS-Based Methodology for the
Sustainable, Participative Management of Walking
Routes in Ireland

Helen Claire Farrell, BSc MSc

Submitted as fulfilment of the requirements for the degree of Ph.D. by research to
Dublin Institute of Technology.

Supervisors: Dr Ken Boyle of Dublin Institute of Technology and
Dr Krysia Rybaczuk of Trinity College, University of Dublin

School of Planning and Environmental Management

August 2007

Volume 2 of 2

TABLE OF CONTENTS

Figure	Title	Page No.
Figure 2.1	The Ladder of Participation	1
Figure 3.1	Strands of Methodology.....	2
Figure 3.2	Location of Study Sites.....	3
Figure 3.3	Location of Waymarked Ways.....	4
Figure 3.4	The Burren Way and nearby Settlements.....	5
Figure 3.5	The East Munster Way and nearby Towns and Villages.....	6
Figure 3.6	Public Transport links and parking places in the Burren	7
Figure 3.7	CORINE Land Cover Types in the Burren Way's Visual Catchment.....	8
Figure 3.8	Land Cover Types and Areas in the Burren Catchment.....	9
Figure 3.9	Areas of Coillte Forest Plantations in the Burren.....	10
Figure 3.10	Burren Road Communications Network.....	11
Figure 3.11	Freshwater Surface Hydrology in the Burren.....	12
Figure 3.12	Surface Elevation in the Burren.....	13
Figure 3.13	CORINE Land Cover Types in the East Munster Way's Visual Catchment.....	14
Figure 3.14	Land Cover Types and Areas in the East Munster Catchment.....	15
Figure 3.15	Area of Coillte Forest Plantation in the East Munster region.....	16
Figure 3.16	Parking and Links to Public Transport in East Munster.....	17

Figure 3.17	Road Communications Network in East Munster.....	18
Figure 3.18	Freshwater Surface Hydrology in the East Munster region.....	19
Figure 3.19	Surface Elevation in East Munster.....	20
Figure 3.20	Location of People Counter Mats on Burren Way.....	21
Figure 3.21	Site of User Questionnaire Surveys on the Burren Way.....	22
Figure 4.1	Checklist Survey Scores on the Burren Way.....	23
Figure 4.2	Checklist Survey Scores on the East Munster Way.....	24
Figure 4.3	Total Passers-By, by Date, Ballinalackan counter site.....	25
Figure 4.4	Total Passers-By, by time of day, Ballinalackan counter site.....	26
Figure 4.5	Total Passers-By, by date, Caher Valley counter site.....	27
Figure 4.6	Total Passers-By, by time of day, Caher Valley counter site.....	28
Figure 4.7	Total Passers-By, by date, combined counter sites.....	29
Figure 4.8	Seven-day running mean, Ballinalackan	30
Figure 4.9	Seven-day running mean, Caher Valley.....	31
Figure 4.10	Mode of transport into Burren area.....	32
Figure 4.11	Sections of the Burren Way in most frequent use by focus group participants.....	33
Figure 4.12	Favourite Sections of the Burren Way.....	34
Figure 4.13	Problems on Burren Way, identified during focus group sessions.....	35
Figure 4.14	Further problems on the Burren Way, identified by focus group participants.....	36
Figure 4.15	Most frequently walked stretches of the Burren Way, identified by members of the Burren Way management committee only.....	37

Figure 4.16	Most frequently walked stretches of the Burren Way; identified by those not involved in the management committee.....	38
Figure 4.17	Favourite Stretches of the Burren Way, identified by members of the management committee only.....	39
Figure 4.18	Favourite Stretches of the Burren Way, identified by those not involved in the management committee.....	40
Figure 4.19	Problems identified by members of the Burren Way management committee.....	41
Figure 4.20	Problems identified by those not involved with the Burren Way management committee.....	42
Figure 4.21	Residence of Online Survey Respondents.....	43
Figure 4.22	Location of Photographs on East Munster Way.....	44
Figure 4.23	Location of Photographs on Burren Way.....	45
Figure 4.24	Attractiveness of Photographs of East Munster Way to online Survey Respondents.....	46
Figure 4.25	Attractiveness of Photographs of Burren Way to online Survey Respondents.....	47
Figure 4.26	Landscape Character Units and Visual Preferences.....	48
Figure 4.27	CORINE Land Cover and Visual Preferences.....	49
Figure 4.28	Landscape Character Units and Visual Preference.....	50
Figure 4.29	CORINE Land Cover and Visual Preference.....	51
Figure 4.30	Favourite Stretches and Visual Preferences.....	52
Figure 4.31	Visual Catchment (Viewshed) of the Burren Way.....	53
Figure 4.32	Landscape Character Assessment for the Burren Way.....	54
Figure 4.33	Area of Landscape Character Units, Burren Way Catchment.....	55
Figure 4.34	Landscape Character Assessment – Land Use in the Burren Catchment.....	56

Figure 4.35	Landscape Character Assessment – Surface Pattern in the Burren Catchment.....	57
Figure 4.36	Landscape Character Assessment – Vegetation Cover in the Burren Catchment.....	58
Figure 4.37	Landscape Character Assessment – Settlement Pattern in the Burren Catchment.....	59
Figure 4.38	Landscape Character Assessment – Settlement Structures in the Burren Catchment.....	60
Figure 4.39	Visual Catchment (Viewshed) of the East Munster Way.....	61
Figure 4.40	Landscape Character Assessment for East Munster Way.....	62
Figure 4.41	Area of Landscape Character Units, East Munster Way Catchment.....	63
Figure 4.42	Areas of High Development Pressure, Burren region.....	64
Figure 4.43	Conservation Designations (SPAs and NHAs).....	65
Figure 4.44	Special Areas of Conservation in the Burren.....	66
Figure 4.45	Amenity Areas, designated by Tipperary South Riding County Council.....	67
Figure 4.46	SACs in East Munster.....	68
Figure 4.47	NHAs in East Munster.....	69
Figure 4.48	The Route of Green Roads in the Burren Area.....	70
Figure 4.49	Other walking routes adjoining the East Munster Way.....	71
Figure 4.50	Gap Analysis of Burren Catchment.....	72
Figure 4.51	Gap Analysis of East Munster Catchment.....	73
Figure 4.52	Sections most commonly walked and CORINE land cover types.....	74
Figure 4.53	Landscape Character Units and sections of the Burren Way most commonly walked.....	75
Figure 4.54	Favourite Stretches of the Burren Way and CORINE land cover types.....	76
Figure 4.55	Vegetation Cover and favourite sections of the Burren Way.....	77

Figure 4.56	Favourite sections of the Burren Way and Landscape Character Units	78
Figure 4.57	Historic Sites and Monuments within 100m of the Burren Way.....	79
Figure 4.58	National Monuments in State care.....	80
Figure 4.59	Historic Sites and monuments on the East Munster Way.....	81
Figure 4.60	National Monuments in State Care.....	82
Figure 5.1	Preferred land cover types and suggested alternative routes for the Burren Way.....	83
Figure 5.2	Alternative Routes with Environmental Designations marked.....	84
Figure 5.3	Preferred land cover types and alternative routes for the East Munster Way.....	85

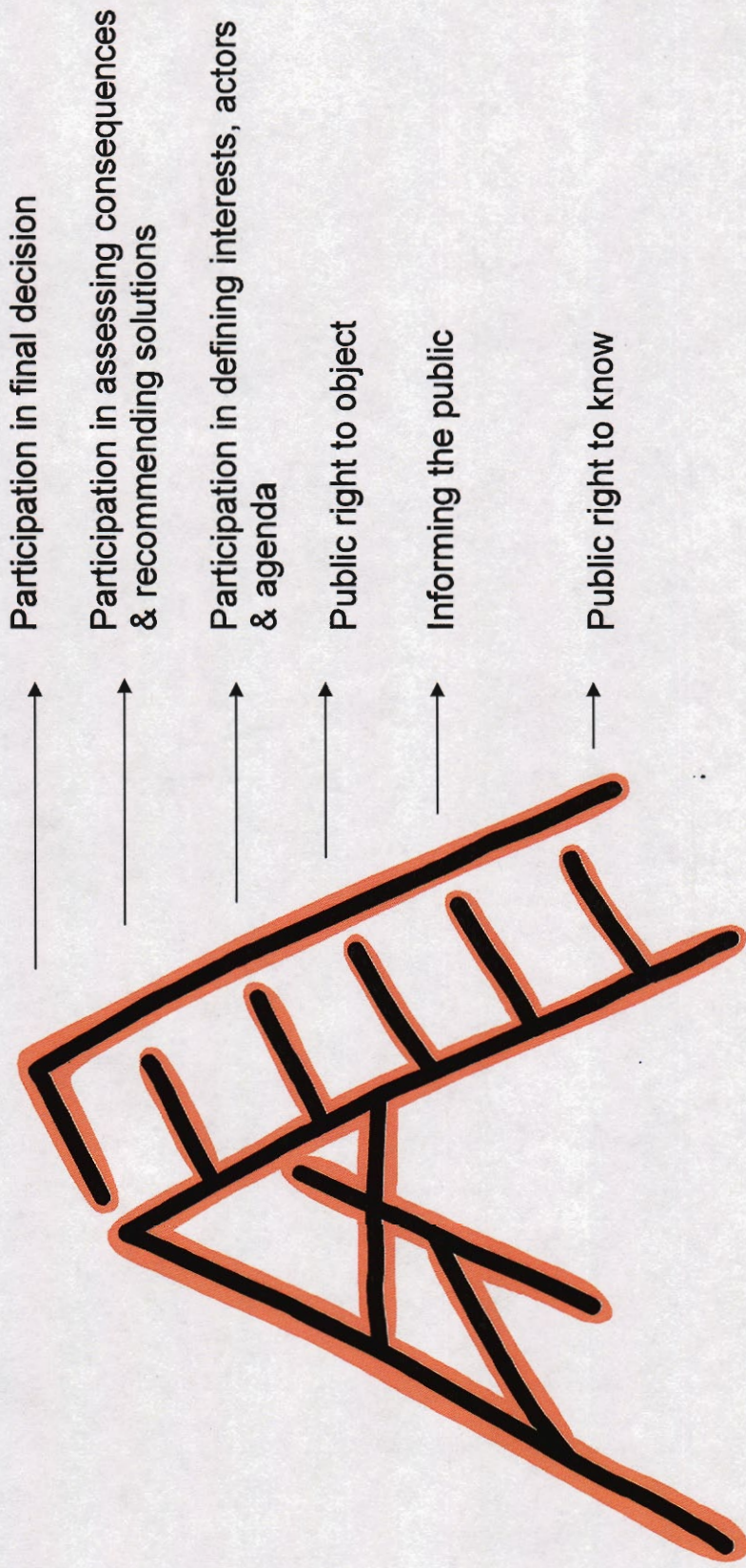


Figure 2.1 The Ladder of Participation (Kingston, *et al.*, 1999)

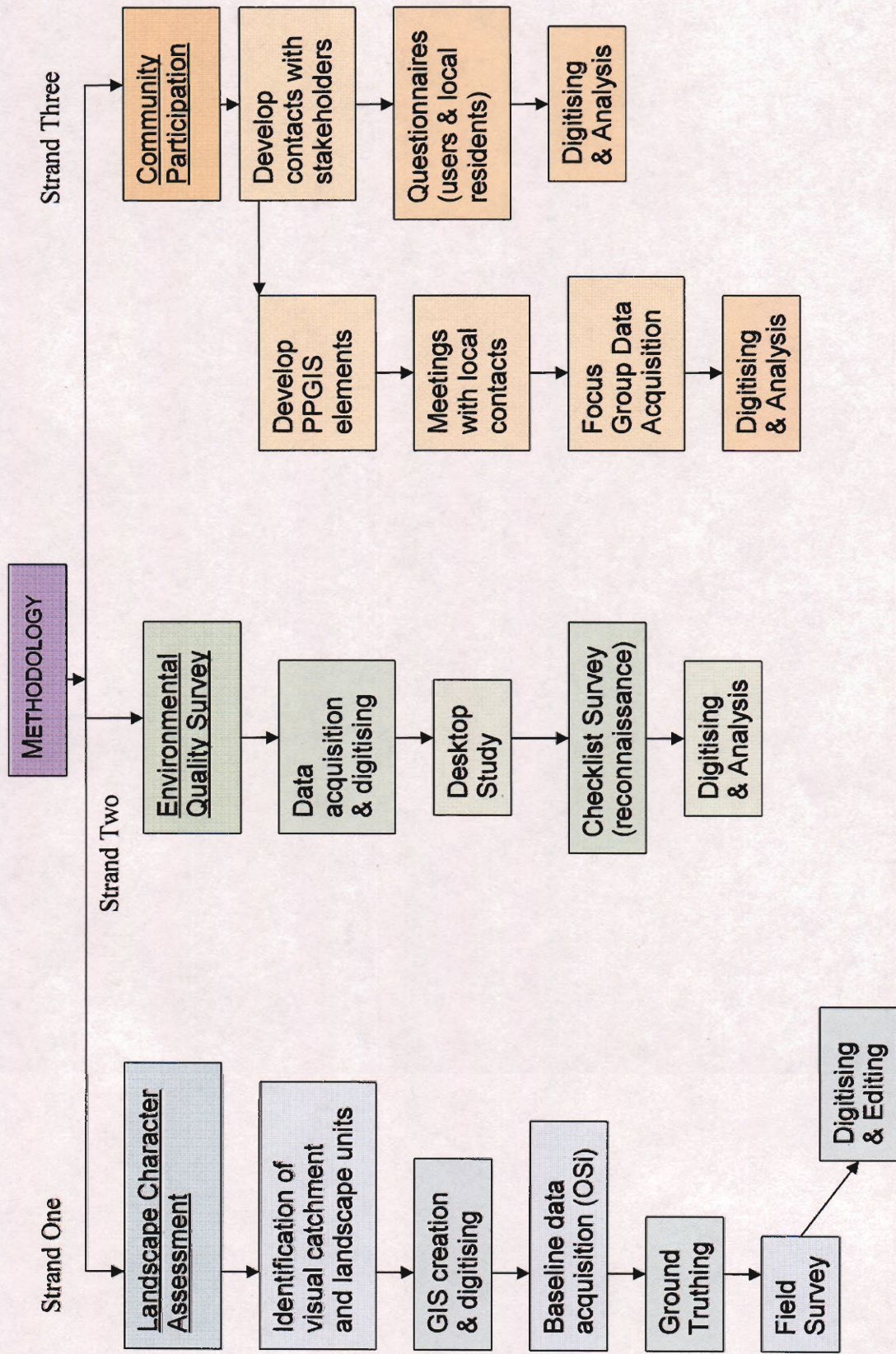


Figure 3.1 Strands of Methodology

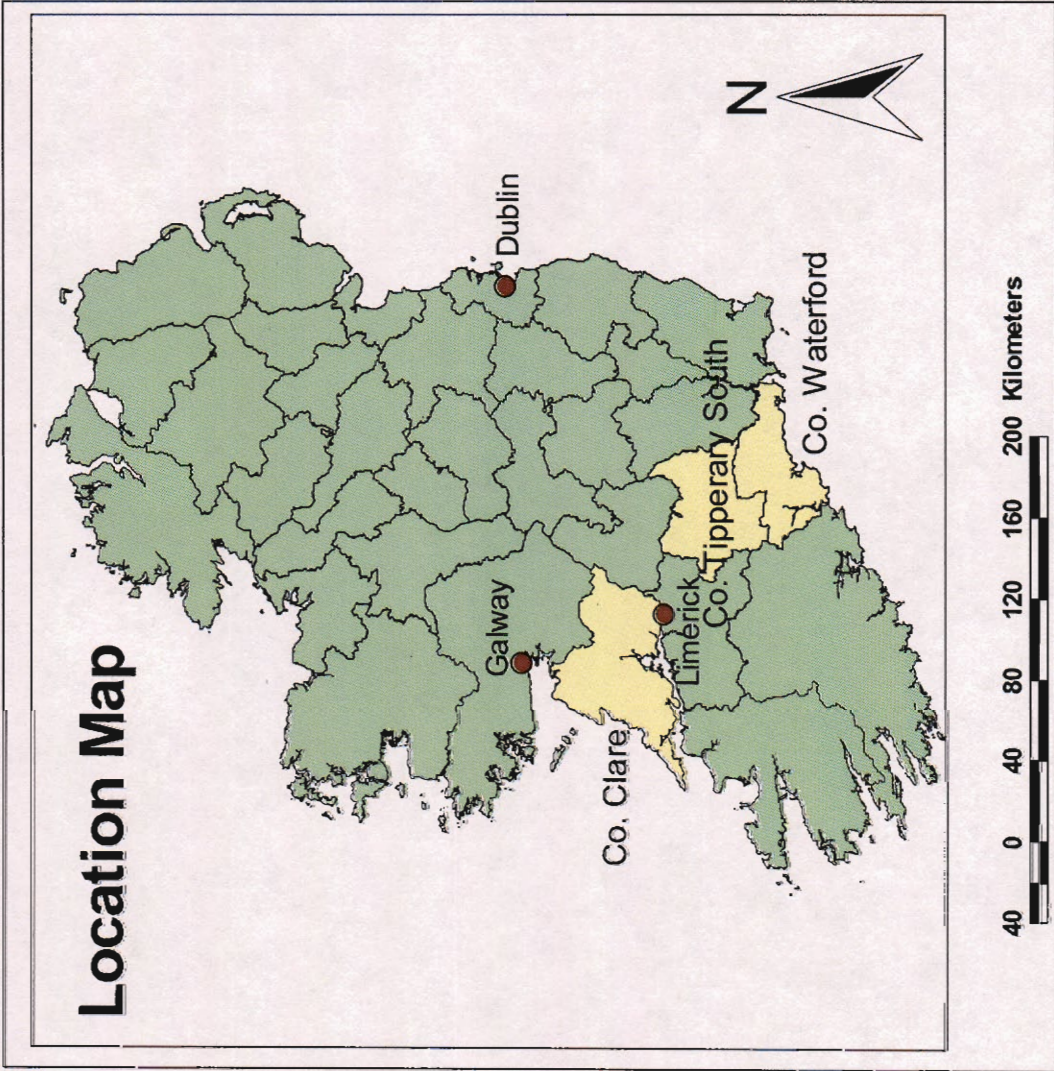
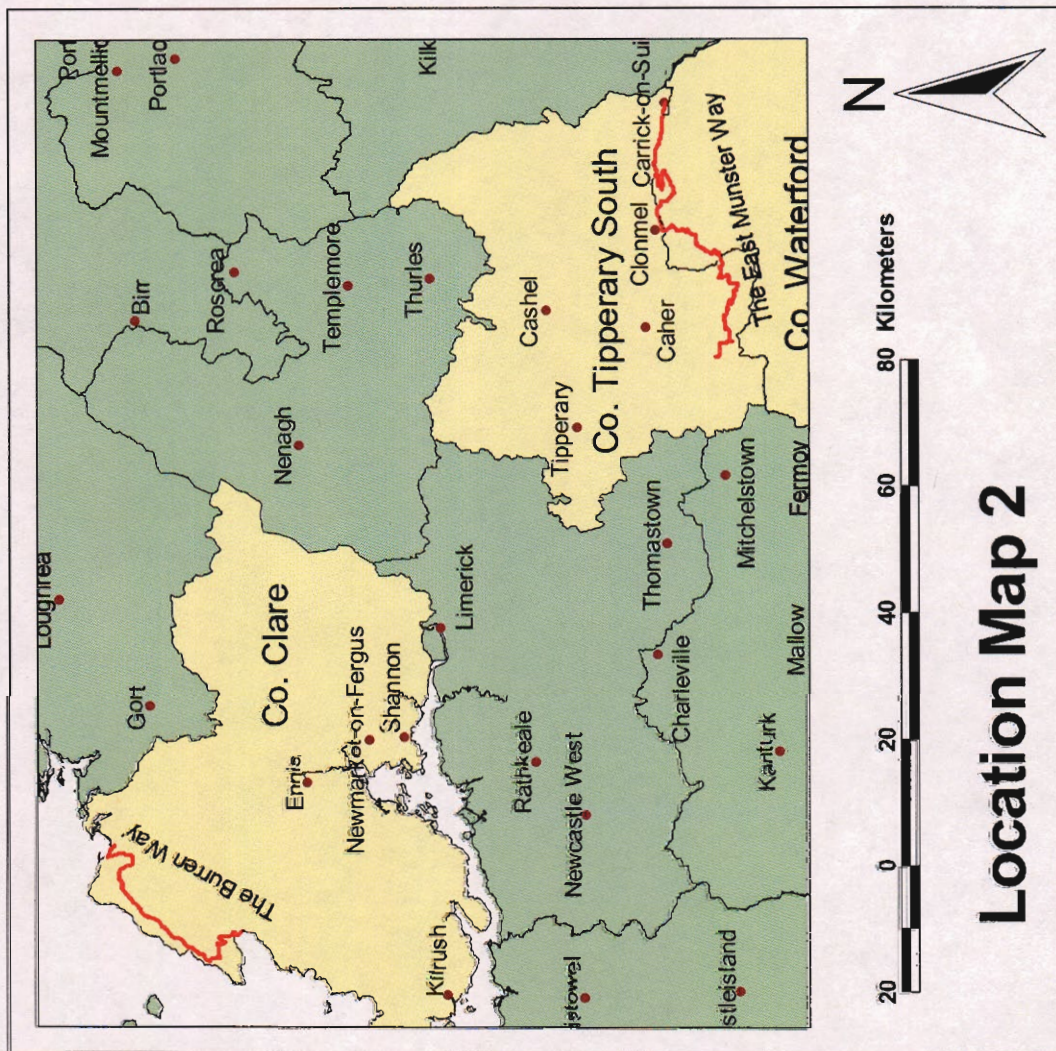


Figure 3.2 Locations of Study Sites



Location Map 2

Figure 3.3 Location of Waymarked Ways

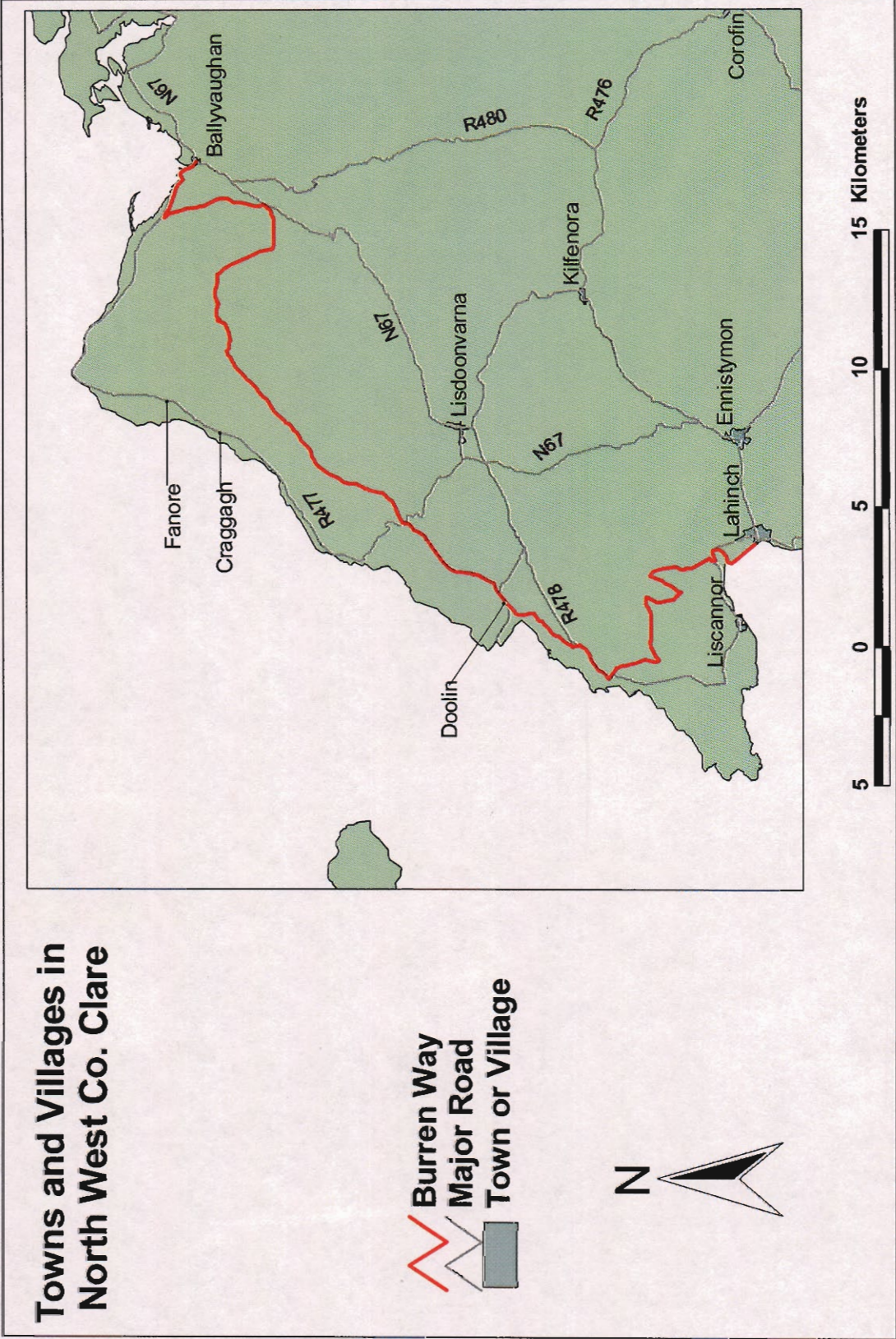





Figure 3.4 The Burren Way and nearby Settlements

Towns and Villages in East Munster

-  East Munster Way
-  Major Road
-  Town or Village

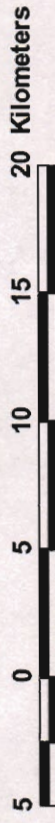
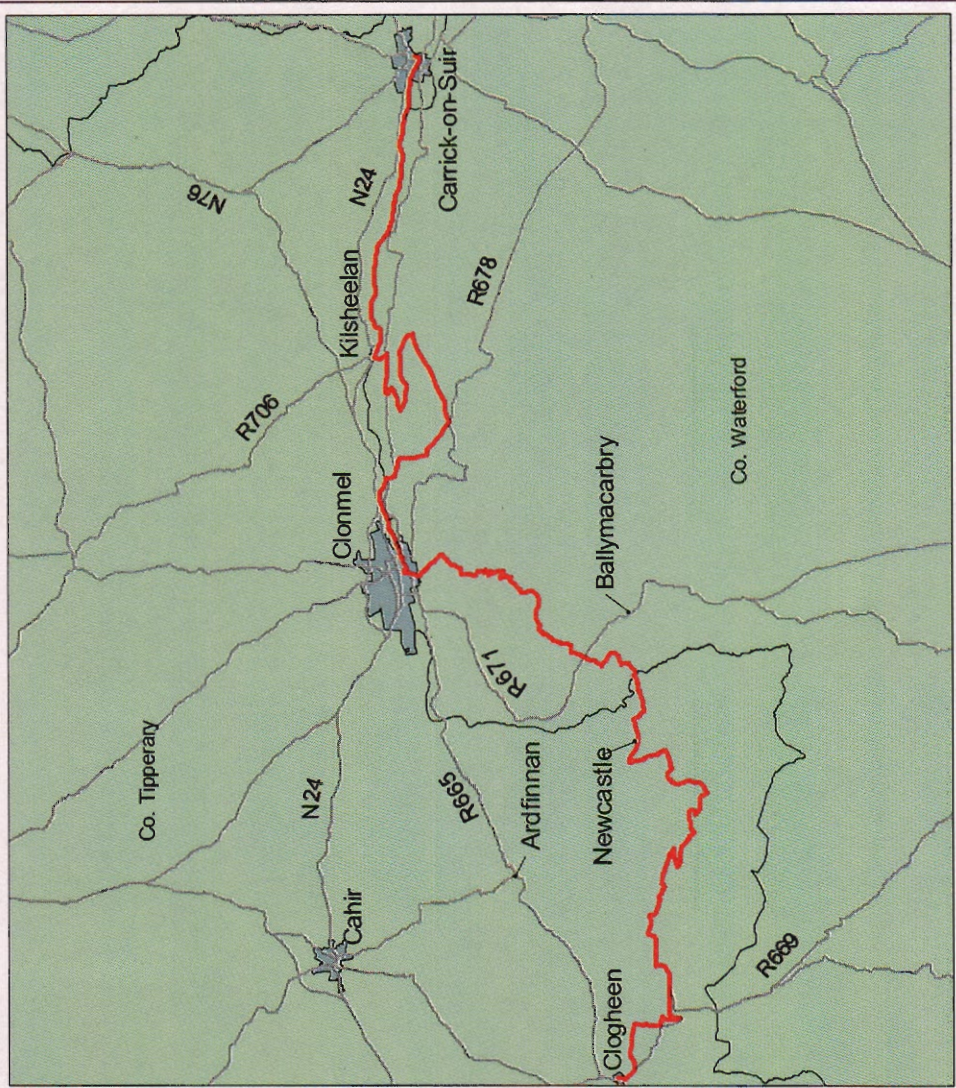


Figure 3.5 The East Munster Way and nearby Towns and Villages

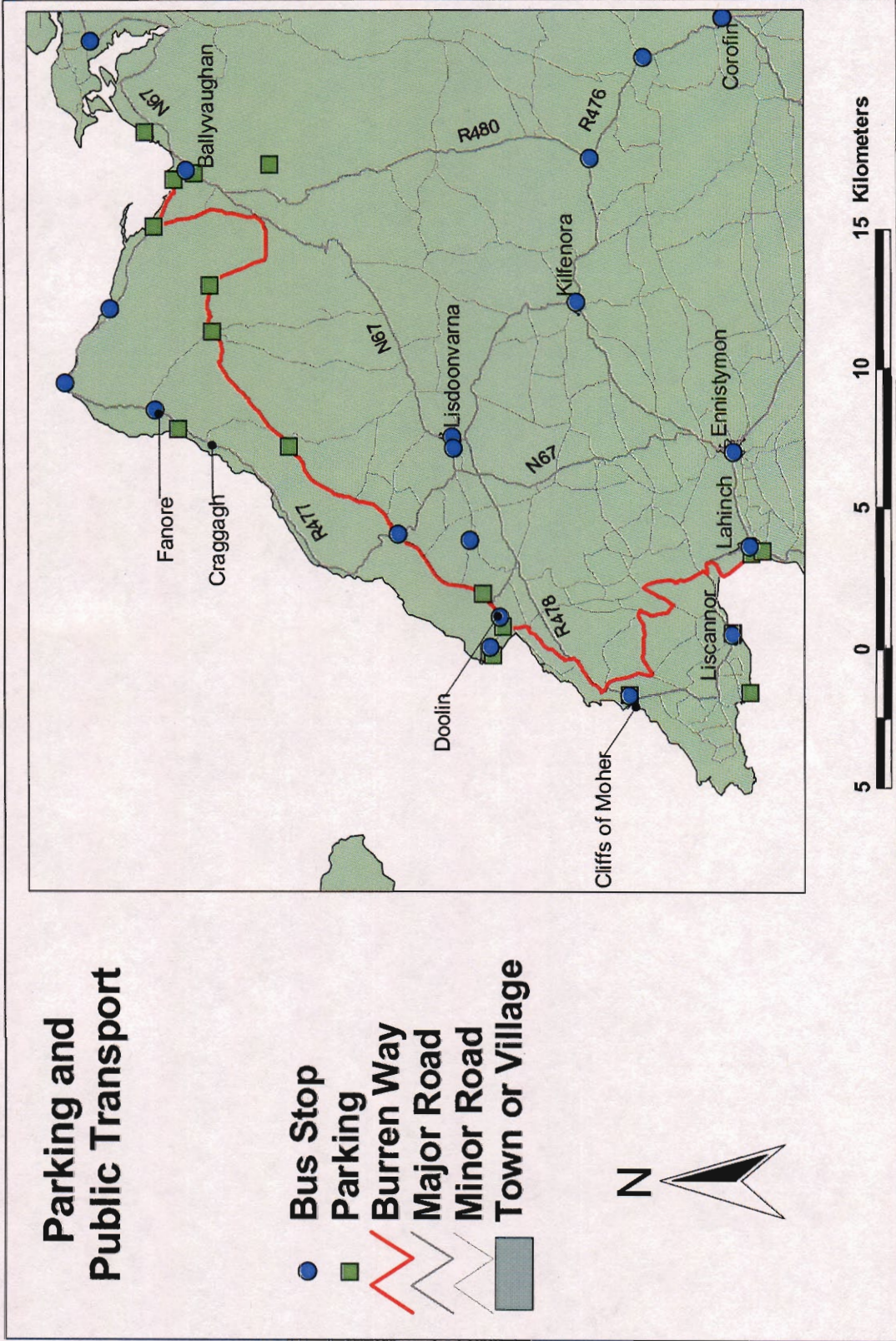


Figure 3.6 Public Transport links and parking places in the Burren

Land Cover - Burren Catchment

- CORINE Land Cover Type
- Blanket Bog, Lowland Exploited
 - Blanket Bog, Mountain Exploited
 - Blanket Bog, Mountain Intact
 - Blanket Bog, Upland Exploited
 - Blanket Bog, Upland Intact
 - Dry Unimproved Pasture
 - Wet Unimproved Pasture
 - Improved Pasture
 - Bare rocks
 - Complex cultivation patterns
 - Coniferous forest
 - Continuous urban fabric
 - Discontinuous urban fabric
 - Estuaries
 - Inland marshes
 - Land principally occupied by agriculture
 - Moors and heaths
 - Natural grassland
 - Non-irrigated arable land
 - Sparsely vegetated areas
 - Sport and leisure facilities
 - Transitional woodland scrub

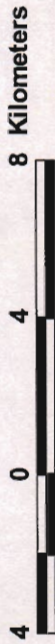


Figure 3.7 CORINE Land Cover Types in the Burren Way's Visual Catchment

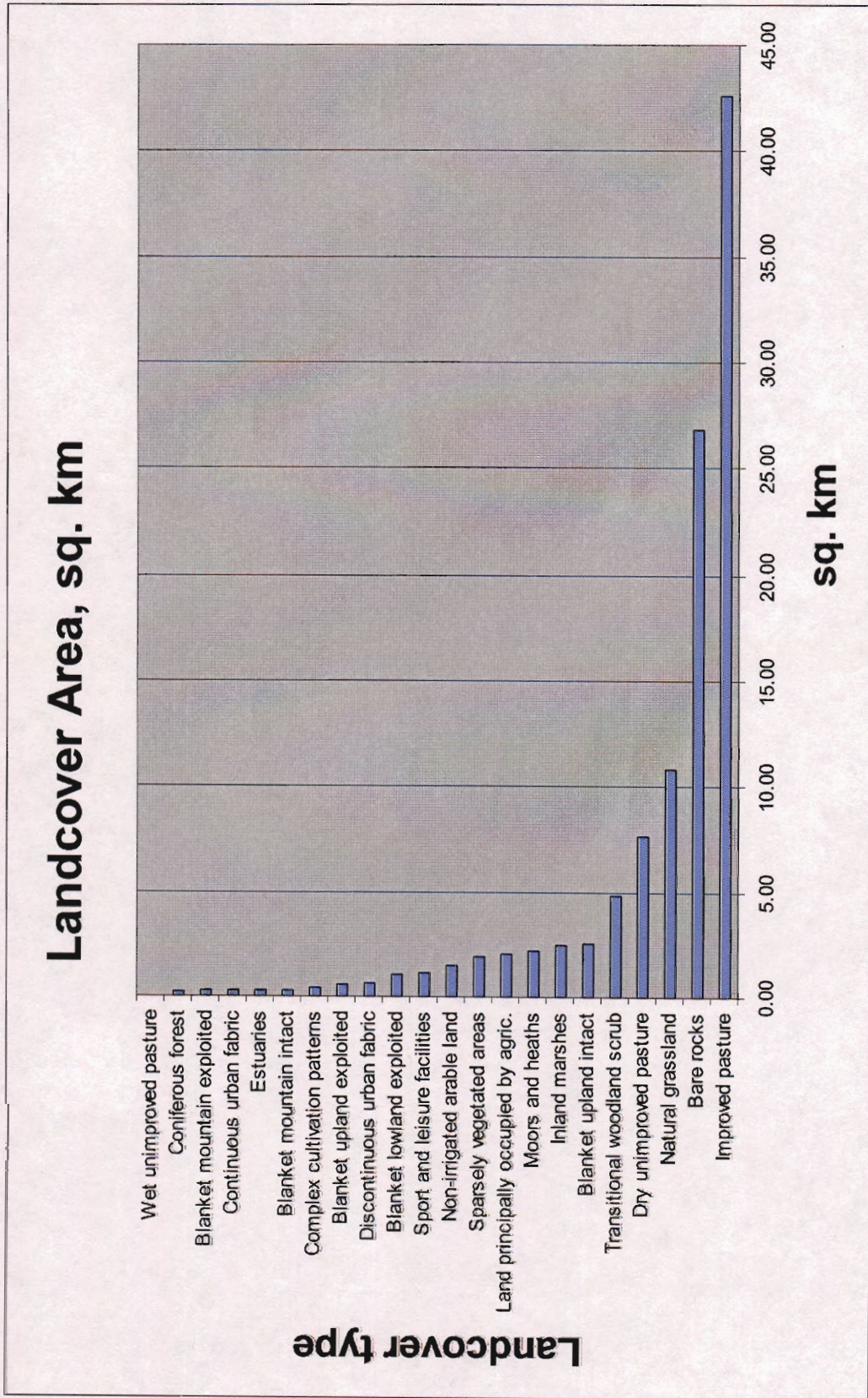


Figure 3.8 Land Cover Types and Areas in the Burren Catchment

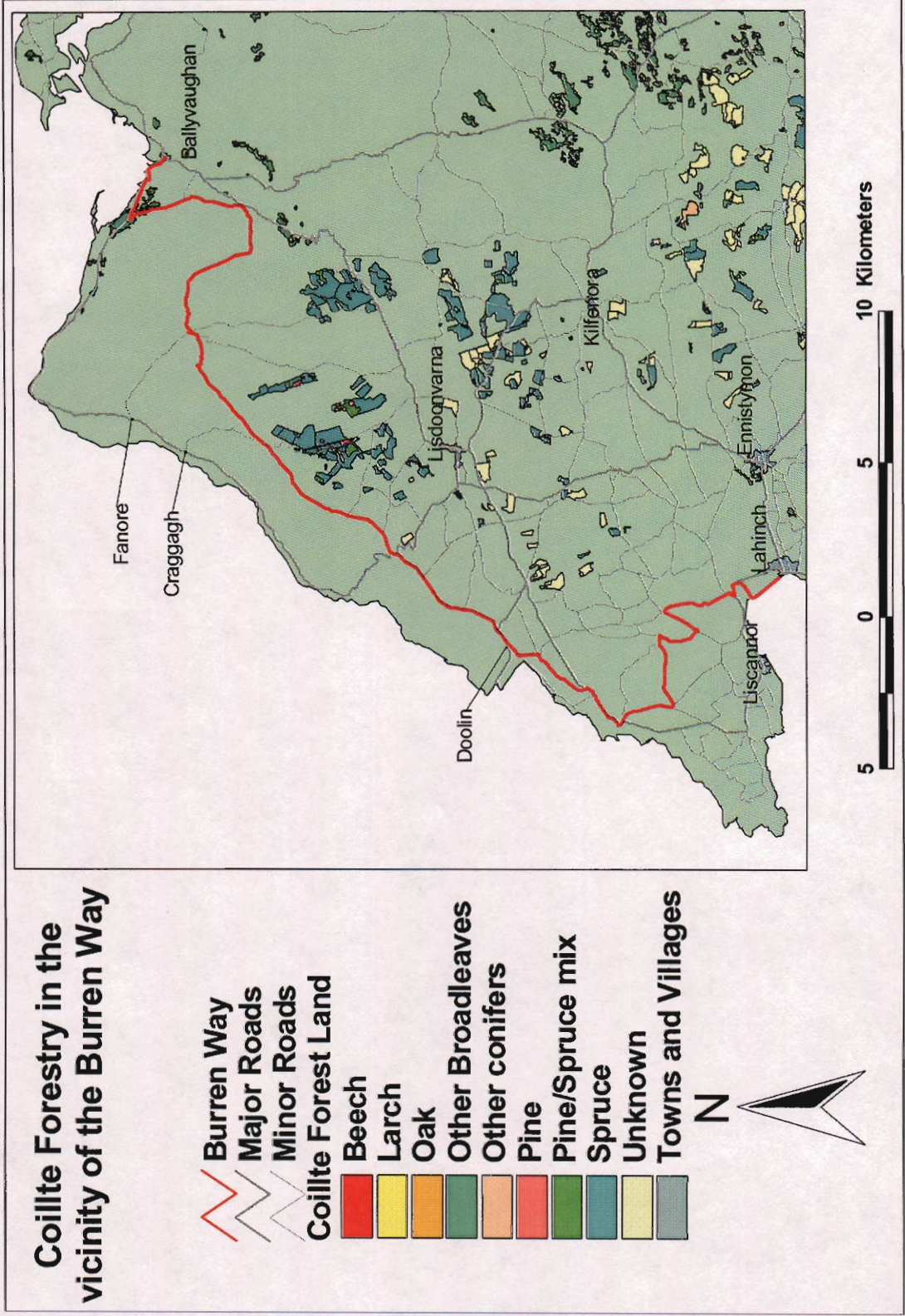


Figure 3.9 Areas of Coillte Forest Plantations in the Burren

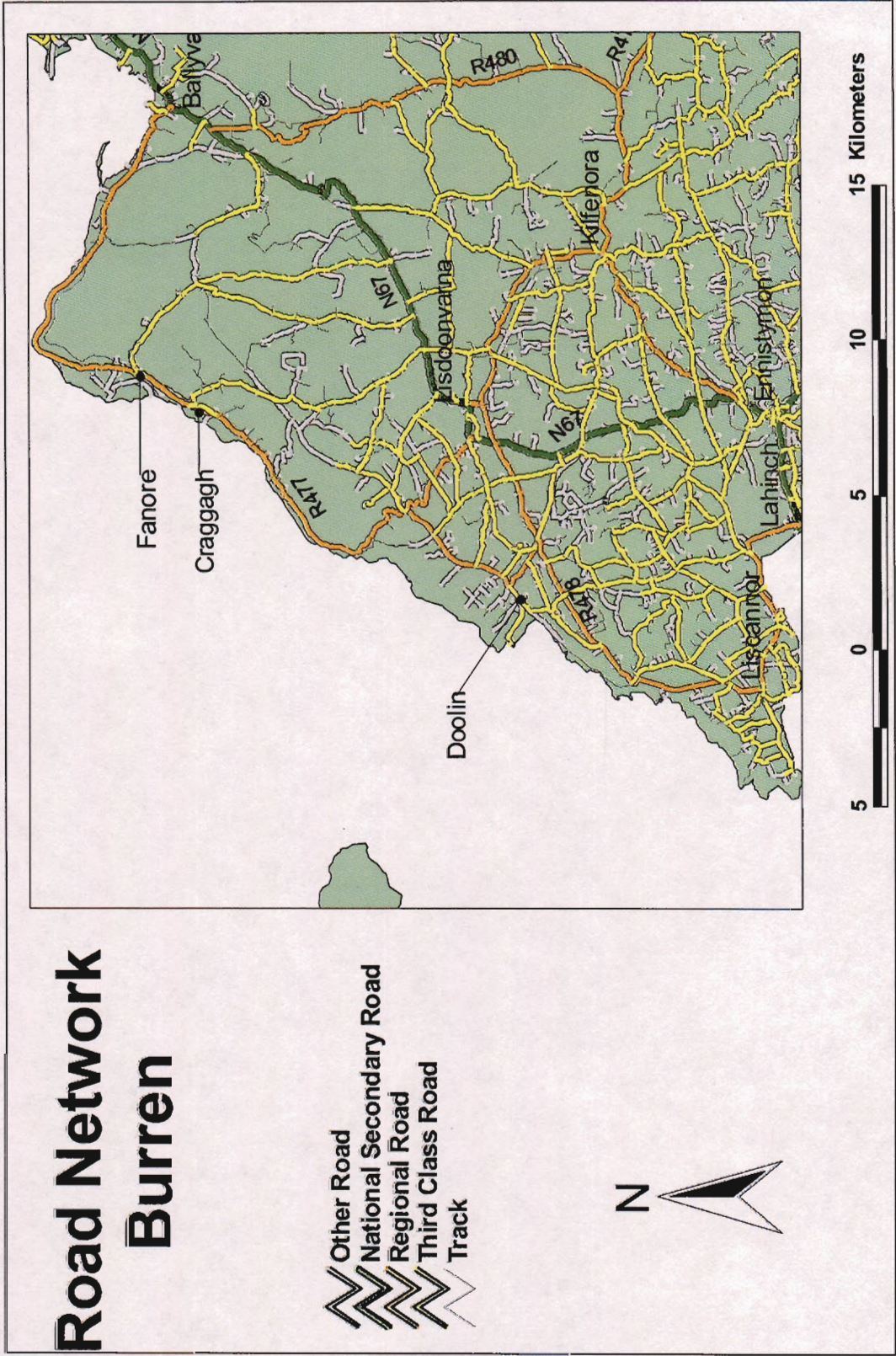


Figure 3.10 Burren Road Communications Network

Hydrology Burren

- Water body
- Water course
- Burren Way
- Town or Village

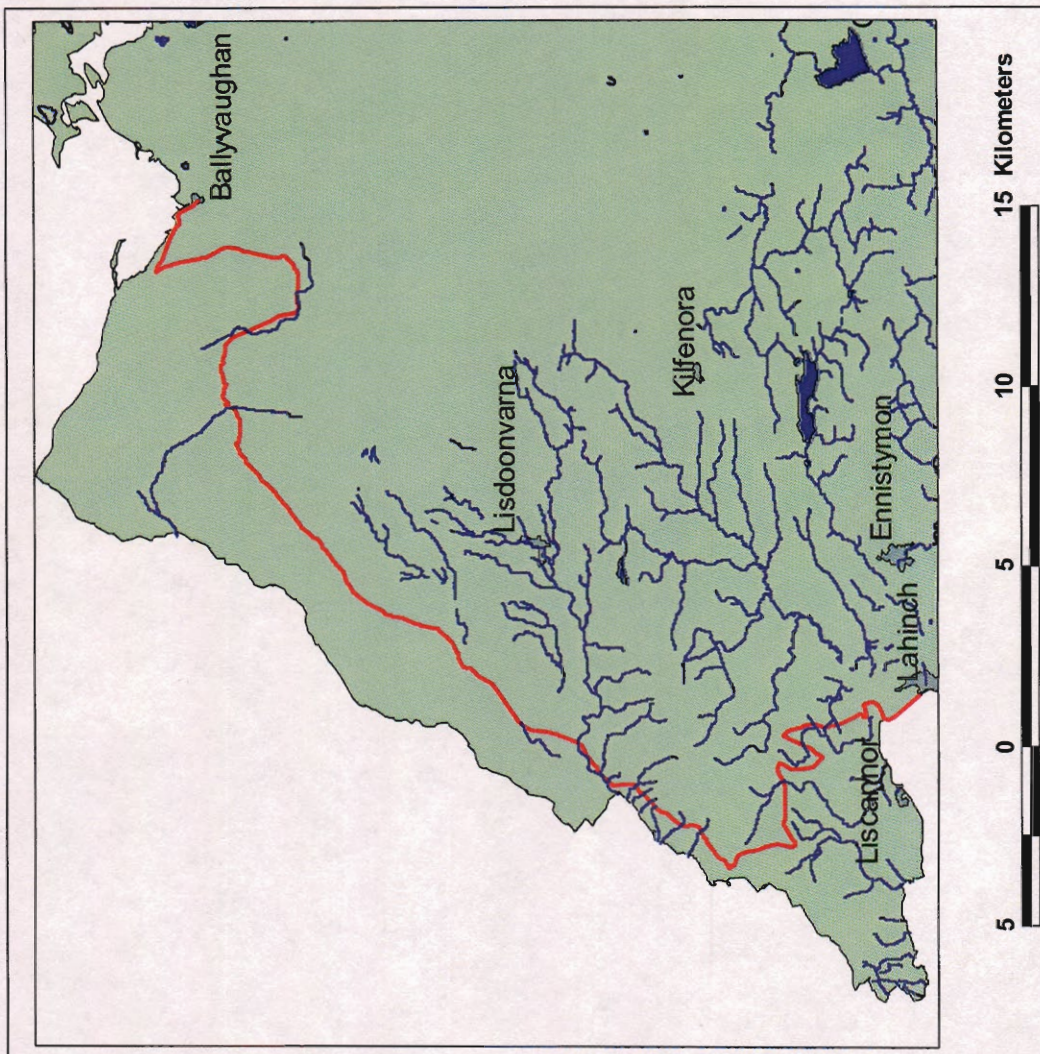


Figure 3.1.1 Freshwater Surface Hydrology in the Burren

Relief Map

Burren

Contour elevation

0 - 50m

50 - 90m

90 - 130m

130 - 180m

180 - 340m

Burren Way



Figure 3.12 Surface Elevation in the Burren

Land Cover - East Munster

- CORINE Land Cover Type**
-  Blanket Bog, Mountain Intact
 -  Blanket Bog, Upland Intact
 -  Dry Unimproved Pasture
 -  Wet Unimproved Pasture
 -  Improved Pasture
 -  Broad Leaved forest
 -  Complex cultivation patterns
 -  Coniferous forest
 -  Continuous urban fabric
 -  Discontinuous urban fabric
 -  Industrial or commercial units
 -  Land principally occupied by agriculture
 -  Mineral extraction sites
 -  Mixed forest
 -  Moors and heaths
 -  Natural grassland
 -  Non-irrigated arable land
 -  Sport and leisure facilities
 -  Stream courses
 -  Transitional woodland scrub



Figure 3.13 CORINE Land Cover Types in the East Munster Way's Visual Catchment

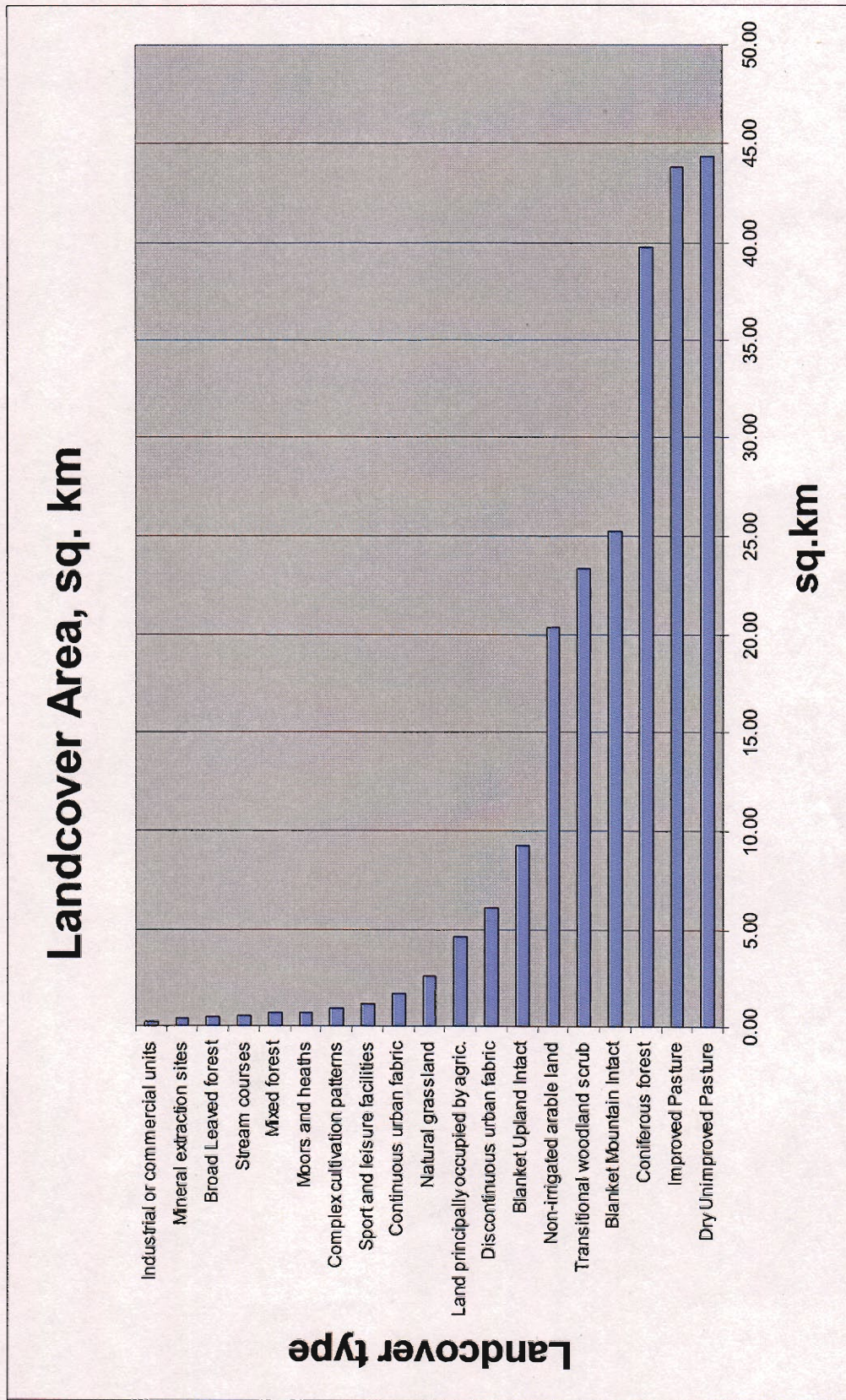












Figure 3.14 Land Cover Types and Areas in the East Munster Catchment

Coillte Forestry in the vicinity of the East Munster Way

-  East Munster Way
-  Major Roads
-  Minor Roads
-  Coillte Forest Land
-  Beech
-  Larch
-  Oak
-  Other Broadleaves
-  Other conifers
-  Pine
-  Pine/Spruce mix
-  Spruce
-  Unknown
-  Towns and Villages

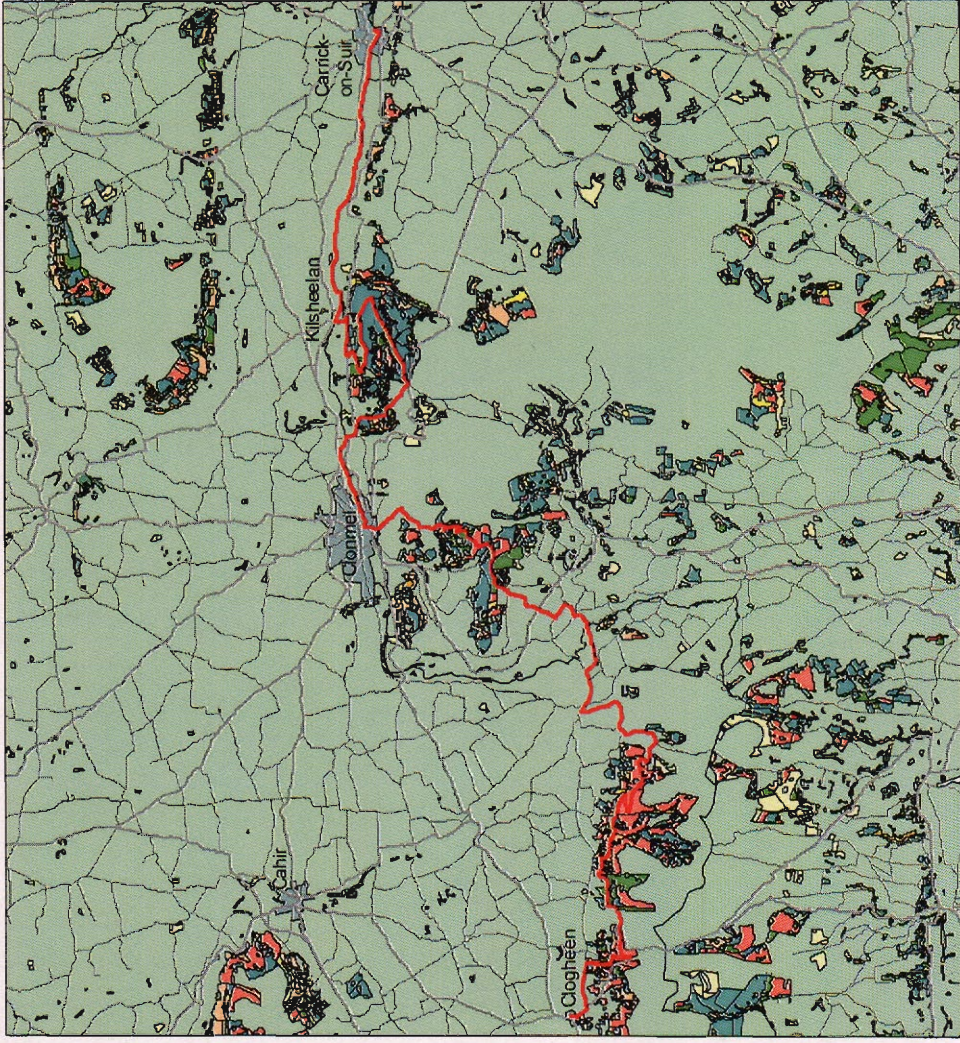










Figure 3.15 Area of Coillte Forest Plantation in the East Munster region

Parking and Public Transport

-  Railway Station
-  Bus Stops
-  Parking
-  East Munster Way
-  Railway Line
-  Major Road
-  Minor Road
-  Town or Village

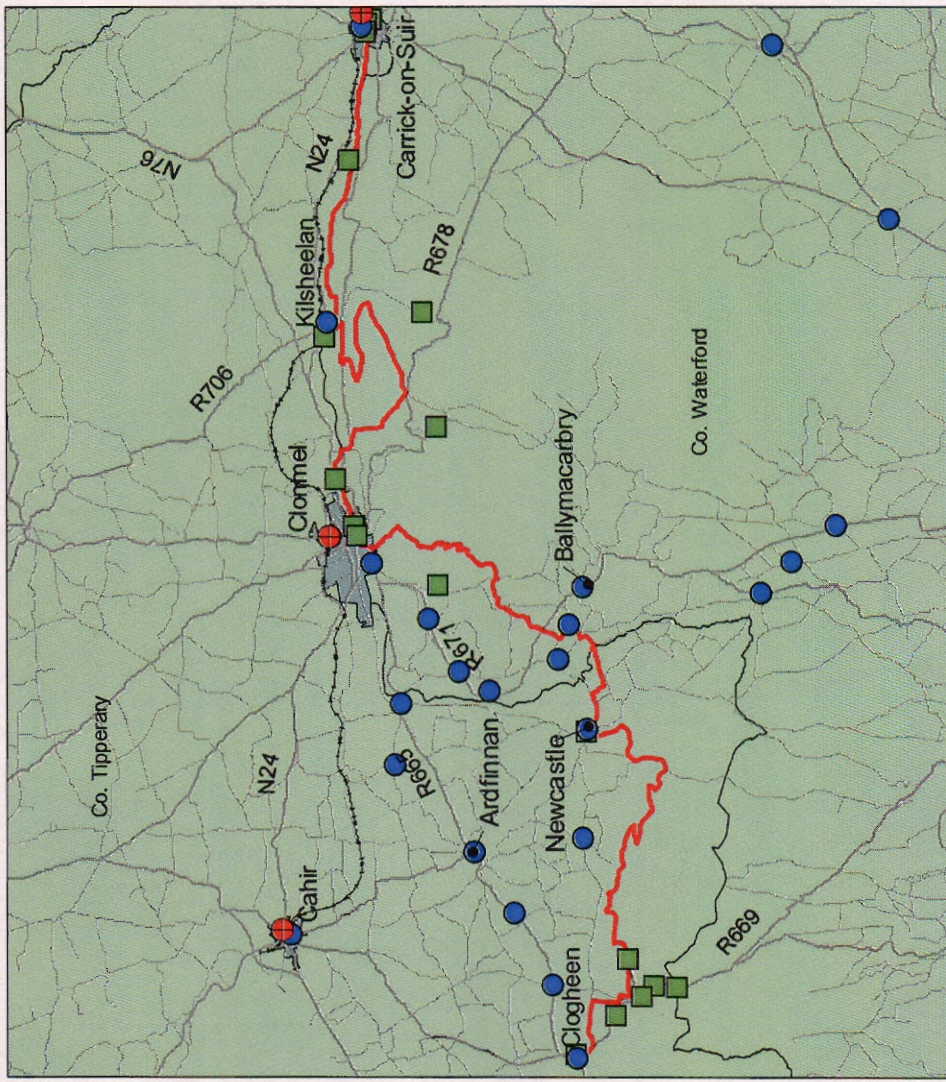
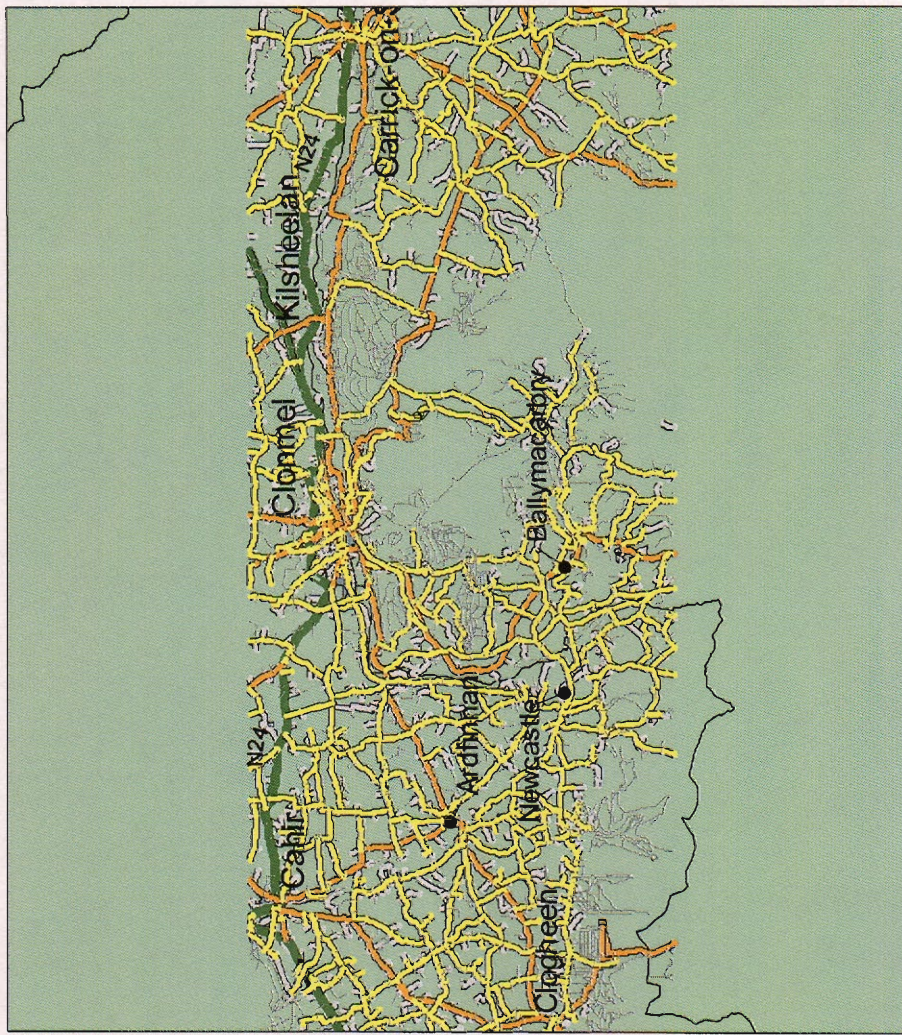


Figure 3.16 Parking and Links to Public Transport in East Munster

East Munster Road Network

- Other Road
- National Primary Road
- National Secondary Road
- Regional Road
- Third Class Road
- Track



5 0 5 10 15 20 Kilometers

Figure 3.17 Road Communications Network in East Munster

Hydrology East Munster

- Water body
- Water course
- East Munster Way
- Town or Village

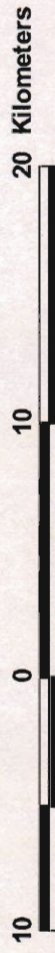
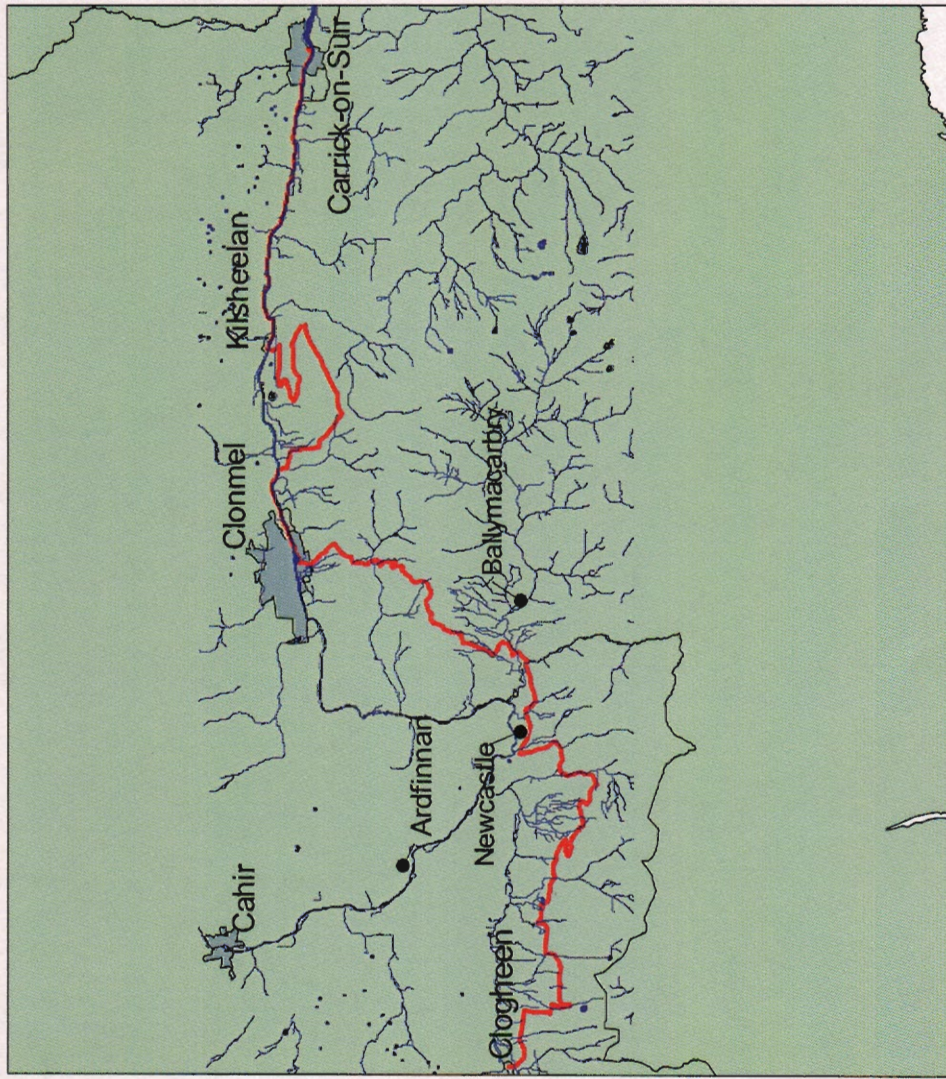


Figure 3.18 Freshwater Surface Hydrology in the East Munster region

Relief Map East Munster

 East Munster Way
Contour Elevation









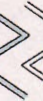

-  0 - 28m
-  28 - 42m
-  42 - 66m
-  66 - 97m
-  97 - 128m
-  128 - 164m
-  164 - 212m
-  212 - 285m
-  285 - 427m
-  427 - 792m



Figure 3.19 Surface Elevation in East Munster

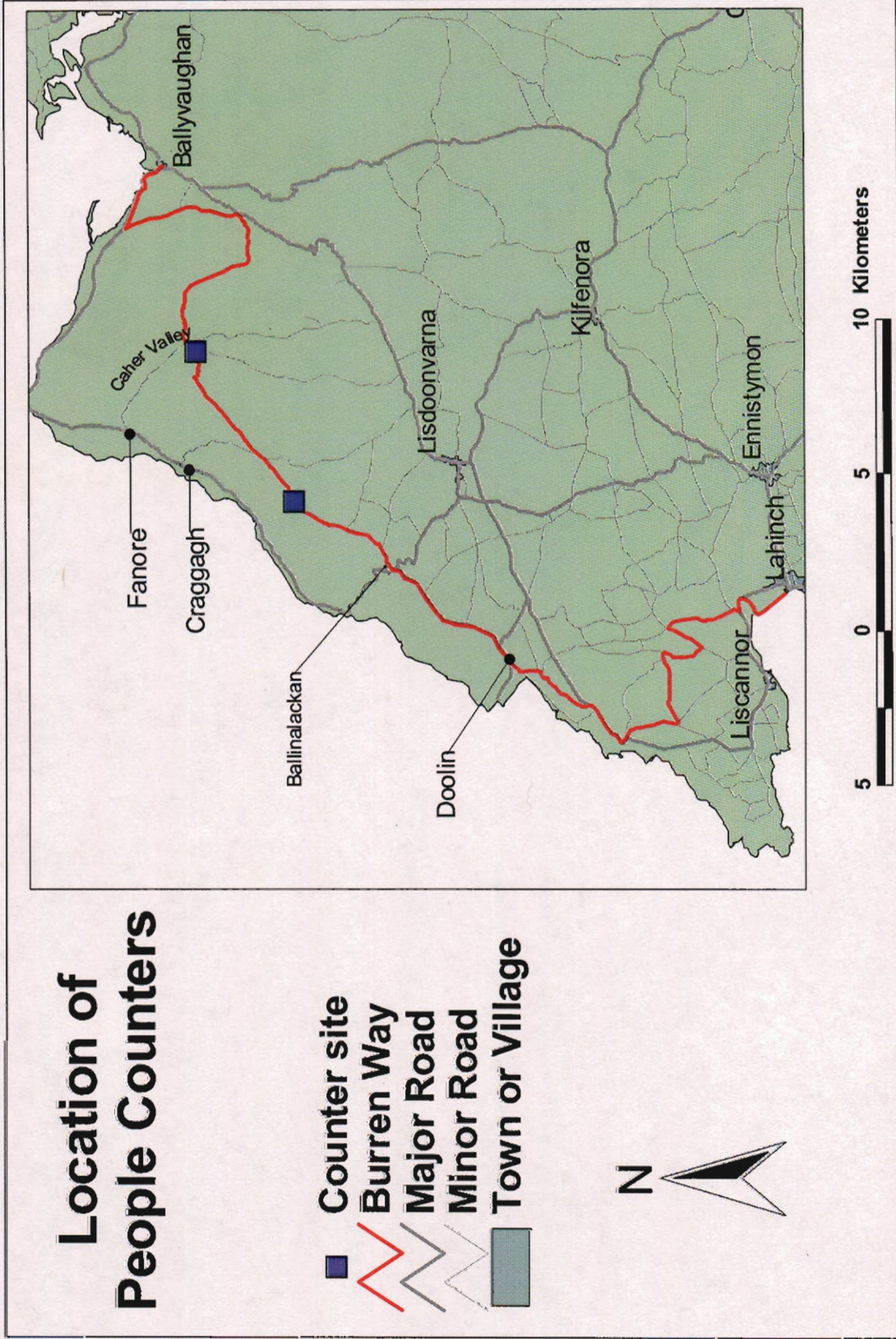


Figure 3.20 Locations of People Counter Mats on Burren Way

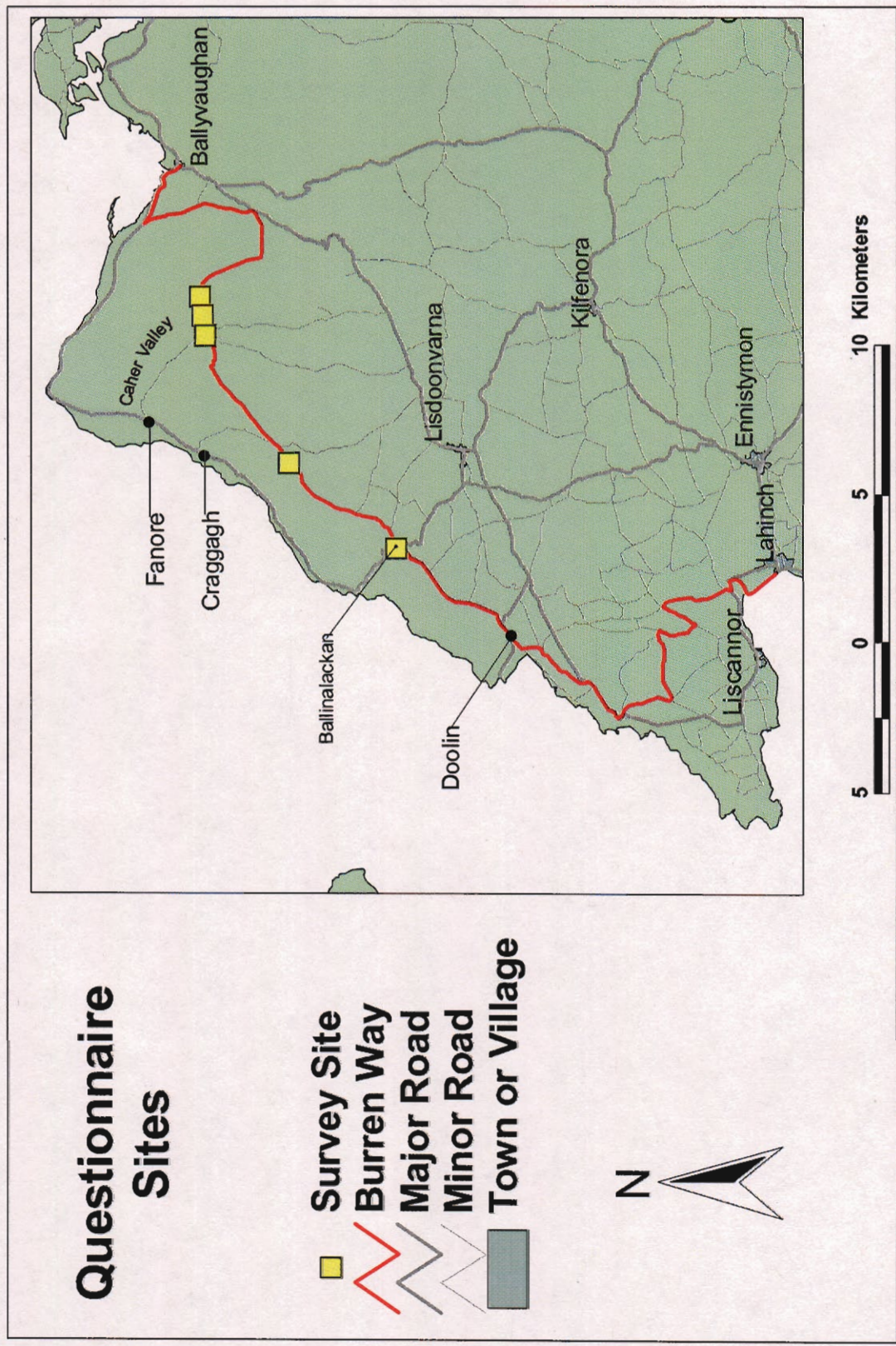


Figure 3.21 Sites of User Questionnaire Surveys on the Burren Way

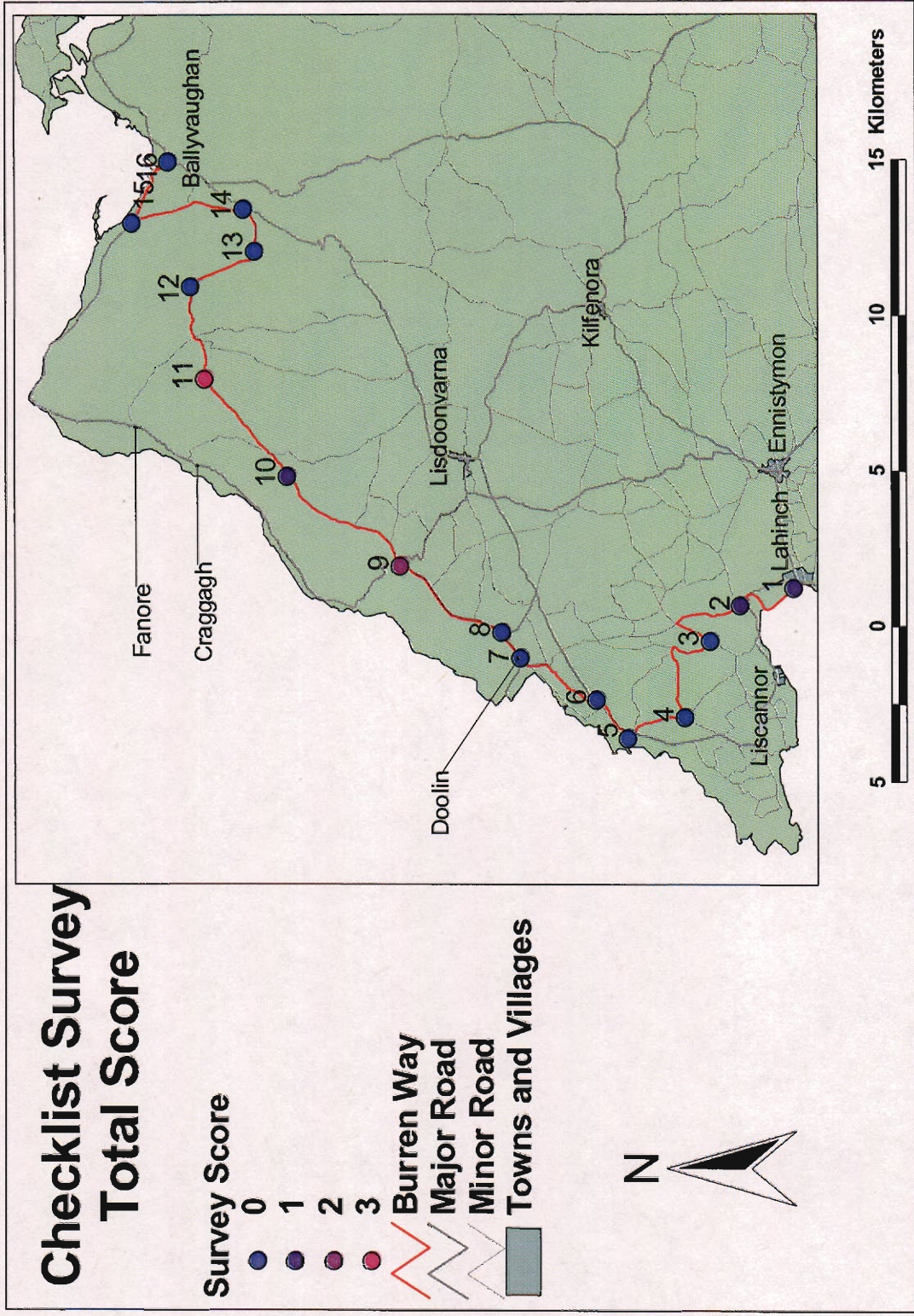


Figure 4.1 Checklist Survey Scores on the Burren Way

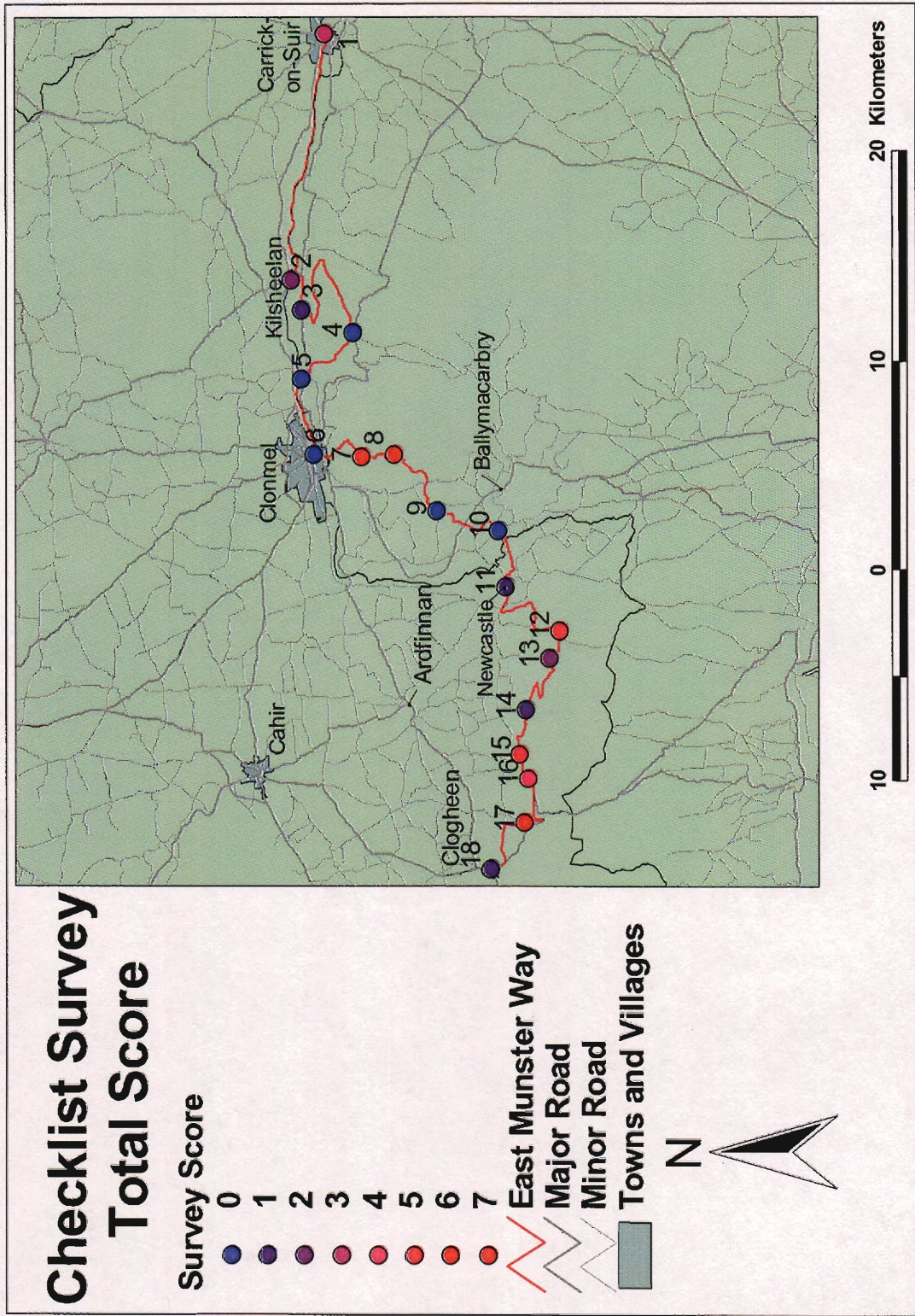


Figure 4.2 Checklist Survey Scores on the East Munster Way

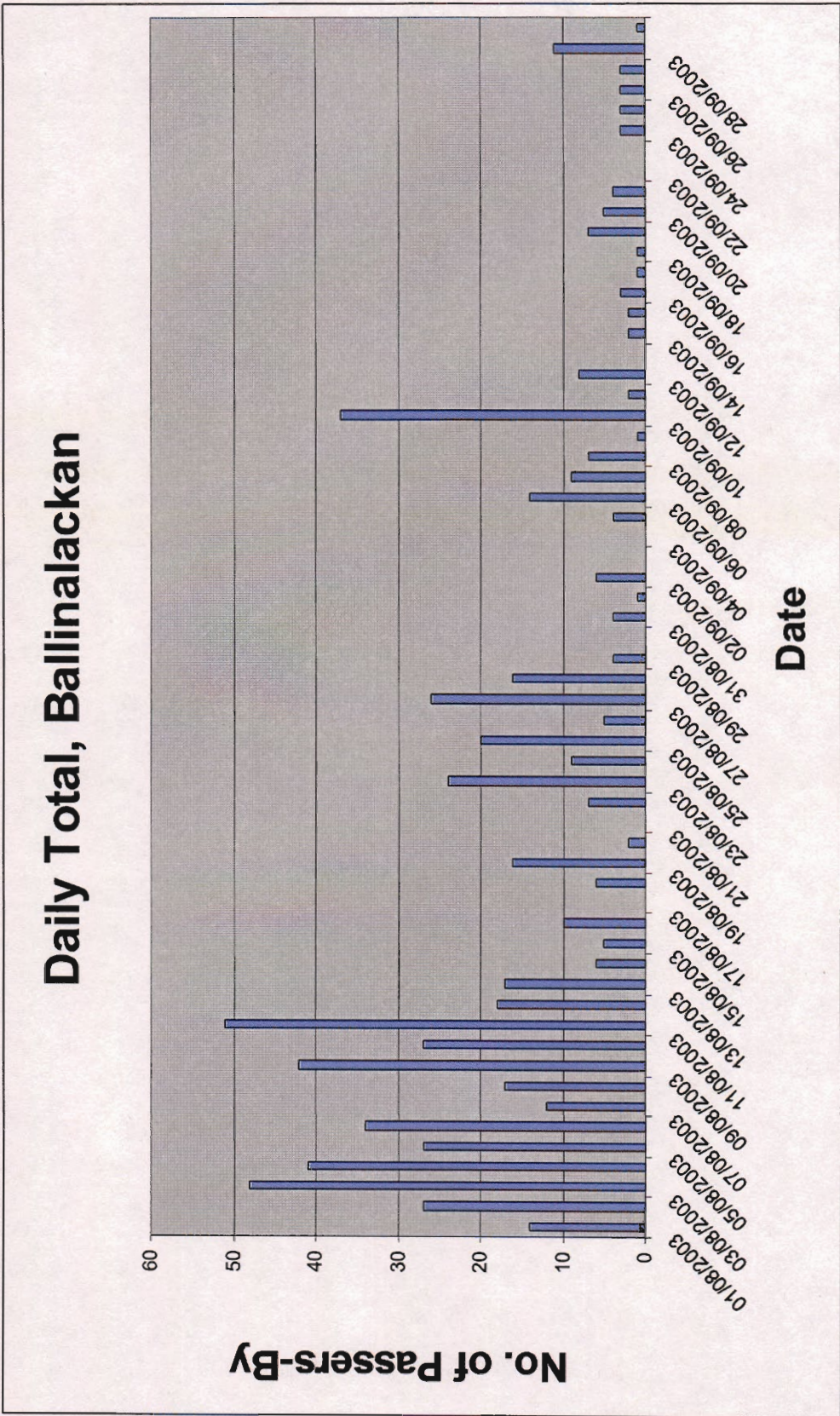


Figure 4.3 Total Passers-By, by Date, Ballinalackan counter site.

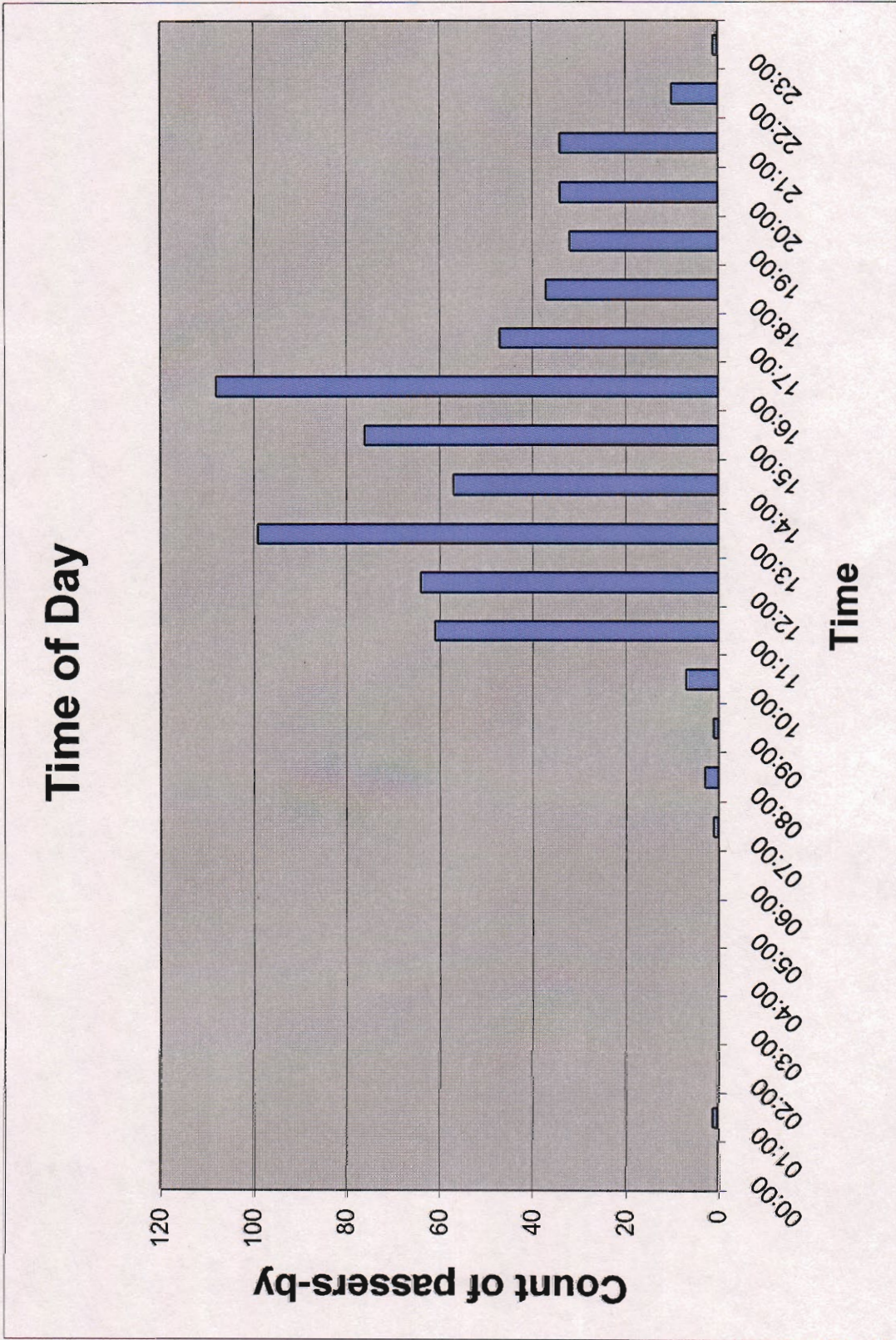


Figure 4.4 Total Passers-By, by time of day, Ballinalackan counter site

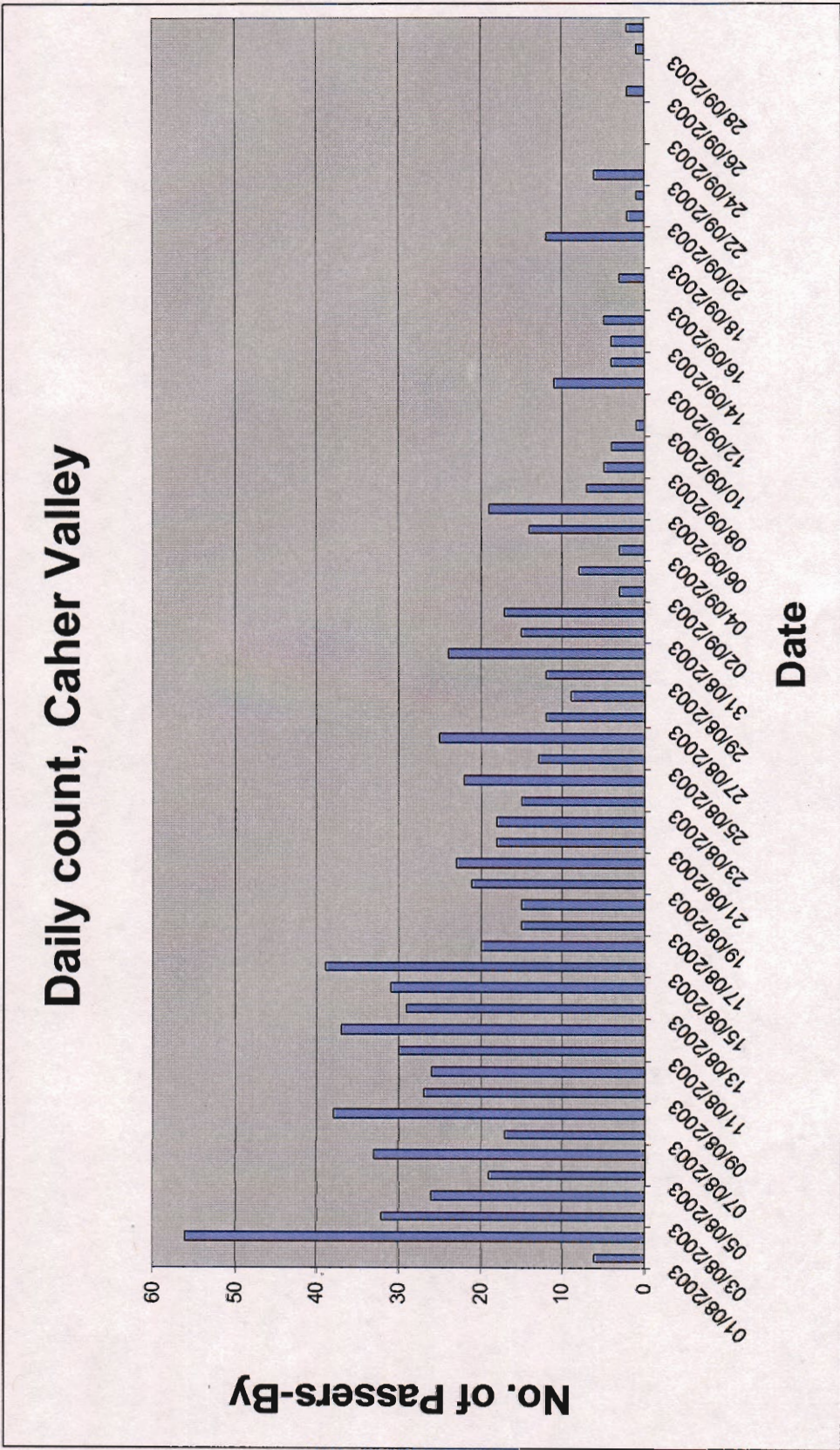


Figure 4.5 Total Passers-By, by date, Caher Valley counter site

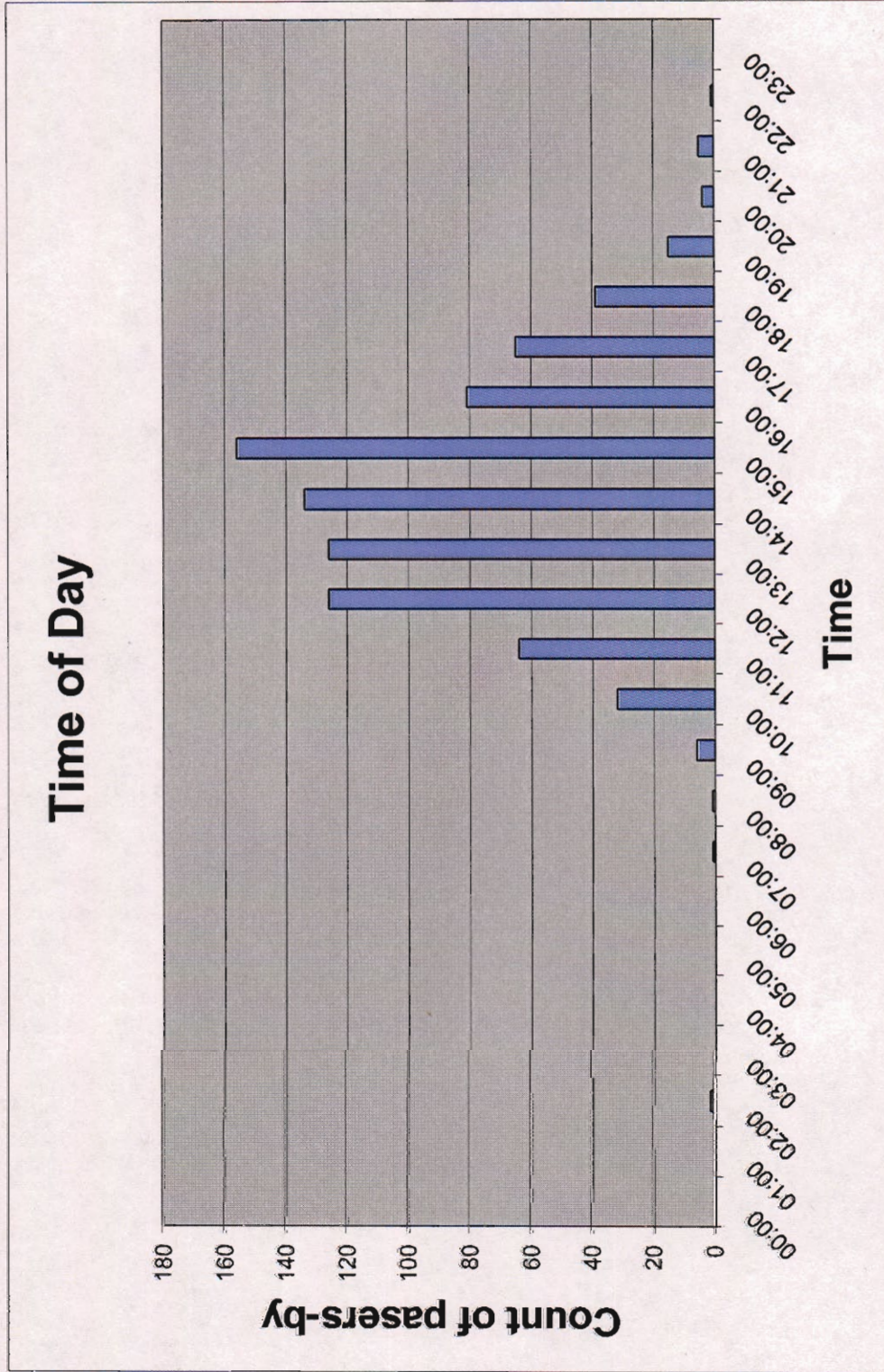


Figure 4.6 Total Passers-By, by time of day, Caher Valley counter site

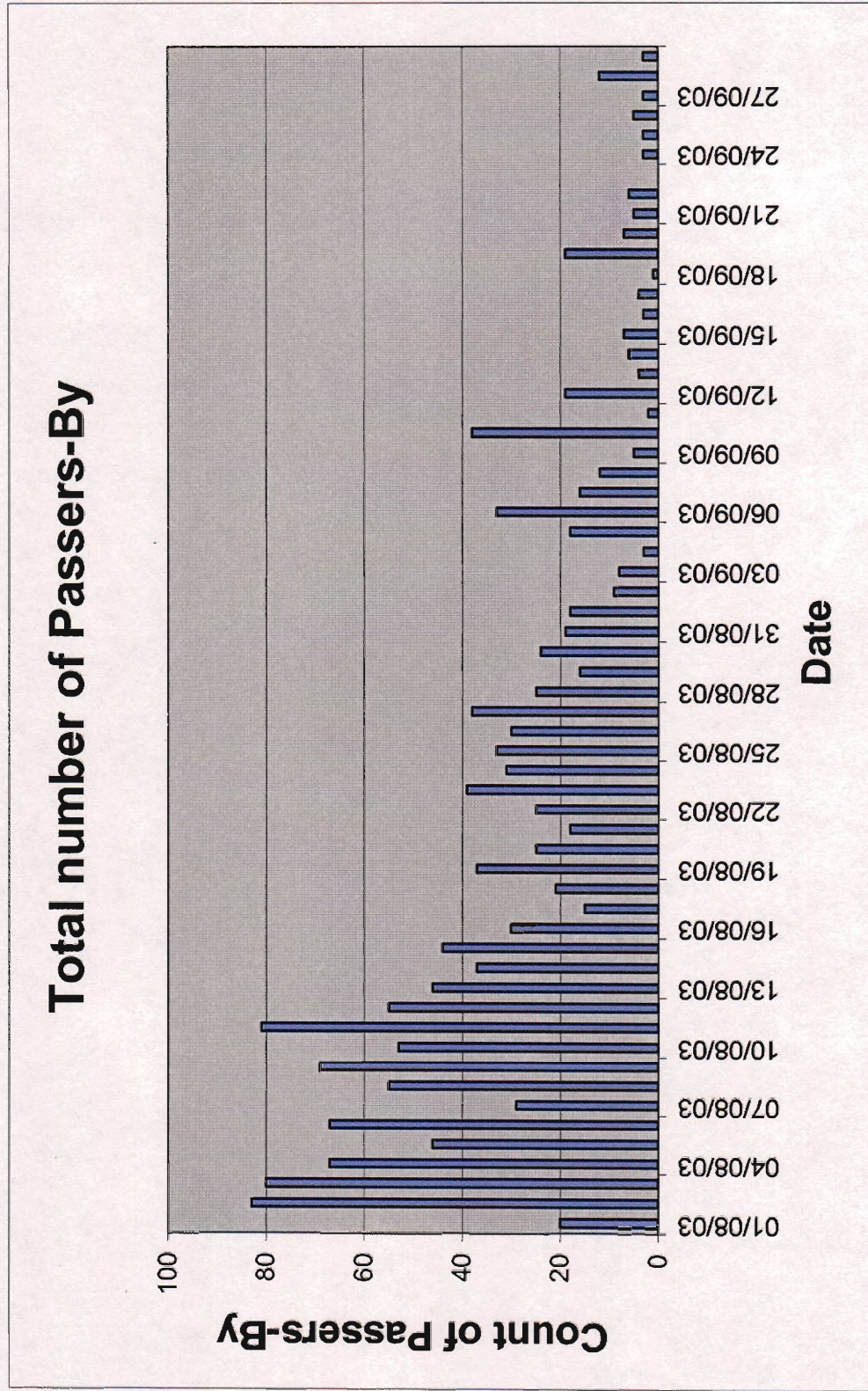


Figure 4.7 Total Passers-By, by date, combined counter sites

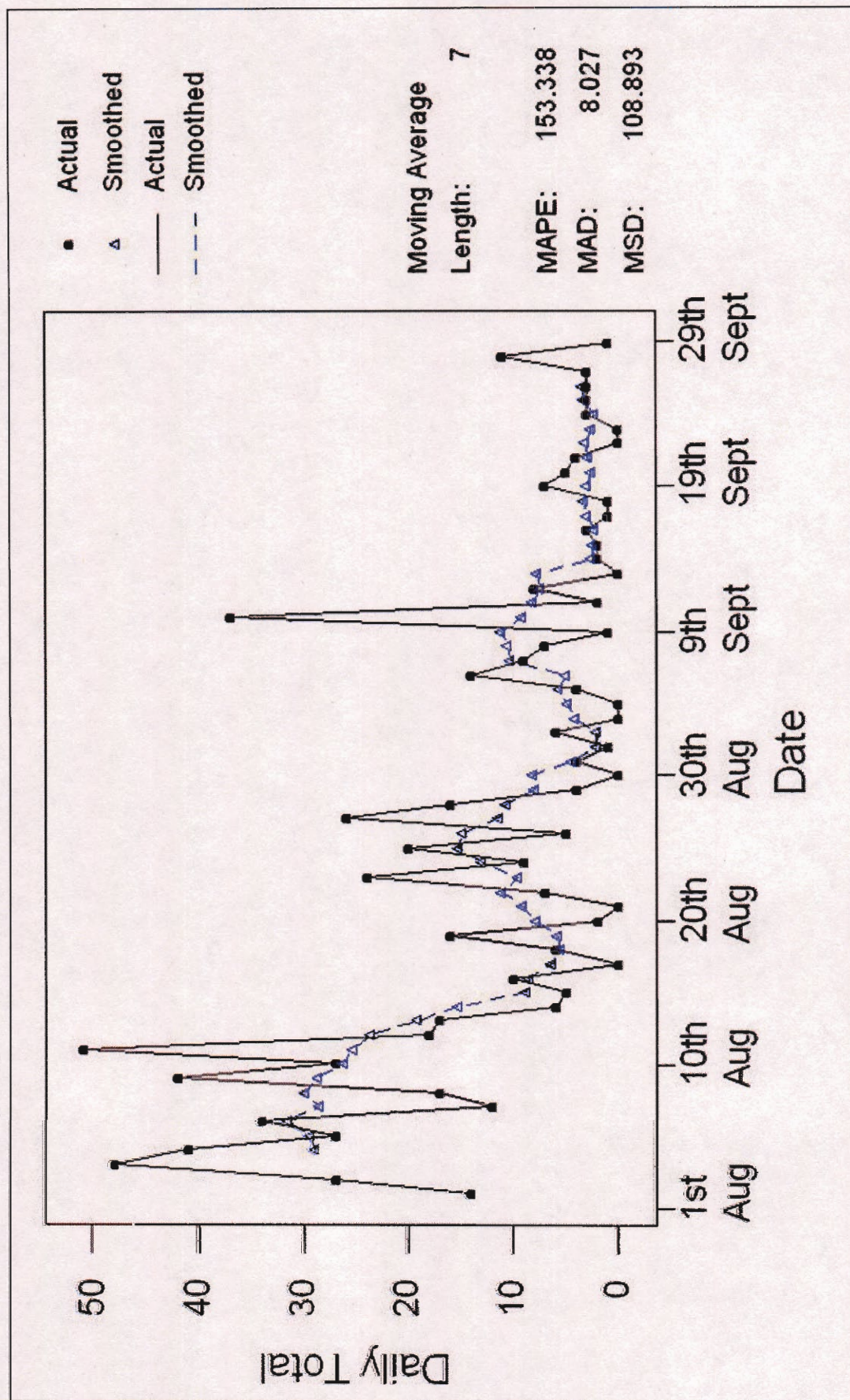


Figure 4.8 Seven-day running mean, Ballinalackan

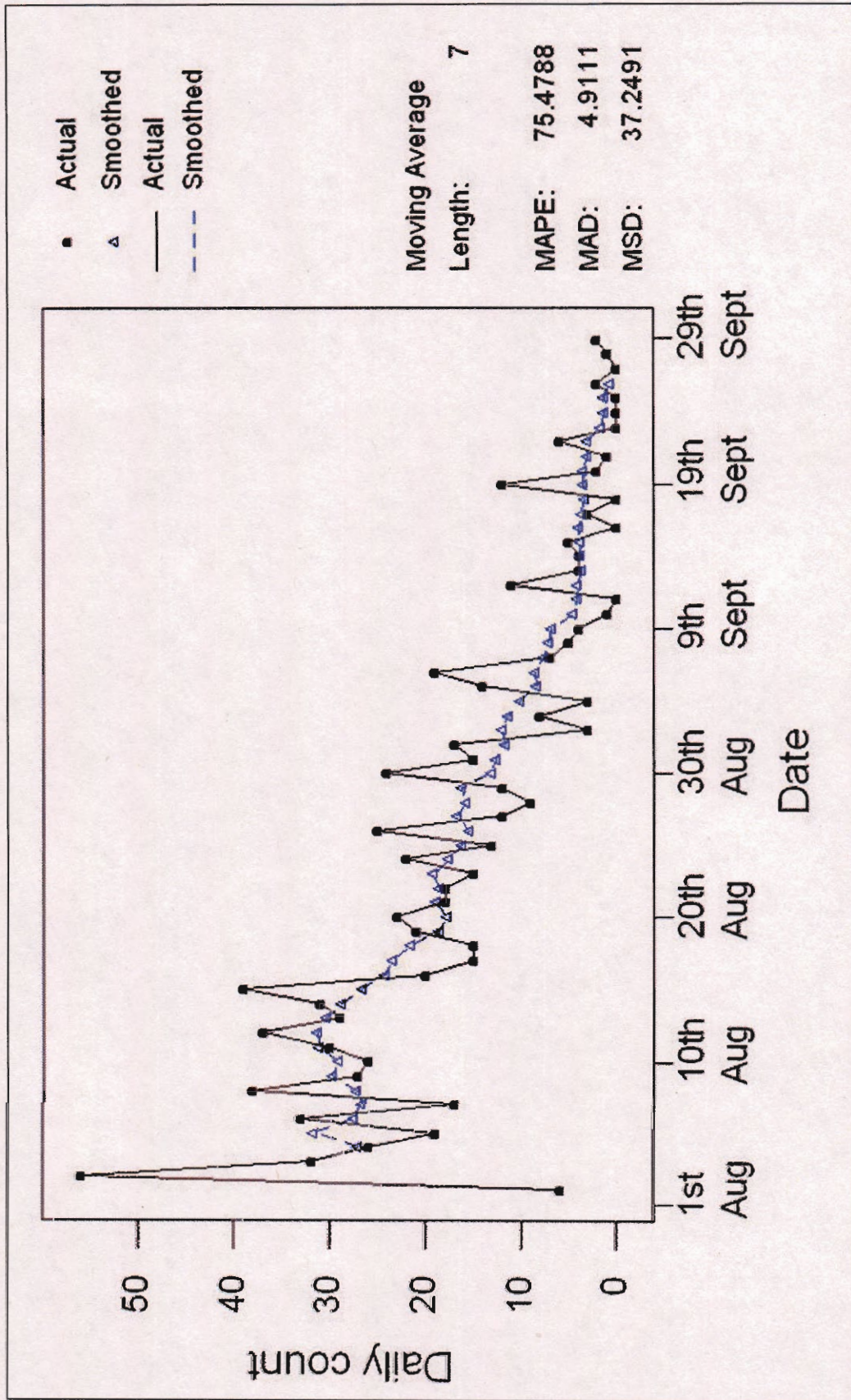


Figure 4.9 Seven-day running mean, Caher Valley

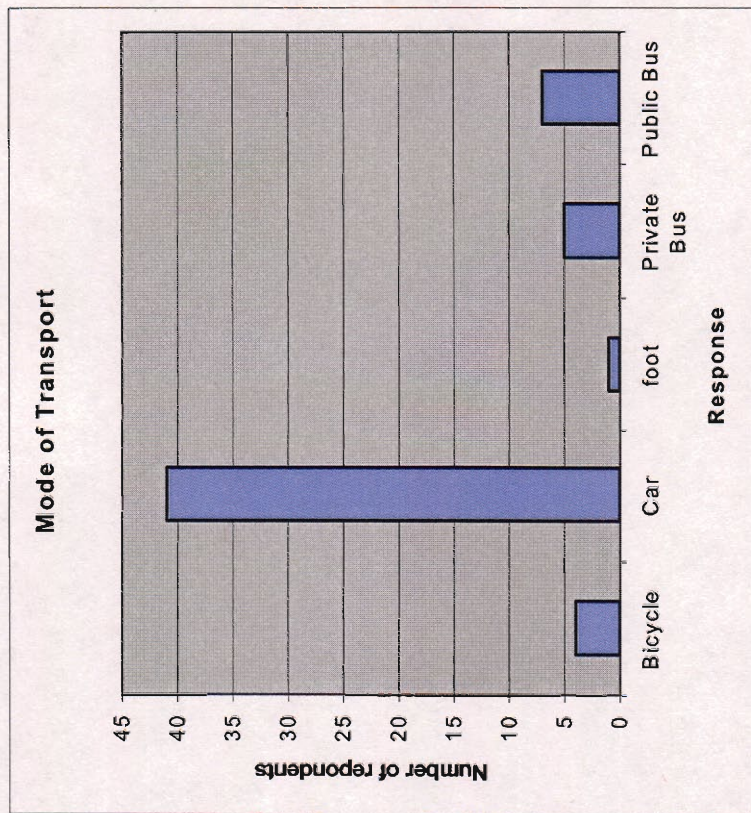


Figure 4.10 Mode of transport into Burren area

Sections most commonly walked

- Sections walked
- Burren Way
- Major Roads
- Minor Roads

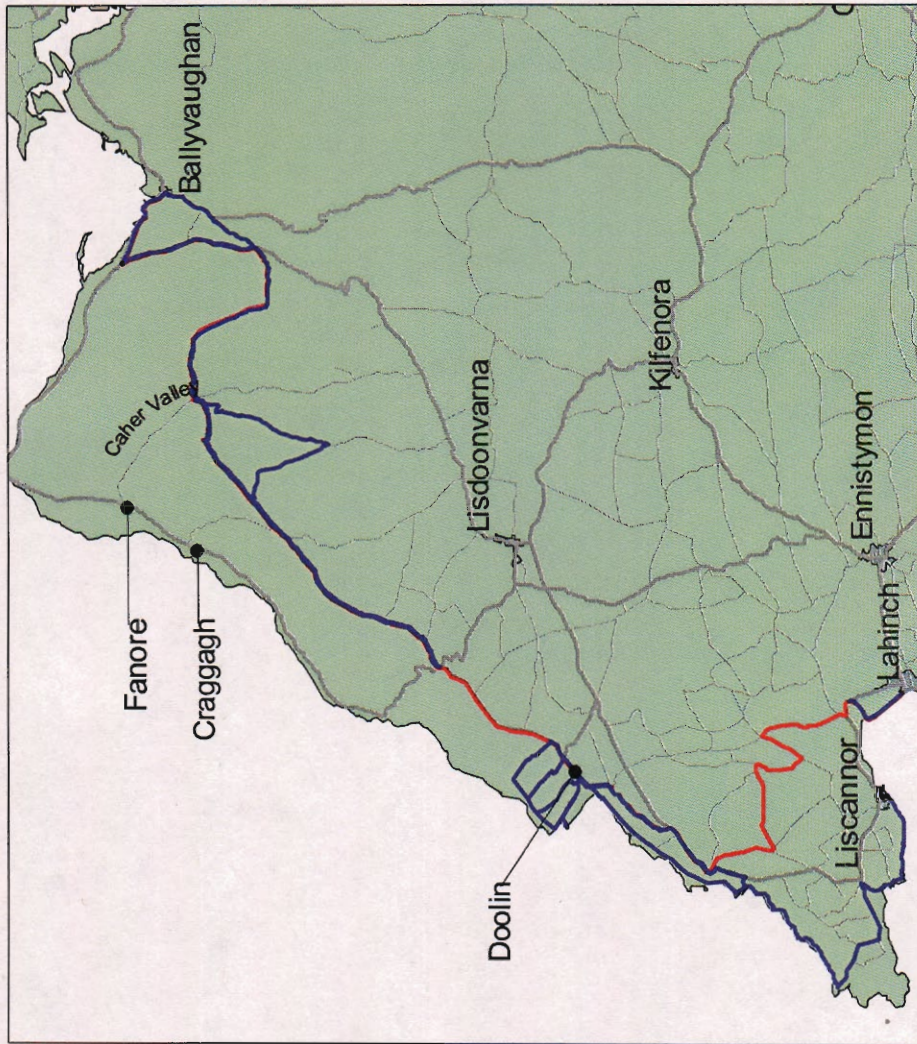


Figure 4.11 Sections of the Burren Way in most frequent use by focus group participants

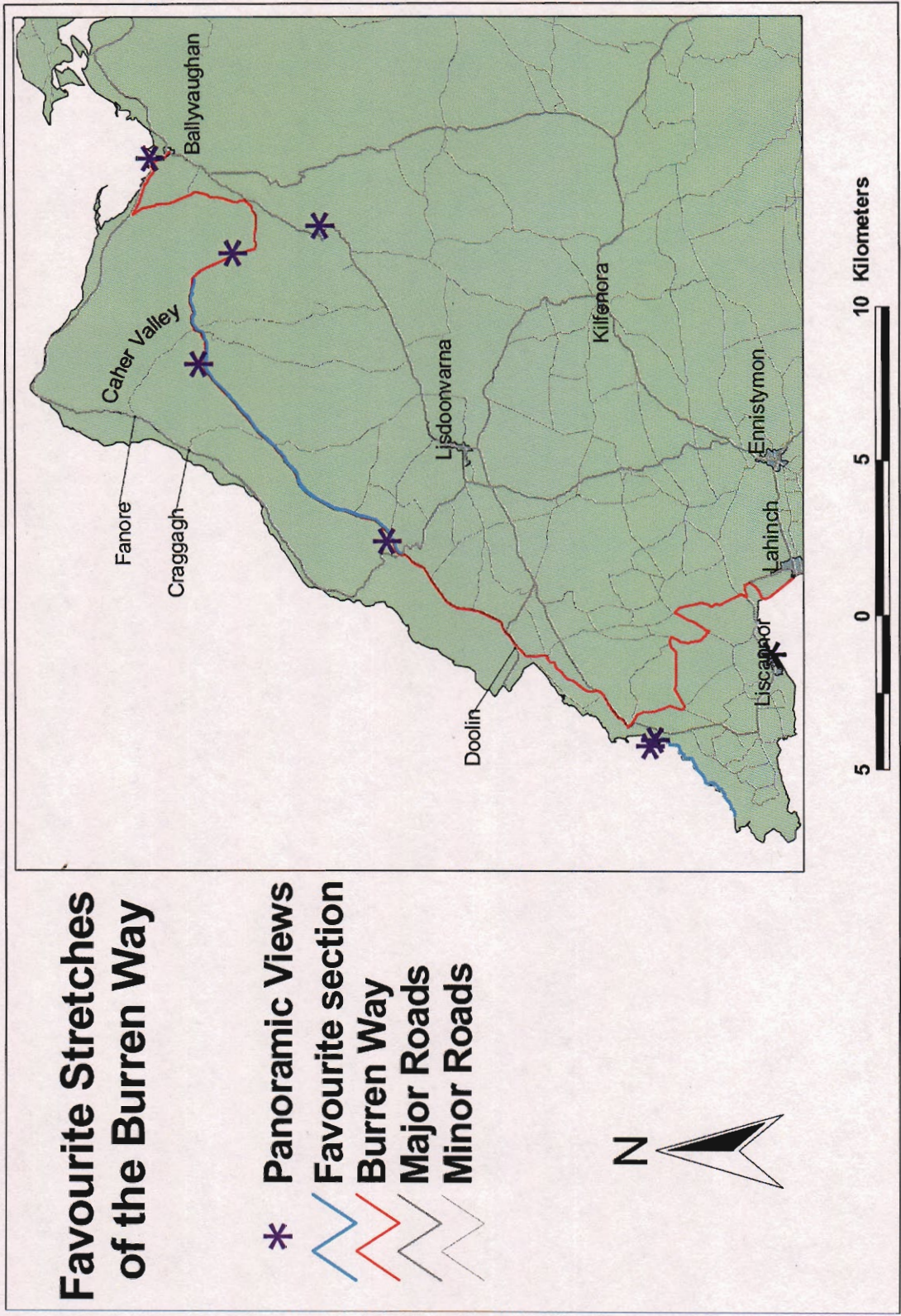


Figure 4.12 Favourite Sections of the Burren Way

Problems on the Burren Way



Burren Way
Major Roads
Minor Roads

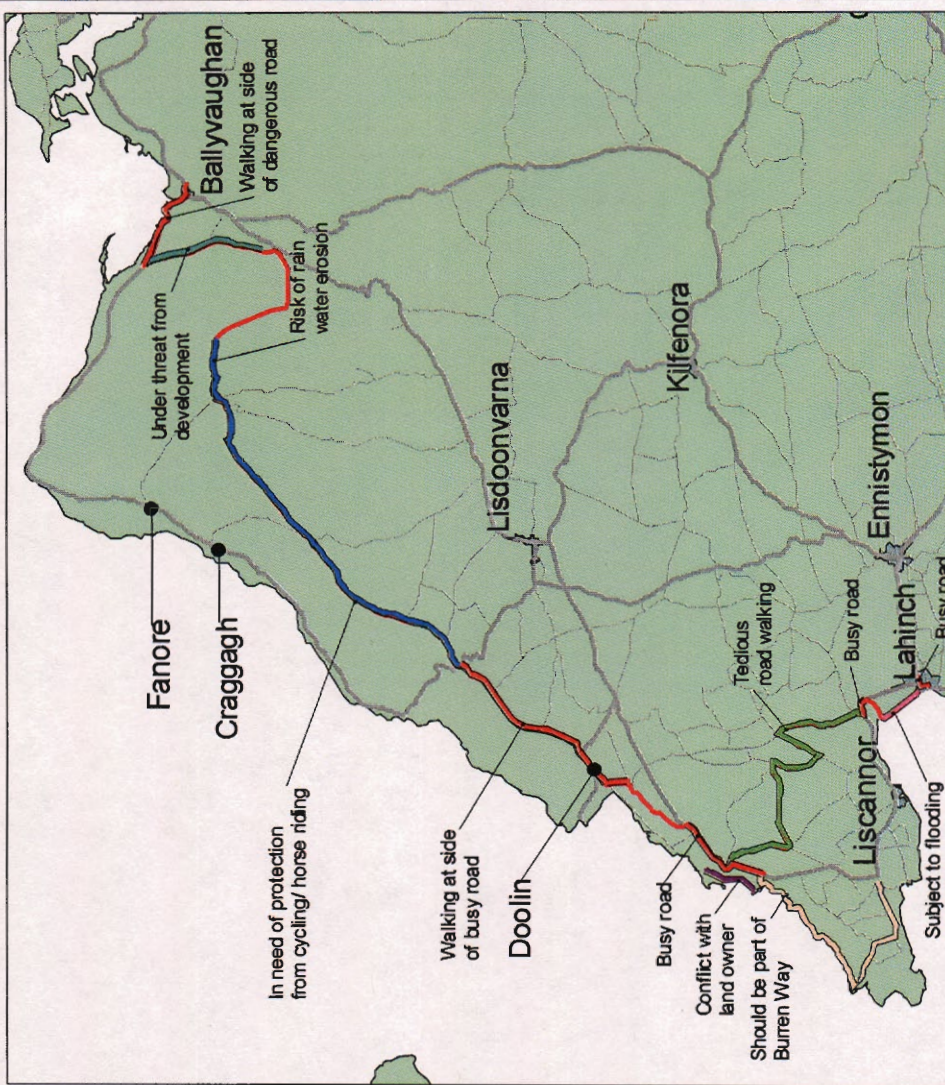


Figure 4.13 Problems on Burren Way, identified during focus group sessions

Problems on the Burren Way



Burren Way

Major Roads

Minor Roads

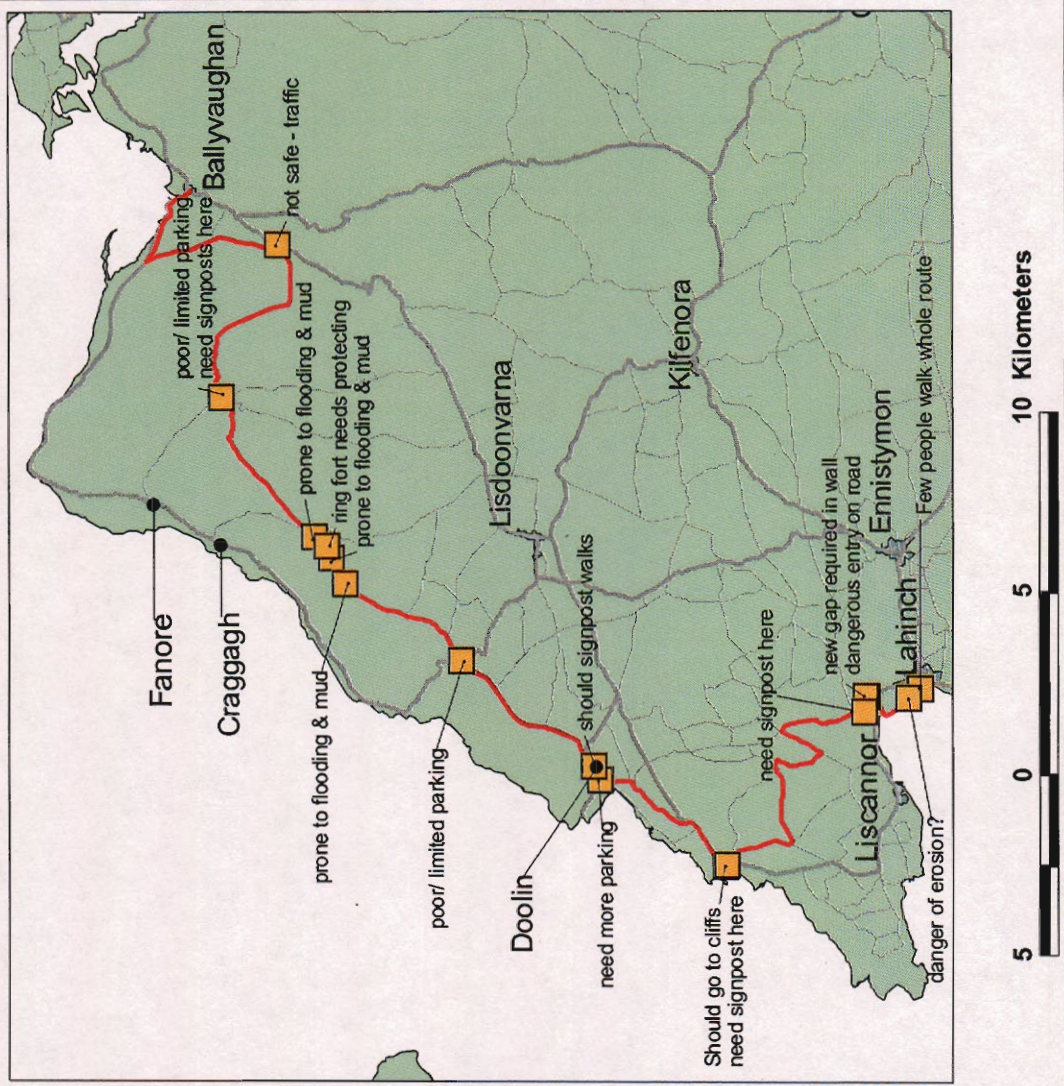






Figure 4.14 Further problems on the Burren Way, identified by focus group participants

Sections most commonly walked - non-members only

-  Section walked
-  Burren Way
-  Major Road
-  Minor Road

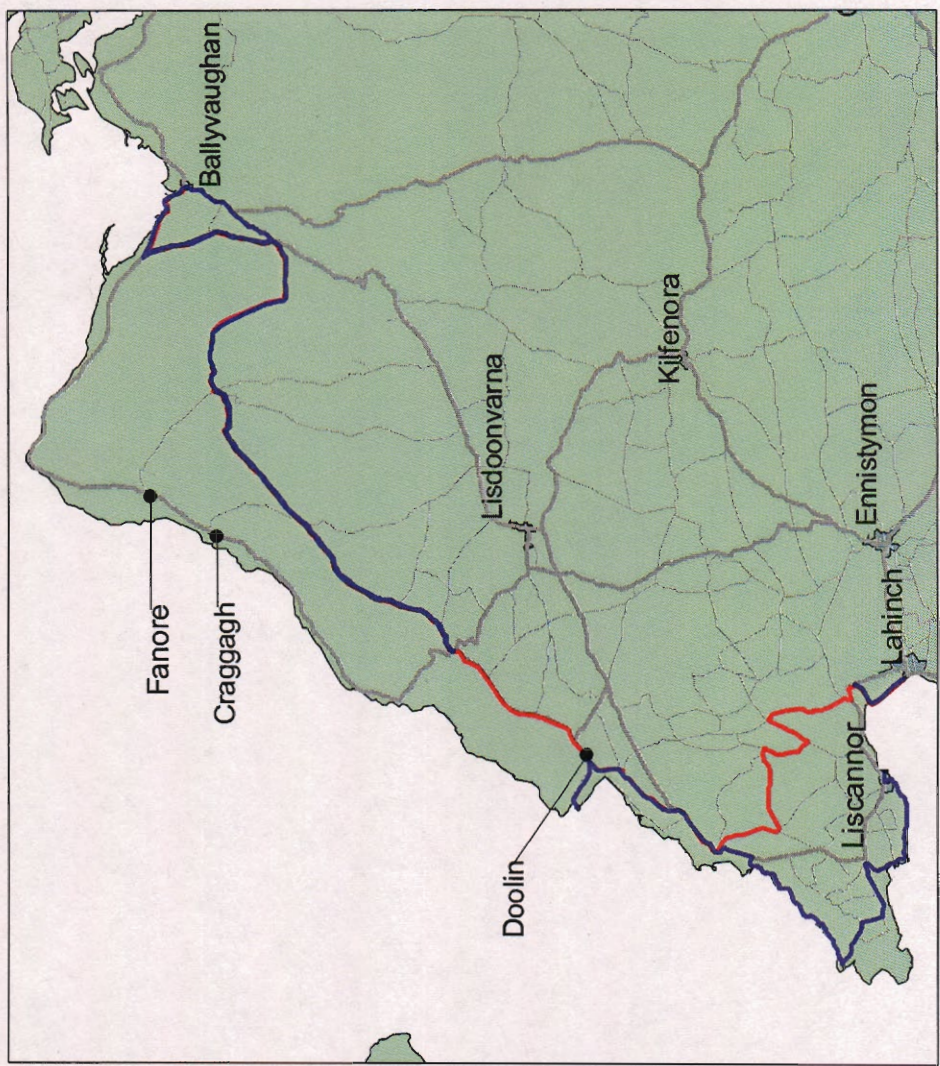






Figure 4.16 Most frequently walked stretches of the Burren Way, identified by those not involved in the management committee

**Favourite Sections -
committee members only**

-  **Favourite Section**
-  **Burren Way**
-  **Major Road**
-  **Minor Road**

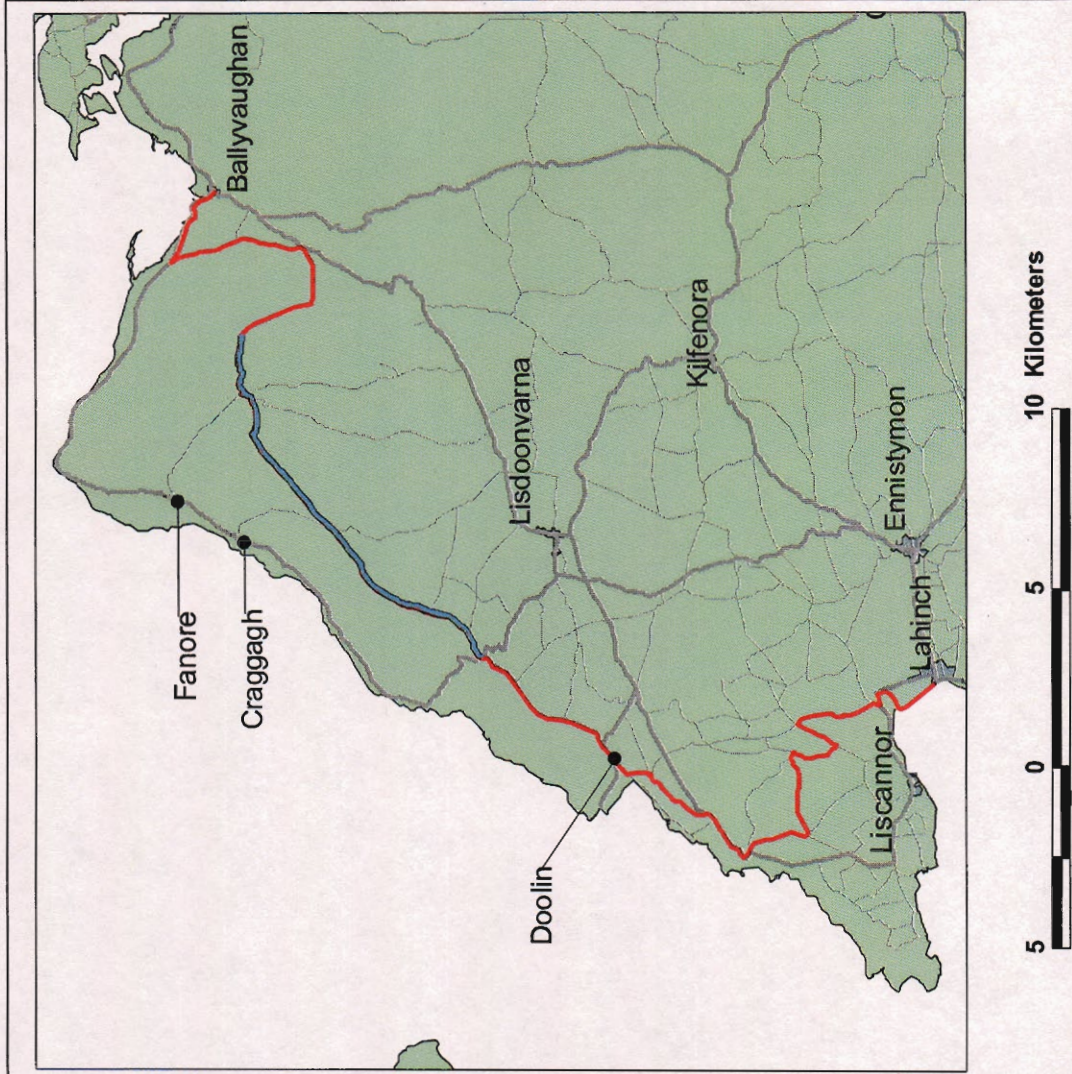


Figure 4.17 Favourite Stretches of the Burren Way, identified by members of the management committee only

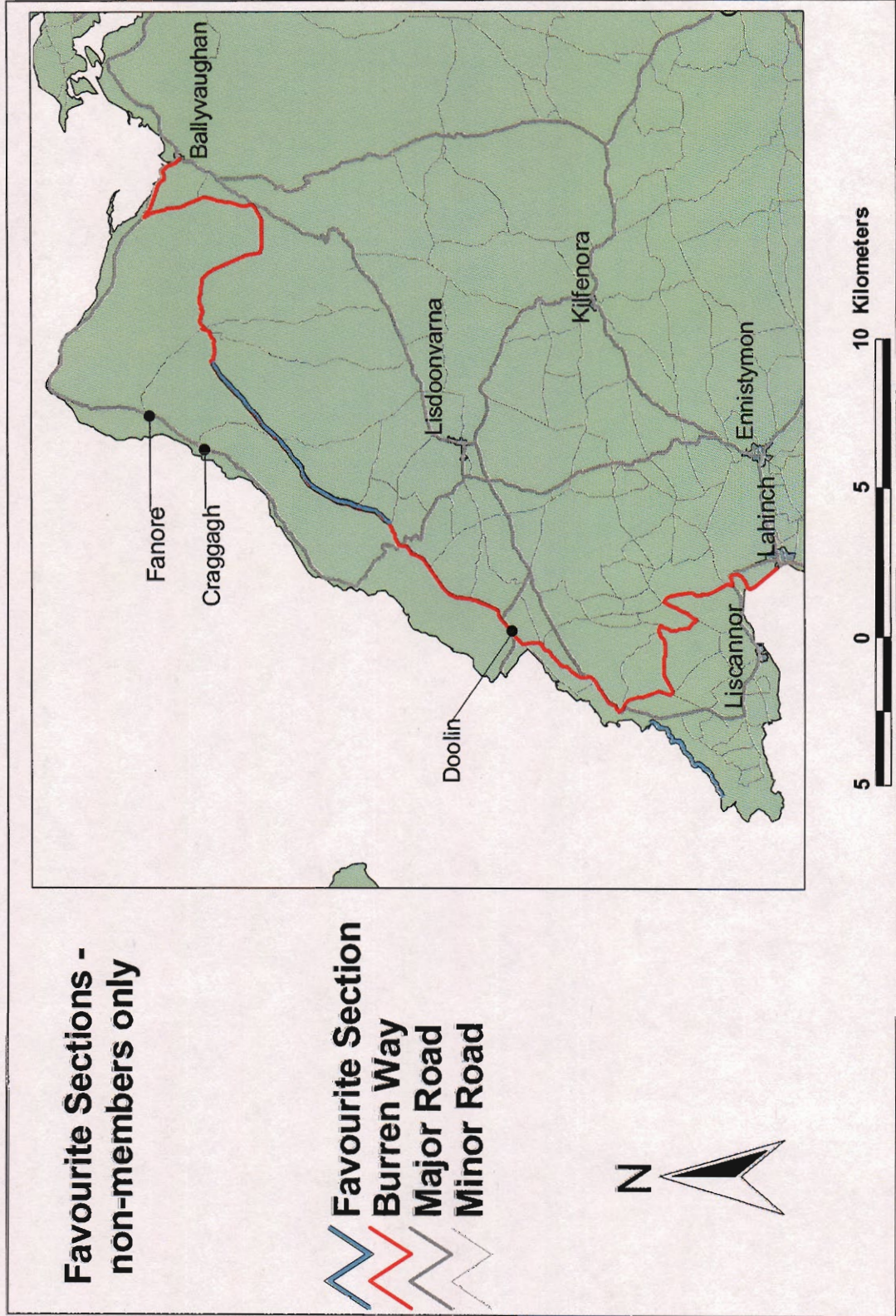


Figure 4.18 Favourite Stretches of the Burren Way, identified by those not involved in the management committee

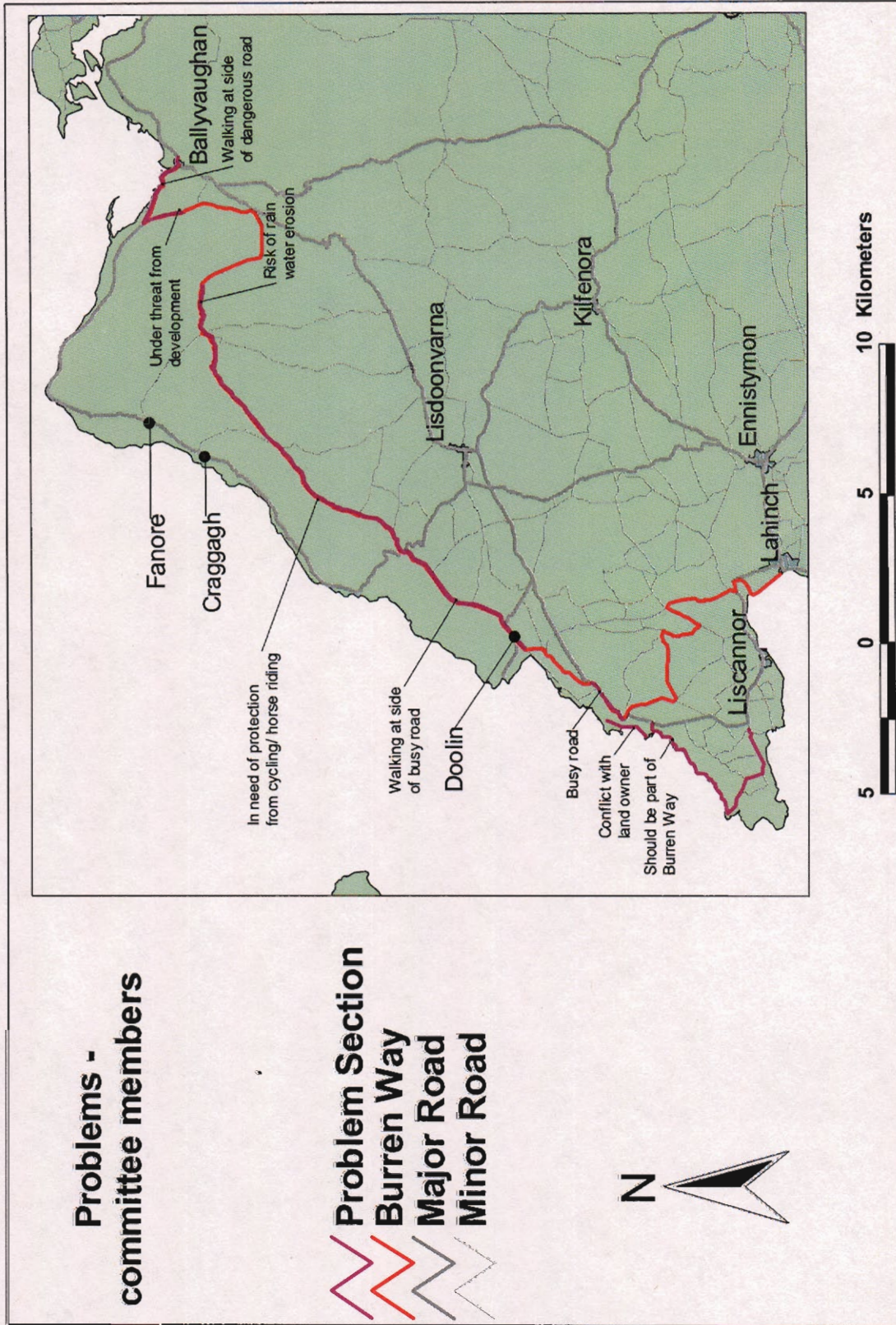


Figure 4.19 Problems identified by members of the Burren Way management committee

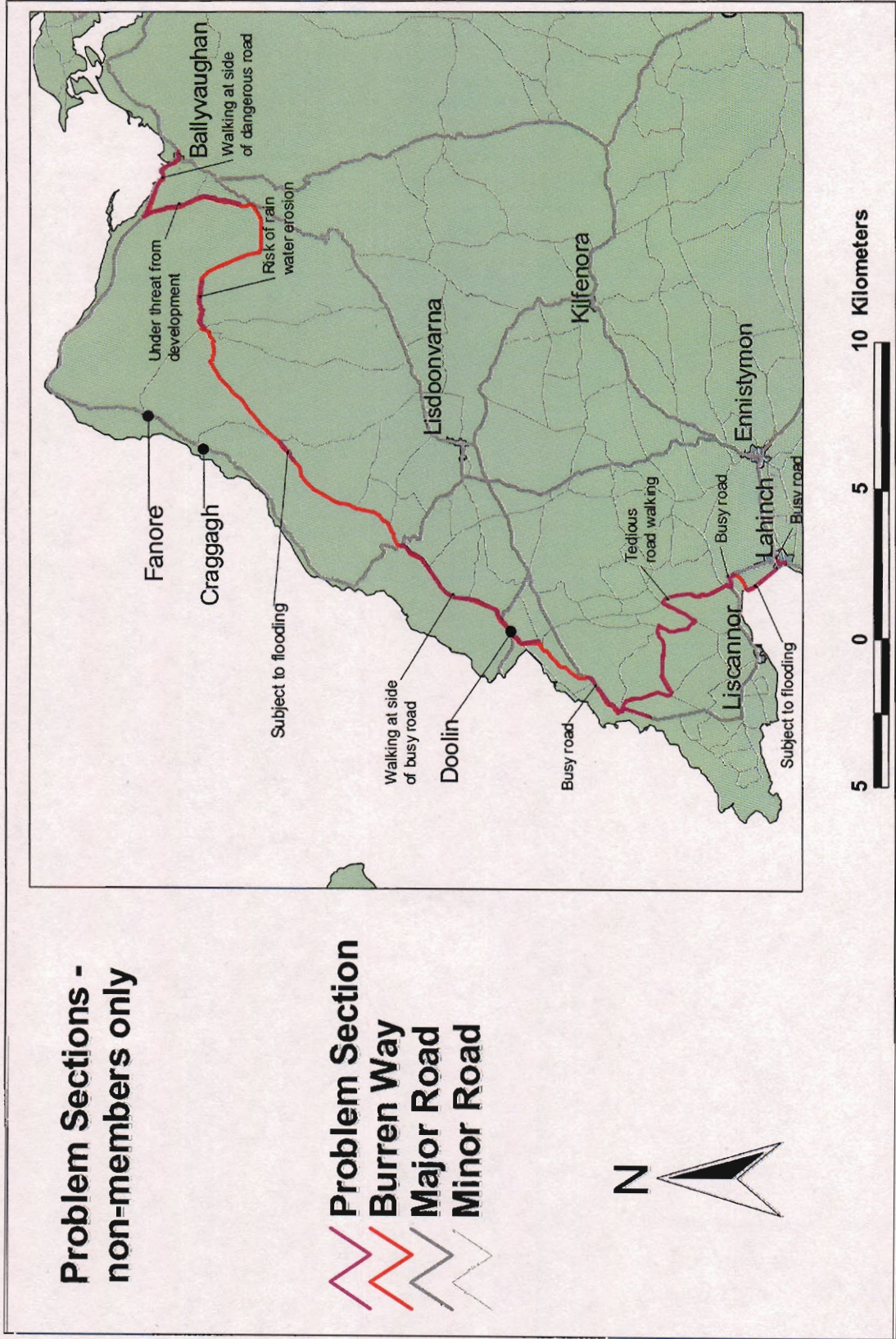


Figure 4.20 Problems identified by those not involved with the Burren Way management committee

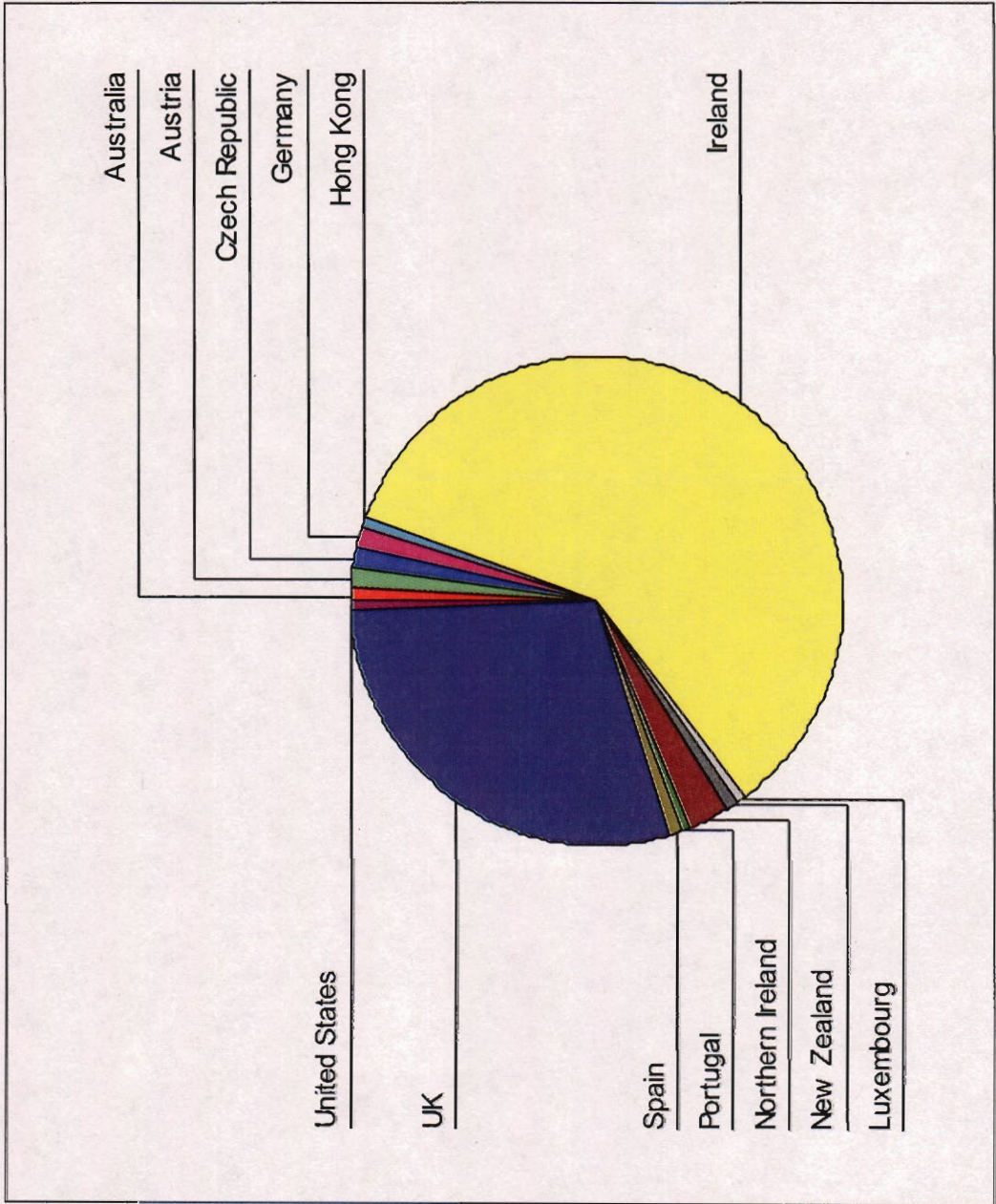







Figure 4.21 Residence of Online Survey Respondents

Location of Photographs

-  Photograph
-  East Munster Way
-  Major Road
-  Minor Road
-  Town or Village

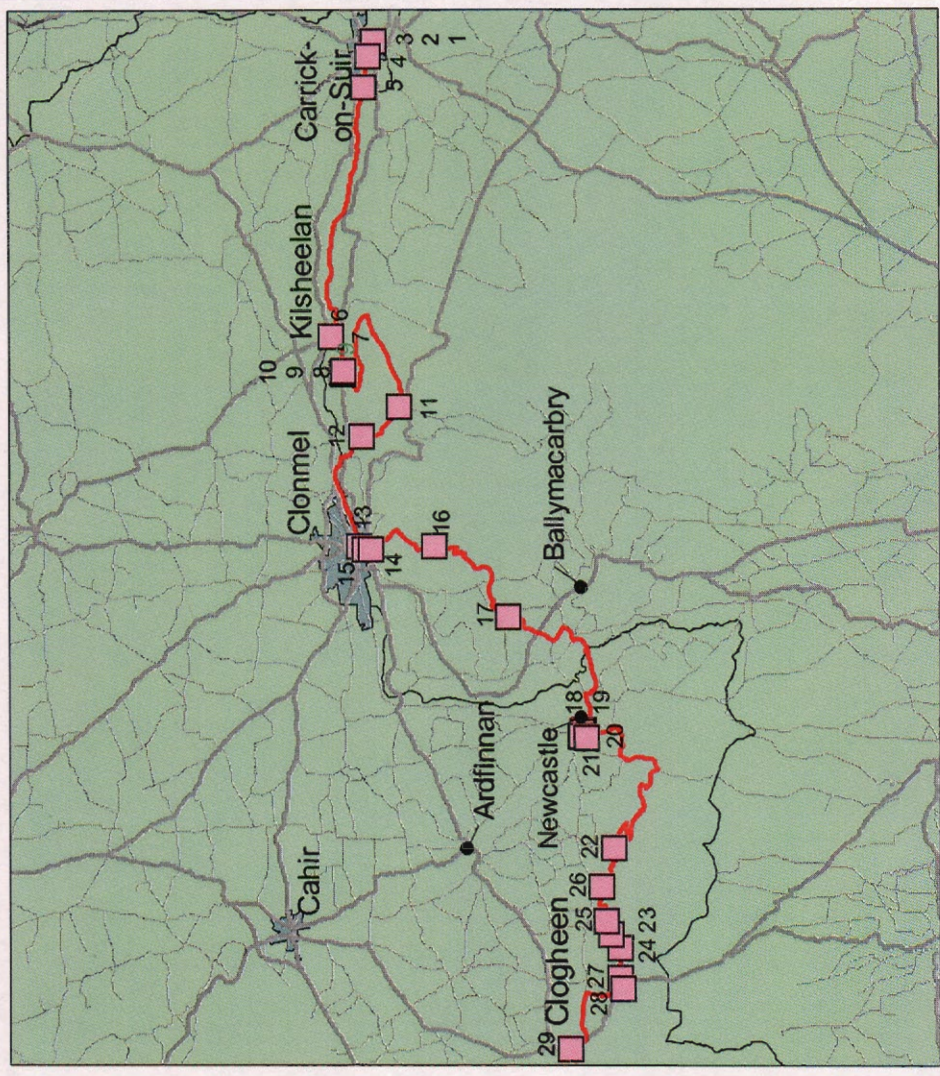





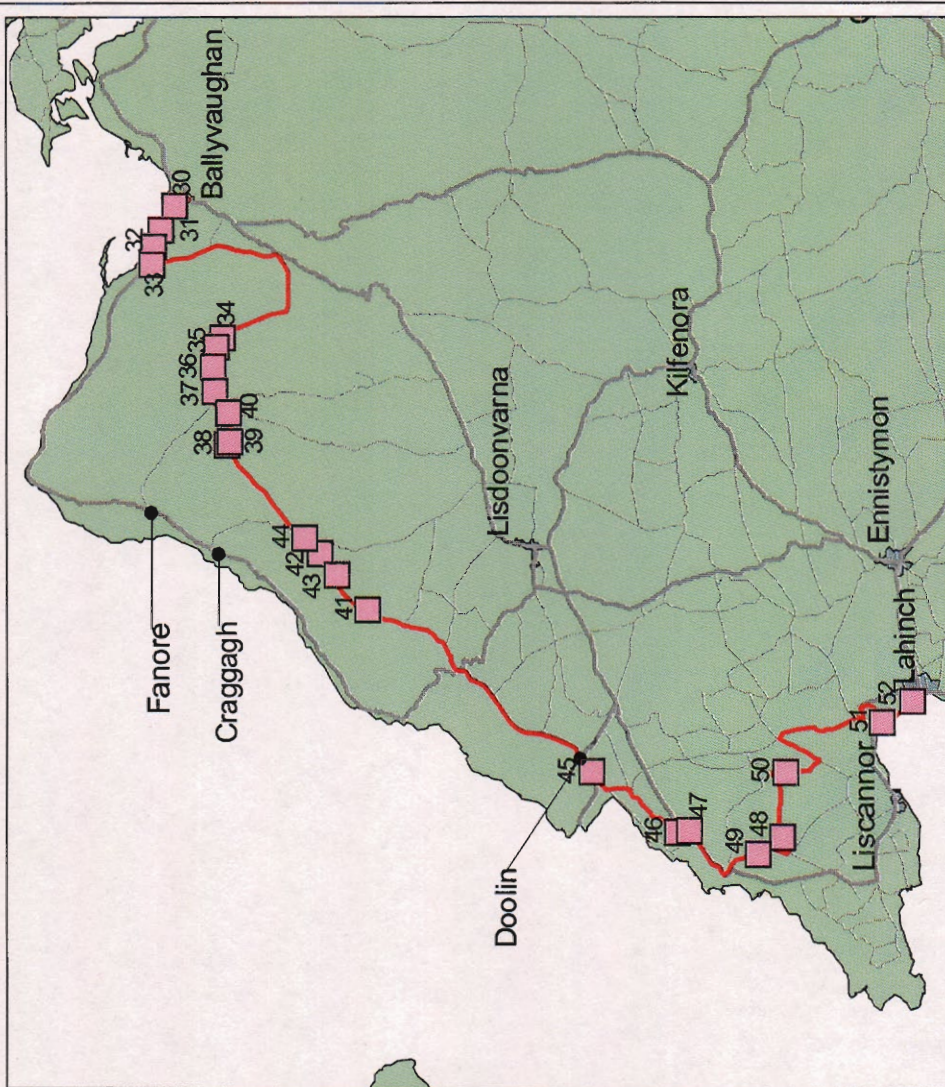


Figure 4.22 Locations of Photographs on East Munster Way

Location of Photographs

-  Photograph
-  Burren Way
-  Major Road
-  Minor Road
-  Town or Village



5 0 5 10 Kilometers

Figure 4.23 Locations of Photographs on Burren Way

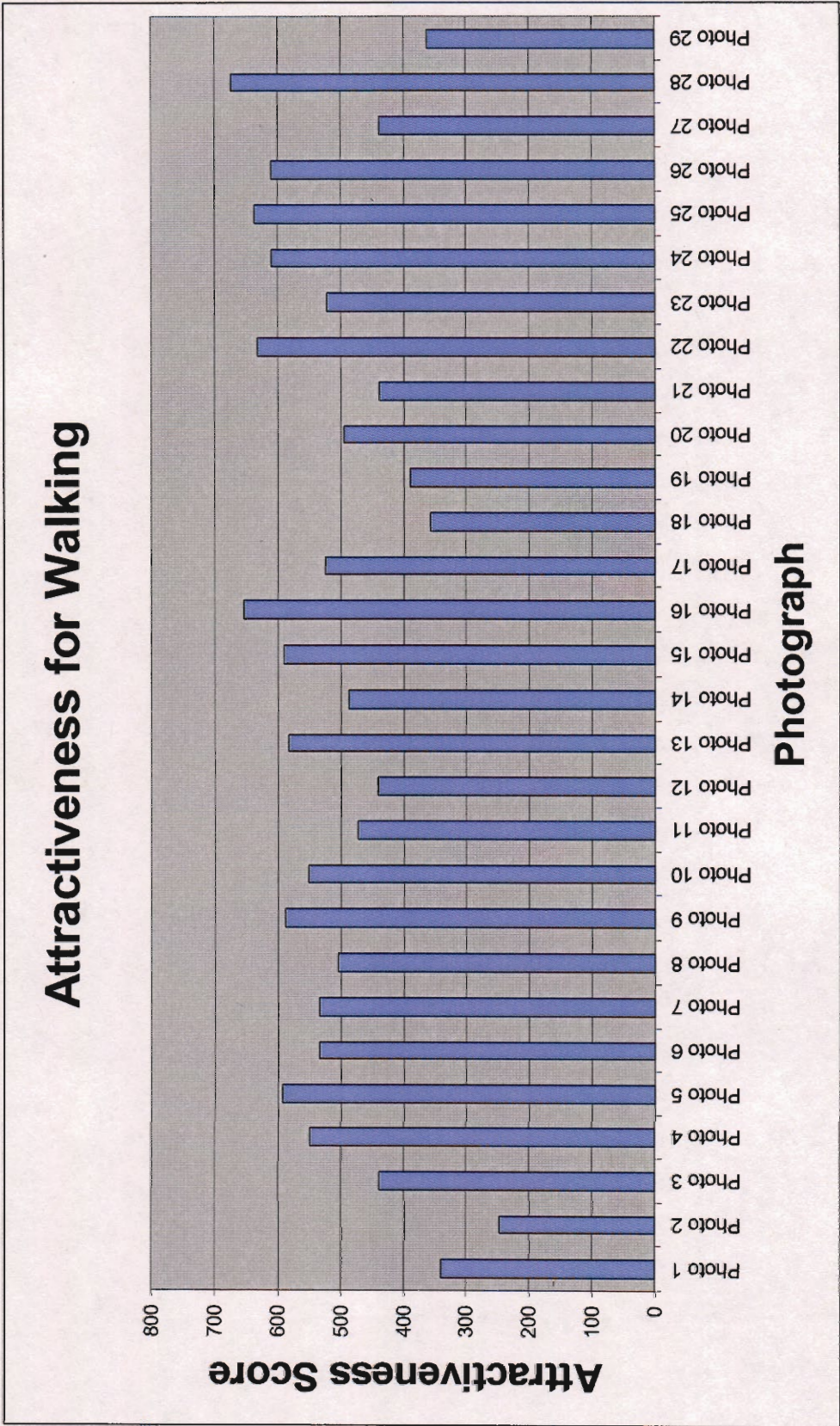


Figure 4.24 Attractiveness of Photographs of East Munster Way to online Survey Respondents

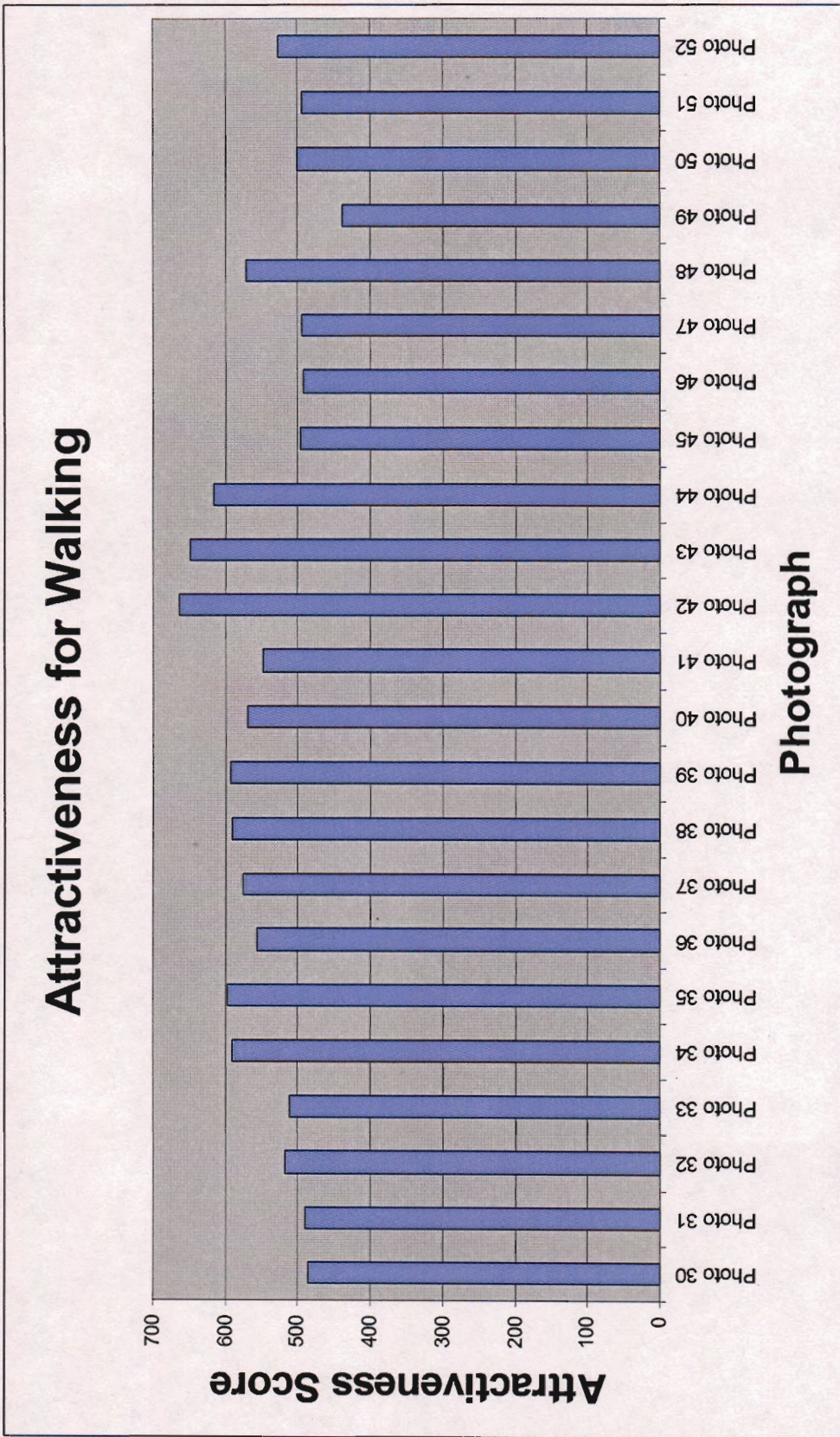


Figure 4.25 Attractiveness of Photographs of Burren Way to online Survey Respondents

Landscape Character and Preferences

- Mean Score**
- 3.03 - 3.32
 - 3.32 - 3.61
 - 3.61 - 3.9
 - 3.9 - 4.19
 - 4.19 - 4.47

▲ Burren Way

Landscape Character Units

- gentle slope
- low river valley/plain
- low rolling hills
- lower peak
- moderate slope
- peak
- plateau
- steep slope
- upper valley walls
- v-shaped valley

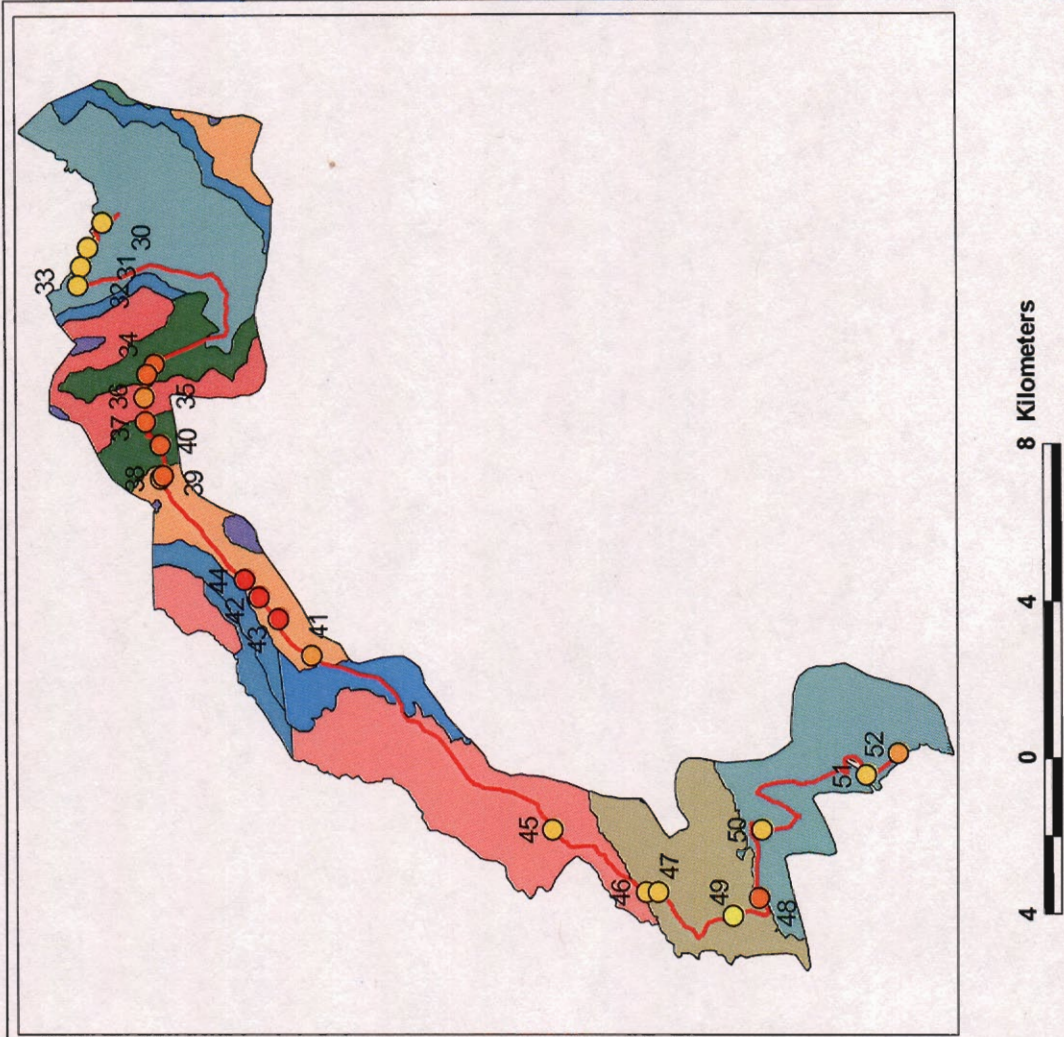


Figure 4.26 Landscape Character Units and Visual Preferences

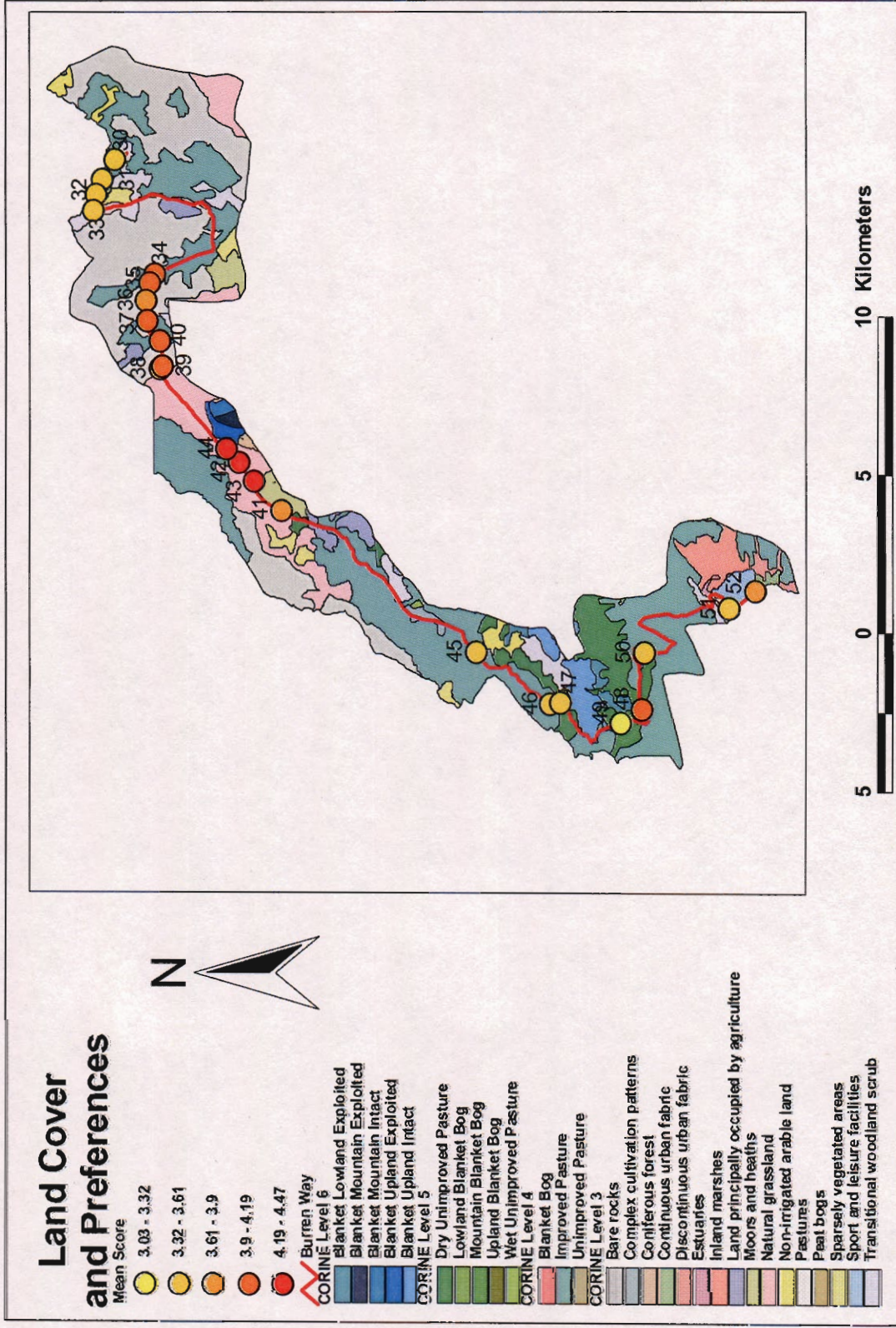


Figure 4.27 CORINE Land Cover and Visual Preferences

Landscape Character and Preferences

- Mean Score**
- 1.7 - 2
 - 2 - 2.29
 - 2.29 - 2.59
 - 2.59 - 2.88
 - 2.88 - 3.18
 - 3.18 - 3.47
 - 3.47 - 3.77
 - 3.77 - 4.06
 - 4.06 - 4.36
 - 4.36 - 4.65
- East Munster Way**
- Landscape Character Units**
- corrie
 - low river valley/ plain
 - lower peak
 - moderate slope
 - peak
 - plateau
 - saddle
 - steep slope
 - v-shaped valley

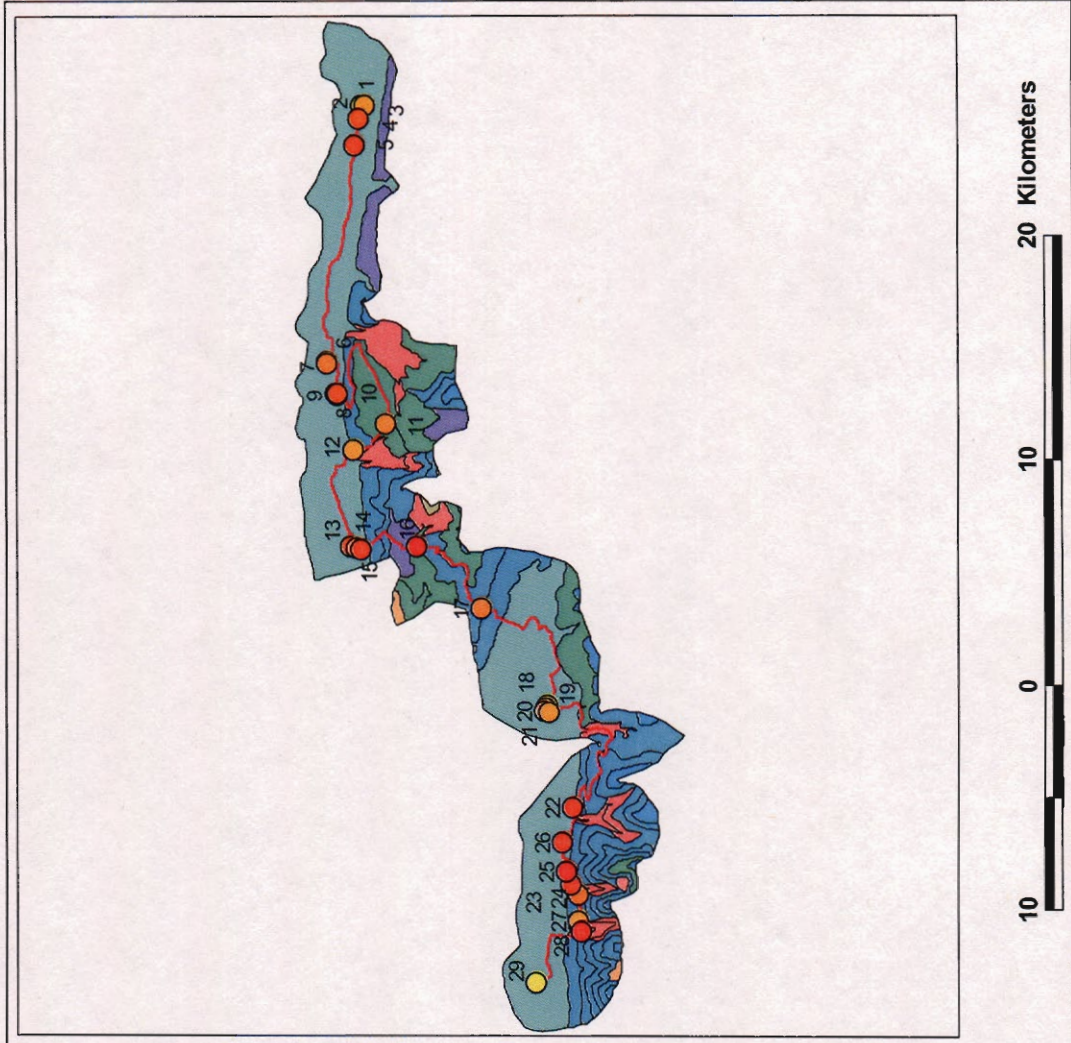


Figure 4.28 Landscape Character Units and Visual Preference

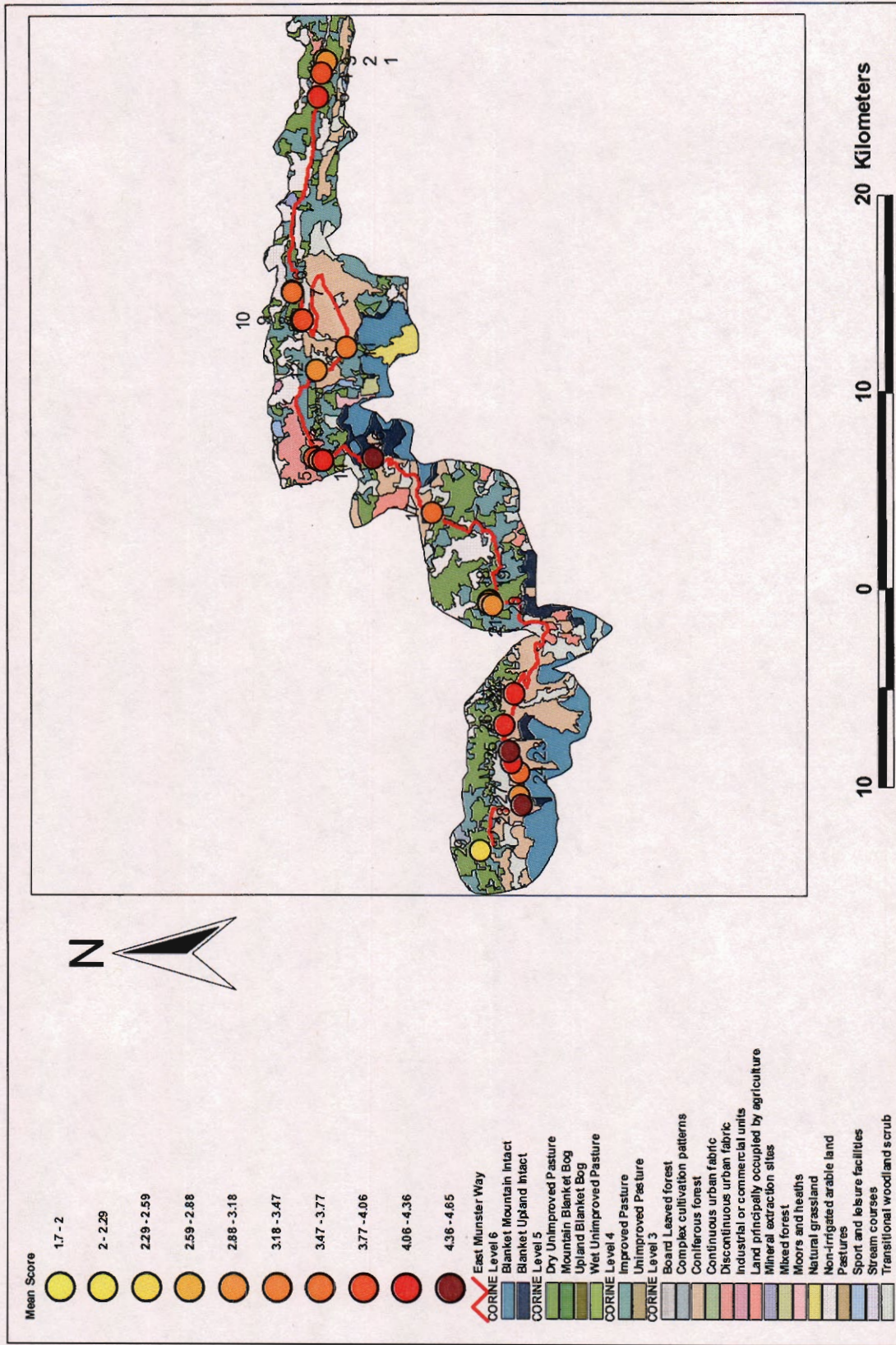











Figure 4.29 CORINE Land Cover and Visual Preference

Preferences (Online survey & Focus Group)

-  Favourite stretch
- Mean Score**
-  3.03 - 3.32
-  3.32 - 3.61
-  3.61 - 3.9
-  3.9 - 4.19
-  4.19 - 4.47
-  Burren Way
-  Major Road
-  Town or Village

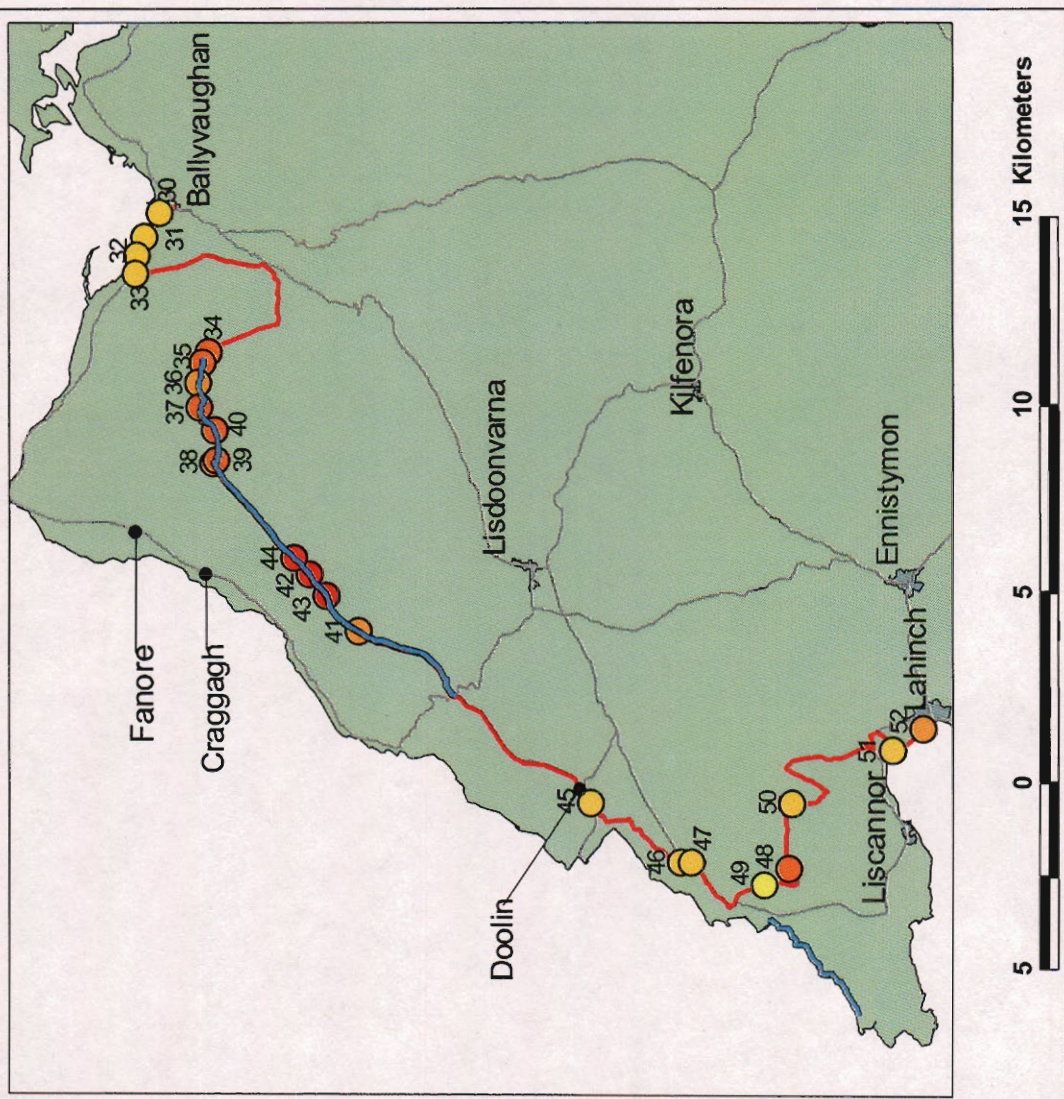



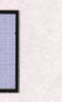


Figure 4.30 Favourite Stretches and Visual Preferences

Burren Way Visual Catchment

-  Burren Way
-  Major Road
-  Town or Village
-  Visual Catchment

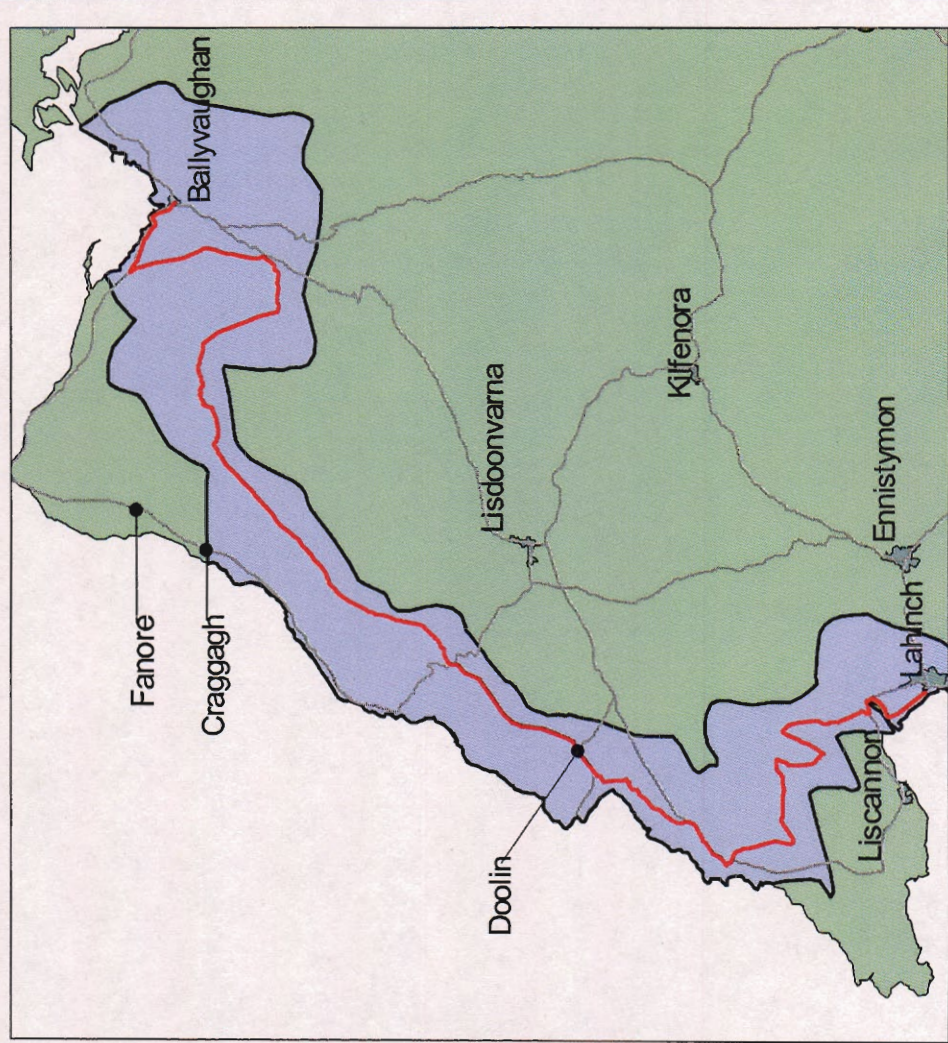


Figure 4.31 Visual Catchment (Viewshed) of the Burren Way

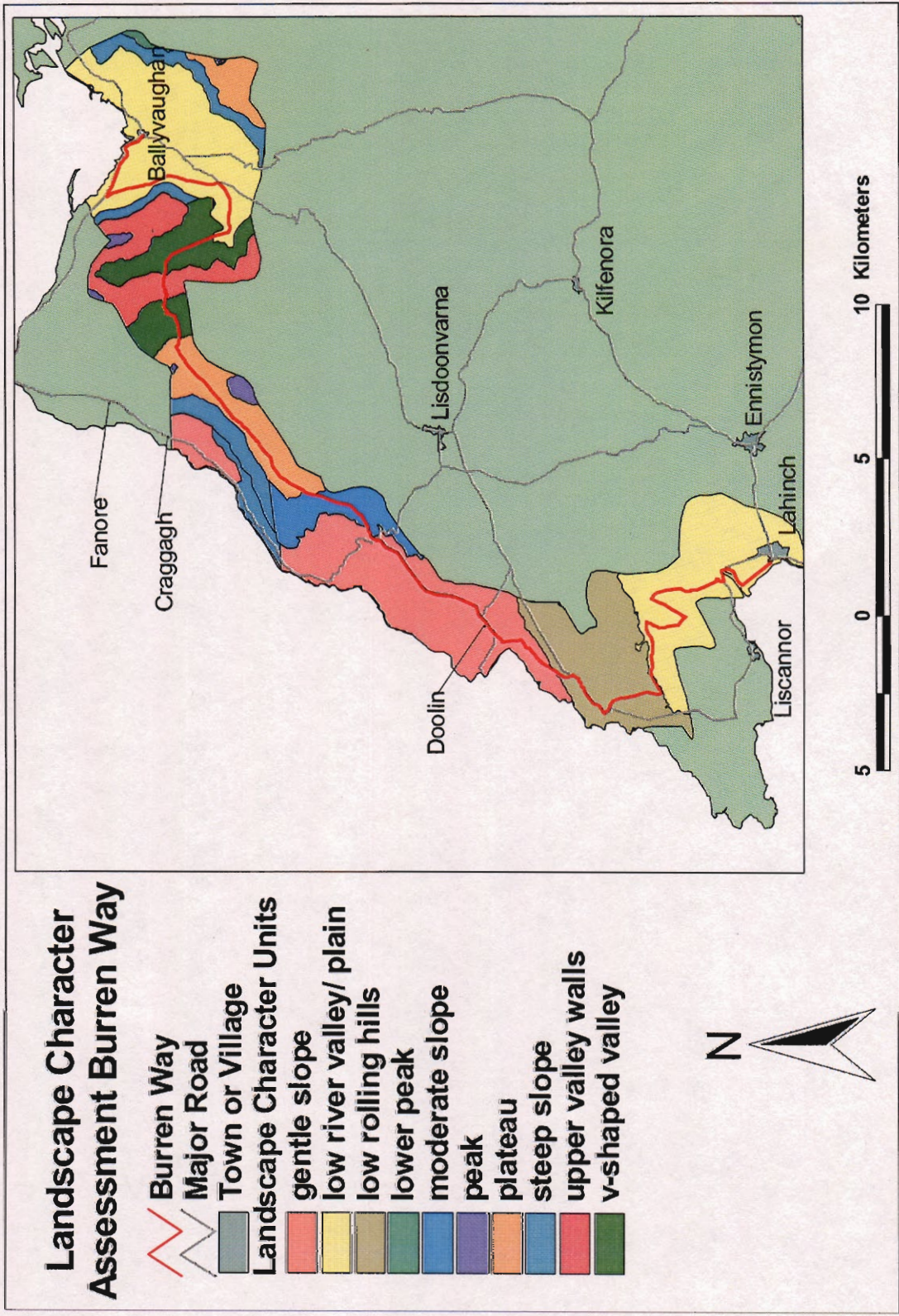


Figure 4.32 Landscape Character Assessment for the Burren Way

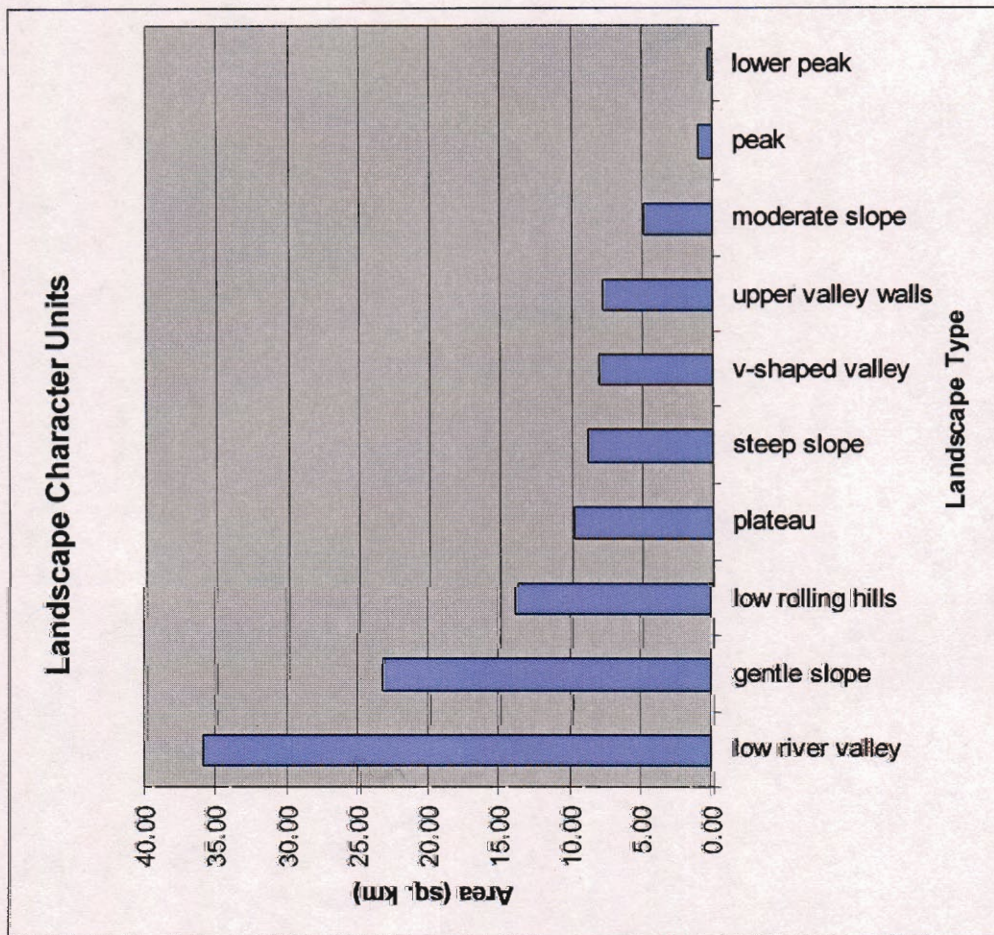


Figure 4.33 Area of Landscape Character Units, Burren Way Catchment

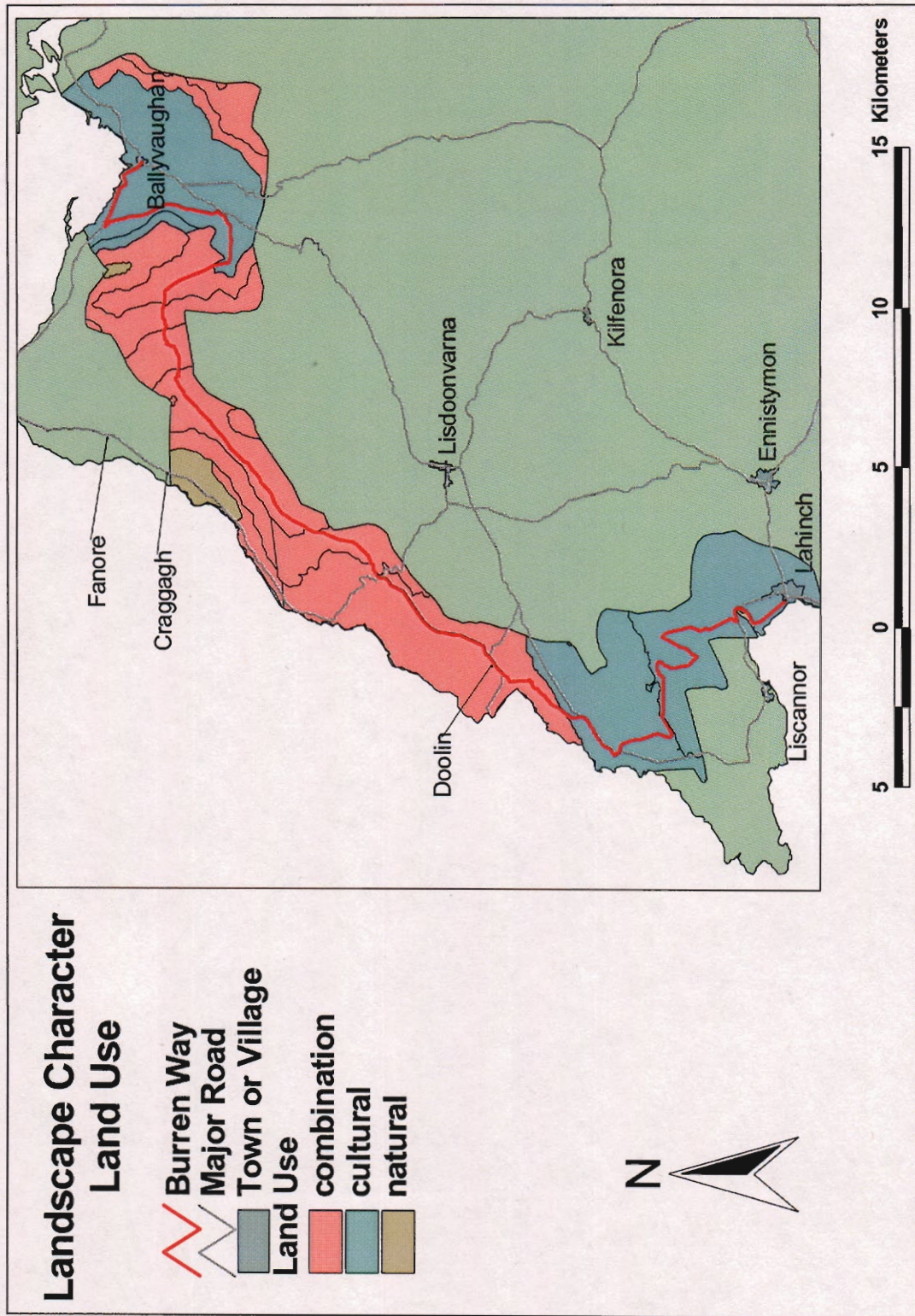


Figure 4.34 Landscape Character Assessment – Land Use in the Burren Catchment

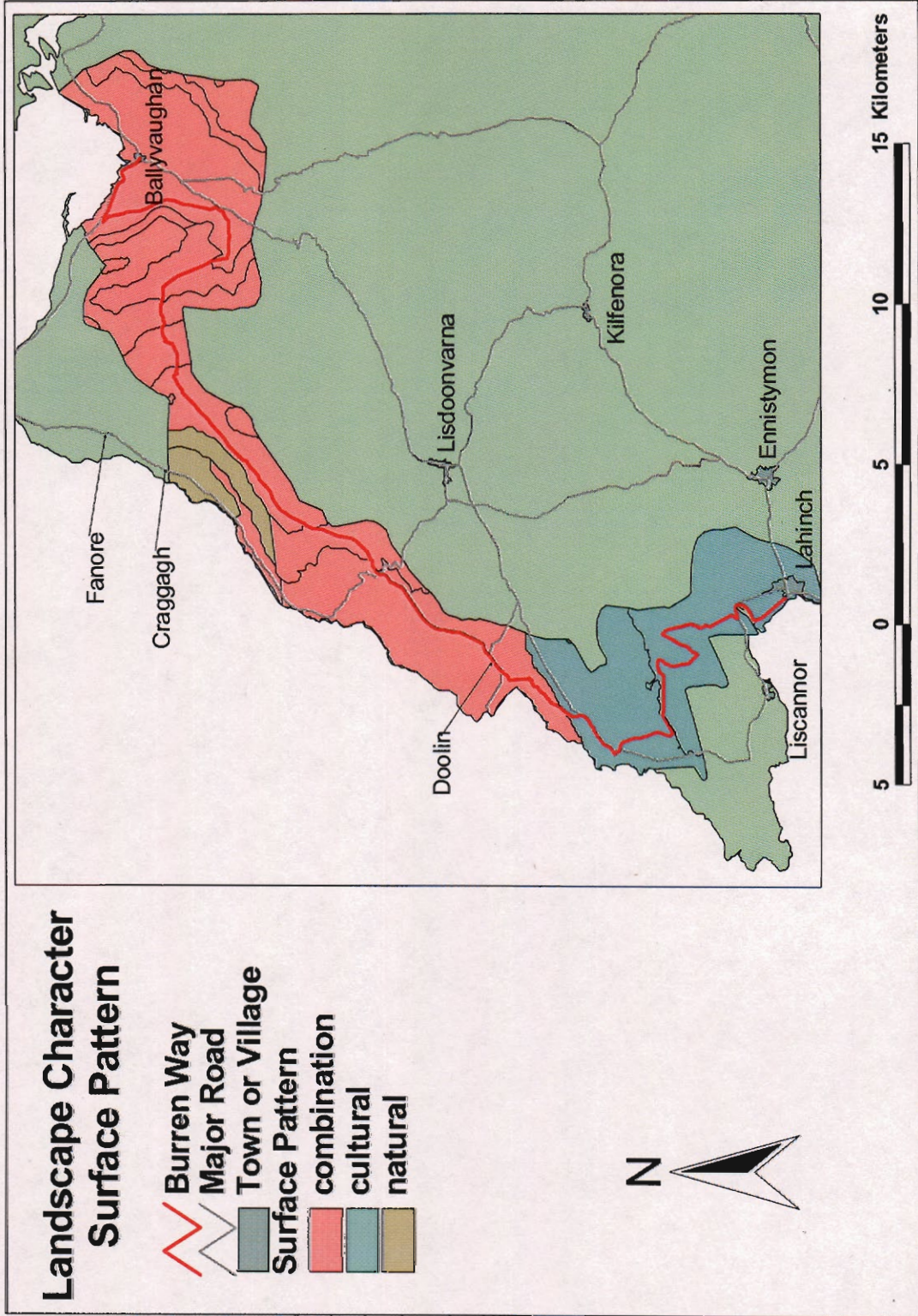


Figure 4.35 Landscape Character Assessment – Surface Pattern in the Burren Catchment

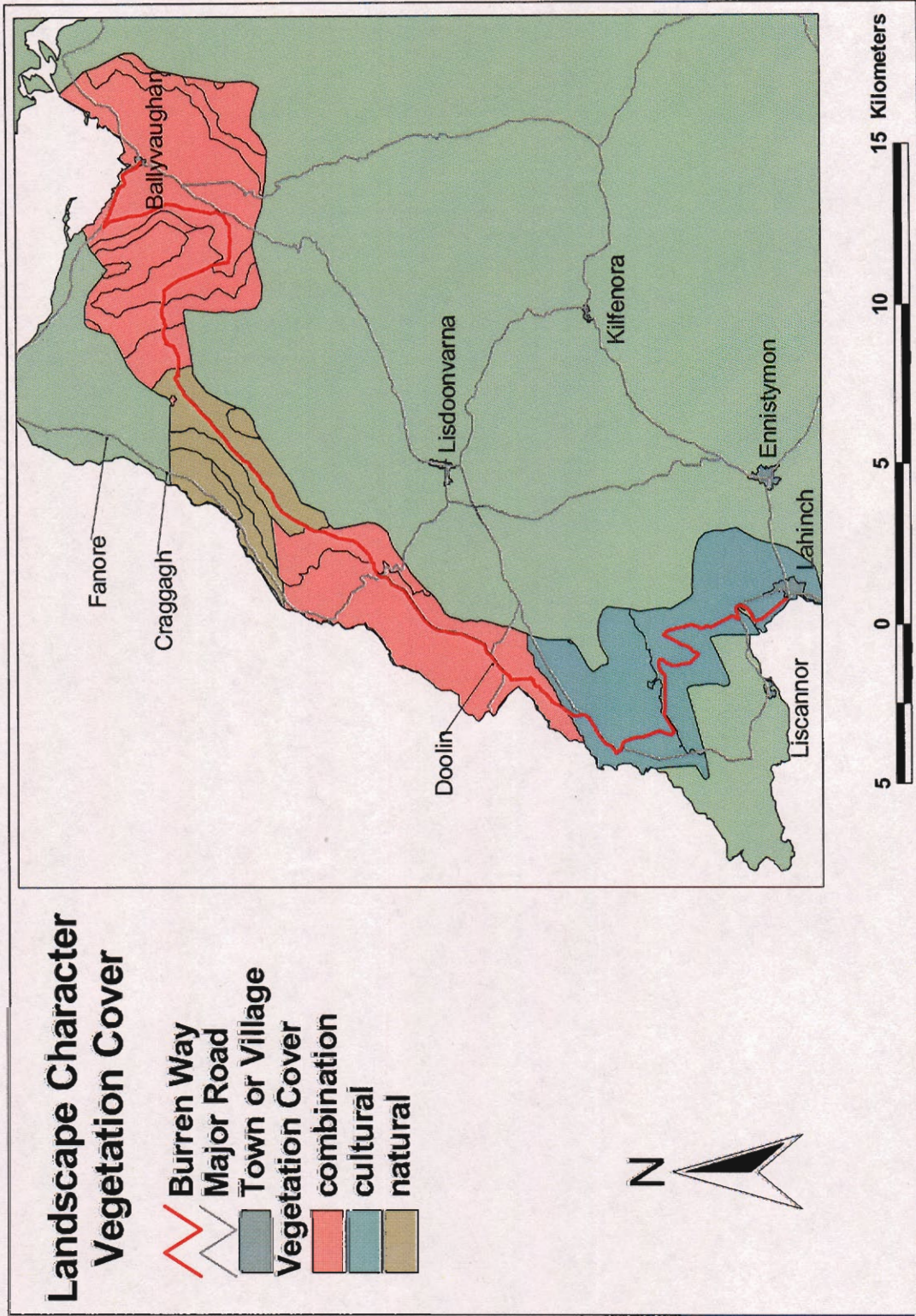


Figure 4.36 Landscape Character Assessment – Vegetation Cover in the Burren Catchment

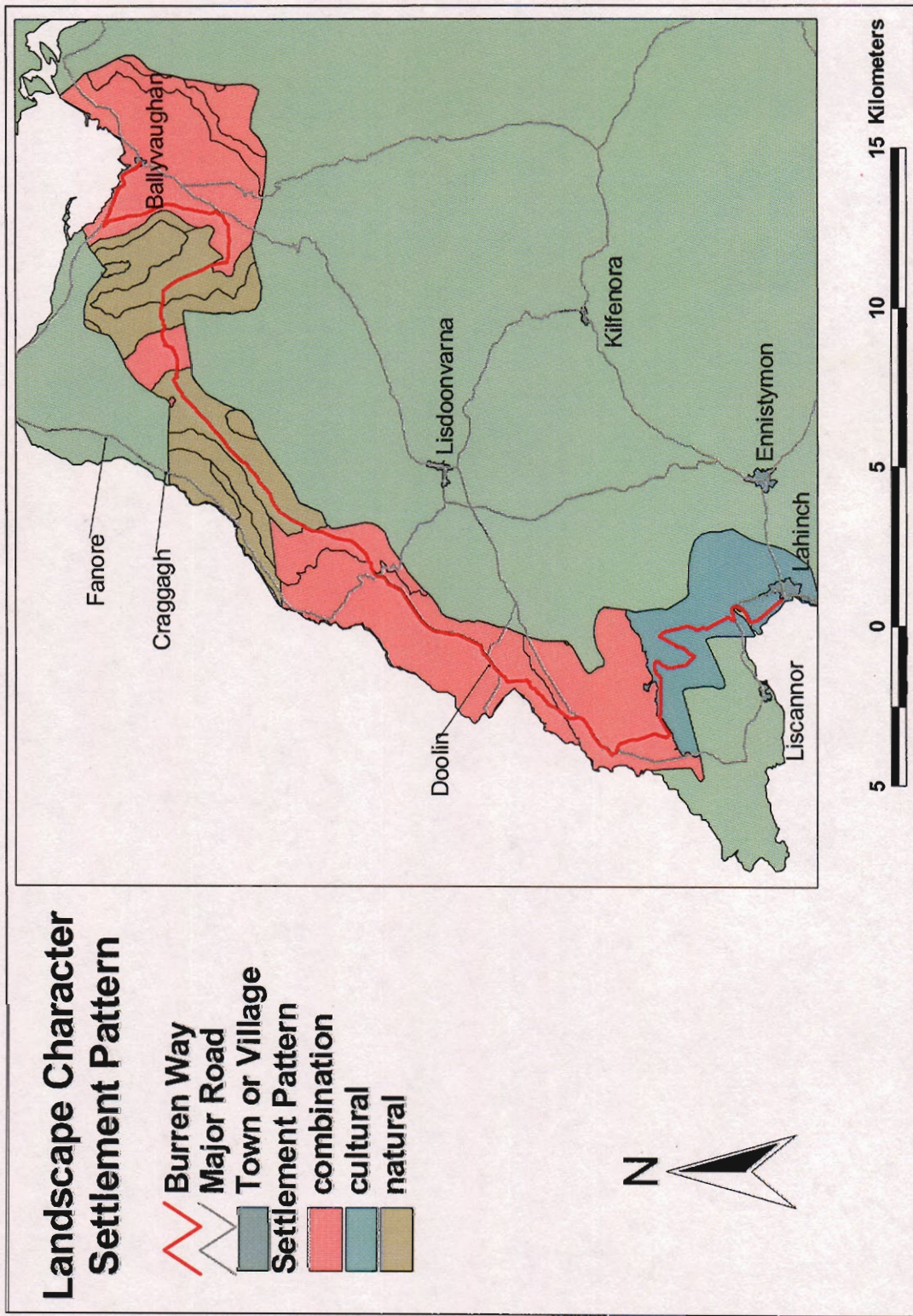


Figure 4.37 Landscape Character Assessment – Settlement Pattern in the Burren Catchment

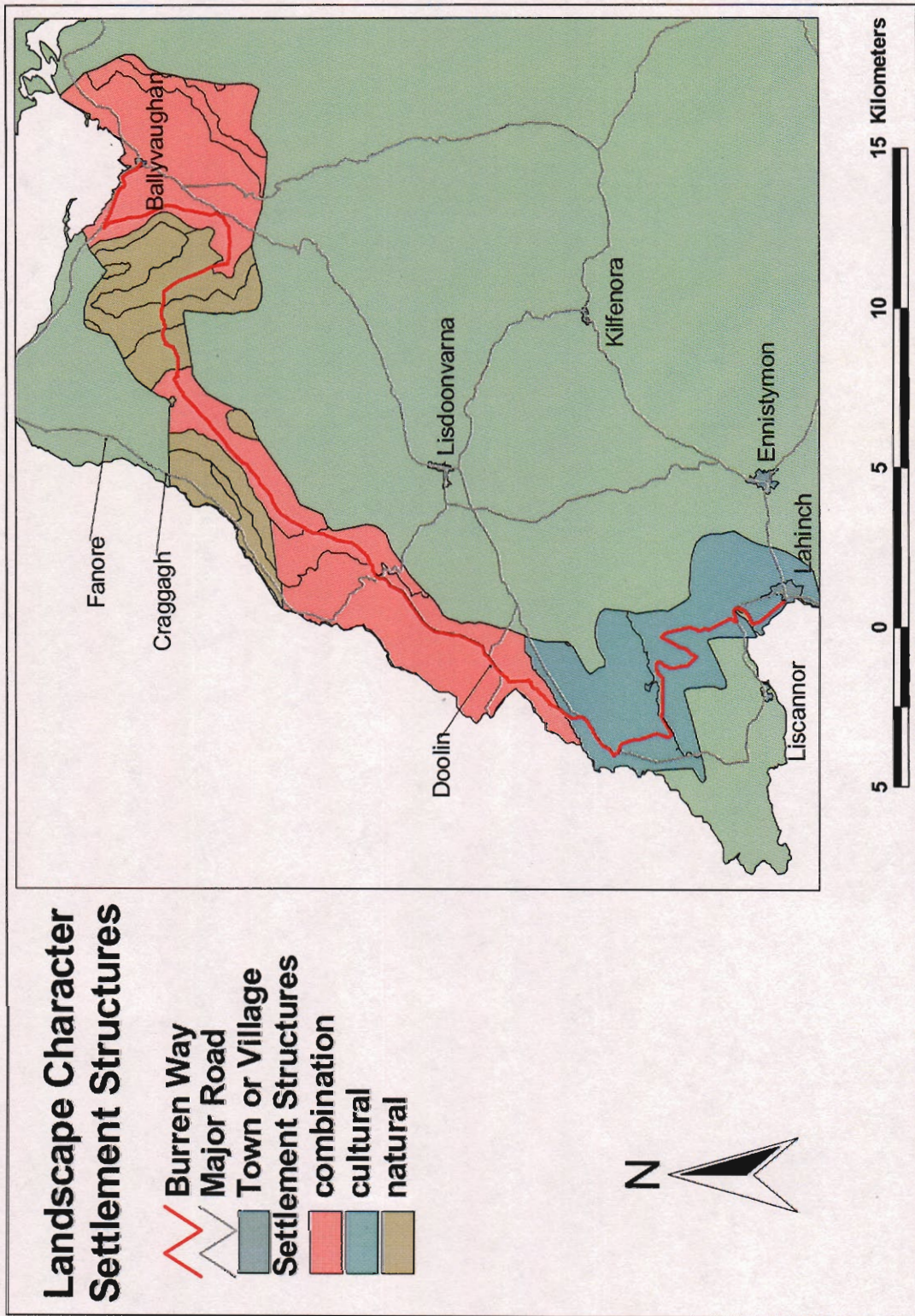






Figure 4.38 Landscape Character Assessment – Settlement Structures in the Burren Catchment

Visual Catchment East Munster Way

-  East Munster Way
-  Major Road
-  Town or Village
-  Visual Catchment

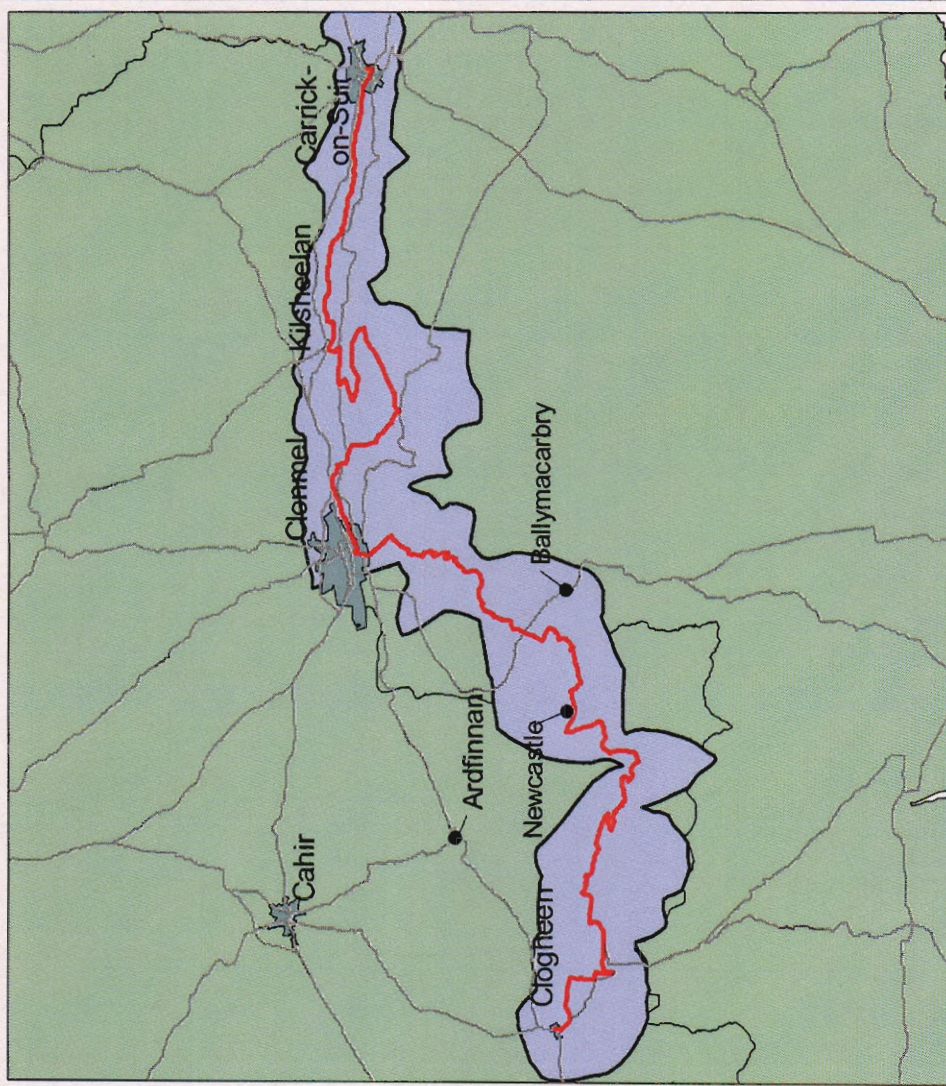













Figure 4.39 Visual Catchment (Viewshed) of the East Munster Way

Landscape Character Assessment East Munster Way

East Munster Way Landscape Character Units

-  incline S
-  low river plain
-  low river valley
-  mid river valley
-  mid-level hills
-  peak
-  u-shaped valley
-  upland
-  v-shaped valley
-  Major Road
-  Town or Village

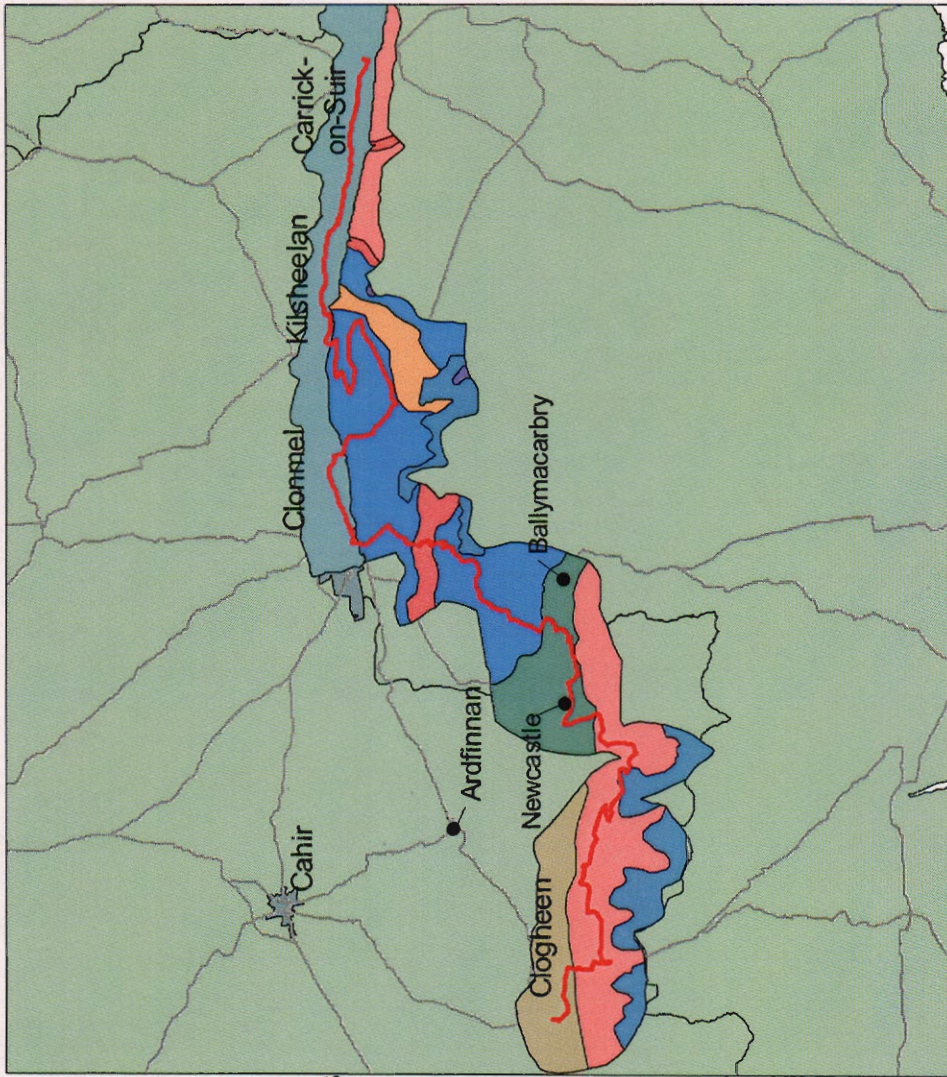


Figure 4.40 Landscape Character Assessment for East Munster Way

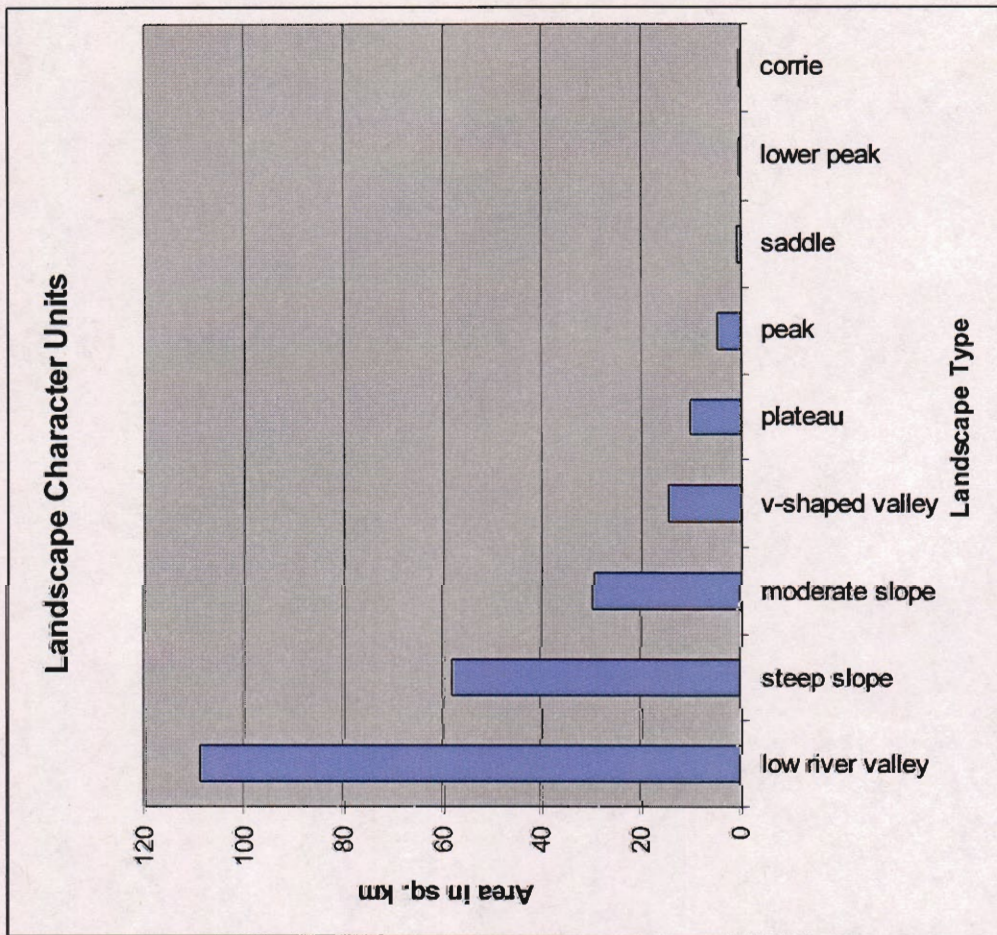


Figure 4.41 Area of Landscape Character Units, East Munster Way Catchment

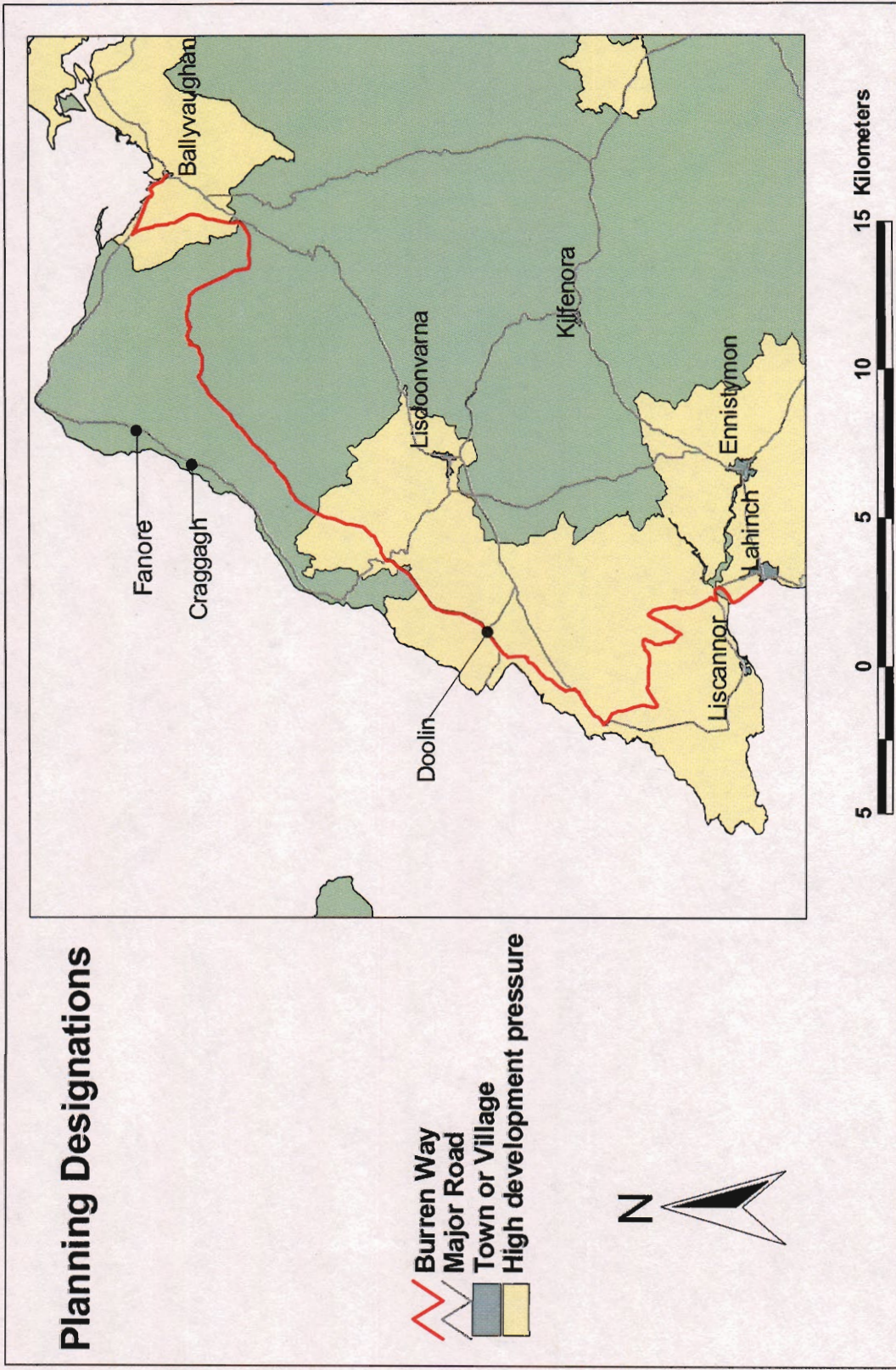


Figure 4.42 Areas of High Development Pressure, Burren region

Conservation Designations

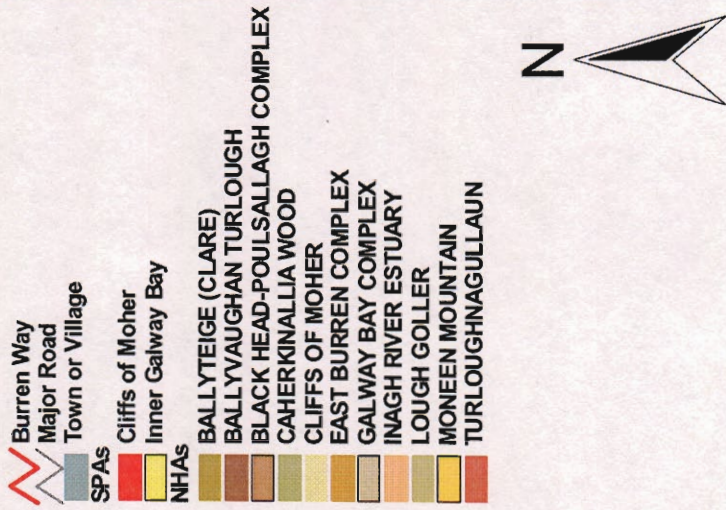













Figure 4.43 Conservation Designations (SPAs and NHAs) in the Burren

Special Areas of Conservation (SACs)

-  Burren Way
-  Major Road
-  Town or Village
-  SACs
-  BALLYTEIGE (CLARE)
-  BALLYVAUGHAN TURLOUGH
-  BLACK HEAD-POULSALLAGH COMPLEX
-  EAST BURREN COMPLEX
-  GALWAY BAY COMPLEX
-  INAGH RIVER ESTUARY
-  MONEEN MOUNTAIN

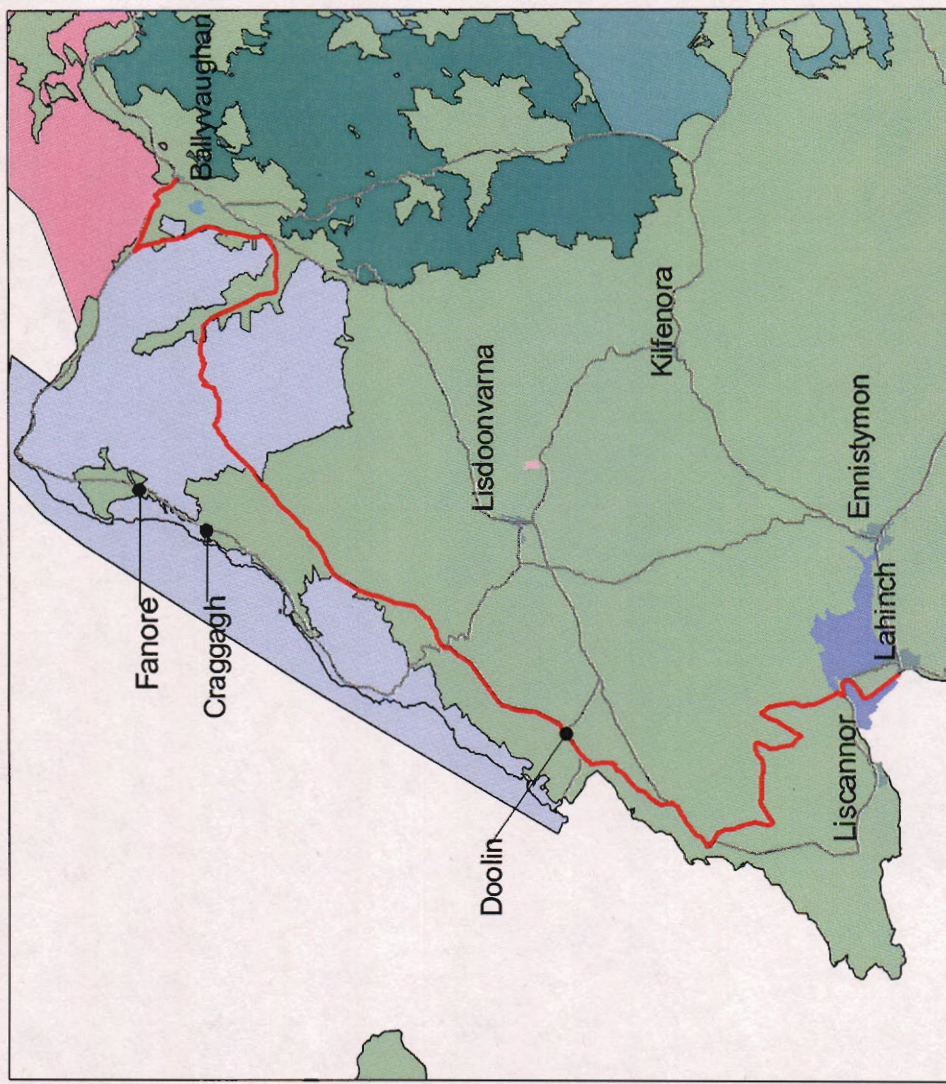






Figure 4.44 Special Areas of Conservation in the Burren

Amenity Areas

-  East Munster Way
-  Major Road
-  Town or Village
-  Amenity Area

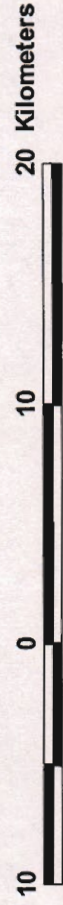
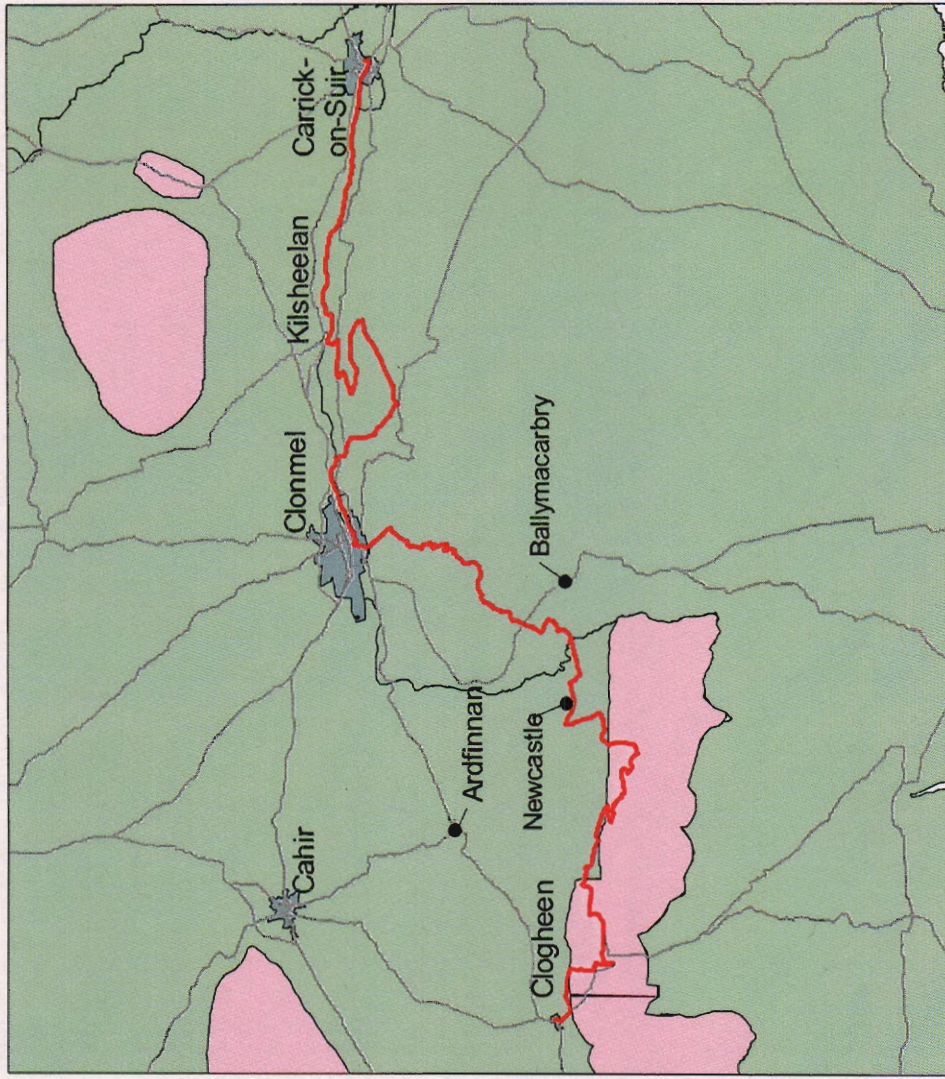













Figure 4.45 Amenity Areas, designated by Tipperary South Riding County Council

Special Areas of Conservation

-  East Munster Way
-  Major Road
-  Town or Village
-  SACs (Co. Tipperary)
-  AHERLOW RIVER
-  LOWER RIVER SUIR
-  SACs (Co. Waterford)
-  Ardmore Head
-  Comeragh Mountains
-  Lismore Woods
-  Nier Valley Woodlands

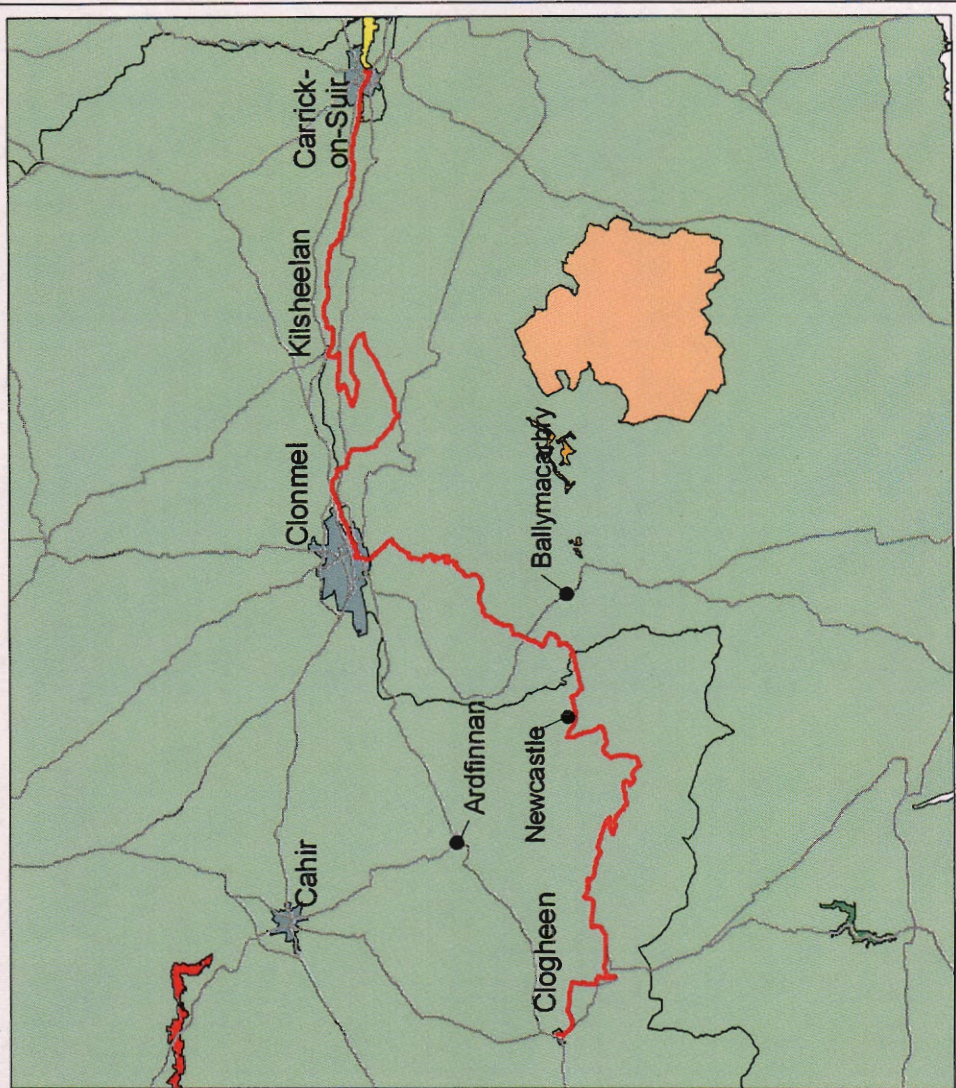


Figure 4.46 SACs in East Munster

Natural Heritage Areas

East Munster Way

Major Road

Town or Village

NHA (site code only)

000667

000668

001701

001708

001897

001933

001952

NHA (named)

Cahir Park Woodland

Glenboy Wood

Marfield Lake

Quarryford Bridge

River Suir Below

Rockwell College

Scaragh Wood

Templetny Quarry

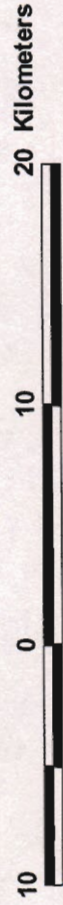
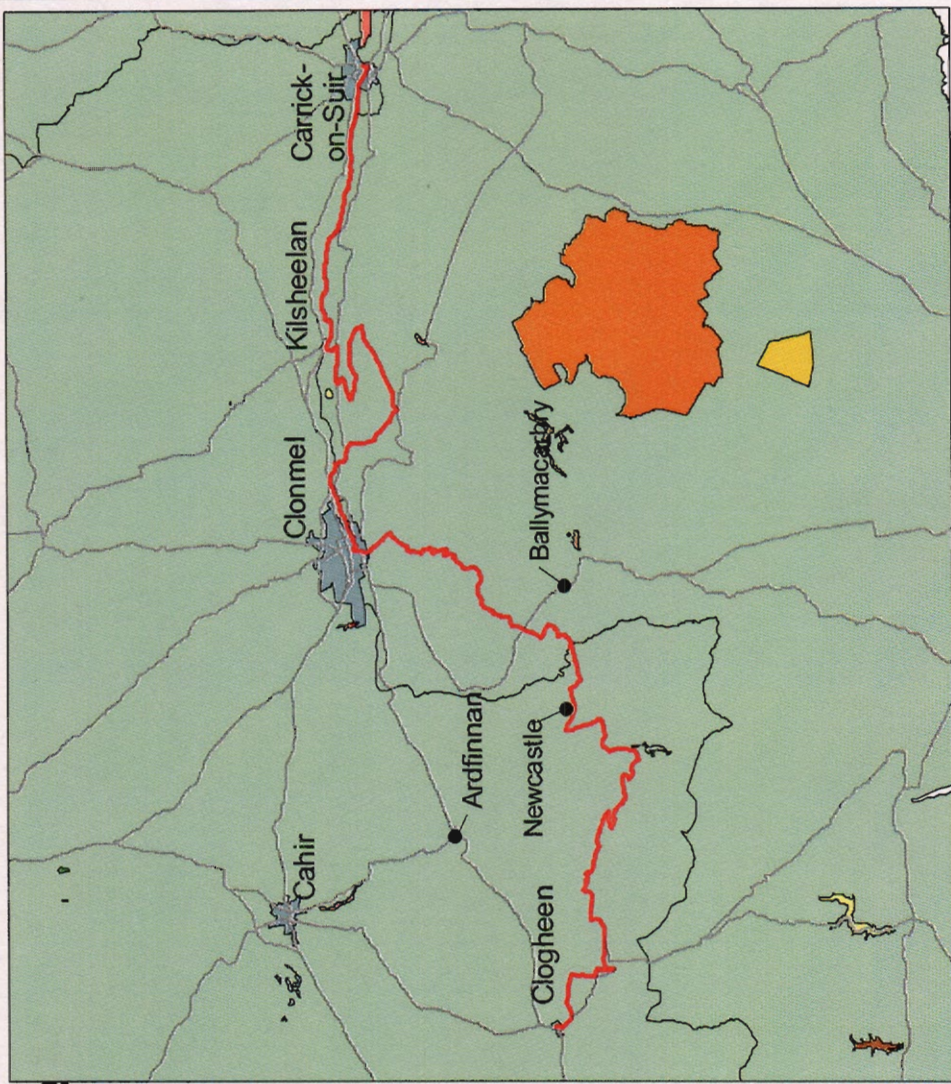


Figure 4.47 NHAs in East Munster

Green Roads and Burren Way

-  Green Road
-  Burren Way
-  Major Road
-  Minor Road
-  Town or Village

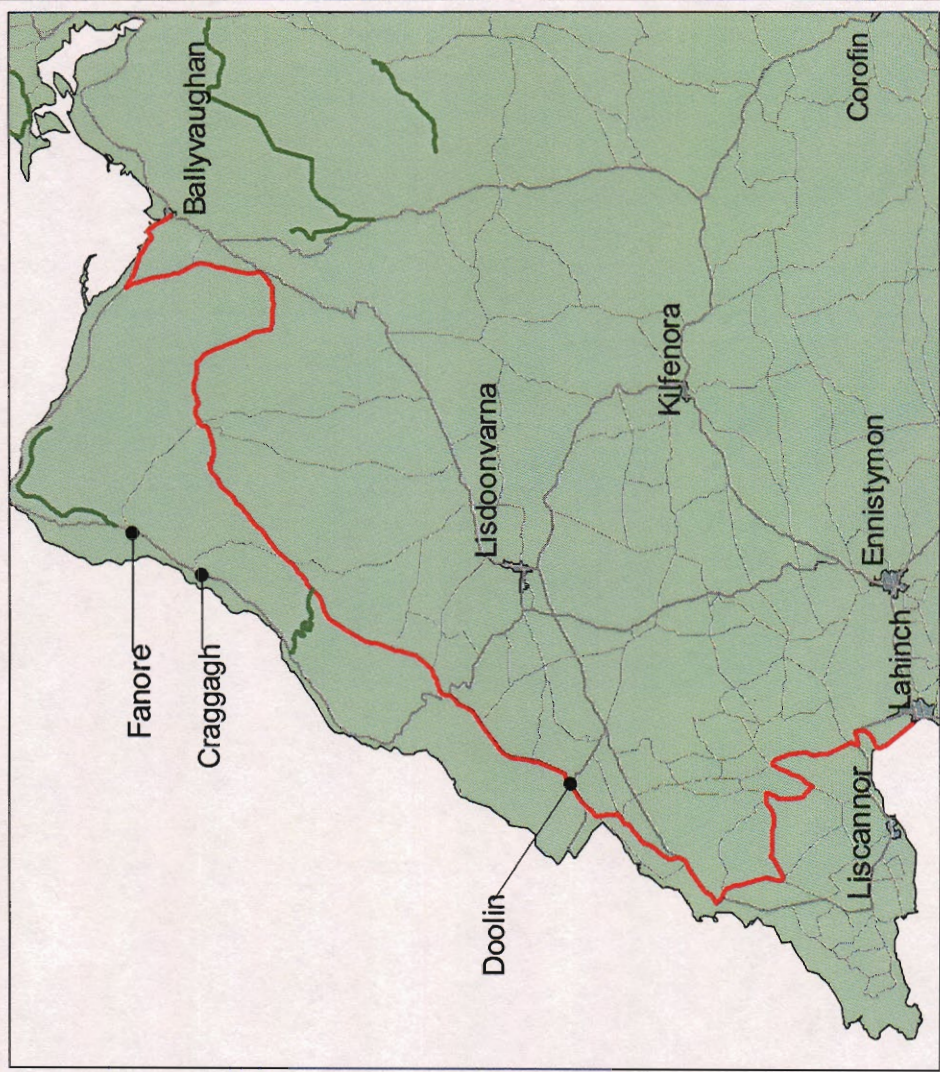


Figure 4.48 The Route of Green Roads in the Burren Area

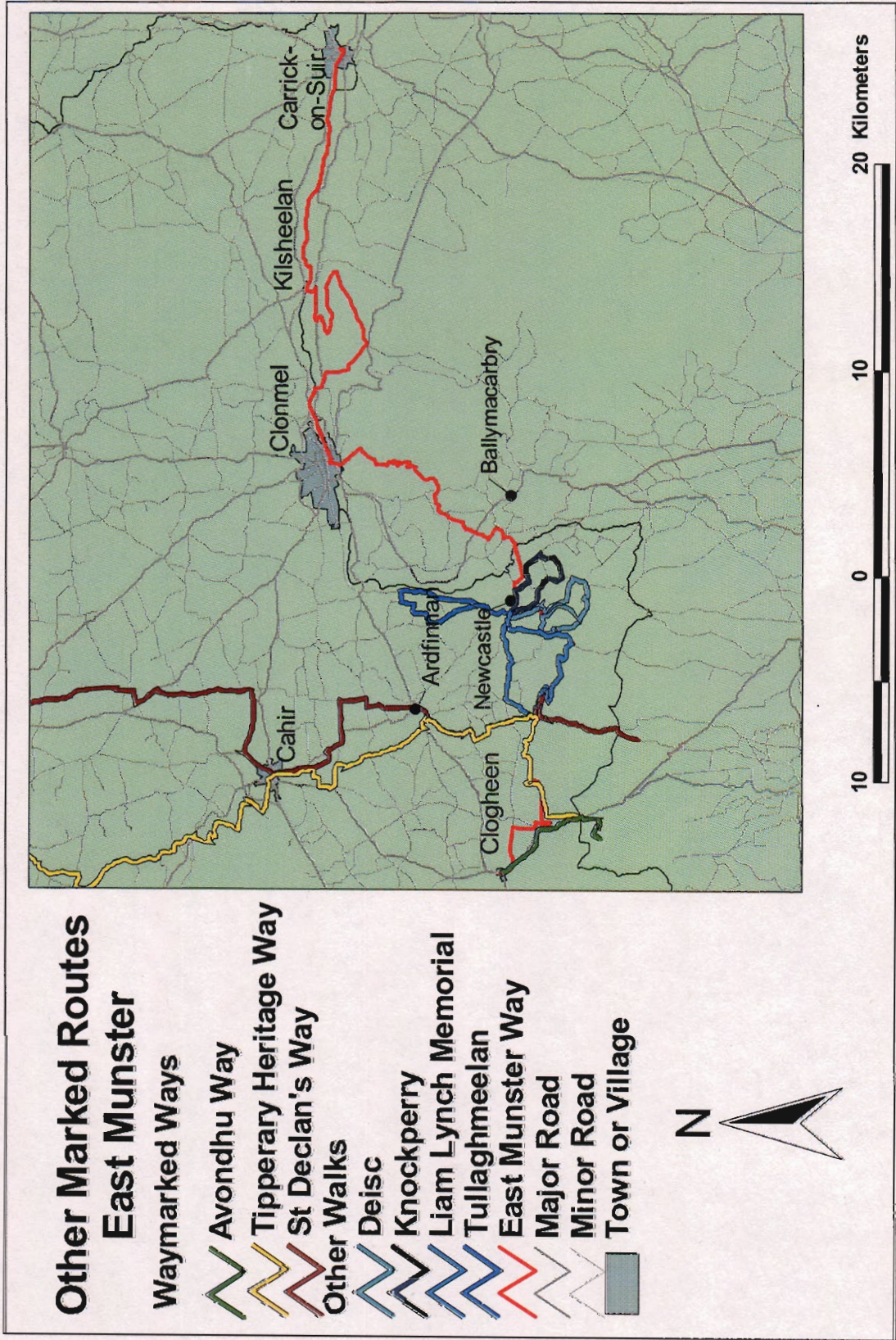


Figure 4.49 Other walking routes adjoining the East Munster Way

Gap Analysis Burren

- Areas under designation
- Areas outside designations

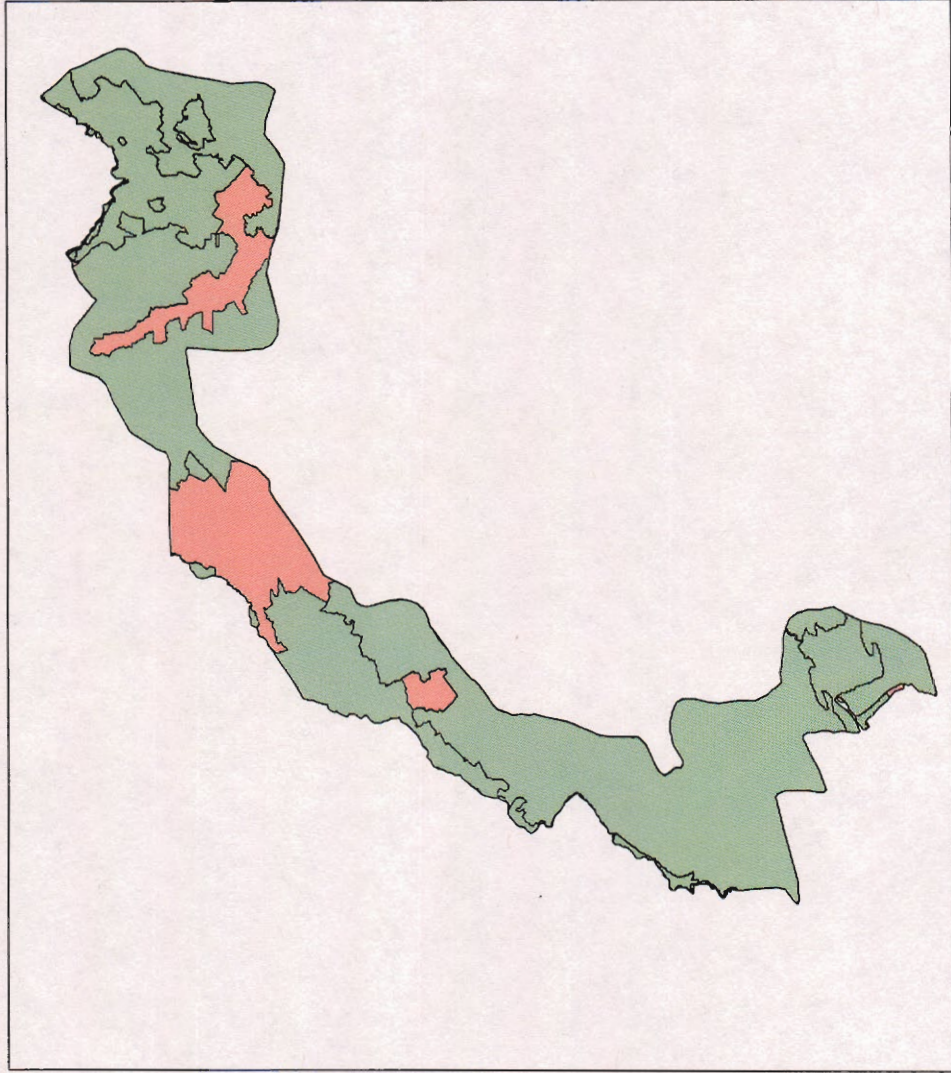


Figure 4.50 Gap Analysis of Burren Catchment

Gap Analysis East Munster

- Areas under designation
- Areas outside designations

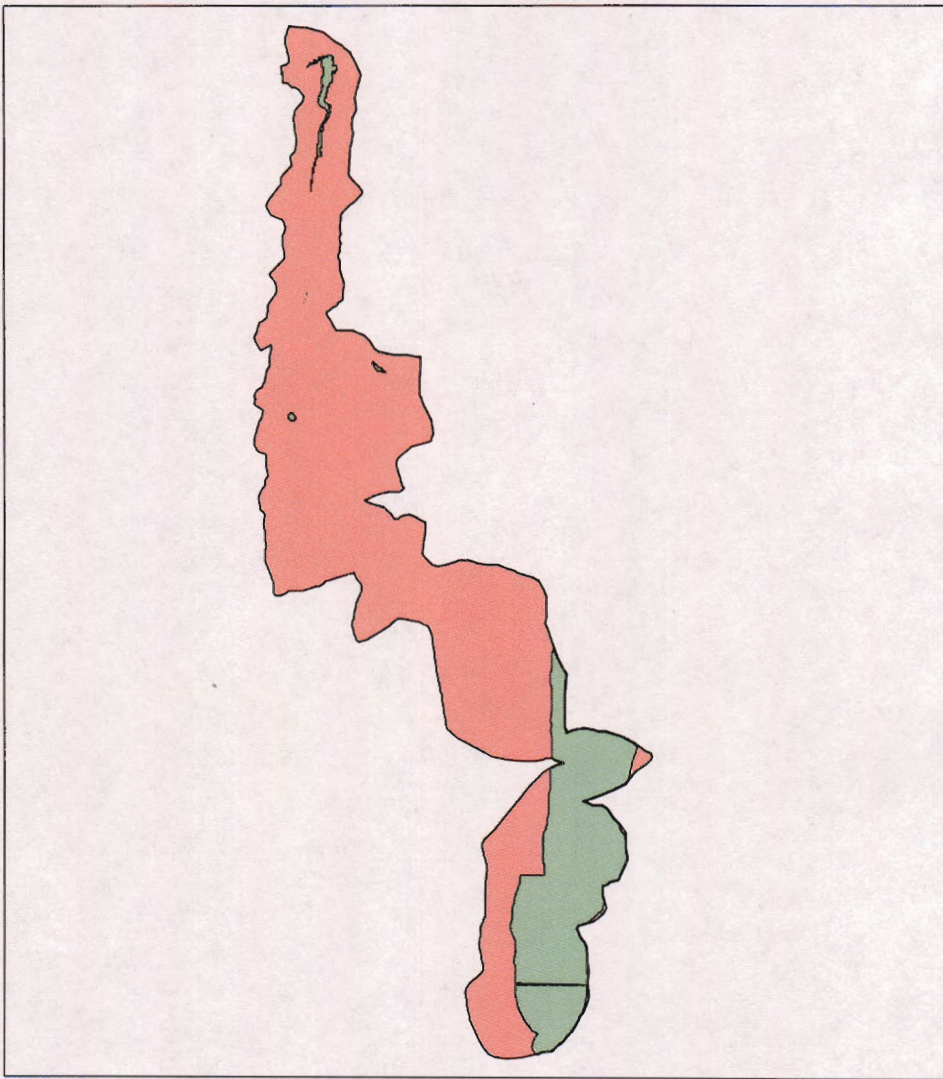


Figure 4.51 Gap Analysis of East Munster Catchment

Land Cover and Sections Walked













Figure 4.52 Sections most commonly walked and CORINE land cover types

Landscape Character and sections walked



Landscape Character Units

-  gentle slope
-  low river valley/ plain
-  low rolling hills
-  lower peak
-  moderate slope
-  peak
-  plateau
-  steep slope
-  upper valley walls
-  v-shaped valley

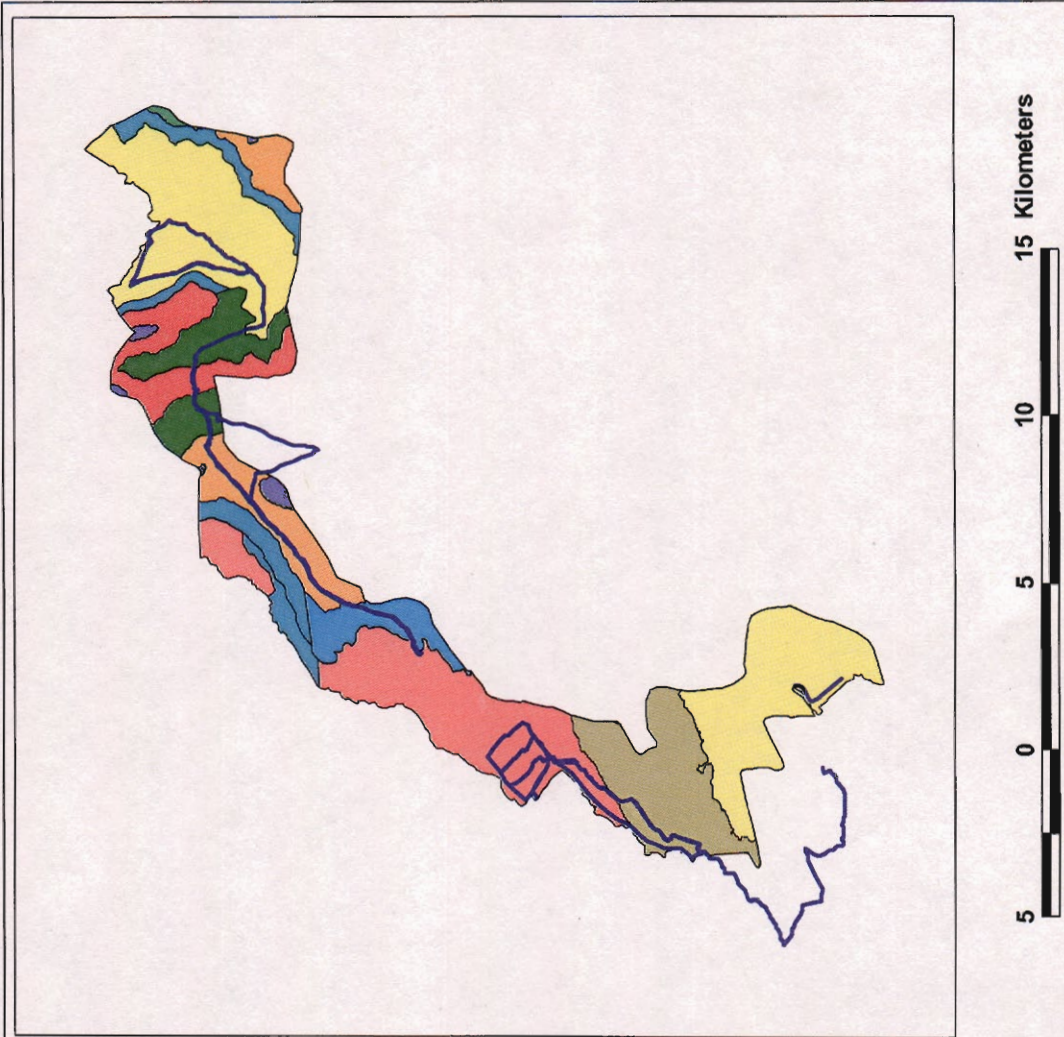


Figure 4.53 Landscape Character Units and sections of the Burren Way most commonly walked

Land Cover and Favourite Stretches

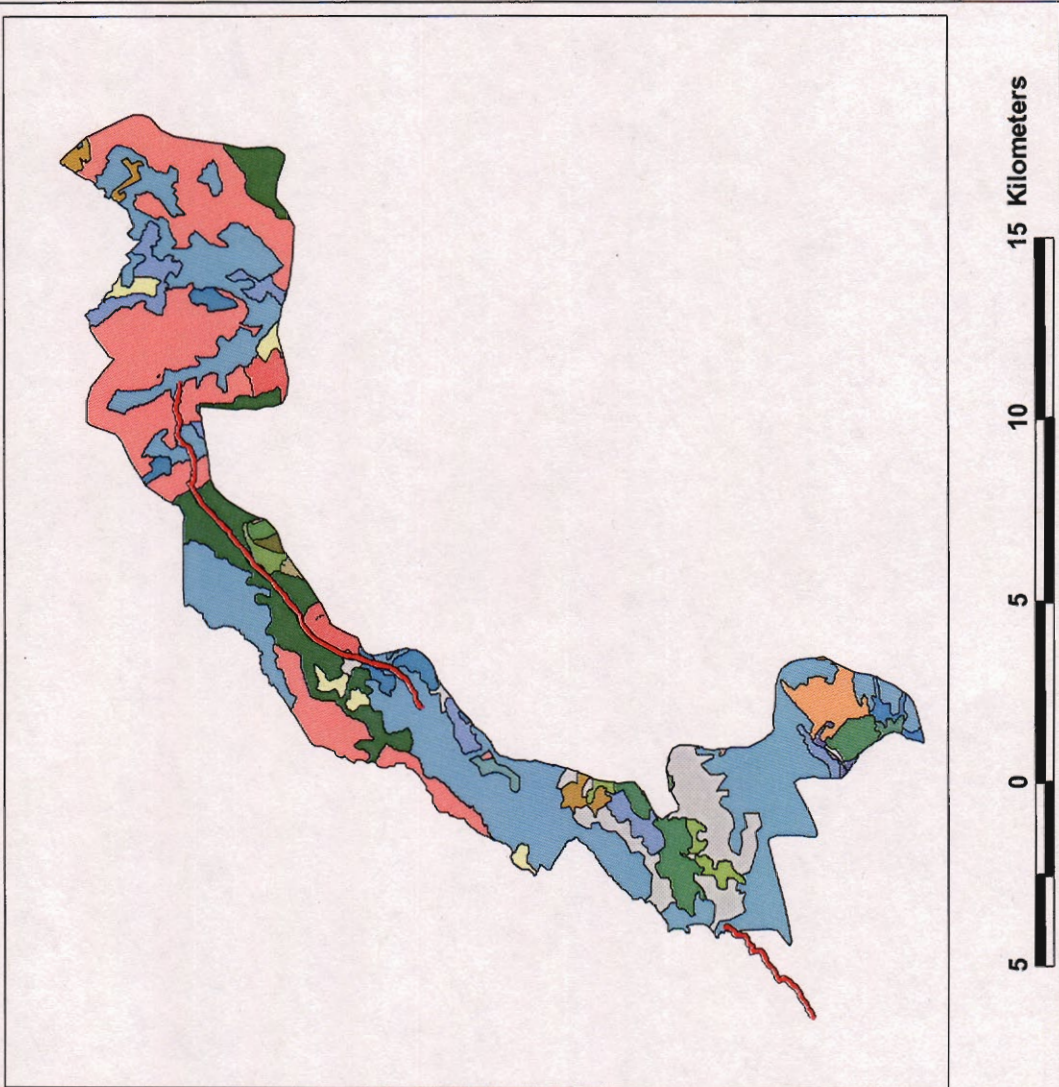


Figure 4.54 Favourite Stretches of the Burren Way and CORINE land cover types

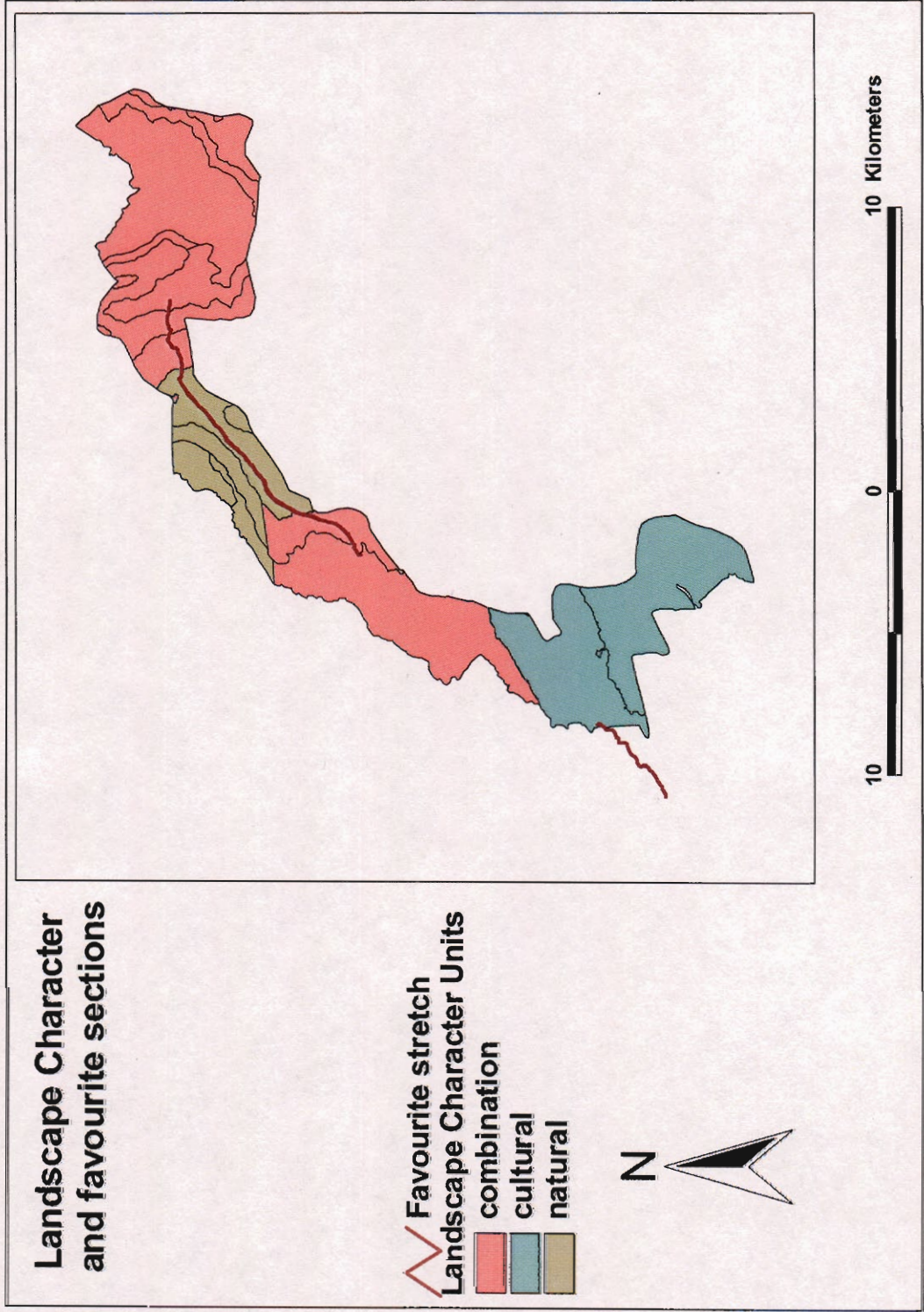


Figure 4.55 Vegetation Cover and favourite sections of the Burren Way

Landscape Character and favourite sections

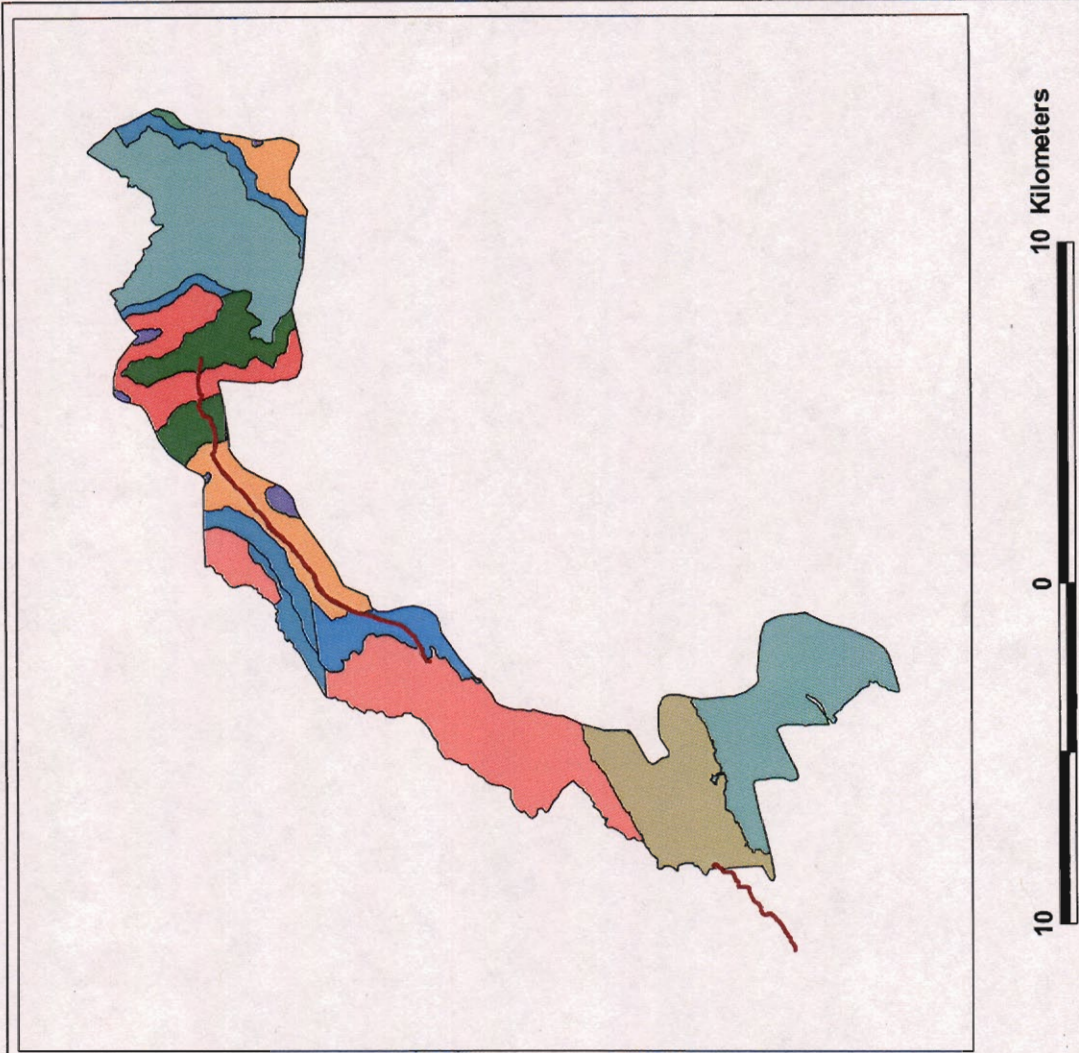
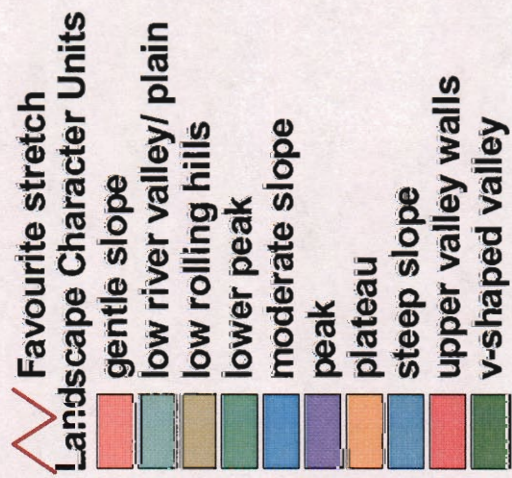


Figure 4.56 Favourite sections of the Burren Way and Landscape Character Units

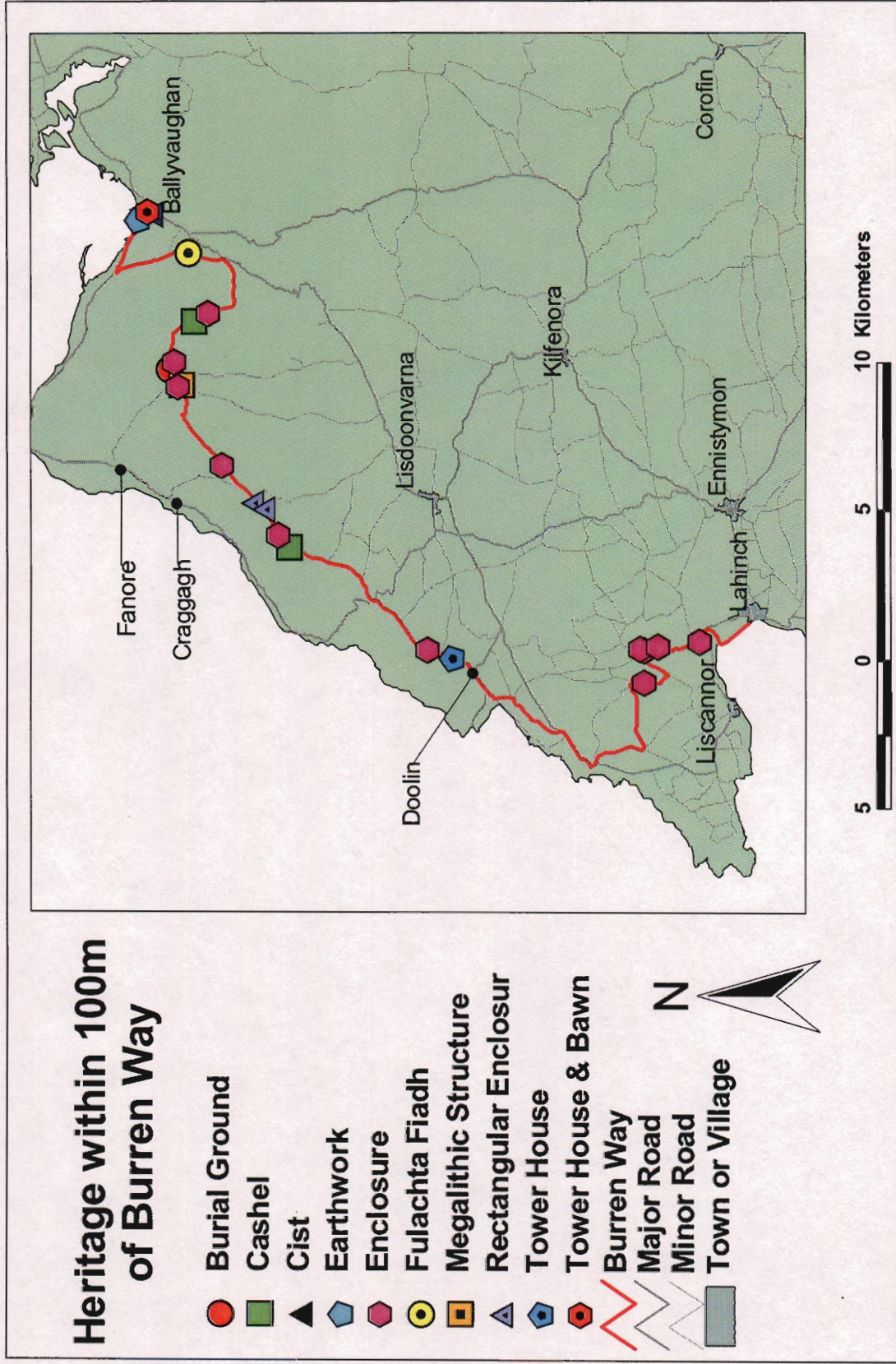


Figure 4.57 Historic Sites and Monuments within 100m of the Burren Way

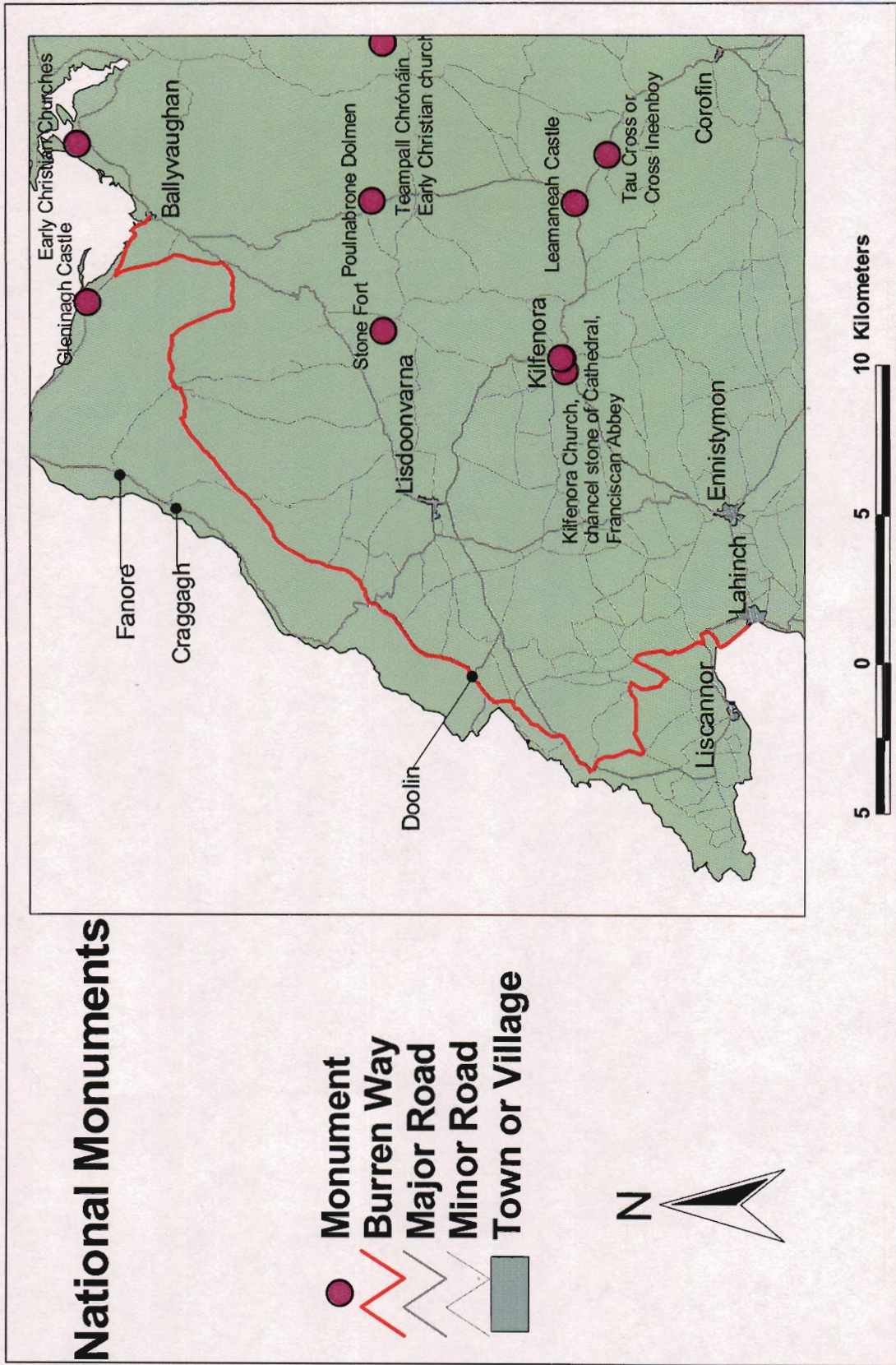



















Figure 4.58 National Monuments in State care

Heritage Sites within 100m of East Munster Way

- | | |
|---|--------------------|
|  | Fulacht Fiadh |
|  | Inscribed Stone |
|  | Standing Stone |
|  | Tower House |
|  | Castle |
|  | Church & Graveyard |
|  | Field System |
|  | Holy Well |
|  | Market Place |
|  | Mill Race |
|  | Settlement |
|  | Village |
|  | Weir |
|  | East Munster Way |
|  | Major Road |
|  | Minor Road |
|  | Town or Village |

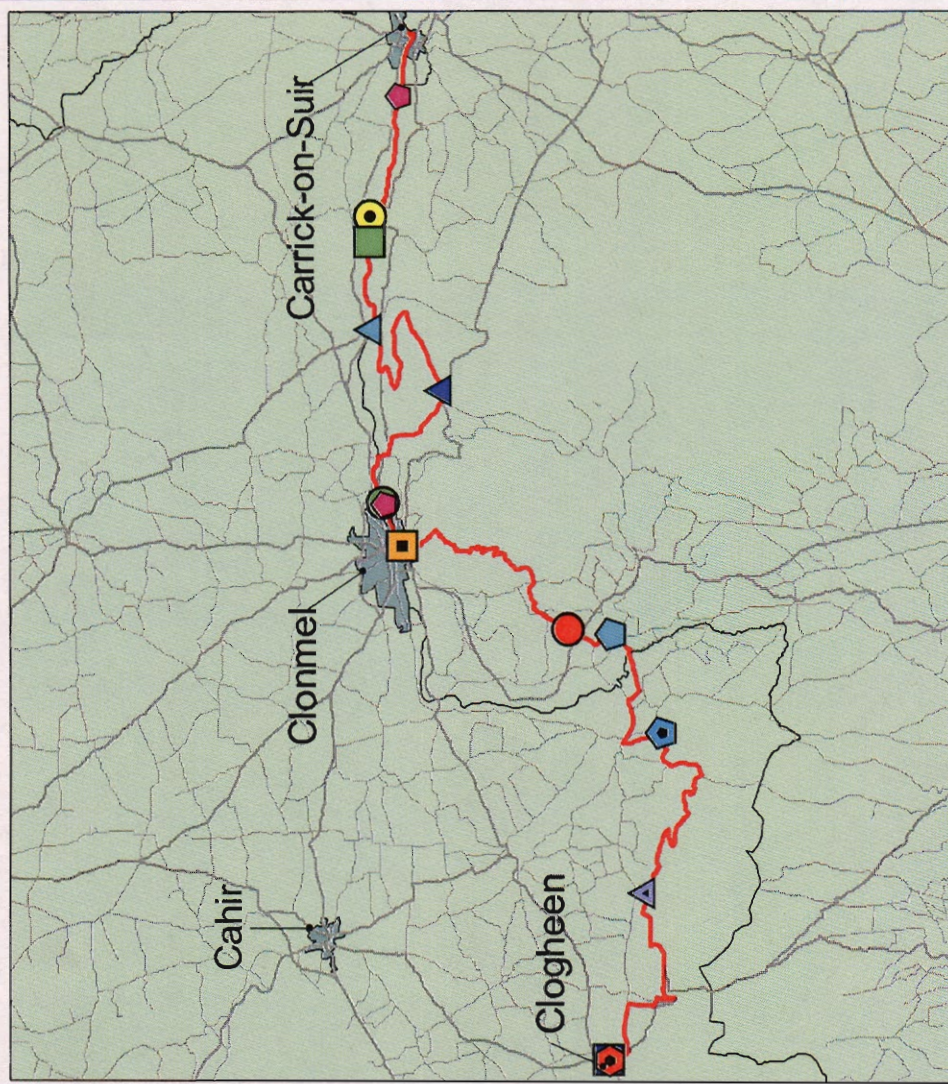


Figure 4.59 Historic sites and monuments on the East Munster Way

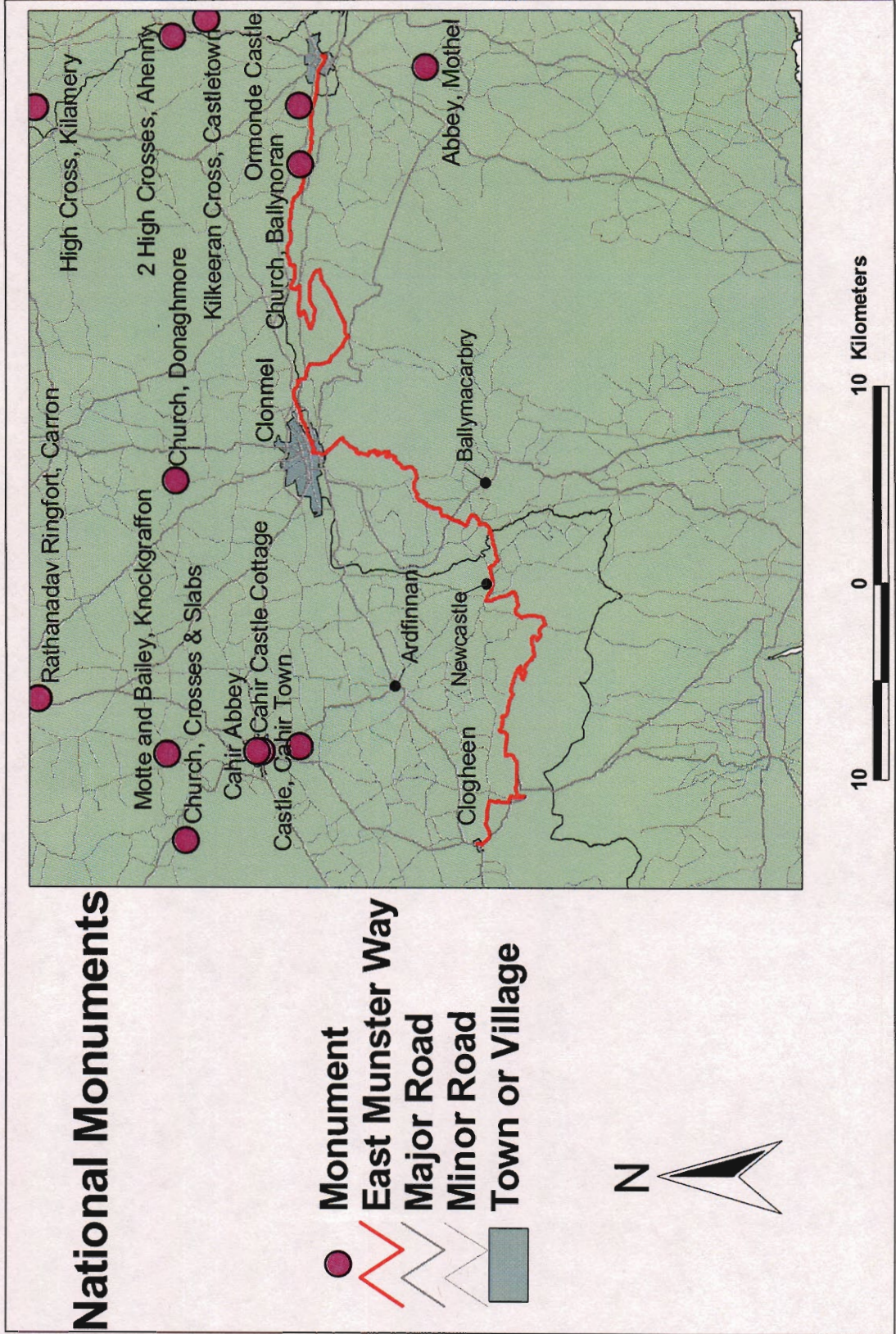


Figure 4.60 National Monuments in State Care

Suggested Diversions on Burren Way

- Bus stops
- Burren Way
- Possible routes
- Major Roads
- national secondary regional
- Minor Roads
- Towns and Villages
- Preferred Land Cover Types
- Bare rocks
- Beaches, dunes, sand
- Broad Leaved forest
- Land principally occupied by agric.
- Moors and heaths
- Natural grassland
- Non-irrigated arable land
- Pastures
- Sparsely vegetated areas

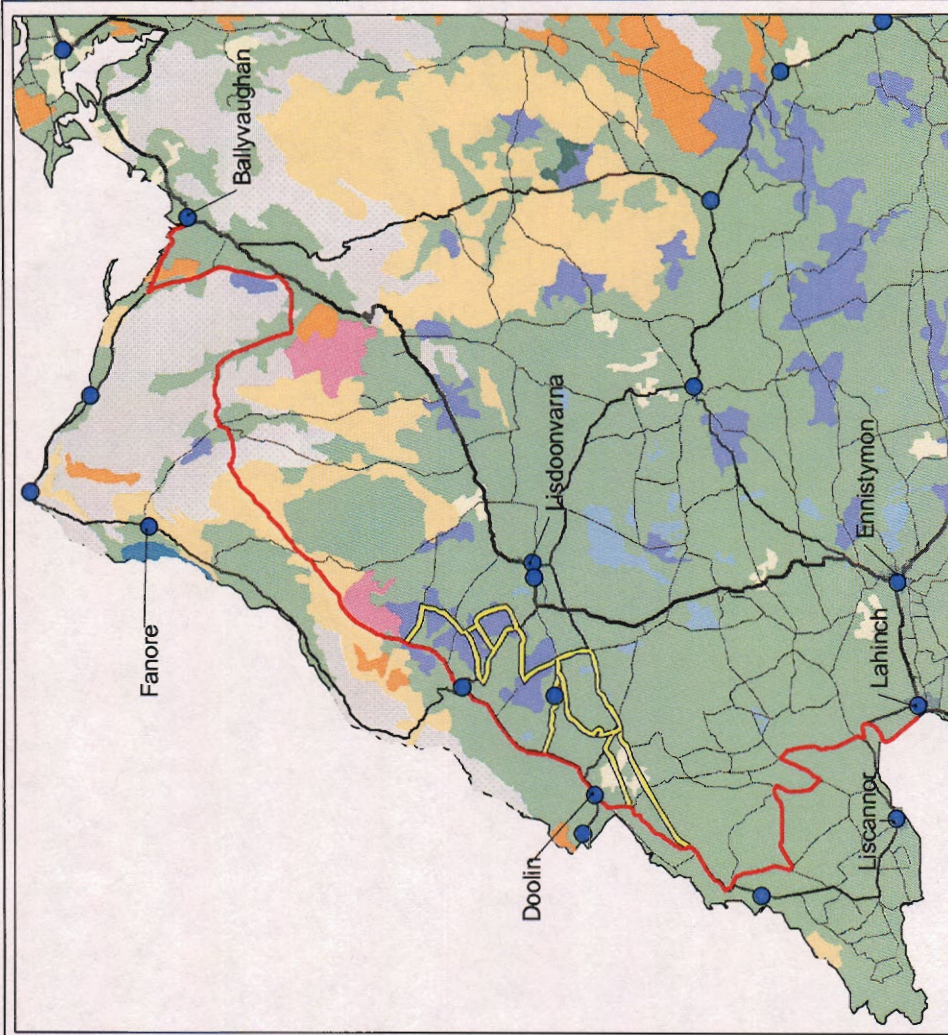


Figure 5.1 Preferred land cover types and suggested alternative routes for the Burren Way

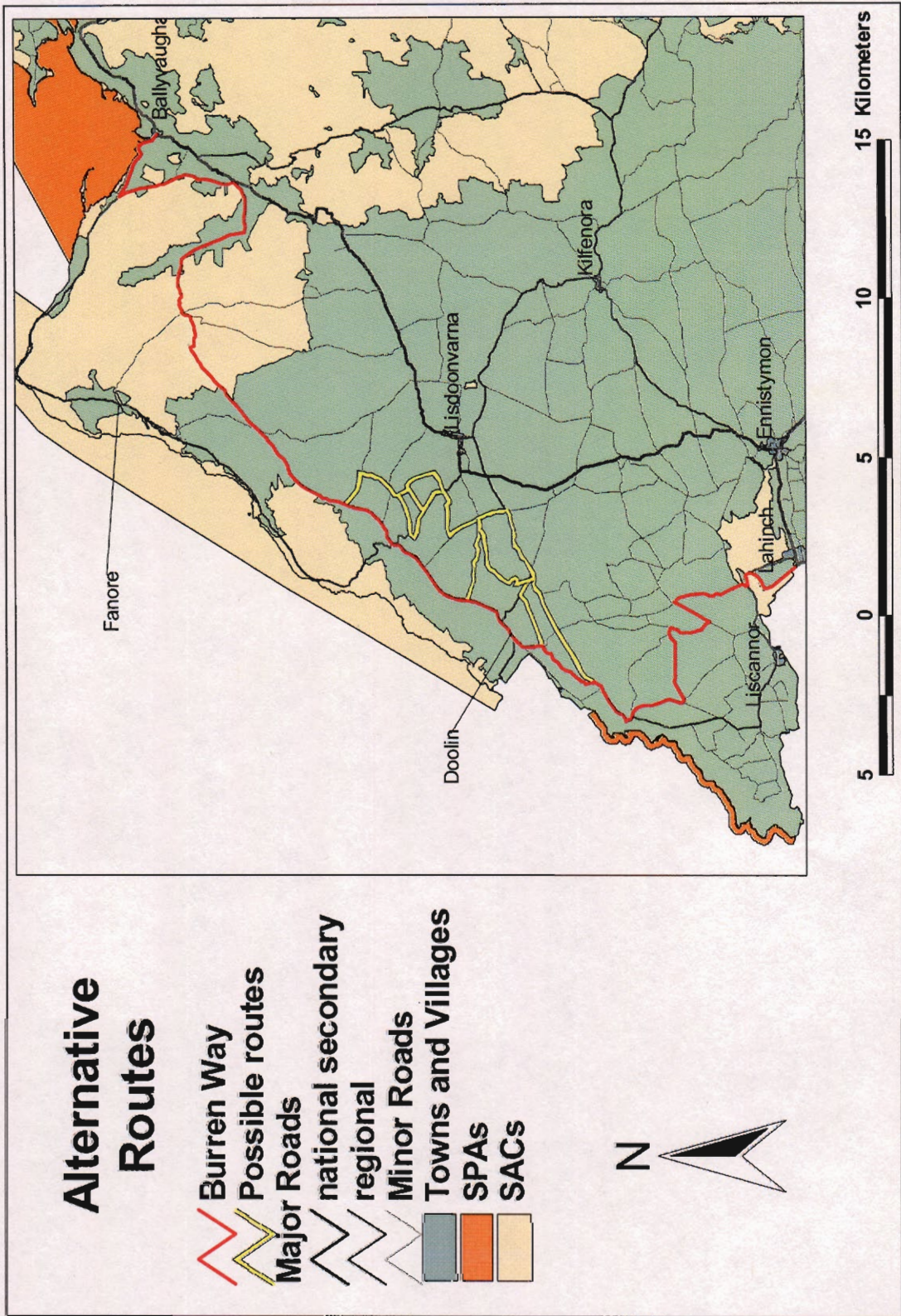


Figure 5.2 Alternative Routes with Environmental Designations marked

Suggested Diversions on East Munster Way

- Stations
- Bus stops
- East Munster Way
- Possible Routes
- Major Roads
 - national primary
 - national secondary
 - regional
- Minor Roads
- Towns and Villages
- Preferred Land Cover Types
 - Broad Leaved forest
 - Moors and heaths
 - Natural grassland
 - Non-irrigated arable land
 - Pastures

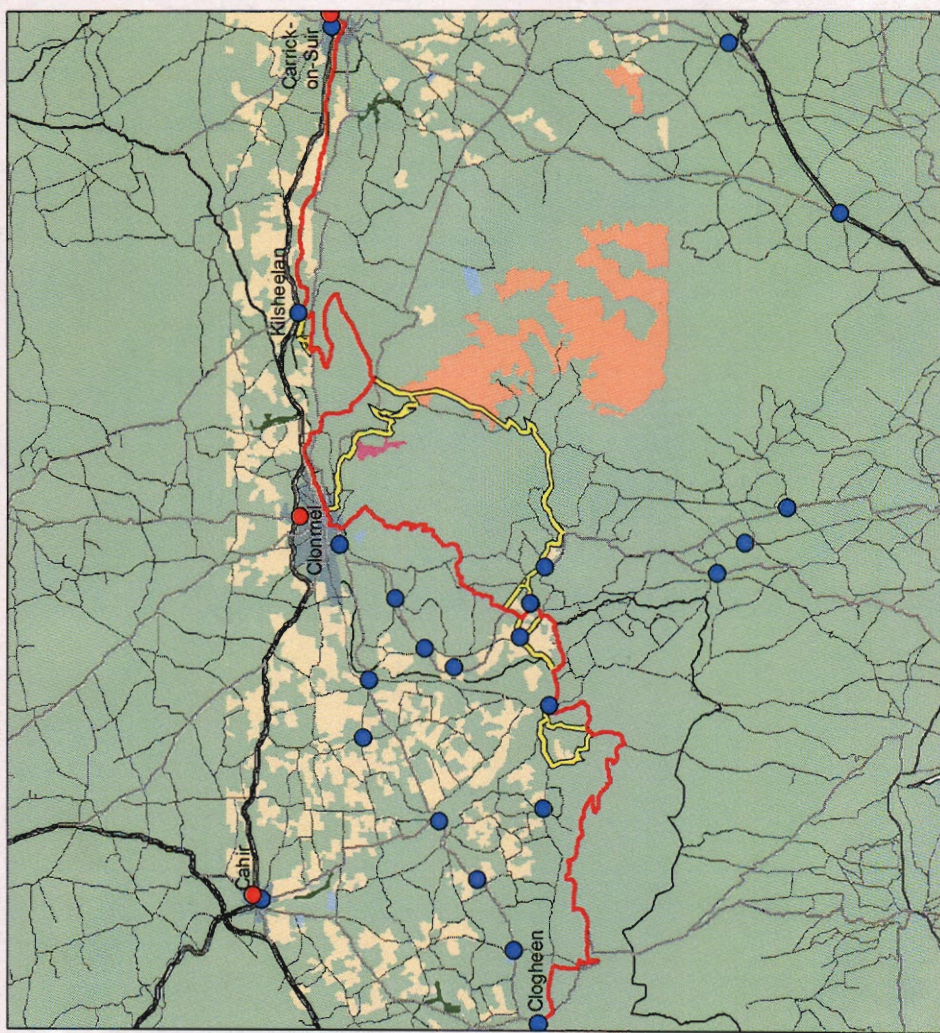


Figure 5.3 Preferred land cover types and suggested alternative routes for the East Munster Way