Little Flanders beyond Wales

Gerben Verbrugghe

FACULTY OF ARTS
AND PHILOSOPHY

Little Flanders beyond Wales

A landscape archaeological study of
row settlements in the British Isles
and the County of Flanders

Gerben Verbrugghe

GHENT
UNIVERSITY

Dissertation submitted to obtain the
degree of Doctor in Archaeology

For my family and friends,
who value sports, antiques and good food as much as I do.

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Klein Vlaanderen in Wales. Een landschapsarcheologische studie naar rijnederzettingen in de Britse Eilanden en het Graafschap Vlaanderen

Front cover: The village of Wiston (Pembrokeshire) from the east on RCAHMW colour oblique aerial photograph AP_2007_4316 taken by dr. Toby Driver on 29/11/2007.
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FACULTEIT LETTEREN
EN WIJSBEGEERTE

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Acknowledgements

The Road goes ever on and on
Down from the door where it began
Now far ahead the Road has gone,
And I must follow, if I can,
Pursuing it with eager feet,
Until it joins some larger way
Where many paths and errands meet.
And whither then? I cannot say.

Singing this song, Bilbo Baggins set off on his last adventure in JRR Tolkien's legendary The Fellowship of the Ring. My own road to adventure began as a little boy in the garden of my parent's house, trying to walk in my father's wellies and draping his shirt around me, pretending to be a Roman. Now, many years later, it gives me great pleasure to have come a long way along the archaeological road, being able to present this dissertation as my personal travel log. But, as in Tolkien's story, I did not make the trip all by myself. Therefore, at the beginning of this dissertation, I would like to take the opportunity to thank my fellowship of travellers who have made this journey possible and worthwhile.

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Bruges, August 2020

List of Abbreviations

AAD	Artefact-accurate survey of Diagnostic ceramics
AIV	Agentschap Informatie Vlaanderen
ANOVA	Analysis of Variance
CAI	Centrale Archeologische Inventaris/Central Archaeological Inventory
CPA	Corrected Perimeter Area ratio
DEV	Deviation from mean elevation
DIFF	Difference from mean elevation
DOE	Depth of exploration
DTM	Digital Terrain Model
EC	Electrical Conductivity
ECa	Apparent Electrical Conductivity
EMI	Electromagnetic Induction
ERT	Electrical Resistivity Tomography
GCP	Ground Control Point
GIS	Geographic Information System
GPS	Global Positioning System
HCP	Horizontal Coplanar receiver array
IDW	Inverse Distance Weighting

IGN	Institut National de l'Information Géographique et Forestière/ National Institute for Geographical and Forest Information
IRPA	Institut Royal du Patrimoine Artistique/ Royal Institute of Cultural Heritage
KDE	Kernel Density Estimation
KIA	Kiel AMS
LiDAR	Light Detection and Ranging
MBG	Minimum Bounding Geometry
mS	milli Siemens
MS	Magnetic Susceptibility
MSa	Apparent Magnetic Susceptibility
NNR	Nearest Neighbour Ratio
OS	Ordnance Survey
OSTN	Ordnance Survey National Grid Transformation
Ppt	parts per thousand
PRP	Perpendicular receiver array
RCAHMW	Royal Commission on the Ancient and Historical Monuments of Wales
RHB	Rim-Handle-Base
RICH	Royal Institute for Cultural Heritage
RTK	Real Time Kinematic
SD	Standard Deviation
WGS	World Geodetic System

List of Tables

Table 1: Different subtypes of row settlements following Van De Velde et al. (2012): number and percentage of total (N=720). See examples in Figure 14. 83
Table 2: Chi-square tests for settlement morphology and first mention (grouped as century). The relation between morphology and first mention is indicated by Count (number of sites), Chi-Square (Chi-square value) and Sig. (2-sided) (p-value for the Chi-square test). Values for the latter, that are indicated with a * represent statistically significant relations at the 0.05 level. 96
Table 3: Chi-square tests for settlement morphology and first mention (grouped as phase of reclamation). The relation between morphology and first mention is indicated by Count (number of sites), Chi-Square (Chi-square value) and Sig. (2-sided) (p-value for the Chi-square test). Values for the latter, that are indicated with a * represent statistically significant relations at the 0.05 level. 97
Table 4: Chi-square tests for soiltexture and first mention (grouped as century). The relation between morphology and first mention is indicated by Count (number of sites), Chi-Square (Chi-square value) and Sig. (2-sided) (p-value for the Chi-square test). Values for the latter, that are indicated with a * represent statistically significant relations at the 0.05 level. 98
Table 5: Chi-square tests for soiltexture and first mention (grouped as phase of reclamation). The relation between morphology and first mention is indicated by Count (number of sites), Chi-Square (Chi-square value) and Sig. (2-sided) (p-value for the Chi-square test). Values for the latter, that are indicated with a * represent statistically significant relations at the 0.05 level. 99
Table 6: Inventory of high medieval rural settlement sites in the study area (until 01/05/2020). 112
Table 7: Chi-square tests for DIFF analysis of settlement sites 123
Table 8: Morphological classes for the background landscape 124
Table 9: Enclosed areas of fully excavated enclosure structures. 136
Table 10: Relative proportions of the rim and grouped RHB for the registered ceramics during artefact-accurate survey in Nieuw-Roeselare in

relation to the same relative proportions at Monnikerede, Hoeke and Coxyde (de Ruijsscher 2019a; Trachet et al. 2017).................................. 190
Table 11: Descriptive statistics for the mapped widths at the Welsh case studies. 242
Table 12: Output for the test of normality. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that only the observation at Reynalton are characterised by a Gaussian distribution (p-value (Sig.) of 0,200 and 0,439 are higher than 0,05 and therefore not significantly different from the Gaussian distribution). 244
Table 13: Output for the test of homogeneity of variances. All p-values (Sig.) are lower then 0,05 and therefore significant. 244
Table 14: Output for the Kruskal-Wallis test. 244
Table 15: Output pairwise comparisons of selected Welsh settlements. 246
Table 16: Descriptive statistics of the metrics for the mapped plots at the Welsh case studies. 247
Table 17: Output for the tests of normality. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that only the observations at Reynalton are characterised by a Gaussian distribution. 248
Table 18: Output for the test of homogeneity of variances. All p-values (Sig.) are lower than 0,05 and therefore significant. 248
Table 19: Output for the Kruskal-Wallis test. 249
Table 20: Output pairwise comparisons of average width for the selected Welsh settlements. 249
Table 21: Output pairwise comparisons of CPA for the selected Welsh settlements. 250
Table 22: Output pairwise comparisons of Fractal D for the selected Welsh settlements. 250
Table 23: Descriptive statistics for the mapped widths at the case studies in the County of Flanders. 252
Table 24: Output for the test of normality. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that only the observation at Millam and Nieuw-Roeselare are characterised by a Gaussian distribution (p-value (Sig.) of 0,200/0,200 and 0,350/0,378 are higher than 0,05 and therefore not significantly different from the Gaussian distribution). 255
Table 25: Output for the test of homogeneity of variances. All p-values (Sig.) are lower then 0,05 and therefore significant. 256
Table 26: Output for the Kruskal-Wallis test. 256
Table 27: Descriptive statistics of the average width for the mapped plots at the case studies in the County of Flanders. 257
Table 28: Descriptive statistics of the CPA metric for the mapped plots at the case studies in the County of Flanders. 258
Table 29: Descriptive statistics of the Fractal D metric for the mapped plots at the case studies in the County of Flanders. 259
Table 30: Output for the tests of normality of the average width metric. 260
Table 31: Output for the tests of normality of the CPA metric. 261
Table 32: Output for the tests of normality of the Fractal D metric. 262

Table 33: Output for the test of homogeneity of variances. All p-values (Sig.) are lower than 0,05 and therefore significant. 263
Table 34: Output for the Kruskal-Wallis test. 263
Table 35: Illustration of the complementarity of applied methodologies at the sites of Nieuw-Roeselare, Dudzele-Kruisabelestraat, Whitson and Wiston (after De Clercq et al. 2019, 90). 271

List of Figures

Figure 1: Localisation map of the different study areas for this dissertations (SRTM data from earthexplorer.usgs.gov visualised using 2.5 Standard Deviations stretch). 4
Figure 2: Diagram of the migration process ((Fernández-Götz 2014, 2) after (Anthony 1990, 900)). 14
Figure 3: Theoretical model of four types of organization of landscape and settlement, after Riddersporre (1999, 173). 24
Figure 4: Cited locations. 28
Figure 5: Comparison of morphologies for Woesten and Kluizen. Left: Count de Ferraris's Carte de Cabinet for Woesten (1771-1778, geopunt.be/KBR, The Royal Library of Belgium). Right: Map of Kluizen along the channel from Langerbrugge to Ertvelde, made by J. Balde (1654, State Archives Ghent, Map collection P. De reu, nr. 1784). 35
Figure 6: Villages and counties with a strong Flemish link in Scotland (after Toorians (1996)). 49
Figure 7: Settlements with place names referring to Flemings in South Wales (after Toorians (1990, 110 and 114) and Roberts (1987, 199-200)). 56
Figure 8: Schematic representation of the twofold research approach. 64
Figure 9: Approximate demarcation of the early-twelfth-century County of Flanders. 65
Figure 10: Pembrokeshire in Wales. 67
Figure 11: Visualisation of the early-twelfth-century delineation of the County of Flanders in relation to the modern-day region of Flanders with indication of the main locations cited in the chapter and 1654 map of Kluizen as also presented in figure 5 (State archive Ghent, Kaartenverzameling P. De Reu, nr. 1784). 73
Figure 12: Main soil textures within the County of Flanders based on the European Soil Database (distribution version 2.0, vector) classified according to Parent Material Dominant (PARMADO) attribute. 81
Figure 13: Visualisation of the 720 mapped row settlements, classified according to 13 subtypes, on a Digital Elevation Model (SRTM, visualised using Percent Clip stretch with defined min and max = 2) for the county. 82

Figure 14: Examples of the different row settlement morphologies, used in this research, on the Count de Ferraris's Carte de Cabinet (KBR, The Royal Library of Belgium). ... 85
Figure 15: Visualisation of the 720 mapped row settlements, classified according to the century of their first mention (a, upper) and phase of reclamation (Verhulst 1995) of their first mention (b, lower), in relation to the main soil textures in the county. ... 86
Figure 16: Kernel density estimation of the 720 mapped row settlements in the County of Flanders (Visualised using 2.5 Standard Deviations stretch). ... 87
Figure 17: Visualisation of the Getis-Ord Gi* statistic for the 720 mapped row settlements in the county (Visualised using 2.5 Standard Deviations stretch). ... 89
Figure 18: Number of high medieval rural settlement sites excavated since 1985 in the study area, grouped in periods of two years. ... 103
Figure 19: Number of sites with an excavated area equal or larger than 1ha. ... 104
Figure 20: Point locations of the inventoried high medieval settlement sites in the northern part of the County of Flanders (Provinces of West and East Flanders). ... 105
Figure 21: Calibrated ^{14}C-dates for Aalter-Langevoorde (De Clercq personal communication). ... 114
Figure 22: KDE of the 186 inventoried high medieval rural settlement sites in the study area (Visualised using 2.5 Standard Deviations stretch). ... 117
Figure 23: Distribution of the high medieval rural settlement sites in relation to the classified soil textures. ... 119
Figure 24: Distribution of the high medieval rural settlement sites in relation to the classified soil drainage. ... 120
Figure 25: Monte-Carlo simulation of the relation between site location and soil texture. ... 121
Figure 26: Monte-Carlo simulation of the relation between site location and soil drainage. ... 121
Figure 27: Distribution of observed and random points located higher or lower than their surrounding landscape. ... 123
Figure 28: Spatial analysis by means of difference from mean elevation of the topographical location of high medieval rural settlements against 100 sets of random points for radii of 150m, 300m, 600m and 1200m. ... 125
Figure 29: Distribution of high medieval rural settlements in relation to six classes of landscape morphology, based on DEV for observed and random points. ... 126
Figure 30: Two examples of georeferenced oblique aerial photographs for the site at Brugge-Dudzele-Kruisabelestraat (Photographs 82208 and 68532 from the collection of the Department of Archaeology at Ghent University). ... 128
Figure 31: Interpretation of the EMI survey and excavation at Brugge-Dudzele-Kruisabelestraat (DTM visualised using 2.5 Standard Deviations stretch). ... 129

Figure 32: Interpretation of the EMI survey in relation to the sixteenth-century Pourbus Map (Trachet 2018). A: Former roads; B: Former buildings to the east of the survey area; C: Former buildings to the south of the survey area; D and E: Still existing farms. 130
Figure 33: Eca-HCP1 electrical conductivity plot of EMI survey at Brugge-Dudzele-Kruisabelestraat. 131
Figure 34: MSa-HCP2 magnetic susceptibility plot of EMI survey at Brugge-Dudzele-Kruisabelestraat. 131
Figure 35: Distribution of DIFF values for three time frames of the high medieval period. 133
Figure 36: Topographical location of the high medieval features at Brugge – Sint-Andries – Refuge (DTM visualised using 2.5 Standard Deviations stretch). 133
Figure 37: % of high medieval settlement sites with features dating to other periods. 135
Figure 38: Schematic visualisation of excavated enclosures in Table 9. 1: Jabbeke – Snellegem - Meersbeekstraat, 2: Evergem – Belzele - Ralingen/Schoonstraat, 3: Oostkamp – Oostkamp - Zwarte gat, 4: Ronse – Ronse - De Stadstuin, 5: Evergem – Belzele - Koolstraat, 6: Brugge - Sint-Andries – Refuge. 137
Figure 39: Grouped settlement at Damme-Sijsele-Stakendijke with indication of the assumed tenth to eleventh centuries phase in yellow and twelfth to thirteenth centuries phase in orange. Simplified excavations plans following De Gryse et al. (2012) and Deconynck et al. (2019) (DTM visualised using 2.5 Standard Deviations stretch). 141
Figure 40: Excavations and grouped settlement at Evergem-Belzele. Simplified excavations plans following De Logi et al. (2009), De Logi and Schynkel (2008), Schynkel and Urmel (2009), Van de Vijver et al. (2009) and Vanhee (2011) (DTM visualised using 2.5 Standard Deviations stretch). 143
Figure 41: Detail of zone 2 at Zele-Wijnveld. Simplified excavation plan and indication of enclosure systems following Brouwer et al. (in press) (DTM visualised using 2.5 Standard Deviations stretch). 145
Figure 42: Mapping and KDE of the 186 high medieval settlement sites (1) in relation to the dataset of 1588 excavations until 2018 as made available through the CAI (state of the art April 2020) (2) (Visualised using 2.5 Standard Deviations stretch). 147
Figure 43: Mapping and KDE of the excavations until 2018 as made available through the CAI (state of the art April 2020). (1) 532 before 1993, (2) 709 from 1993 and before 2012, (3) 306 from 2012 until 2018 (Visualised using 2.5 Standard Deviations stretch). 148
Figure 44: Interpretational model of the settlement morphology at Damme-Sijsele-Stakendijke (DTM visualised using 2.5 Standard Deviations stretch). 153
Figure 45: Interpretational model of the settlement in zone 2 at Zele-Wijnveld (DTM visualised using 2.5 Standard Deviations stretch). 154

Figure 46: Map of Nieuw-Roeselare in relation to the historic harbour landscape of Bruges (Medieval Bruges and its outports: (Trachet & de Ruijsscher 2019))(DTM visualised using Histogram Equalize stretch). 160
Figure 47: Excavation plan of the first archaeological research (3 campaigns) on the site of Nieuw-Roeselare (Van Doorselaer & Verhaeghe 1974, 16-17). 165
Figure 48: Original excavation picture showing one of the buttress structures of building I (section EF (eastern section) of square SMR 67/10) at Nieuw-Roeselare (Van Doorselaer & Verhaeghe 1974, 38). 166
Figure 49: Excavation plan of the archaeological research on the church of Nieuw-Roeselare in 1979 (Van Vooren 1980, Fig. 10).. 166
Figure 50: Detail of a 1652 figurative map, depicting the Roeselare polder and the location of the former cemetery of Nieuw-Roeselare (State archive Gent - Kaartenverzameling P. De Reu nr. 612). 169
Figure 51: 1724 map of the Roeselare polder (State archive Brugge - Kaartenverzameling Mestdagh nr. 2333). 169
Figure 52: Detail of the 1724 map of the Roeselare polder (State archive Brugge - Kaartenverzameling Mestdagh nr. 2333). 170
Figure 53: 1m resolution Digital Terrain Model (DTM) of the study area of Nieuw-Roeselare (visualised using Histogram Equalize stretch). 171
Figure 54: Preliminary interpretation of the village of Nieuw-Roeselare based on the known and attested features in the landscape. 173
Figure 55: Overview of the mapped crop marks at the site of Nieuw-Roeselare with focus on the enclosures. Oblique aerial photograph from the collection at Ghent University: DSC_0103 taken on 15/07/2018 by Wim De Clercq. 178
Figure 56: Different ECa data-plots for the EMI survey at the site of Nieuw-Roeselare, with enlargements of representative features. A: recent ground and stabilisation works; B: abrupt linear difference in ECa; C: double-ditched street; D: enclosures; E: former wells. 179
Figure 57: Filtered ECa-HCP4 data-plot and interpretation of the archaeological features related to Nieuw-Roeselare, with enlargements of representative features: dike-related ditches, double ditched street, enclosure and former wells. 180
Figure 58: Calibration curve for C14-dated charcoal fragment at Nieuw-Roeselare. The sample (RICH-26964; 645±22BP) was calibrated in OxCal, using the IntCal13 atmospheric curve (Reimer et al. 2013)............................... 181
Figure 59: Different MSa data-plots for the EMI survey at the site of Nieuw-Roeselare. A&B: brickworks; C: recent groundworks; D: excavated church; E: excavated manor. 182
Figure 60: ECa-HCP1 and MSa-HCP2 detail showing the interpreted settlement core at Nieuw-Roeselare. See Figure 64 for interpretation. 183
Figure 61: Location and visualisation of the three Pseudo-2D Tomography profiles the on abrupt change in EC.. 184

Figure 62: KDE of registered ceramics at Nieuw-Roeselare, in relation to the dispersal of ceramics, bricks and MSa-HCP2 data-plot (Visualised using 2.5 Standard Deviations stretch). 186
Figure 63: Getis-Ord Gi* statistic of registered ceramics at Nieuw-Roeselare, in relation to the dispersal of ceramics and MSa-HCP2 data-plot (Visualised using 2.5 Standard Deviations stretch). 187
Figure 64: Schematic interpretation of settlement lay-out at Nieuw-Roeselare. 189
Figure 65: Topography of the landscape around Wiston (Hill shade visualised using 2.5 Standard Deviations stretch). 197
Figure 66: Oblique aerial view of Wiston from the east (Driver 2007). 198
Figure 67: Previous archaeological research in Wiston. 200
Figure 68: Schematic interpretation by Murphy (1995, 98) on the first edition OS map. 201
Figure 69: Schematic interpretation by Lilley (1995, 80-82) on the first edition OS map. 201
Figure 70: Topography of the Caldicot Levels (DTM visualised using Histogram Equalize stretch). 202
Figure 71: Phases of first reclamations of the Caldicot Levels following Rippon (1996, 66) (DTM visualised using Histogram Equalize stretch). 204
Figure 72: Schematic reclamation phases of Whitson following Rippon (1996, 84) (DTM visualised using Histogram Equalize stretch). 206
Figure 73: 2016 magnetometry survey in the context of a solar farm planning application following Davies (2016). 207
Figure 74: EMI survey zones Wiston. 208
Figure 75: EMI survey zones in Whitson. 209
Figure 76: ECa data plots for survey zone 1 in Wiston. A=Wet depression, B=Modern infrastructure, C=Micro-topographic field-boundaries. 213
Figure 77: ECa data plots for survey zone 2 in Wiston. A=Wet depression, B=Modern infrastructure, C=Micro-topographic field-boundaries. 214
Figure 78: MSa data plots for survey zone 1 in Wiston. B=Modern infrastructure, C=Micro topographic field-boundaries. 215
Figure 79: MSa data plots for survey zone 2 in Wiston. B=Modern infrastructure, C=Micro topographic field-boundaries. 215
Figure 80: ECa data plots for The Green. B=Modern infrastructure. 216
Figure 81: MSa data plots for The Green. B=Modern infrastructure, D=Concentration of building material. 217
Figure 82: Overview of features visible on EMI data plots in survey zone 1. 217
Figure 83: Overview of features visible on EMI data plots in survey zone 2. 218
Figure 84: ECa data plots for survey zone 1, north of Crab Tree Reen. 220
Figure 85: ECa data plots for survey zone 2, south of the village. 221
Figure 86: Main ditch features visible on ECa and MSa data plots for zone 1. 222
Figure 87: Main ditch features visible on ECa and MSa data plots for zone 2. 222
Figure 88: MSa data plots for survey zone 1, north of Crab Tree Reen. 223
Figure 89: MSa data plots for survey zone 2, south of the village. 223
Figure 90: LiDAR Whitson (Visualised using Histogram Equalize stretch). 224

Figure 91: Interpretative model of settlement morphology at Wiston. 225
Figure 92: Interpretation of the former field-boundaries in Wiston, based on the large-scale EMI survey and the first edition Ordnance Survey map. 226
Figure 93: Renewed interpretation of Rippon's 1996 model for the development of Whitson (DTM visualised using Histogram Equalize stretch). 227
Figure 94: Interpretation of the former field-boundaries in Whitson, based on the large-scale EMI survey and LiDAR data.. 228
Figure 95: Examples of possible elongated S-shapes to the north of Whitson. 229
Figure 96: Planned rural settlements on the first edition Ordnance Survey map, and Flemish place names in Pembrokeshire following Toorians (1990) and Roberts (1987). 232
Figure 97: Plots and widths in Angle. 234
Figure 98: Plots and widths in Letterston. 235
Figure 99: Plots and widths in Reynalton. 236
Figure 100: Plots and widths in Templeton. 237
Figure 101: Plots and widths in Wiston. 238
Figure 102: Plots and widths in Whitson. 239
Figure 103: Selected row settlements in the County of Flanders. 241
Figure 104: Boxplot of width measurements at the Welsh case studies. 243
Figure 105: Histogram of width measurements for Welsh settlements. 245
Figure 106: Boxplot of width measurements at the Flemish case studies. 253
Figure 107: Histogram of width measurements for selected settlements in the County of Flanders. 254
Figure 108: KDE for mapped and dated row settlements in the County of Flanders according to century of first mention (Visualised using 2.5 Standard Deviations stretch). 1: (pre) 9th century (n=20); 2: 10th century (n=10); 3: 11th century (n=42); 4: 12th century (n=76); 5: 13th century (n=48); 6: 14th-17th centuries (n=47). 279
Figure 109: Kernel Density Estimation for mapped row settlements (1: upper map) in comparison to *Kouter* place names (2: lower map) as mapped by Verhulst (1995, 121) (Visualised using 2.5 Standard Deviations stretch). 280
Figure 110: Rudimentary indication of the spatial relation between the Norman castle town of Haverfordwest and its suburb of Prendergast on the First Edition OS-map (1853-1904) after Lilley (2000, 525). 288

Table of Contents

Preface **1**
Little Flanders beyond Wales 1
Geographical framework 2
Chronological framework 5
Structure of this dissertation 5

Part 1: Introduction ***9***

Chapter 1 Theoretical framework **11**
1.1 An archaeological perspective on migration 11
1.2 Habitus, memory and landscape 16
1.3 Identity 19
1.4 Village versus grouped rural settlement: conceptual considerations 21
1.5 Grouped rural settlements as an expression of identity? 24

Chapter 2 Research framework for rural settlement landscapes in the high medieval County of Flanders **27**
2.1 Medieval rural settlement research in Flanders 27
2.2 The ’Great Reclamation Period’ in the County of Flanders 31
2.2.1 A period of intensification 31
2.2.2 Phased development 32
2.2.3 A diffusion in socio-economic systems 37
2.3 Conclusion 39

Chapter 3 Little Flanders beyond Wales: The historic context of Flemish settlement landscapes in South Pembrokeshire and elsewhere **41**
3.1 Introduction 41
3.2 “Flemings”, what’s in a name? 43
3.3 Flemish settlements in Britain 45
3.3.1 England 45
3.3.2 Scotland 46

3.3.3 Wales 50
3.4 Flemish settlements elsewhere 57

Chapter 4 Research questions, aims, objectives and methodological framework 61

4.1 Central research question, aims and objectives 61
4.2 Methods and case studies 62
4.2.1 Methodological approach 63
4.2.2 The build-up of a comparative framework in Flanders 64
4.2.3 Planned row settlements in South Wales 67
4.2.4 Comparative analysis 68
4.2.5 Overall discussion and interpretation 68

Part 2: Unearthing the high medieval settlement landscapes of the County of Flanders 69

Chapter 5 Row settlements and landscape reclamations in the medieval County of Flanders 71

5.1 Introduction 71
5.2 Study area 74
5.3 Methods and materials 75
5.3.1 Mapping of the row settlements 75
5.3.2 Dating the settlements 77
5.3.3 GIS analysis of the settlement distribution 78
5.4 Results 81
5.5 Discussion 89
5.5.1 The Colonisation of the sandy soils 90
5.5.2 Geographical clusters 91
5.5.3 Other processes at work? 92
5.5.4 Considerations 93
5.6 Conclusion 95

Chapter 6 High medieval grouped rural settlements in the archaeological record 101

6.1 Expanding the dataset 101
6.2 Some remarks about settlement dating 113
6.3 Geographical distribution and topographical location of the sites 115
6.3.1 Geographical distribution 115
6.3.2 Soil texture and drainage 116
6.3.3 Relative topographic position 122
6.3.4 Assessing inter- and intra-site chronological spatial variability 132
6.3.5 High medieval rural settlement sites in the wider environment 134

6.4 Characteristics of high medieval rural settlements 135
6.4.1 Enclosures are an important aspect of the settlement 135
6.4.2 Main buildings in relation to the enclosures and secondary features 137
6.5 Grouped rural settlements in the archaeological dataset 139
6.5.1 Sijsele-Stakendijke 139
6.5.2 Evergem-Belzele 142
6.5.3 Zele-Wijnveld 143
6.6 Discussion 145
6.6.1 Regional clustering of rural settlements 145
6.6.2 The importance of enclosures at rural settlements 149
6.6.3 Grouped settlements 151
6.7 Conclusion 155

Chapter 7 Lost but revived. Revisiting the medieval village of Nieuw-Roeselare 157

7.1 Introduction 157
7.2 Novum Rollarium 159
7.2.1 Geographical and historical context of Nieuw-Roeselare 159
7.2.2 First excavations 163
7.3 The start of a new research: reassessment of historical sources 167
7.4 Archaeological methods and data acquisition 173
7.4.1 Oblique aerial photography 173
7.4.2 Frequency-domain multi-receiver EMI 174
7.4.3 Verifying the EMI results 175
7.5 Results 177
7.5.1 Aerial photography 177
7.5.2 Frequency-domain multi-receiver EMI 177
7.5.3 Pseudo-2D tomography 182
7.5.4 Artefact-accurate fieldwalking 185
7.6 Discussion 188
7.6.1 Planted settlement morphology 188
7.6.2 Ceramic frequencies in relation to nearby sites 189
7.6.3 Re-embankment 190
7.7 Conclusion 191

Part 3: The Flemish settlements in Wales 193

Chapter 8 Multidisciplinary mapping of Wiston and Whitson 195

8.1 Introduction 195
8.2 Morphological hypotheses 197
8.2.1 Wiston 197
8.2.2 Whitson 202

8.3 Survey area and methodology 207
8.3.1 Selection of the survey area 207
8.3.2 Methodology 209
8.4 Results 210
8.4.1 Wiston 211
8.4.2 Whitson 218
8.5 Interpretation 224
8.5.1 Morphology of Wiston 224
8.5.2 Development of Whitson 226
8.5.3 Some thoughts on indications of ridge and furrow in Whitson 228
8.6 Conclusion 230

Chapter 9 Morphological and metrical analysis of row settlements in South Wales and the County of Flanders 231

9.1 Introduction to the approach 231
9.1.1 Wales 231
9.1.2 County of Flanders 240
9.2 Statistical analysis of metrics and morphology 242
9.2.1 Comparison of widths in 'Flemish' settlements in South Wales 242
9.2.2 Comparison of morphological metrics for 'Flemish' settlements in South Wales 247
9.2.3 Comparison of widths for row settlements in the County of Flanders ... 251
9.2.4 Comparison of morphological metrics for row settlements in the County of Flanders 256
9.3 Discussion 264
9.4 Conclusion 265

Part 4: Interpreting Little Flanders beyond Wales 267

Chapter 10 Discussion: Towards an understanding of Little Flanders beyond Wales 269

10.1 Integrated landscape archaeological approach 269
10.1.1 Complementarity of landscape archaeological techniques 270
10.1.2 Considerations regarding scales of approach 272
10.2 Row settlements in the County of Flanders 273
10.2.1 Interpretation of the geographical distribution 273
10.2.2 Socio-economic and political triggers for the occurrence of row settlements in the county 277
10.2.3 A much more diverse rural settlement landscape 283
10.3 Translocation of row settlements as an expression of identity 284
10.4 Identifying the character of Flemish migration to Wales 291

Chapter 11 Conclusions and future lines of research 295
11.1 Landscape archaeological mapping of row settlements 295
11.2 Row settlements and the high medieval settlement landscape in the County of Flanders 296
11.3 Comparative analysis of row settlement in the County of Flanders and southern Wales 298
11.4 Character of the Flemish migration to Wales 299
11.5 Future perspectives 299

Bibliography 303

Appendices 351

English summary 371

Nederlandstalige samenvatting 373

Preface

For this doctoral research, I was granted a four-year scholarship by the Special Research Fund (BOF) at Ghent University (BOF16/DOC/277). Research was conducted within the Historical Archaeology Research Group (HARG) at the Department of Archaeology, under supervision of promotor Prof. dr. Wim De Clercq (Department of Archaeology) and copromoters Prof. dr. Steven Vanderputten (Department of History) and Prof. dr. Veerle Van Eetvelde (Department of Geography). The research ran in close collaboration with Prof. dr. Stephen Rippon (University of Exeter, UK) who was also a member of the doctoral advisory committee.

Little Flanders beyond Wales

"What did the Flemings do for us?". With this Monty Python reference, Hancock (2015, 10) starts his Pembrokeshire LIFE article on the disputed legacy of the Flemings in the Welsh county. For centuries Flemings have been part of the local folklore of this southwestern corner of Wales and are believed to have contributed to the distinct character of the region which is popularly known as 'Little England beyond Wales'. To date, however, researchers such as Austin (2005) strongly reject the interpretation that Flemings, among other Anglo-Norman settlers, would have paved the way for a massive colonisation of Normans and English to the region in the twelfth century. Nor that the perceived fault line between the Welsh north and English south of Pembrokeshire purely dates back to these twelfth-century migrations. Despite demonstrating that the myth of 'Little England beyond Wales' was created in the political context of Tudor nation building in the sixteenth century, Austin (2005) notes that a Flemish migration to the region has been well-documented. No clear remnants or indications of Flemish presence can be found, however, apart from place names referring to Flemish personal names (Roberts 1987; Toorians 1990). Despite a long research history, the possible Flemish influence on British settlement landscapes has scarcely been studied. Researchers such as Harvey

(1981; 1982), Roberts (1987), Kissock (1990; 1995; 1997) and Rippon (1996; 1997; 2008) have described similarities to Flemish settlements and other examples in the Low Countries, but little reference to literature on the County of Flanders has been incorporated in international publications. Consequently, little detailed research on this possible Flemish influence has been carried out.

Furthermore, the geographical division of the former County of Flanders over three modern-day countries and five administrative regions/*départements*, which leads to differences in archaeological legislation and state of the art of archaeological and historical research, has resulted in a disjointed framework on high medieval rural settlements for the county.

The further expanding archaeological dataset in the region of Flanders and recent improvements in landscape archaeological methods and approaches, however, offer new possibilities for comparative research. The integration of multi-proxy datasets for the County of Flanders and Britain thus has the potential to further analyse Flemish influence on British settlements.

The Little Flanders beyond Wales research was therefore set up, in collaboration with Prof. dr. Stephen Rippon (University of Exeter, UK), to create a first comparative framework on high medieval rural settlements in the County of Flanders and to explore the potential of metrical and morphological comparative research on the settlements in both the County of Flanders and the south of Wales.

Geographical framework

The research area for this project comprises the former County of Flanders and villages in the Welsh counties of Pembrokeshire and Monmouthshire (on the Caldicot Levels).

The County of Flanders originated in 863 as one of the *pagi* of West Francia. It was granted to Baldwin 'Iron Arm' following his marriage with Judith, daughter of King Charles the Bald. The following dynasty of Flemish counts thus became vassals of the Kings of West Francia and later France (De Maesschalck 2012; Koch 1981; Nicholas 1992). The county's territory covered the modern-day Belgian provinces of Hainaut and West and East Flanders, the southern part of the Dutch province of *Zeeland* and parts of the French *départements* le Nord and Pas-de-Calais (Figure 1). However, the geographical as well as political boundaries of the former County of Flanders (covering more than 14500 km^2) were highly dynamic (e.g.Despriet 1998), especially in the coastal area. Therefore, in the context of this dissertation, an approximate delineation of the early-twelfth century based on the modern-day coastline and river systems is represented, following the geographical research data of the Diplomata Belgica-GIS (Figure 1).[1] Using this delineation, it must be considered that the many border changes near the North Sea and the Scheldt river are thereby not taken into account. This specific demarcation was chosen because the twelfth century has been considered as the optimum of the tenth to the thirteenth centuries landscape exploitations and clearances in order to extend the cultivated areas across Europe, generally called 'The Great Clearances' or 'Great Reclamation Period' (Aberth 2013, 92-97; Hoffmann 2014, 119-133; Williams 2000).

The Flemings that are described in historical sources to have come to Wales (see part 1) are understood to have been sent to several cantrefi[2] or lordships in the former kingdom of Dyfed (Charles-Edwards 2012, 537-580). This area was incorporated into the shire of Pembrokeshire in the early-twelfth century, which still gives its name to the most southwestern county of Wales. Although the delineations of the shire and county of Pembrokeshire might have evolved, the county extent is used in this dissertation since the respective cantrefi that are of interest to this study are therein incorporated (see Chapters 3 and 8).

In addition to the Flemish settlements in Pembrokeshire, research by Rippon (1996) has suggested a possible influence of the Low Countries on the origin and morphology of the village of Whitson, which is located on the Caldicot Levels near Newport in the Welsh county of Monmouthshire. Therefore, this specific settlement has been incorporated in this study (see Chapters 3 and 8).

The basic geographical data, used on the many maps in this dissertation, has been derived from the Office for National Statistics (ons.gov.uk), Ordnance Survey (ordnancesurvey.co.uk) and the Digimap project[3] (digimap.edina.ac.uk) for the United Kingdom and Agentschap Informatie Vlaanderen (AIV) (geopunt.be/ download.vlaanderen.be) for Flanders. Maps for the County of Flanders and case studies in the county use the Belgian-Lamberts 72 coordinate-system. For maps visualising research data in the United Kingdom, the WGS 1984 Complex UTM Zone 30N was used. Applying the National Grid Transformation OSTN02, this allowed to accurately combine the different British datasets (either in the Ordnance Survey National Grid/British National Grid coordinate-system or WGS 1984), LiDAR and geophysical survey data (measured in WGS 1984).

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[1] Ghent University and Commission Royale d'Histoire/Koninklijke Commissie voor Geschiedenis, www.diplomata-belgica.be.

[2] Medieval Welsh land division, also called hundred.

[3] 1st Edition County Series Maps 1:2500 of Wiston and Whitson (1853-1904). Crown Copyright and Landmark Information Group Limited 2020. All rights reserved.

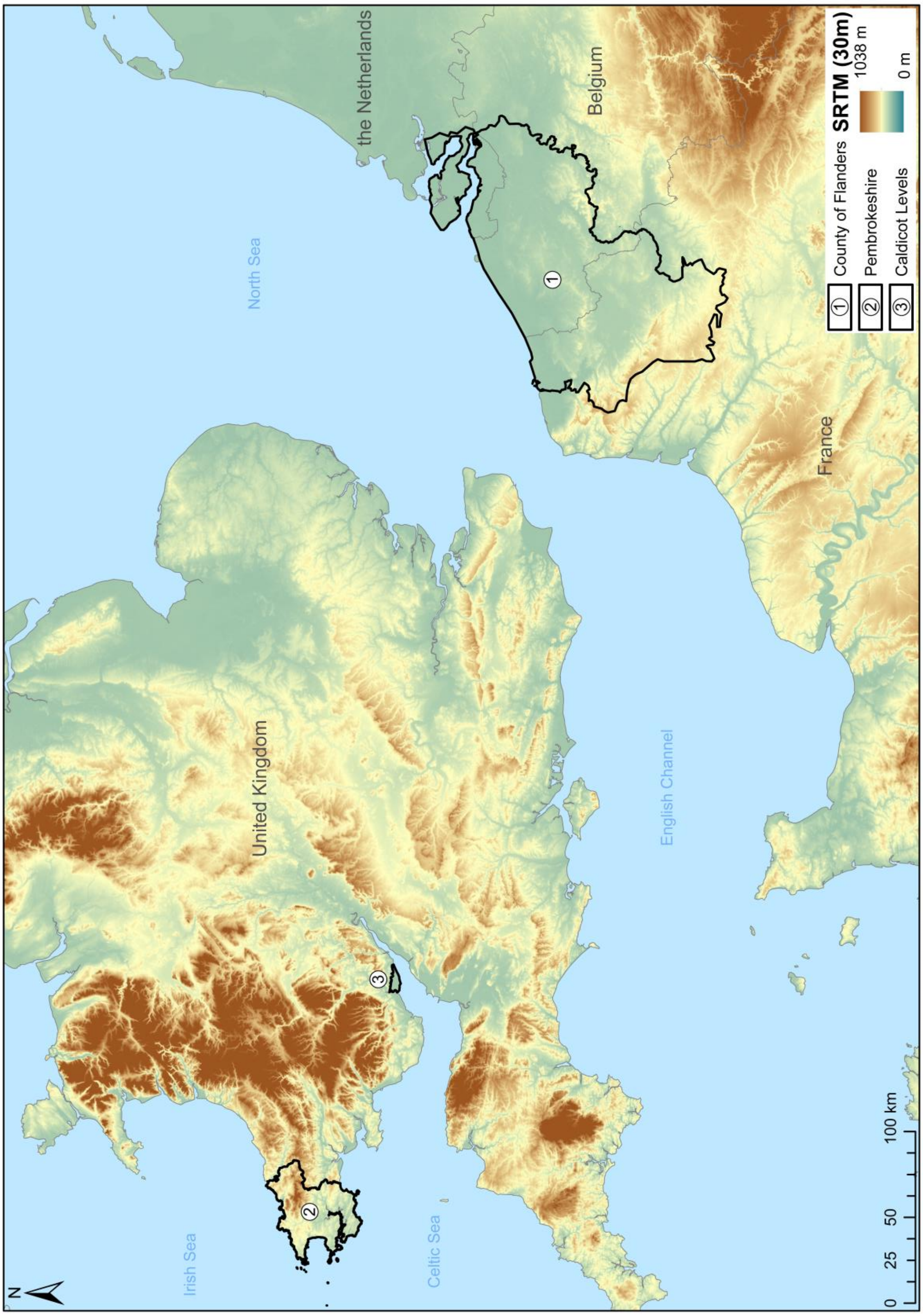

Figure 1: Localisation map of the different study areas for this dissertations (SRTM data from earthexplorer.usgs.gov visualised using 2.5 Standard Deviations stretch).

Chronological framework

This research focusses on the high medieval period (tenth to mid-thirteenth century AD), which corresponds to the time in which Flemings are described in historical sources to have migrated across Europe in the context of landscape reclamations and ab nihilo settlement plantations. This timeframe should, however, not be considered as a strict delineation as many of the processes described in this dissertation already started before and/or continued after the high medieval period.

Structure of this dissertation

This dissertation comprises both published and unpublished material in accordance with Art. 11 of the doctoral regulations of the Faculty of Arts and Philosophy at Ghent University. Over the course of this research, incorporated papers were supplemented with new or adjusted data and/or insights. Since the structure of this thesis is not purely a collection of papers, publications have been divided to fit into the respective chapters when required. The following publications have been incorporated in their original or altered form:

(1) Verbrugghe, G., Saey, T., and De Clercq, W. (2020). Lost but revived. Revisiting the medieval village of Nieuw-Roeselare (Flanders) using large-scale frequency-domain multireceiver EMI and landscape archaeological prospection. *Archaeological Prospection* 27(3), 239-252. (A1-published). *Contributes to Chapter 7*.

(2) Verbrugghe, G., De Clercq, W., and Van Eetvelde, V. (2020). Row settlements and landscape reclamations in the medieval County of Flanders. *Journal of Historical Geography* 70, 47-64. (A1-published). *Contributes to Chapter 5*.

(3) Verbrugghe, G., Vanderputten, S., Van Eetvelde, V., and De Clercq, W. (2020). Flemish settlements beyond Flanders: A review and new perspectives on transregional medieval settlement landscapes in Britain. In: L.L. Gathagan, W. North and C. Rozier. (Eds.). *Haskins Society Journal 31*, Martlesham: Boydell&Brewer (Book chapter-published). *Contributes to Chapters 2 and 3*.

(4) Verbrugghe, G. (2019). *Novum Rollarium*: an introductory case study on planted grouped settlements in the context of high medieval landscape reclamations in the County of Flanders and Beyond. *Medieval Settlement Research* **34**, 60-72 (A2-published). *Contributes to Chapter 7*.

(5) Verbrugghe, G. and De Clercq, W. Little Flanders beyond Wales; The historic context of Flemish settlement landscapes in South Pembrokeshire, In: S.C. Thomson (Ed.)

Strangers at the Gate! The (Un)Welcome Movement of People and Ideas in the Medieval West, Explorations in Medieval Culture, Leiden: Brill, 88-100 (Book chapter-submitted). *Contributes to Chapters 2 and 3*.

(6) Verbrugghe, G., Van Eetvelde, V., Vanderputten, S. and De Clercq, W. Nieuw-Roeselare, an introduction to renewed research on a lost village in the context of landscape archaeological and historical geographical research on deserted medieval settlements in the borderlands of Flanders and Zealand. *Geoscape* (A1-submitted). *Contributes to Chapter 7*.

(7) Verbrugghe, G., Saey, T. and De Clercq, W. Mapping 'Flemish' settlements: Electromagnetic Induction (EMI) survey at the villages of Wiston (Pembrokeshire) and Whitson (Monmouthshire). *Archaeologia Cambrensis* (A2-accepted). *Contributes to Chapter 8.*

This dissertation takes up eleven chapters that are divided into four parts. The first part introduces the subject to the reader and frames the aims and research questions within the theoretical framework and *status quaestionis*. The second and third part form the main body of this dissertation and consider the different aspects of desktop research and fieldwork in both the County of Flanders and South Wales. In the fourth part, the results of part two and three are integrated and summarized. This part also formulates conclusions and possibilities for further lines of research. A summarized overview of the individual chapters is described below.

Part 1 – Introduction

Chapter 1: *Theoretical framework* considers the respective theoretical discourses that directed the different methodological approaches for this research, as well as the selection of case studies and supported final interpretations.

Chapter 2: *Research framework for rural settlement landscapes in the high medieval County of Flanders* offers an overview of the research history on medieval rural settlement landscapes within the County of Flanders and described the socio-economic background to the development of those landscapes.

Chapter 3: *Little Flanders beyond Wales: The historic context of Flemish settlement landscapes in South Pembrokeshire and elsewhere* elaborates on the presence and influence of Flemings outside the County of Flanders. Furthermore, it addresses considerations regarding the use and meaning of 'Fleming' in an international context.

Chapter 4: *Research question, aims, objectives and methodological framework* describes the dissertation's research questions, aims and objectives. Besides, it offers an overview of the methodological approaches and selected case studies.

Part 2 – Unearthing the high medieval settlement landscapes of Flanders

Chapter 5: *Row settlements and landscape reclamations in the medieval County of Flanders* delivers the results of the identification, mapping and dating of row settlements within the County of Flanders. Based on the geographical and chronological distribution, it is discussed whether this grouped settlement morphology is indeed related to the Great Reclamation Period.

Chapter 6*: High medieval grouped rural settlements in the archaeological record* examines the potential of the growing number of archaeological excavations on high medieval rural settlements to contribute to a better understanding of grouped rural settlements in the northern parts of the County of Flanders, despite the highly built-up character of modern-day Flanders.

Chapter 7: *Lost but revived. Revisiting the medieval village of Nieuw-Roeselare* describes the cross-disciplinary study of a deserted medieval settlement near the Dutch-Belgian border. Through desktop research and landscape archaeological fieldwork, the settlement is located, its planned row morphology studied and considered in its historical context of landscape reclamations.

Part 3 – The Flemish settlements in Wales

Chapter 8: *Multidisciplinary mapping of Wiston and Whitson* elaborated on the large-scale geophysical survey at the Welsh villages of Wiston (Pembrokeshire) and Whitson (Monmouthshire). By combining the results of a frequency-domain multi-receiver Electromagnetic Induction (EMI) survey with new LiDAR data and historical maps, new models of the former settlement layouts are proposed.

Chapter 9: *Morphological and metrical analysis of row settlements in South Wales and the County of Flanders* analyses and compares planned row settlements within and between both study areas based on morphological and metrical characteristics. This allows to attest whether or not similarities can be found.

Part 4 – Interpreting Little Flanders beyond Wales

Chapter 10: *Discussion: Towards an understanding of Little Flanders beyond Wales* integrates and discusses the general results for the different case studies in Part 2 and 3, in relation to the theoretical framework and *status quaestionis* as considered in Part 1.

Chapter 11: *Conclusions and future lines of research* summarizes the results and findings of this dissertation, and offers prospects for further research.

Part 1: Introduction

Chapter 1 Theoretical framework

As indicated in the preface, this dissertation considers Flemish migration to southern Wales and subsequent influence on rural settlement landscapes in the region. This chapter describes the general theoretical framework and concepts in which this research is set. First an archaeological approach to migration, habitus, identity and landscape as material culture is considered within the context of this dissertation. Second the current multifaceted understanding of settlement nucleation is presented in view of the aims and approaches of this research. Although these concepts are interrelated, they are first addressed individually at a theoretical level and finally brought together and considered in the context of this research.

1.1 An archaeological perspective on migration

> *"The history of mankind is a history of migrations."*
> *(Burmeister 2016, 43)*

Migration can be considered as an integral part of the human existence (Burmeister 2012; 2016; 2017; Cabana & Clark 2011, 3). Burmeister (2012; 2016) therefore sees the human as a *homo migrans* and considers migration to be one of the basic themes within archaeological research. However, migrations are difficult to detect archaeologically (Halsall 2012, 32) and migration itself has long been absent as an object of research in archaeology (Anthony 1990, 896; Burmeister 2000, 539):

> "Migration itself is seen neither as being in need of explanation and thus as a research topic in its own right nor as a potential explanation for the manifestations of cultural change."(Burmeister 2000, 539)

To date, an increase in quality data and the developing incorporation of scientific techniques within physical anthropology using DNA and stable isotope analyses offers new opportunities to bring the archaeological debate forward (Amorim et al. 2018; Fernández-Götz 2014, 1; Hakenbeck 2008, 19; Halsall 2012, 29; Larmuseau et al. 2018; van Dommelen 2014, 479).[4] Nevertheless, for periods in which historical sources describing migration are scarce or absent, there remains a strong focus on proving that migration did take place, instead of studying the implications of migration (van Dommelen 2014, 479-480). An in-depth archaeological understanding of the multi-layered process of migration is therefore almost non-existent (Anthony 1997; Burmeister 2000, 553). For migration is not straightforward, occurs under many circumstances, in various phases, can take many forms and is not unidirectional. Most importantly, migratory groups typically consist of subgroups with specific goals, going to already known destinations (Anthony 1990; 1997; Burmeister 2000; Fernández-Götz 2014, 3; Prien 2005, 313-314). Anthony (1990) thereby makes the distinction between short- and long-distance migrations. The former is believed to make up the majority of migratory moves, resulting from the fact that the area, movement costs and opportunities are already known (Anthony 1990, 901; Lewis 1982, 44-46). Long-distance migration, in contrast, is considered to be highly "dependent on the long-distance transmission of information concerning potential destinations, and on transportation routes" (Anthony 1990, 902). Notwithstanding that migration has, and sometimes still is, solely been considered as waves of mass invasions in foreign territory (e.g. Papastergiadis 2000) or as particularistic irregular occurrences, Anthony (1990) and Burmeister (2000, 540) argue that migration should more correctly be interpreted as a long term process of infiltrations. Through a model of leapfrogging or chain migration, scouts send information back to the region of origin before other groups migrate along well-defined routes (migration streams) towards specific destinations (Anthony 1990, 902-904) (Figure 2). This certainly was the case for a group of individuals that were described in Domesday Book as Flemish tenants in the area around Northampton. Keats-Rohan (2001) and Oksanen (2012, 203) state that they came from the same region in Artesia and Picardy and that it is highly likely that they would have come to England together or through a mutual connection, such as Count Eustache of Boulogne. It would have been Eustache's niece, Judith, who held the group together in England. The Artesian Flemings

[4] Similarly to the use of material culture in the twentieth century, these approaches are now received with critique and concern because of an assumed linear reasoning and not acknowledging far greater complexity of the past connections and interactions (e.g. Heyd 2017; Kristiansen et al. 2017). McSparron et al. (2020, 227) therefore urge to consider the existing theoretical framework in archaeological migration research when applying these new methodological approaches.

were tenants of Judith and often tenant-in-chief in their own right (Keats-Rohan 2001, 144-145).

Although identifying specific causes of migration is often difficult, there are in general a number of 'push' (negative stresses in the home region) and 'pull' (positive attractions in the destination region) factors influencing the occurrence, scale and direction of migration (Anthony 1990, 899-900; Lee 1966). Famines, climate anomalies and natural hazards have, for example, been considered to have acted as push-factor for the migration of settlers, among which also Flemings, to Central and Eastern Europe during the high medieval period (Rüther 2018, 134). Besides, Oksanen (2012, 197-200) states that career opportunities, inheritance patterns and opportunities to acquire new property and wealth would have encouraged younger sons of Flemish elites to cross the channel to Britain, while using their families' resources and political connections. Both examples represent two ends of the scale-spectrum in which migration may occur: the (mass) movement of larger populations comprising whole family groups for whom migration is a way of securing livelihood, versus elite individuals. It thereby must be stressed that the former does not implicate mass migration of entire societies or social groups. As stated by Burmeister (2000, 543) "established societies or social groups do not migrate as a whole; usually the group of migrants represents a more or less clearly defined segment of the aggregate population". This implies that, in between the two ends of the scale spectrum, multiple gradations and selections may occur based on for example gender-specific, age groups, and class (Anthony 1990, 905; Burmeister 2000, 543).

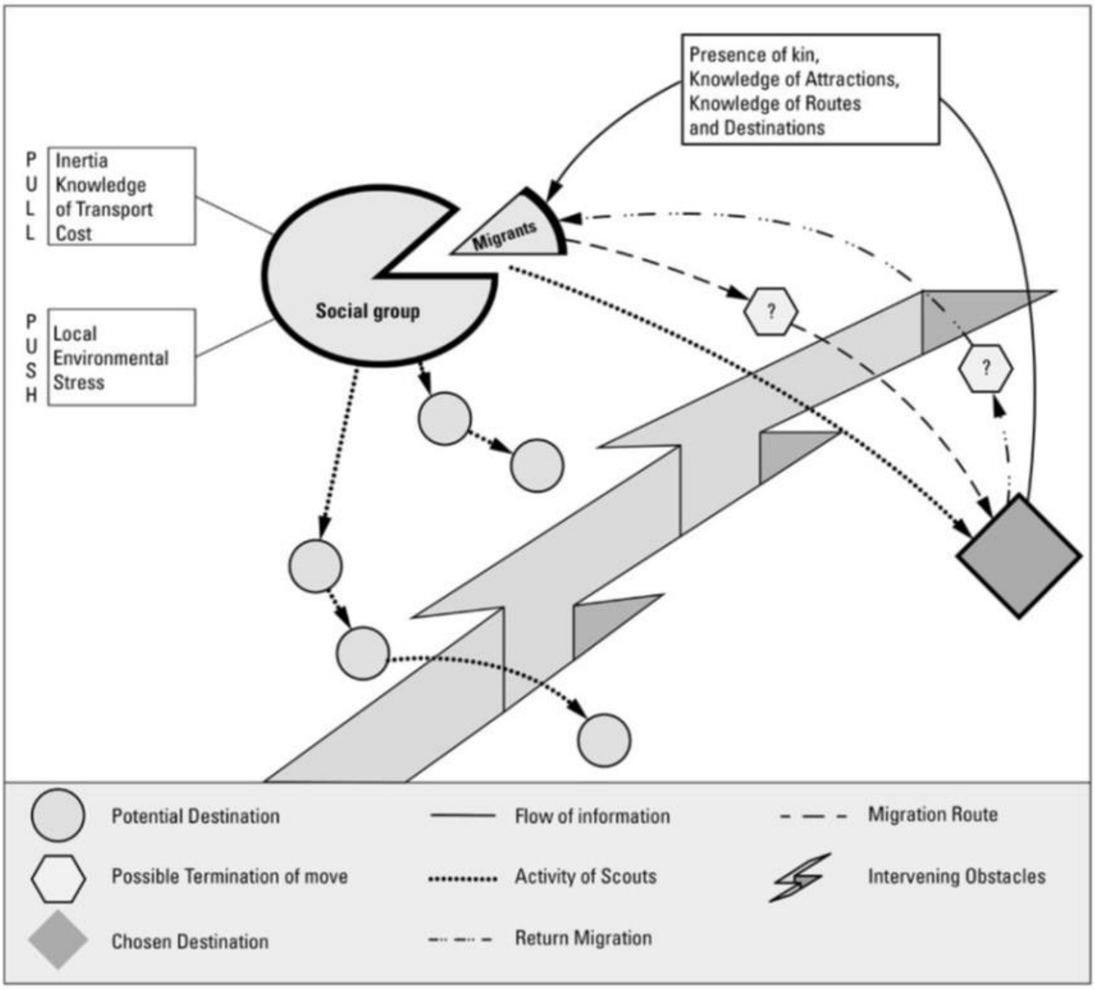

Figure 2: Diagram of the migration process ((Fernández-Götz 2014, 2) after (Anthony 1990, 900)).

The New Archaeology's 'retreat from migrationism' in the 1960s has been considered to have strongly influenced archaeological thinking about migration (Hakenbeck 2008, 9). Its position to reject migration as an explanatory concept has since then been criticized as being "immobilist" (Hawkes 1987, 203), "anti-migrationist" (Härke 1998, 19) and having "demonized" migration (Anthony 1997, 21). This rejecting attitude towards migration, however, was based on the absence of a theoretical and methodological framework regarding migration within the traditional approaches in archaeology (Burmeister 2000, 539; 2013, 229-230). Nineteenth- and early-twentieth-century archaeological research on migration and identity often consisted of attaching ethnicity to material culture, resulting in culture-historical and ethnic-diffusionist approaches, inspired by the work of Kossina and Gordon Child (Burmeister 2000; Curta 2007; 2011; Fotiadis 1997; Härke 2004; Heather 2015, 1-2; Tys 2012a). Migratory groups were identified on the basis of "specific traits of the material culture as well as on the temporal and spatial collimation of a regional source of the dispersed cultural property" (Burmeister 2000, 540).

The fourth to seventh centuries, for example, have long been associated with "Barbarian" mass migrations of entire ethnic populations based on the dispersal of certain aspects of material culture (e.g. Böhme 1974). Objects belonging to the same typological classification were interpreted as belonging to one and the same ethnic group and its dispersal was explained through migration and expansion of that ethnic group (Halsall 2012; Snow 1995, 72; Tys 2012a, 21-22). The recent paradigm, however, is more nuanced and stresses the importance of gradual evolution and elite identities rather than mass migration (Härke 2004, 455; Theuws 2009; Van Thienen 2016, 269-366). Yet, in contrast to these recent advances, Härke (1998; 2004, 454) criticizes this minimizing perspective towards migration as a problem of attitude and states that archaeologist feel fashionably uneasy with material culture as an expression of ethnicity.

This unease flows from the variable character of the migratory process, which complicates the identification of migration through archaeology. As a way forward, Burmeister (2000, 542) offers a different concept than *ethnos*/ethnicity in order to allow the use of material culture, whatever its form, in researching migration through archaeology. Based on Bourdieu's (1977) *habitus* concept (cf. infra), he described the 'culture of the private' idea. This model makes a distinction between a public sphere (or external domain) and a private sphere (or internal domain). Burmeister describes the public sphere as the zone of contact where the *habitus* is confronted with change and adapts. If for example economic or social conditions (Bourdieu's *field*) are different in comparison to the situation in which the *habitus* was created, the practices of the immigrants will be adjusted. In contrast, the private sphere is not directly connected to external conditions, therefore it is more traditional and thus more applicable to study migration through material culture:

> "Archaeological proof of migration will most likely – if not exclusively – be found in the material culture of the internal domain. The focus has to be on the details of culture – on traits that have little functional effect on outsiders or lack social significance for them and cannot be adopted as objects of either prestige or fashion"(Burmeister 2000, 542)

Burmeister (2000) illustrates this application of *habitus* with research on European settlers in North America. He thereby refers to the concept of 'preadaptation' developed by the geographer Jordan (1989a; 1989b) and its application in the context of migratory research. The idea is that elements of the home culture, e.g. type of log cabin, allowed immigrants to better adapt to conditions in the new settlement region (Burmeister 2000, 541). Jordan's study, however, indicates that the heterogeneity in European "home cultures" was not entirely transferred to North America (Jordan 1985, 154). Functional traits were rather adopted by all groups, indicating the adaptability of immigrants to their foreign new environment. This is, for example, indicated by the guidelines on loghouse building in a nineteenth-century manual for Belgian migrants in the north of the United States and its advice to hire a local (de Ham 1849, 12 and 51).[5] In contrast, the interior of for example houses would have followed the same rules as in the home culture, thus reflecting the private sphere and a more reliable link to the *habitus* (Burmeister 2000, 541-542).

1.2 Habitus, memory and landscape

According to Burmeister's model, the two spheres of an individual's social life result in distinct practices in the use of material culture, allowing to archaeologically study migration (Burmeister 2000, 542). Giddens (1984, 2) considers these social practices as "self-reproducing" and "recursive".

> "That is to say, they are not brought into being by social actors but continually recreated by them via the very means whereby they express themselves as actors." (Giddens 1984, 2)

Practices are the product of interplay between an individual's *habitus*, capital and the field (Maton 2008, 51). These four concepts have found their way into archaeology from Bourdieu's sociological theory of practice as presented in 'Esquisse d'une théorie de la pratique' (1972) and 'Le sens pratique' (1980), which have been translated in 'Outline of a Theory of Practice' (1977) and 'The Logic of Practice' (1990). The field is therein considered as the social space in which interactions, transactions and events take place (Thomson 2008, 67), while capital is understood as an individual's position and/or assets within the field. These can be economic or symbolic, such as cultural, linguistic and social, depending on the field in which they are to be found (Moore 2008, 101-103). The main concept in the context of this dissertation, however, is *habitus* which is defined as:

> "[…] systems of durable, transposable dispositions, structured structures predisposed to function as structuring structures, that is, as principles of the generation and structuring of practices and representations which can be objectively "regulated" and "regular" without in any way being the product of obedience to

[5] Special thanks to Dr. Maxime Poulain for pointing this out and informing me on his research on Belgian migration to Wisconsin.

> rules, objectively adapted to their goals without presupposing a conscious aiming at ends or an express mastery of the operations necessary to attain them and, being all this, collectively orchestrated without being the product of the orchestrating action of a conductor" (Bourdieu 1977, 72)

In fact, *habitus* is the existing socio-cultural structure that has been shaped by past conditions (e.g. family, education and experiences) and, at the same time, shapes present and future practices (Bourdieu 1977, 72-73 and 81-82; De Clercq 2009, 29; Maton 2008, 51). Bourdieu (1977, 82) thereby states that individuals carry their present and past positions (capital) in this socio-cultural structure (field) with them, at all times and in all places. It can be seen as:

> "[…] a past which survives in the present and tends to perpetuate itself into the future by makings itself present in practices structured according to its principles […]" (Bourdieu 1977, 82)

This seemingly deterministic aspect of the *habitus* concept, in which individuals have no control over the objective social and cultural structures nor can intentionally regulate their social strategies, has been criticized because of its apparent unsuitability for change and agency (King 2000, 424; Sewell 1992, 15). Hardy (2008, 131) contradicts this by pointing out how change is presupposed in Bourdieu's theory. Individuals are considered social agents who are not suppressed by structural variants of their *habitus* but rather know it so well that they can act beyond it, though ever in the light of their socio-cultural structures (Bourdieu 1977, 73-79 and 86; King 2000, 419). This is strongly similar to Giddens's (1984) understanding of structures, which he considers to shape people's practices and to be shaped by these practices themselves (Sewell 1992, 4). Both Bourdieu's *habitus* and Giddens's structures thus consider individuals to be able to act beyond their socio-cultural conditions. However, the range of creativity will always depend on an individual's structures/*habitus* (Maton 2008, 52). Moreover, change is an immanent result of the interplay between *habitus* and field as "change in one necessitates a change in the other" (Hardy 2008, 131). Under stable conditions, change can evolve gradually while *habitus* and field remain well matched. In these circumstances, *habitus* can adapt constantly to new experiences. In times of crisis, however, change to *habitus* has to occur abruptly in order to cope with severe changes to field. This takes time and, when *habitus* lags behind, results in a (temporarily) mismatch between *habitus* and field, known as the hysteresis-effect (Bourdieu 1977, 78; Hardy 2008, 132; King 2000, 427). "Because its dispositions are embodied, the *habitus* develops a momentum that can generate practices for some time after the original conditions which shaped it have vanished" (Maton 2008, 59). Migration can be considered as such a field change, which places actors in different, previously unknown, surroundings and induces new interactions. Bourdieu's hysteresis-effect thereby offers an explanation to why certain individuals or communities continue to depend on the same initial *habitus*, e.g. preadaptation and the apparent uniformization in log buildings in contrast to the variation in interior architecture of European settlers in North America (Burmeister 2000; Jordan 1989a; 1989b).

Following Bourdieu (1977, 79), *habitus* is the *modus operandi* of practice and practice is the *opus operatum* of *habitus*. This implies that every practice has a social meaning. Hence, the production and adaptation of material culture is the result of social actions and interactions, which can vary in different contexts. Therefore, material culture is also material practice (Abbink 1999, 30; De Clercq 2009, 29).

In the study of migration, material culture should not merely comprise objects or artefacts. It is to be understood more broadly, equally incorporating and considering landscapes. For the landscape is shaped by people's actions, but it shapes people's actions as well (Robertson & Richards 2003, 1). Robertson and Richards (2003) therefore see the landscape as both a cultural product and a cultural process.[6] Based on the work of Mitchell (1994), they consider landscape to be a dynamic process which forms identities. However, archaeological research has indicated that landscape can be considered as the expression of identities as well. De Clercq (2011), for example, noticed for Roman rural sites in Sandy Flanders how the internal spatial layout of the settlement reflected the social status of the inhabitants through the positioning of granaries. Related to planned rural settlements, the subject of study in this thesis, Roberts (1996b) ascribed an important role to the *habitus* in expressing identity:

> "If a settlement is indeed planned, then the people who created it had in their mind's eye an image, a concept, of what a settlement should be. This is exciting, for not only are these images derived from roots deep within cultures and lifestyles, they can travel as a package in the mind, be elaborated or simplified, duplicated exactly or adapted to changed or local circumstances" (Roberts 1996b, 95-97).

Schama (1996) follows this by stating that people experience and create landscapes based on their shared system of beliefs and ideologies (*habitus*): "landscape is the work of the mind. Its scenery is built up as much from strata of memory as from layers of rock" (Schama 1996, 6-7). This, so to say, holistic approach to landscape, connecting both the physical landscape as well as human identity and emotional aspects is also incorporated in the definition of Landscape in the European Landscape Convention, which defines Landscape as "an area, as perceived by people, whose character is the result of the action

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[6] This is similar to Bourdieu's concepts of structured (*opus operatum*) and structuring (*modus operandi*) structures (Grenfell 2008, 45).

and interaction of natural and/or human factors”(Council of Europe 2000, 2). Perceiving is of course much more than just seeing or looking. Taylor (2008, 1), for example, wrote that “we see it with our eye but interpret it with our mind”. He therefore considers landscapes as cultural constructs that are shaped by our memories and sense of place. According to Lowenthal (1975), a landscape is therefore not only the result of human actions in the past but also a symbol of people’s attachments to and interpretations of the past. This results in selectively saved, altered or fabricated reconstructions of the past in the landscape. Modern-day landscapes thus merely form a patchwork of historic human influences and reworkings of its remnants based on memory and perceived importance (Lowenthal 1975). The same goes for landscapes throughout history. Naum’s (2018) research on the seventeenth-century colony of New Sweden, for example, indicates how instructions and regulations regarding every aspect of daily life had to safeguard the creation of “a mirror of Sweden” along the Delaware River in northeastern America. Swedish place names as well as traditional means of house building, home making and sustenance were used to create a recognizable and emotionally comfortable environment (Naum 2018, 87-88).

1.3 Identity

The above has touched upon the interplay between material culture, landscape, habitus and identity. The latter has been a complex, fuzzy and much debated concept in archaeological theory and practice (Davidovic 2006; Diaz-Andreu et al. 2005; Insoll 2007a; Jones 1997; Shennan 1994). Besides, clearly defining the concept of identity is hard and ambiguous as it can refer to both the individual and a group (Barnard & Spencer 1996, 292). As already stated above, nineteenth- and early-twentieth-century archaeological research on identity consisted of studying the geographical distribution of material culture, which was then interpreted as representing the appearance of a group (Lucy 2005, 86). In practice, however, this resulted in the, often problematic, linking of ethnic identities to material culture as acclaimed proof for mass migrations in the late Roman and early medieval period (Insoll 2007b, 7; Jones 1997, 15-26 and 106-110; Snow 1995, 72). Therefore, the misuse and misunderstanding of identity (in particular ethnic identity) should be treated with more care and consideration (Fotiadis 1997, 109; Insoll 2007b, 7). Some even describe it as a social and political responsibility or duty of archaeology to do so (Fotiadis 1997, 109; Halsall 2012, 29).

Over the last decades, though, researchers have started to consider identity as something that is both self-imposed and imposed by others, and is continuously asserted and reasserted in a range of different ways within distinct situations and for specific purposes (Barth 1969, 10; Shennan 1994, 12; White & Beaudry 2009, 210). Shennan (1994, 16), referring to the work of Bentley (1987, 36) and the *habitus* concept of Bourdieu (1977), concludes that ethnic identity is "anchored internally in experience as well as externally in the cognitive distinctions in terms of which that experience is ordered". Geary (1983, 18) described this as the subjective approach to ethnicity. His research on the different categories by which individuals were identified and ascribed an ethnic classification in early medieval written sources, for example, showed that this was largely subjective and strongly related to military or political contexts, rather than cultural, legal or linguistic ones:

> "First, authors became conscious of ethnic designations most often when their subjects were part of the elite, either fulfilling some official office or duty to which they had been appointed by the king, or when they had close personal relations, by blood or friendship, with a king. Second, but closely related to the first, were instances in which individuals were serving in a military capacity. Third, authors found it appropriate to mention ethnicity when their subject was in some sense "out of place", either geographically or religiously." (Geary 1983, 23).

The modern-day tendency, however, is to go past ethnicity and to consider identity as a much wider, multi-layered concept including for example gender, age, class, religion, kinship and ethnicity (Diaz-Andreu et al. 2005; Ensor 2013; Insoll 2007b; Meskell 2007). Based on Halsall's (2012, 33) vision on ethnicity, it could be stated that the only constant is that identity (in the more general consideration) is a matter of belief. People think of themselves as belonging to a specific group and think of other groups as different. The identity of an individual, whether or not related to a group identity, can thus change over time and, most importantly, be multiple at the same time. Because of this relation towards others/other groups, Diaz-Andreu and Lucy (2005, 2) state that identities are constructed through interactions and that identities are "aspects of social practice, which have to be continually constructed and generated, and are most effective when this is done through the use of shared ways of doing things." (Lucy 2005, 101). This importance of common praxis is followed by David and Kramer (2001, 172-173) in their consideration of identity through style. Not material culture itself can be indicative of identity, but rather the formal characteristics resulting from the manufacturing processes should be considered as the result of (un)conscious choices. Burmeister (2000, 546) stresses that the expressing of different forms of identity becomes most relevant in contexts of (sometimes difficult) interactions, such as the relationship between a native and immigrant population. Barth (1969, 10) describes this as a process of exclusion and incorporation, something that has also shown to have impacted both historic (e.g. expressing 'outsider' status through the internal structure of Anglo-Norman towns as studied by Lilley (2000, 523)) and modern-day landscapes (Anderson & Gale 1992).

The ways and practices in which material culture comes to be can thus be considered as being informative about identity. Especially in contexts of migration, when the habitus is undergoing change in response to changes in the field.

1.4 Village versus grouped rural settlement: conceptual considerations

> *"[…] villages, far from being a normal form of settlement, are an aberration […](Taylor 1983, 125).*

With this quote, Taylor (1983, 125) refers to the fact that villages are not at all the one typical concept of rural settlement and rather form part of a much more complex and diverse pattern including isolated farmstead and hamlets. Although village formation has been at the focus of many archaeological and historical geographical publications, which considered it as the core element of the rural settlement landscape and regarded its formation as a turning point in the development of the rural landscape (e.g. Beresford 1951; Beresford 1969; Beresford & Hurst 1971; Chapelot & Fossier 1980; Fabre et al. 1996; Fossier 1992; Hoskins 1955; Jones & Page 2006; Roberts 1987; Roberts & Glasscock 1983; Verspay et al. 2018), the (geographical) variation in rural settlements as described by Taylor (1983) is generally accepted and widely studied (e.g. Fabech & Ringtved 1999; Lewis et al. 1997; Rippon 2008; Roberts 1977; Roberts et al. 1995; Roberts 2006; Verhulst 1995; Williamson 2003; Yante & Bultot-Verleysen 2010). An in-depth understanding of the origin of the wide array in village-, hamlet- and dispersed farmstead morphologies, and the causes for a geographical dispersal between grouped and dispersed rural settlements is still a subject of research and debate though (Chapelot & Fossier 1980; Kissock 1990; Renes 1981; Rippon 2008; Roberts 1996b; Van De Velde et al. 2012; Verspay et al. 2018).

"Rural settlements are considered as the centers of the organization of their surrounding territory, and can be seen as the building blocks of the landscape"(Van De Velde et al. 2012, 93). Based on morphology and function, a settlement is defined as a permanent human habitation with a minimum of one dwelling (Egli 1991; Uhlig & Lienau 1972; Van De Velde et al. 2012, 93). Making further distinction between settlements, considering other aspects such as size and hierarchy, is more complicated and part of semantic debate (Lillehammer 1999; Verspay et al. 2018). As Roberts (1996b, 15-19) and

Verspay et al. (2018, 27-29) demonstrate, for example, defining a village is not straightforward and can be based on settlement size, function or amenities, hierarchy, morphology or place names. Moreover, as demonstrated for Scandinavia by Lillehammer (1999) and Riddersporre (1999) different languages ascribe different meanings to the village concept. Important research on the terminology and typology of rural settlements has been done by the '*Internationale Arbeitsgruppe für die geographische Terminologie in der Agrarlandschaft*' (Lienau 1986; 1995; Uhlig & Lienau 1972). For other regions in Europe the work of Schröder and Schwarz (1969), Renes (1981), Egli (1990; 1991), Lebeau (1996), Roberts (1977; 1982a; 1987; 2008) and Roberts and Wrathmell (2000) has been influential. Specifically for Belgium, initial work was done by Dussart (1957) and Lefèvre (1964a), and significantly brought forward by Van Eetvelde and Antrop (2005) and Van De Velde et al. (2012). The settlement typology used in this dissertation is based on this previous work by Van De Velde et al. (2012), which in turn is based on the mentioned international research.

The rural settlements that are the subject of research in this dissertation are studied both from a historical geographical and archaeological perspective and can be considered as villages, hamlets and groups of single farms in the light of the international terminology. In order to find a way out of terminological or semantic limitations, however, these settlements are considered as grouped rural settlements in the context of this dissertation. These are defined as agglomerations of habitation and people who live and work in a rural context of subsistence and/or commercial production, and who are subject to hierarchical socio-economic structures. The grouped aspect is important in this perspective and relates to the morphological clustering, nucleation or agglomeration of habitation (Antrop & Van Eetvelde 2017, 253; Roberts 1982b, 7; 1987, 26). However, 'grouped' is used to stress the joined location of habitation in the landscape, regardless of its settlement typology/classification. This way, confusion with nucleated or clustered settlements, which may be interpreted as settlements located around a nucleus (e.g. church, green, square) and thereby excluding row settlements in some typologies, should be avoided. Yet, whenever a settlement is described as 'village' in this dissertation, this refers to its modern-day hierarchical status, rather than morphology or historical/archaeological characteristics.

Although it should be acknowledged that grouped settlements occurred since the prehistoric period, it is generally accepted that the occurrence of village-like grouped settlements in North-western Europe took off in the late-early medieval and certainly in the high medieval period, considering various speeds and incentives (Blair 2018; Curtis 2013; Hamerow 2002; 2012). Many explanations have been offered for the geographical and chronological distribution of grouped settlements, such as landscape conditions, economic systems, technological changes in agriculture, land rights, elite influences, taxations and social relations (Curtis 2013; Hamerow 2002; Myhre 1999; Roberts 1996b).

It should be considered, however, that these explanations never stand alone and may show chronological and geographical variation. For the late Anglo-Saxon period in England, for example, Williamson (2012, 164) considers settlement stabilization rather than nucleation to have caused the grouping of habitation. This would have resulted in so-called ‘proto-villages’ of grouped farmsteads instead of intentionally grouped settlements. In contrast, Hamerow (2012, 91) suggests that the growing importance of regular plots at both individual farmsteads and grouped settlements from the tenth century onwards might suggests an influence of taxation or lordship. However, she and Rippon (2008, 20) stress that the transformation of dispersed to grouped settlements still is not completely understood. Hamerow (2012, 94) therefore states that it is unclear to what extent elites would have been able to impose these changes onto the rural communities, nor to what degree these communities would have been able to establish and maintain certain systems themselves. For later periods in Scandinavia, research by Göransson (1979) on the metrics and legal frameworks of structured settlements suggests that the legal principles would have originated in Danish laws during the thirteenth century and at the end of the thirteenth century in Eastern Sweden. The primary motives would have been the equality principle, rather than fiscal purposes guided from institutions. Roberts (1996b, 112), however, suggests that the demands or royal taxation formed the basis for these settlement morphologies in Denmark and Sweden. Apart from these political or administrative causes, Lillehammer (1999) indicates that there is no direct link between the suitability of the Norwegian landscape for farming and the presence of grouped settlements since the late medieval period. He points out that the importance of the economic system in which corn-growing is combined with fishing and animal husbandry resulted in the occurrence of grouped settlements. In contrast to what might be expected, grouped settlements are therefore found along the western and northern coasts with their dramatic topography, while the lowlands of eastern Norway are mainly characterized by single farms for agriculture. Riddersporre (1999) builds on this land use aspect and stresses the importance of combining settlement structure with landscape organization to understand the social and functional aspects of identified settlement types. His ‘living apart/working together’ theoretical model offers a matrix of four types of organization of landscape and settlement, allowing for intermediate cases to fit in (Figure 3). Based on this model, grouped settlements (live together) may relate to different landscape organizations (work together versus work apart).

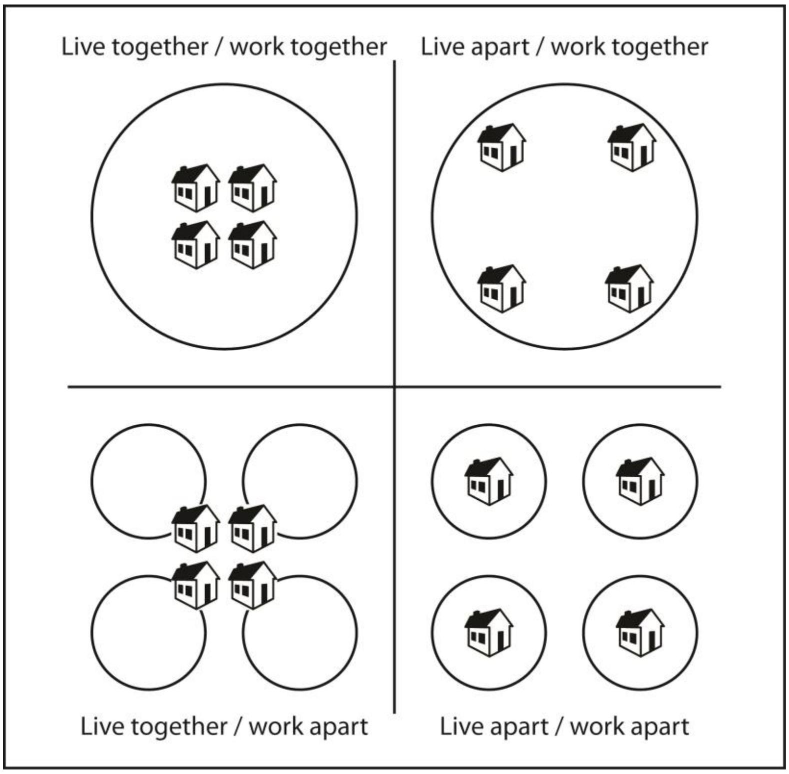

Figure 3: Theoretical model of four types of organization of landscape and settlement, after Riddersporre (1999, 173).

1.5 Grouped rural settlements as an expression of identity?

The central question in this dissertation is to what extent spatial planning traditions were being translocated as part of cultural traditions of migrants. This is based on the logic of common practice or habitus model as described by Bourdieu (1977), in which practices and material culture are shaped by past conditions and are embedded in cultural tradition. Following Robertson and Richards (2003), the settlement landscape is thereby considered as material culture, which can provide indications for assessing migration. Burmeister's (2000) application of the habitus concept in archaeological research has highlighted a distinction between the internal and external cultural domain. Migration and cultural identity are most likely to be recognised archaeologically through material culture from the internal domain. Material culture used in this private sphere is more likely to refer to the origin and traditions of the migrant population, expressed in their day to day domestic practices. Material culture used in the external domain, in contrast, is more prone to interaction and influence of the immigration area. It is therefore considered to represent an individual's social status or identity as member of a (social) group (Burmeister 2000;

Tys 2012). It follows that the archaeological and historical geographical study of the aspects that are characteristic for these settlements provides a better understanding of the habitus and conditions that shaped and changed them.

Chapter 2 Research framework for rural settlement landscapes in the high medieval County of Flanders

This chapter has partly been published as:

Verbrugghe, G., Vanderputten, S., Van Eetvelde, V. and De Clercq, W. (2020). Flemish settlements beyond Flanders; A review and new perspectives on transregional medieval settlement landscapes in Britain. In: L. Gathagan, W. North and Ch. Rozier (Eds.). *The Haskins Society Journal 31*. Martlesham: Boydell & Brewer.

This chapter offers a *status quaestionis* for medieval settlement research in Flanders and aims at describing the socio-economic background to the development of high medieval settlement landscapes within the County of Flanders. The focus will thereby be on Inland Flanders (covering the sandy, sandy loamy and loamy soils), but references to the situation in the coastal area will be made as well.

2.1 Medieval rural settlement research in Flanders

Historical and archaeological approaches to the rural medieval County of Flanders have long been constrained by a preferential focus on urban history and a lack of archaeological data. In contrast to the British perception that rural areas still preserve evidence of the past against commercial and industrial developments, Belgian scholars such as Pirenne (1939; 1971) were more interested in urban and pre-urban contexts. This should not be surprising, since Flanders had been one of the most urbanized regions in Europe since the twelfth century (Gardiner et al. 2012, 2; Hoskins 1955, 23; Thoen & Dejongh 2006, 177). Early general views and interpretations on the rural areas of Belgium were strongly influenced by Meitzen's (1895) division between an *Einzelhof* or Farmstead system south and *Dorf* or Village system north of the language border. This was based on alleged ethnic differences between Germanic and Roman populations. In 1926, Des Marez (1926) was the first to contest this ethnic explanation by stating that a division between farmsteads and villages occurred in all Belgian regions, due to the diffuse availability of water (Verhulst 1980, 11). Despite these general national studies, regional differences in rural settlement systems could not be explained. Although scarce historical studies on planted rural settlement such as Woesten had been carried out before (Six 1931), the rural history research field only started to gain momentum after the Second World War. Focussing largely on judicial, but also on socio-economic, political and agricultural aspects of agrarian areas, researchers such as Genicot, Koch, Verriest and Ganshof made considerable historical contributions to the field (Ganshof 1942; 1949; Genicot 1943-1982; Koch 1951; Thoen & Dejongh 2006, 178-179; Verriest 1916-1917; 1959).

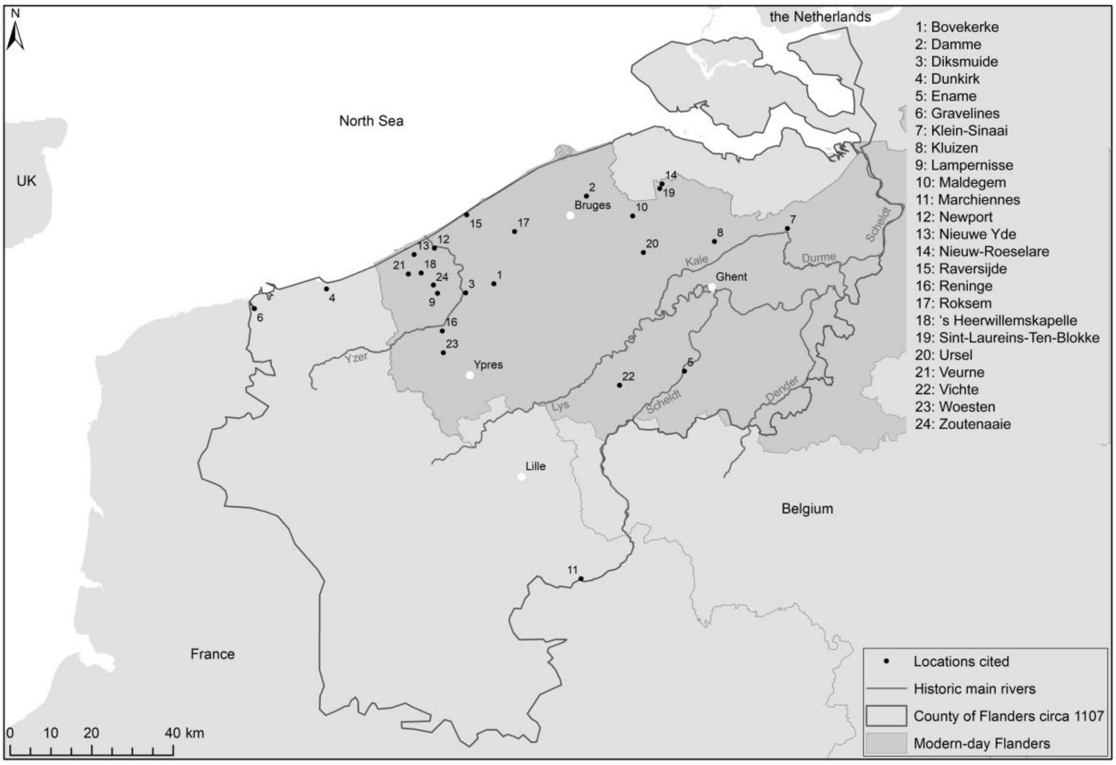

Figure 4: Cited locations.

The rural historian and historical geographer Verhulst was the first to incorporate landscape and settlements into the research field on medieval rural settlements. By acknowledging the importance of an interdisciplinary historical, archaeological and geographical approach, he had a major influence on the study of rural medieval Flanders

(Gysseling & Verhulst 1969; Prevenier & Thoen 1995; Thoen 2007b; Thoen & Dejongh 2006, 179; Verhulst 1958; 1966a; 1966b; 1995). His interest in medieval land organisation and reclamation resulted in several highly important publications on the medieval landscape in the County of Flanders. Verhulst's synthesis work, *Het landschap in Vlaanderen in historisch perspectief* published in 1965, was highly innovative for its time (Verhulst 1966a; 1966b). Together with the updated version *Landschap en Landbouw in Middeleeuws Vlaanderen* from 1995 (Verhulst 1995), it still is the most important reference work on Flemish rural medieval history for archaeologists and geographers. In particular the chapters and additional articles on the villages of Woesten and Kluizen allowed the reader to understand the socio-political processes involved in the plantation of settlements during the high medieval period. Moreover, both publications also increased the general awareness for the subject (Verhulst 1991a; 1991b).

For a long time, archaeological input into the research on medieval settlement structures was almost non-existent. Archaeological research on medieval habitation sites in the early-twentieth century was limited to small scale excavations and prospections by amateurs (Verhaeghe 1980, 37-38). During the interwar years, deserted villages such as Nieuw Yde and Raversijde received more interest, although no archaeological fieldwork took place on these sites. The mapping of the Belgian soil map, which started in 1947 in the area of Lampernisse (West Flanders), gave a new impulse to medieval archaeology in Flanders, as several deserted medieval moated sites were being discovered. In 1957, the Ghent branch of the *Belgisch Centrum voor Landelijke Geschiedenis* (Belgian Centre for Rural History) organised an excavation campaign at one of the moated sites, which dated the structure to the fourteenth century, and more habitation sites were studied over the following years. However, a systematic approach was lacking until the late 1960s and early 1970s, when interest in lost or deserted medieval rural settlements increased (Scollar et al. 1970; Verhaeghe 1980, 37-39; 1981).

Regarding the abandonment or loss of settlements, the German term *Wüstungen* is most commonly used in Flanders, with a distinction between *Dorfwüstungen* for deserted settlements and *Flurwüstungen* for deserted lands. Generally referring to the crises of the late medieval period as catalyst for these abandonments, Flemish historical research suggests that in Flanders the impact would have been limited (Thoen 1999, 75). Verhulst (1967b, 123-124) stated that the number of deserted or lost villages in Belgium is considerably lower than in England and Germany. A distinction can thereby be made between the high amount in Wallonia and a lower amount in Flanders. Within Flanders, more sites have been identified in the loamy than in the sandy areas. Thoen (1999) stresses in this context the difference between Coastal and Inland Flanders. Natural calamities would have had a larger impact on the coastal settlements than demographic deficiency in Inland Flanders.

The best known lost villages in Flanders are located near the border with the Dutch province of Zeeland. Swept away by floods, these were first described by Gottschalk (1955; 1983) and Verhulst (1967b). The latter ascribes the locating of Nieuw-Roeselare and Sint-Laureins-Ten-Blokke to local historian Verstraete (1957; 1965), who wrote several papers on the lost villages in the north of West and East Flanders. Unfortunately, these were published in a local historical magazine, therefore complicating access for many (international) academics. Due to the densely built up character of Flanders and the recurrent phenomenon of continuous on site habitation to date, specific archaeological research on villages has been limited to these deserted or lost medieval village sites. The most extensive research took place on the site of a late medieval fishing village in Raversijde, but Nieuw-Roeselare, s'Heerwillemskapelle, Zoutenaaie and Roksem were also partly studied, allowing for a first insight into the location and topography of these settlement sites (De Meulemeester & Termote 1983, 33; Mertens 1988; Pieters et al. 2013; Termote 1987).

At the same time, interest in other medieval rural habitation sites increased. From 1972 to 1976, prospections and trial excavations took place in the region of Diksmuide and Veurne, which identified 367 moated and non-moated sites. According to Verhaeghe (1980; 1981), the former date back to the late medieval period and were characterized by a moat of at least 5 meters wide and 2.5 meters deep. The continuing work of local archaeological services and, after the Flemish implementation of the Valetta Treaty in the 1990s, the increasing importance of development-led archaeology, has extended the archaeological dataset on rural medieval settlements considerably (De Clercq 2017, 48; De Clercq, Bats, et al. 2012). Furthermore, academic interest in the subject is increasing, especially in the development of new methodologies and in synthesising all available archaeological data on settlement morphologies. Excavations and geophysical prospections with a specific scientific goal were therefore undertaken at Klein-Sinaai, Maldegem and Ursel on enclosure sites and *Einzelhöfe* (De Clercq, De Smedt, et al. 2012; De Smedt et al. 2014; De Smedt, Van Meirvenne, et al. 2013). Together with the interdisciplinary landscape archaeological research on the harbour sites of the Zwin area by Trachet (2016), these studies show that the use of an integrated methodology using proximal and remote sensing methods significantly contributes to the location and interpretation of medieval rural sites. Nevertheless, archaeological fieldwork on planted settlements remains scarce.

2.2 The ’Great Reclamation Period’ in the County of Flanders

Historical research, mainly by Verhulst (1953, 349-351; 1991a; 1991b; 1995, 130-133; 1998a, 12), indicates that the occurrence of planted settlements in the medieval County of Flanders dates back to the high medieval and early late medieval period. The tenth to thirteenth centuries in the County of Flanders are generally referred to as the ‘Great Reclamation Period’, in which a complex interaction of economic revival, an increase in population, urban development and growing comital and elite power induced the reclamation of new arable lands (Dumolyn, Declercq, et al. 2018, 38; Thoen 1993a, 260; 2007b, 65-73; Thoen & Soens 2015, 227-229; Verhulst 1966a, 74-78; 1995, 128-133).

2.2.1 A period of intensification

Williams (2000) generalises the idea of reclamations for the whole Middle Ages, describing it as a period in which people consciously started to make deliberate decisions concerning land use, resulting in settlement intensification and the first large-scale systematic reclamation of forests. However, it must be emphasized that this idea of reclamation is culturally defined and variable through time. Verhulst (1957, 41-54; 1966a, 55), for example, defines reclamation as a shift from a natural environment of forests and *wastinae* (wastelands) towards a cultural landscape, based on human abilities and social structures. Since then, other scholars, such as Behre (1988, 648), Wickham (1994, 170) and Thoen and Soens (2015, 228) have challenged this idea and urged for a more nuanced conceptualization. Their work has shown that, in a day to day context, forests and wastinae were never hostile, wild and uninhabited natural areas, but were instead already used extensively for centuries as hunting grounds, for wood gathering and for grazing. The original idea of one general extensive forest covering large parts of the early medieval County of Flanders has therefore been abandoned. Through the work of Verhulst and the later nuances on the dichotomous view of nature versus culture also present in his work, it now is generally accepted that there rather would have been large forested areas, intermingled with wastelands and plots of degenerated forest. Oak, birch and elm would therein have been characteristic, while wastelands typically would have had a mixture of grasses, herbs, birch shrubs and oak (Haneca 2015; Tack et al. 1993, 18-21). These minor human landscape-interventions, be it direct or through husbandry, would have thinned out or, in some cases, degenerated forests since even before Roman and early medieval times, thus affecting the environment. The medieval reclamations would have enhanced this effect and created a closed landscape of fields and open spaces surrounded by hedges and groves. As described by the thirteenth-century writer Glanville, the Flemish landscape would have been characterized by many trees but few forests: "*Multas quidem habens arbores, non tamen multas silvas*." (Bartholomei Anglici quoted by Blanchard 1906, 335). However, historical and archaeological sources reject such a total depletion of forest and ascribe an equal importance in the medieval economy to forests and wastelands as to pastures and fields (Haneca 2015; Wickham 1994, 184). In the context of twelfth-century Cistercian reclamations in France, for example, Aberth (2013, 94) states that forests "were not enemies to be overcome but useful resources to be managed". Following this line of thought, the 'Great Reclamation Period' would therefore have been a period of intensification of human use and influence on the non-cultivated forests and waste lands, rather than an *ab nihilo* reclamation.

2.2.2 Phased development

In spite of more recent general overviews of the medieval landscape history of the County of Flanders, it is for now generally accepted that, following a pattern of shifting cultivation in the early medieval period, reclamations for Inland Flanders (i.e. part of the county outside the coastal area) a more intense landscape use commenced already in the seventh to ninth centuries (Tack et al. 1993, 18-21; Thoen 2007b, 60-65; Verhulst 1995, 118). Recent archaeobotanical research stresses that significant geographical differences must be taken into account when addressing early medieval landscape use though (Deforce & Ervynck 2019). Due to increasing population density, related intensification of agriculture, and increasing power of landowners, settlement location stabilized from the high medieval period onwards (Hamerow 2002, 105; Thoen 2007b, 62-65). As a consequence of the counts their growing central political power, which was largely based on their possession of land through rural estates across the county, they became the most influential landowners. This had been possible thanks to the acquisition of royal manors and the use of a regal right on vacant lands, the so called Wilderness rule, allowing the counts to claim control and jurisdiction over large areas of wastelands and abandoned abbey demesnes from the ninth century onwards (Deschepper 2016, 23; Tys 2004, 34; Verhulst 1958, 57). In practice, this meant that the initiative for reclamation was taken by the counts themselves or had to be approved by them (Thoen 1993a, 260-261; 2001, 107; Thoen & Soens 2015, 228; Verhulst 1966a, 75; 1995, 116). Although during the tenth century the exploitation of forests and *wastinae* initially remained mainly a small-scale local enterprise around villages and farmsteads, reclamation intensified and became more systematic. The coastal area would have been used more extensively as *terrae ad oves* or grazing grounds for large sheep holdings on the *marisci* (salt marshes) and individual farms on slightly elevated locations in the tidal landscape (Tys 2010; 2012b; 2013, 207-208; Verhulst 1966a, 19; Verhulst 1998b). In the context of these sheep holdings on comital lands or domains, though, embankment of the coastal areas started already in the tenth and eleventh centuries using a system of local nuclear embankments or *ringdijken* as protective enclosures (Tys 2013, 217-220; Verhulst 1966a, 27). A second reclamation phase, from the eleventh to late-twelfth centuries, induced a large-scale increase in exploitations. The growing demand for luxury goods by the increasingly wealthy and powerful Flemish counts and their nobility would have stimulated rural specialisation and an increase in agricultural production (Thoen 2001, 106-107; Thoen & Soens 2015, 226). Simultaneously, continued urban development and an ever-growing population of city dwellers induced the further need for larger agricultural yields, fuel and timber, which triggered the introduction of new agricultural techniques as well as the cultivation of more arable lands (Deforce 2017; Hoffmann 2014, 122-127; Thoen 1993a, 265; Thoen & Soens 2015, 226 and 229; van Cruyningen & Thoen 2012, 2). The counts of Flanders started to become actively involved in the process by planting new settlements, such as Kluizen and Woesten. Intended to expand the political and social power of the initiator, the planting of extraction villages characterized a period in which the reclamation of forests and wastelands became systematic (Tack et al. 1993, 20; Verhulst 1966a, 75-76; 1995, 130-131). An eyewitness of these reclamations would have been Gervasius, Archbishop of Reims. Around 1060, he send a letter to count of Flanders Baldwin V to commemorate him on his splendid efforts and achievement to reclaim such lands (Petri 1974, 700; Willems 1840, 173 and 177). Based on his political power and quasi-monopoly over *wastinae*, the count was able to give the settlements he planted political, fiscal and legal benefits in contrast to the surrounding settlements of other landowners (Tack et al. 1993, 20; Verhulst 1966a, 75-76; 1995, 130-131). Verhulst (1992a; 1992b) emphasizes, however, that this granting of benefits was not necessarily a common practice. Nor does the planned row morphology of a settlement by definition exclusively relates to the granting of benefits (i.e. a row planned village would not necessarily have been granted benefits). On the other hand, he argues that a regular row planned settlement structure can be linked to an *ab nihilo* plantation, based on its structured lay-out and morphology (Verhulst 1992a; 1992b; 1995, 130-133).

A relatively early example of the count of Flanders' influence in settlement plantations is the village of Kluizen to the north of Ghent in the modern-day Belgian province of East Flanders. It is one of two well-documented and studied cases of the count's involvement in the reclamations. Its origin is referred to in two charters from 1140, in favour of count Thierry of Alsace. One of these is in fact a confirmation of an earlier charter in favour of count Baldwin VII (1111-1119), who around 1115 had granted the abbey of Ename a plot of uninhabited wastinae between Rietvoorde and Langebeke. Baldwin's request to the abbey was to build a church and priory for twelve monks, who would be made responsible for leading and managing the reclamation. Count Baldwin himself intended to build twelve farms and attract colonists to support the monks. These future colonists would receive legal, military and taxation privileges. Count Thierry of Alsace's only addition in the charter of 1140 was the granting of the rights of water and pasture for the livestock already present (Milis 1961, 13-14; Verhulst 1991a). According to Verhulst (1991a) this indicates that the abbey of Ename had not acceded to Baldwin VII's request to build a priory, which meant that the planted settlement had to be safeguarded against the viscount of Ghent, invoking his rights to the water of the canal between Ghent and Zelzate. Count Thierry of Alsace's second charter no longer mentions the building of a priory, but confirms the rights of those already living at Kluizen. Verhulst (1991a) thus concludes that the original idea of a priory had been abandoned.

This failure of the ecclesiastical aspects of the settlement plantation at Kluizen is not the only instance of a difficult collaboration between the count and an ecclesiastical institution. In Woesten, a village situated to the northwest of Ypres in the modern-day Belgian province of West Flanders, an intended priory of the abbey of Marchiennes was also never built. Before its plantation and granting of privileges by count Thierry of Alsace in 1161, the territory of Woesten was part of Reninge, to the southwest of Diksmuide (Verhulst 1991a). A major area of this fief of the count of Flanders was covered in forest described in a 1161 charter in favour of Thierry of Alsace as *solitude Riningensis* (uninhabited wilderness of Reninge) (de Hemptinne & Verhulst 1988, nr 194, 301-303; Verhulst 1991b). According to another charter of 1161, the abbey of Marchiennes was granted tithes in a part of this forest, as well as a plot of land, large enough to build a church and priory. However, in a second charter later that year, the abbey of Marchiennes is no longer mentioned (de Hemptinne & Verhulst 1988, 300-301; Verhulst 1991b). Instead, the count orders the foundation of a church as the centre of a new parish, the vicar of which will be paid by the count himself. Verhulst (1991b) states that this change of plans can be explained by the influence of count Theirry's son, Philip of Alsace. While the first charter was in Thierry's name only and probably made at the request of the abbey of Marchiennes, the second charter was influenced by Philip and at the initiative of the count himself. The reason for this may have been founded on Marchienne's delay in building a church and priory. By taking the ecclesiastical initiative, the count might have wanted to safeguard the settlement against the influence of the lord of Reninge (Verhulst 1991b).

Regarding their respective morphologies (Figure 5), it can be noticed that in contrast to Kluizen, Woesten is not characterized by long perpendicular plots along an axis of exploitation. Although the settlement is located along a supposed Roman road named the

Steenstraat, no habitation is regularly concentrated along it. The exact reason is unknown, but Verhulst (1991a; 1991b) suggests that a different and less organized method of exploitation of the forest may have caused this atypical settlement morphology. Van Acker (1986, 354) suggests a possible influence of pig breeding, which would coincide with a more intensive use of the forest. He links this to the research of Mertens (1970, 76-77) who stated that the high numbers of acreage for the production of oats suggests a low population density in Woesten. Van Acker (1986, 354) suggests that therefore not all forests were turned into arable fields, but were instead used for pig breading.

Figure 5: Comparison of morphologies for Woesten and Kluizen. Left: Count de Ferraris's Carte de Cabinet for Woesten (1771-1778, geopunt.be/KBR, The Royal Library of Belgium). Right: Map of Kluizen along the channel from Langerbrugge to Ertvelde, made by J. Balde (1654, State Archives Ghent, Map collection P. De reu, nr. 1784).

Besides these plantations by the counts, ecclesiastical and lay landlords also planted settlements on their own lands. In most cases these consisted of large single farms or *Einzelhöfe* that acted as centres for further reclamations (Verhulst 1953; 1958). However, several examples of grouped rural settlements can be found as well, for example the villages of Vichte and Bovekerke. By offering low rents, local lords tried to attract as many settlers as possible, aiming at high monetary revenues (cf. infra) (Berings 1985, 69; Thoen 1990, 25). In the coastal areas, during the eleventh and early-twelfth centuries, defensive longitudinal dikes along tidal channels were build. The reclaimed lands were now mainly used as grazing ground for *bercaria* and *vaccaria* or sheep and cow farms which were organised on a large scale (Tys 2013, 217-220; Verhulst 1966a, 27).

During the reign of Thierry of Alsace (1128-1168) and especially of his son Philip of Alsace (1168-1191), reclamations in Inland Flanders slowed down and even seem to have stopped (Verhulst 1966a, 78; 1995, 133). Only thirteen of the 559 charters known to have been issued during the reign of Philip of Alsace are explicitly related to inland reclamations. In one of charters referring to the County of Vermandois, which was in the possession of Philip and his wife Elisabeth, concerns about the degrading forests were given as reason to revoke the logging rights (de Hemptinne & Verhulst 1988; de Hemptinne et al. 2001, 84-85; 2009; Deschepper 2018, 13). By shifting the focus towards the foundation of harbour towns, such as Dunkirk, Newport, Gravelines and Damme, efforts were made to save the degrading forests. In Coastal Flanders, the extraction of peat became increasingly important in order to supplement and replace wood as fuel (Deforce et al. 2007; Jongepier et al. 2011; Verhulst 1967a, 233). Archaeobotanical research on wood and charcoal in the city centre of Ghent by Deforce (2017), indicates a decrease in wood quality from the tenth to twelfth centuries. Initially, specific taxa were selected for their good properties as fuel or construction materials. During the eleventh century, medium quality local wood began to be used, which further changed to low quality local and high quality imported taxa in the twelfth century. Research by Haneca (2015) on the appearance of imported timber in historic buildings in Flanders affirms this evolution.

In the early-thirteenth century, from 1215 to 1250, new demographic pressure induced a third phase of further reclamations, mainly in the northern parts of the county. These were no longer initiated by the count. Instead, lands were sold or given in concession to entrepreneurs, primarily lay elites who planted new settlements as well (Tack et al. 1993, 20-21; Verhulst 1958, 213; 1966a, 79-80; 1966b, 99-116; 1995, 134-139). For the coastal regions, Soens et al. (2014, 138) consider this thirteenth century as the starting period for the creation of sea walls parallel with the coast. In the late-thirteenth century, however, economic expansion decreased and due, to financial problems of both ecclesiastical institutions and lay elites, reclamation activities stopped around 1280 (Verhulst 1995, 145).

Based on the literature regarding the 'Great Reclamation Period' cited above, a general shift in initiators can be observed. In the tenth and early-eleventh centuries, individual settlement inhabitants played an important role in planning and performing reclamations close to their habitations. During this period, an extensive powerbase allowed the count to gain a monopoly on reclamations and the plantation of settlements. Towards the end of the period, the initiative and operation shifted towards other landlords, including both ecclesiastical institutions and lay elites. Thoen and Soens (2015, 6-7) challenge this traditional view on the initiators or reclamations. They state that lords and peasants had a joint interest in reclamations. Peasants wanted to add small plots of forest or wastinae to their holdings, while lords allowed and even encouraged this in exchange for fines or rents. Lordly and monastic reclamations are over-represented because these are often better documented than those by peasants and lay elites. Thoen and Soens (2015, 228) demonstrate this claim by referring to the 180 estates of the abbey of Lobbes near Thuin in the former prince bishopric of Liège (outside the County of Flanders), which had already been reclaimed and cultivated before they were donated to the abbey.

2.2.3 A diffusion in socio-economic systems

Historical research has indicated that the socio-economical structures within the county would have strongly influenced the landscape reclamations and related settlement landscapes. During the high medieval period, the agricultural production within the County of Flanders would have increasingly been characterised by regional specialization. In this system, three complementary sub-regions, i.e. coastal areas, central Flanders (sandy soils) and southern Flanders (loamy soils), provided different products for the commercial circuits and provisioning of the growing towns (Thoen 1993a, 269). Based on historical data for the comital demesnes in these three sub-regions, general insights can be gathered about the variation in productions. While the coastal area was specialized in fishing and stock-breeding related products (e.g. wool, butter, milk, meat, hides), the central and southern parts of the County were known for its cultivation of respectively oats (related to the production of ale) and cereals. For the central region, this would have been completed with pig-breeding (Thoen 1993a, 269-273).

Despite this tripartion, historical economic research indicates that the main differences in farming systems and agricultural development were to be found between the coastal areas and Inland Flanders (Thoen 1999, 76-77; 2001; 2004; Verhulst 1966a; 1966b; 1995). Thoen (2004, 47-52; 2007a, 89) refers to these as 'social agrosystems', which were built up, influenced by and could be changed by different factors (e.g. social relations, environmental aspects, power structures, economic situation, size of holdings). However, the differences between the coastal area and Inland Flanders would have remained limited during the high medieval period, since peasant smallholders were dominant in both regions. Nevertheless, an increased number of large holdings would already have been present in the coastal areas in comparison to Inland Flanders, related to stockbreeding activities (cf. *vaccaria* and *bercaria*). The contrary evolution between the two regions became more pronounced from the late medieval and early modern periods onwards, strongly related with the growing difference in lordly influences in both regions (Soens 2009, 74; Thoen 2004, 53-54; Thoen & Soens 2015, 224-225). Despite the fact that the dichotomy mainly increased from the late medieval period, Thoen (1990, 22-31; 1999, 76-77) considers the 'Great Reclamation Period' as important for this differentiation process.

The intensified reclamations would have started earlier in Inland Flanders, which allowed for a feudal tradition to develop. The elite urge for luxury goods by local lords resulted in a need for more monetary revenues. Labour duties and payments in kind were therefore changed into fixed rents or *cijnzen*, which were mainly monetary in nature (Thoen & Soens 2015, 224). Due to economic growth, these rents would devaluate, which made it possible for small farmers to invest more into reclaiming new land for more profit. From the twelfth century onwards, local elites developed a policy of stimulating population growth and attracting new settlers in order to keep their overall revenues stable and to expand their influence and wealth (Thoen 1990, 24; 1999, 76). They aimed at attracting as many people (the more people, the more revenues) as possible by issuing low rents and by offering privileges (Thoen & Soens 2015, 224), as was also the case for the comital settlement plantations of Kluizen and Woesten (cf. supra).

This resulted in the prevalence of mainly small family holdings within a system of 'commercial peasant economy' (Thoen 2001, 111-112; 2004). The main goal of production was for the family to survive, and although a small amount of production might have been intended for market purposes, no clear commercial intentions were present (Thoen 1999, 76-77; 2001, 111-112; 2004, 53-58). The larger holdings in Inland Flanders, although limited in number, were highly important in this system since they provided for the necessary additional employment (labour on the larger farms) for small farmers and offered support by lending equipment such as horses, mills and ploughs. Without these, most of the small holdings were not large enough for subsistence (Lambrecht 2003, 240; Thoen 1999, 76-77; Thoen & Soens 2015, 226). Many of these larger holdings would have been part of ecclesiastical demesnes, planted as centres of exploitation (Thoen 1990, 25; Verhulst 1953), or were moated sites that were property of urban elites or wealthier local farmers (Thoen 1990, 21 and 30-31; Thoen & Soens 2015, 224).

Considerable differences in political power structures within Inland Flanders, however, resulted in different speeds of these evolutions. Thoen (1990, 26-27) demonstrates how the counts of Flanders were able to limit the power of local lords in the region of the river Lys, while that was less the case between the rivers Scheldt and Dender. In general, however, Thoen (1990) considers these local powers to be diminishing from the twelfth century onwards in favour of the Flemish cities and its urban elites.

This had severe impacts on the (settlement) landscape of Inland Flanders. From the twelfth and thirteenth centuries onwards, in other parts of Europe an evolution towards collective crop rotation systems (*Flurzwang*) took place on the level of the community/settlement. This allowed to maximize the decreasing capital within the individual holdings, as these were decreasing in size. The result was an open landscape without field boundaries, forced upon the community by a political powerbase. However, this was not the case in Inland Flanders, where a closed landscape was predominant. Crop rotation systems did exist, but rather on the level of the individual holdings, except for the micro-openfields (*kouters*) that would have developed from the ninth century onwards but became more important during the twelfth century. In these *kouters*, the most important arable lands of a settlement were grouped, resulting in an open landscape that was intensively cultivated (Thoen 1990, 28-29; 1993b, 71-92; 2007a, 90-91; 2010; Verhulst 1995, 121). Thoen (1990, 28-29) states that this different evolution in the County of Flanders is caused by the diminishing power of the local lords, who were not able to impose a change in agricultural approach and landscape upon the communities. Furthermore, he considers the urgent need of capital rather limited since the countryside was closely related to the cities and market economies across the county.

In contrast to the evolution within Inland Flanders, local lordly power was less present in the coastal area. Instead, the count was able to continue a system of comital officials at the local level. Besides this strong comital influence, it also attracted investments of several abbeys and urban elites. Far more than in Inland Flanders, these reclamations were characterised by large farm holdings, the majority of which focused on commercial production (Thoen 1999, 76-77; 2004, 53 and 56). Soens and Thoen (2004) point out that the number of peasant landowners in the coastal area decreased from the late-thirteenth century onwards. This evolution in property structures was most likely amplified due to environmental pressures in the coastal area, such as storm surges, and increasing costs of maintenance of infrastructure for water management. This caused the majority of the small holdings to disappear in the post-medieval periods (Soens 2009, 79-80; Thoen 2004, 55).

2.3 Conclusion

The research reviewed in this chapter has indicated a great variation in socio-economic organisation of the rural areas within the high medieval County of Flanders. On a county level, the main differences were described between the coastal area and Inland Flanders. However, at a regional and local level, many differences occur as well. This impacted the rural landscape and settlements in different ways. Especially the so called ‘Great Reclamations’ are considered to have been influential in shaping the environment and inducing the plantations of new settlements. Different regional and local geographies, politics and socio-economic relations during these reclamations resulted in different landscapes and settlement systems. Despite these local differences, Verhulst considers this period as of vital importance for the evolution of the planned row settlements within the County of Flanders.

Chapter 3 Little Flanders beyond Wales: The historic context of Flemish settlement landscapes in South Pembrokeshire and elsewhere

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3.1 Introduction

> "Itaque Britannia in praefenti quinque gentibus inhabitatur […] Additur his & nostro tempore sexta nacio, i.e. Flandrenses, qui de patria sua venientes, in regione Mailros in consinio Gualiarum jubente rege Henrico habitacionem acceperunt. Qui hoc usque in insulam catervatim confluentes, nec minus quam indigenae armis & milicia potentes, magnam sibi jam in ea partem sub Normannis militantes adquifierunt." [There presently live five peoples in Britain, […] to these can be added in our time a sixth nation, that is the Flemish, who from their own land come to region of Mailros in the confines of Wales at the orders of King Henry in order to settle there. Having until then gathered in the island in large numbers, no less powerful in weapons and soldiers than the indigenous population, they have made large acquisitions there for themselves as fighters under the Normans.] (Hearne 1716, 10; cited in Oksanen 2012, 178).

As the chronicler Alfred of Beverley c. 1143 describes in his *Aluredi Beverlacensis Annales*, large numbers of Flemings were present in Britain in the aftermaths of the

Norman Conquest and were resettled in South Wales at the orders of King Henry I. Studies of pre-Conquest relations suggest a growing interaction between Flanders and Britain in the late-tenth century, focusing on ecclesiastical relations and mobility, and political marriages across the Channel. For many, the county would have been the first stop on their travels from the British Isles to the continent, while several institutions such as the Abbey of Saint Peter in Ghent would have had properties in Britain (Grierson 1941; Oksanen 2012; Vanderputten 2007; 2017). More recently, also economical and commercial contacts are getting more attention. Dumolyn, Declercq, et al. (2018), for example, suggested a growing importance of the mercantile function of Bruges within a wider network along the North Sea from the middle of the tenth century onwards. Following Anthony's (1990) model, Flemish migration to Britain can therefore clearly be considered as leap frogging, since there were already political, economic and social contacts.

The Norman Conquest, in which Flemings had an active role, would have created opportunities for migration (George 1926; Oksanen 2012, 197-208). Following the Conquest, Flemings played a variety of roles in politics and society, whether as lords, settlers, merchants or mercenaries (Keats-Rohan 2001; Nieus 2015; Sharpe 2011; Tanner 1991; 2004). In Domesday Book, for example, men identified as Flemings held estates in twenty-seven counties and fifteen names could be retained as tenants-in-chief (Verberckmoes 1988).

It is unclear whether emigration was prompted by socio-economic opportunism, ecological or environmental stress, or by demographic pressure. Moreover, it is difficult to pin down exactly how many individuals emigrated from Flanders to settle abroad (Koebner 1942; Oksanen 2012, 183; Rowlands 1980; Thoen & Soens 2015; Toorians 1996; 1998). The only relatively well-known personal information available for these twelfth-century migrations are the names of supposed Flemish leaders embedded in settlement place names, as is the case for Wiston (Wizo) and Thankerton (Tancred) in both Upper Clydesdale (Scotland) and Pembrokeshire (Wales) (Toorians 1990; 1996). These members of the lay elite would have acted as *locatores*, who contracted with the king or ecclesiastical dignitaries, similarly to Flemish settlers in Germany from the twelfth century onwards. They were responsible for both planting new settlements and attracting colonists (Aubin 1942; Kissock 1990, 220-229; 1997; Rippon 2008, 242-249; Rowlands 1980, 148; Toorians 1990, 109; 1998, 69-88; van der Linden 1982). As suggested by Davies (1990, 11), considerable population movements thus must have been of vital importance for these settlements and colonisations. He states that the military aspect of conquest has often been highlighted, while entrepreneurial efforts would have been equally influential.

Moreover, these above mentioned settlements show striking morphological and topographical similarities with planted rural settlements from the tenth to twelfth centuries in the County of Flanders (Kissock 1990; Rippon 2008, 243; Roberts 1987, 199-200; Verhulst 1995, 130-133). Previous research on the Flemish migrations, however, has focused on the economic and political relations of the existing local and incoming new (Flemish) social elites. Detailed studies on morphology, dating and origin of rural settlements and related field systems in Britain, has only hypothesized a Flemish influence on planted villages in Clydesdale (Scotland), Pembrokeshire (Wales) and Northumbria (England). Both Roberts (1987, 199-200) and Kissock (1990; 1995, 115-118; 1997) argued that an Anglo-Norman plantation is one of the possible origins for several Pembrokeshire villages. Toorians (1990; 1996) in turn, described the similarities in place names between Scottish and Welsh villages.

The aim of this chapter is to give a critical overview of current research on Flemish planted rural settlements outside the County of Flanders. Drawing on a broad range of national and international literature (in languages including English, French, German and Dutch), this chapter will offer a platform for renewed research into the influences of a small yet dynamic medieval county on its North Sea neighbours.

3.2 "Flemings", what's in a name?

The medieval County of Flanders covered the modern-day Belgian provinces of West and East Flanders, the southern parts of the Dutch province of Zeeland and parts of the French *départements* le Nord and Pas-de-Calais (Figure 4). It should be considered, however, to what extent the mentioning of Flanders and Flemings in historical sources specifically referred to the County of Flanders itself. Toorians (1996, 659) suggest that "outside the Low Countries the name Flanders in the Middle Ages was as loosely used as 'Holland' is today, and so in the British Isles the term 'Fleming' may well cover people from such areas as Artois, Cambrai, Hainault, Brabant, Zeeland and Holland as well". Indeed, only Flemings are mentioned in the context of Domesday inquest (Darby 1977) and that of the planted row settlements in Wales (Kissock 1997; Roberts 1987; Toorians 1990), which might suggest that it was used as a catchall for people from different regions in the Low Countries. Similarly, further east in the Transylvanian part of the former kingdom of Hungary, settlers who came at the invitation of King Geza between 1140 and 1150 were described as Flemings. It is debated, however, whether these settlers came indeed form Flanders, or whether the designation was in fact used as some sort of nickname for settlers in general (Bartlett 1993, 115). Foreigners in sixteenth- and seventeenth-century Genoa, for example, were known as *Fiamminghi*, which literally means Flemings, but would have had a general reference to people coming from north of the Alps (Bober et al. 2020, 58). Nevertheless, the *Slawenchronik*, written by Helmold von Bosau around 1170, distinguishes people from Flanders, Holland, Utrecht, Frisia and Westphalia (cf. infra) (Helmold von Bosau 1963, 210-213 and 312-315), which in turn might suggest a clear understanding of the different regions of origin at the time.

The use of certain expressions or identifications might be related to different preferences of the narrative sources or changes through translations. Sharpe (2011, 5-7) indicates, as case study, how the meaning of the Old English *frencisc* in legal texts changed from 'Normans' into 'French' through translations into Latin. Furthermore, as presented by Oksanen (2012), the mentioning of peoples changes over time, most likely related with changes in political importance. At the tenth-century court of King Edgar, Flemings were mentioned besides Saxons and Danes (Mynors et al. 1998, 239-242; Oksanen 2012, 180). Almost two centuries later, post Norman conquest, Alfred of Beverley noted around 1143 only five peoples in Britain: the Welsh, the Picts, the Scots, the Normans, the English and the Flemish (Hearne 1716, 10; Oksanen 2012, 178). The ascription of an origin to peoples is of course a complex matter. In several individual cases, however, personal names directly refer to a place of origin. Oksanen (2012, 178-197) and Verberckmoes (1988) highlight how several tenants-in-chief with names referring to places in the southern parts of the County of Flanders and Artois are mentioned in Domesday Book. For others the appellation *flandrensis* ('the Fleming' or 'from Flanders') is used. It is unclear, however, whether the person himself took that name or it was ascribed to him assuming he came from Flanders. Keats-Rohan (2001, 141) states that most of these originated in the county of Lens in the Artesian parts of Flanders. She considers the Artesian Flemings as members of the elite with strong connections to Eustace of Boulogne, with whom they would have gone to Britain (Keats-Rohan 2001, 142).

Regarding the Östsiedlung, Petri (1974, 710) states that terms such as 'Fleming' should be interpreted in a political-geographical way. Building on that, Lück (quoted in Bünz 2008, 99) states that the *flämisches Recht* (Flemish law) is not a direct reference to the origin of the settlers that used it. Bünz (2008, 101) supports this by referring to a 1152 charter in which settlers in the village of Flemmingen are described as:

> "Hollandini, qui et Flamingi nuncupantur" [people from Holland who were also called Flemings] (Bünz 2008, 101).

This would indeed indicate that the ascription of a region of origin to people in historical sources was highly volatile and that people were given other appellations, even when their region of origin would have been known. For when William of Malmesbury, in his *Gesta Regum Anglorum*, refers to the kinship of the 'English' Flemings and the mother of king Henry I (who was the daughter of Baldwin V count of Flanders) (Mynors et al. 1998, 727), it can be assumed that the chronicler had a clear understanding of the County of Flanders and its political relation with England. The correct identification or appellation of individuals and people outside these political contexts may, however, have been more difficult and unclear, resulting in the use of Flemings as catchall.

3.3 Flemish settlements in Britain

Besides important efforts in reclamation of forests and wasteland and the ab nihilo plantations of nucleated settlements by Flemish elites in the medieval County of Flanders itself, considerable efforts were made by Flemings in Britain.

3.3.1 England

The Norman Conquest of England, brought new opportunities for military and elite migration (Oksanen 2012, 178-218). Research by Verberckmoes (1988, 726) on fourteen Flemish tenants-in-chief mentioned in Domesday Book, indicates that individuals of the Flemish elite held estates from the southwest (Devon, Somerset and Dorset), through the Midlands and Lincolnshire up to Yorkshire in the north east. Apart from the concentrated holdings of Drogo de Beuvière in Holderness and of Gilbert of Ghent in Lincolnshire, all the estates of individual Flemish tenants-in-chief were scattered across the country (English 1979; Oksanen 2012, 188-189; Verberckmoes 1988). However, large clusters of holdings by different Flemings were recorded in Bedfordshire, Buckinghamshire and Northamptonshire in the Midlands. Verberckmoes (1988, 725), however, argues that there was no organized Flemish colonization in England by the time of the Domesday survey (1086). Oksanen (2012, 183) contradicts this by arguing that an important region of early Flemish settlement was in northern England, primarily focused around and to the north of Durham. Given that the Domesday survey did not cover this region, very little information is available. A charter, dating between 1066 and 1069, by William the Conqueror to the Archbishop of York, guaranteed the bishops rights and properties and insured compensation for wrongdoings by Frenchmen, Flemings or Englishmen (Oksanen 2012, 183; Sharpe 2011, 8-9). By 1069, Robert of Comines (a place located between Lille and Ypres) was named earl of Northumbria while Gilbert of Ghent had become governor of York in the same year. Both would have brought with them a large retinue (Oksanen 2012, 183-184). Furthermore, Henry of Huntingdon and William Camden mention a

Flemish presence in Carlisle in the late-eleventh and early-twelfth century (George Owen of Henllys 1994, 17; Toorians 1990, 108-109). The most explicit mentions of Flemish presence in England are, however, indirectly given by near contemporary chroniclers describing Flemish migration to Wales. Detailed information is scarce though. Toorians (1990, 108-109) concludes though that there already must have been Flemish settlements in the Scottish borderlands in the late-eleventh and early-twelfth century.

Although rural settlement origin, plantation and morphology have been major interests of historical, archaeological and geographical research in England (Allerston 1970; Hoskins 1955; Oosthuizen 2002; Roberts 1987; Taylor 1983; Taylor 1992), little attention has been paid to any possible Flemish influence on the English settlement landscapes. Roberts (1972; 1982a; 1982b; 1987; 1988; 1992; 1996a; 2008), for example, carried out major research on the morphology and origin of English villages, originally focusing on northern England. He ascribed an early Anglo-Norman planted origin to the planned settlements in County Durham and Cumberland. Harvey (1980; 1981; 1982; 1983) argued the same for the settlements in Holderness, were she notices similarities with planted settlements in Germany, east of the River Elbe. Roberts (1987, 199-200) was the first, and so far the only, scholar to describe a possible relation between these plantations and a Flemish presence during the Anglo-Norman period.

3.3.2 Scotland

For Scotland, it is generally accepted that Flemish migration started early in the Anglo-Norman period. Available data on their eleventh- and twelfth-century settlement is, however, fragmentary, and scarcely more substantial than the presence of personal names in charters. Two key areas of Flemish presence can be discerned, however. Upper Clydesdale in Lanarkshire and Moray in the northeast of Scotland (Figure 6), occur most in the written sources (references to historical sources on specific individuals can be found in Barrow 1973; 1980; Duncan 1975; Ritchie 1954). Furthermore, several Flemings appear to have owned lands in West Lothian, Cunningham and Annandale (references to historical sources on specific individuals can be found in Toorians 1996). Most of them would have come to Scotland during the reign of King David I (1124-1153) and his grandson Malcolm IV (1153-1165), who expanded their power over these areas, thereby ousting traditional rulers and replacing them by non-locals. The origin of these Flemings, however, is unclear. Some of them may have come from the Scottish royal fiefs in England, others may have fled England c. 1150 after their expulsion by Henry II (Barrow 1973, 288-291 and 328-329; 1980; Davies 1990; Duncan 1975, 137-138; Fleming & Mason 2019, 46-54; Owen 1895; Ritchie 1954, 374-379; Toorians 1996, 663).

In Upper Clydesdale, lands that originally belonged to the see of Glasgow, were granted to Flemings during the reign of Malcom IV (1153-1165) (Barrow 1973, 329; Duncan 1975, 137). Barrow (1973, 329) and Duncan (1975, 258) state, however, that David I had retained these lands in his own hands before Malcolm IV divided it into knight's fees. Although the material on these events is considered as scattered by Barrow (1973, 288), the oldest indication of Malcolm IV's activities in Upper Clydesdale dates to 1162 (*Regesta Regum Scottorum* 1960, act 198). According to Duncan (1975, 137) and Toorians (1996, 664), the most important of these knights was Baldwin the Fleming. First recorded in 1162 in the Registrum S. Marie de Neubotle, he was lord of Biggar and the first known sheriff of Lanark. Another explicitly named Fleming was Robert, who was described as brother of Lambein Fleeming. Robert left his name in Roberton, while the village of Lamington is named after his brother Lambin (Barrow 1973, 329; 1980, 45; Duncan 1975, 181; Ritchie 1954, 375; Toorians 1996, 667). A charter in the cartulary of Arbroath indicates that Malcolm IV also granted lands to a certain Tancard, who is believed to be a Fleming and left his name in two Thankgertons near Bothwella dn Lanark. Furthermore, Kelso abbey received from a settler called Wice or Wizo the church in his village, Wiston. Another village in Clydesdale with a name referring to Flemish settlers is Symington, which is believed to refer to Simon Loccard (Barrow 1973, 350; Duncan 1975, 181; Toorians 1996, 667).

The Flemish colonization of Moray is less clear. The only charter that makes explicit reference to a Fleming, was issued by Malcolm IV to Berowald Flandrensis in 1160. Already holding land in West Lothian, where he left his name in Bo'ness or Berowalds-toun-ness, he was granted lands in the Laich or Low lying part of Moray near Elgin (Barrow 1973, 282; Oram 2006, 294; *Regesta Regum Scottorum* 1960, act 175; Toorians 1996, 663-664). Though fertile today, these lands would have been marginal, undesirable and in parts heavily forested marshlands during the twelfth century. However, the key figure, bearing a Flemish name, though never explicitly called a Fleming in the sources, was Freskin. He was granted Duffus in the Laich of Moray and, like Berowald, he already owned land in West Lothian (Duncan 1975, 138; Oram 2006, 282; *Regesta Regum Scottorum* 1971, act 116). A third supposed Fleming, Peter de Polloc, also held an estate in West Lothian and was granted lands on Speyside c. 1176 (Oram 2006, 294; Toorians 1996, 663-664). According to Oram (2006, 289-297), these Flemings marked their arrival with the building of a castle, in contrast to Gaelic magnates in upland Moray.

The aforementioned Flemish landowners in Upper Clydesdale and Moray would have formed a close community of people with all sorts of political, economic or kin relations. The fact that they also owned land in Cunningham, Annandale and Lothian, may suggest a strong trans-regional connection with and active involvement in the Flemish settlement (Toorians 1996, 668). Furthermore, Oram (2006, 296) suggests that it was Freskin's cultural background of Flemish reclamations and the preparedness to take undesirable land, which drew him to Moray. Both Clydesdale and Moray became major suppliers of wool to Flanders in the late-twelfth and thirteenth century, indicating a strong connection with their homeland (Toorians 1996, 668).

Research on the Flemish origin of the settlements presented above has been scarce to non-existent, most likely due to a historical gap in Scottish archaeological knowledge. Dalglish (2012, 272-273) states that, up until the 1950s, medieval settlement research in Scotland was neglected in favour of prehistoric sites. Even into the 1990s, little progress had been made. Intensity of agriculture, fragile remains and a lack of acknowledgement for medieval Scandinavian settlement archaeology in Scotland, made it difficult to gain further insights. As in Flanders, recent development-led archaeology allowed an extension of the archaeological data on medieval settlements. As it stands, however, Flemish settlements in Scotland have, so far, been largely ignored.

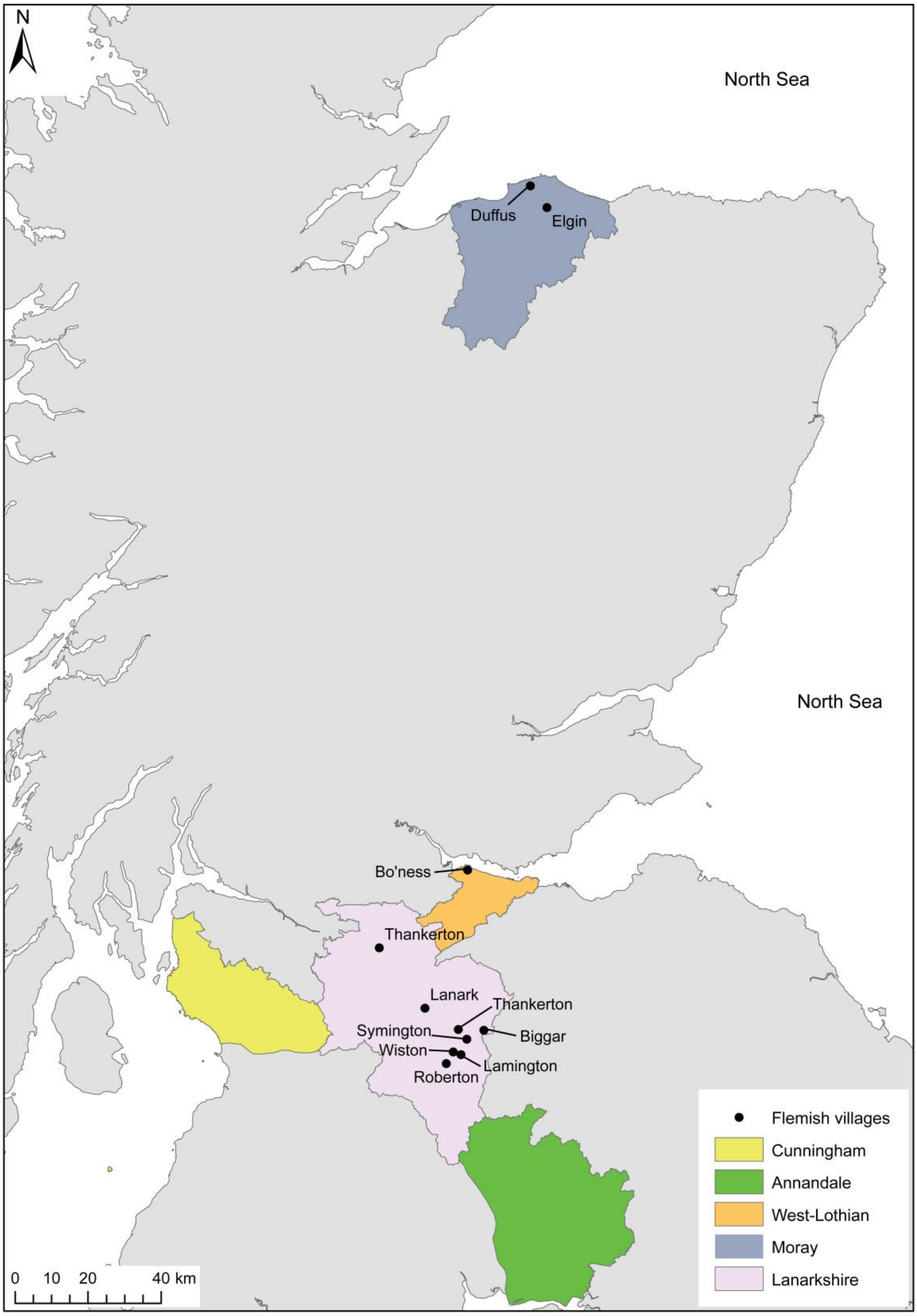

Figure 6: Villages and counties with a strong Flemish link in Scotland (after Toorians (1996)).

3.3.3 Wales

In 1586, William Camden described how the *cantref*[7] of Rhos, in the county of Pembrokeshire, was usually called "Little England beyond Wales" and was inhabited by Flemings (Camden 1725, 755). Some years later, in 1603, George Owen of Henllys extended this 'Little England' attribution to the whole county, referring to the assumed differences in cultural landscapes and spoken languages between North 'the Welshry' and South 'the Englishry' following the Norman conquest (Austin 2005, 39-40; George Owen of Henllys 1994, 36-37). To date, this description still is popularly used. However, its accuracy is regularly challenged. David Austin questions the idea of South Pembrokeshire as a region which was dramatically changed by Anglo-Norman immigrations. Despite classifying the existence of an English enclave in South Pembrokeshire as a myth resulting from sixteenth- and seventeenth-century political circumstances and historiography, something that has been nuanced and contradicted by Rippon (2008, 227-249) based on the presence of nucleated villages, -ton place-names, church architecture and tenure systems, Austin (2005, 30-42) notes that a Flemish immigration into the region has been well documented.[8] To date, the Flemish presence in the county has become part of both local folklore and academic research.

William Camden's and George Owen's insights on the Flemish presence are primarily based on the comments of near-contemporary chroniclers such as Florence of Worcester and Symeon of Durham, on the arrival of Flemings in South Wales (Camden 1725, 755; Dawes 1902; George Owen of Henllys 1994, 17-18; John 2014; Oksanen 2012, 213-218; Toorians 1990). Both of these record for the year 1111 that:

> "Rex Anglorum Henricus Flandrenses qui Northymbriam incolebat cum tota suppellictili sua in Waloniam transtulit, et terram que Ros nominator incolere precipit." [King Henry of the English removed the Flemings which inhabited Northumbria with all their belongings to Wales, to the land called Rhos, to subject its inhabitants] (Florentii Wigorniensis Monachi 1848-49, 64, ca. 1111; John of Worcester 1998, 124-127; Symeon of Durham 2012, 245; Toorians 1990, 108, translation).[9]

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[7] Medieval Welsh land division, also called hundred.

[8] It is generally understood that Flemings did the first colonization and were gradually anglicized or replaced by English settlers, resulting in the believed to be English character of South Pembrokeshire noted above.

[9] It must be commented that Florence of Worcester and Symeon of Durham wrote an identical entry concerning these Flemings for exactly the same year. This might imply that they, despite being contemporaries to these

A more extensive description of the political context for this movement of Flemings is given by William of Malmesbury. In his *Gesta Regum Anglorum*, his 1106 entry explains:

> "Walenses rex Henricus, semper in rebellionem surgentes, crebris expeditionibus in deditionem premebat; consilioque salubri nixus, ut eorum tumorem extenuaret, Flandrenses omens Angliae accolas eo traduxit.Plures enim, qui tempore patris pro maternal cognatione confluxerant, occultabat Anglia, adea ut ipsi regno pro multitudine onerosi viderentur; quapropter cum substantiis et necessitudinibus apud Ros, provintiam Walliarum, velut in sentinam congessit ut et regnum defecaret et hostium brutam temeritatem retunderet." [The Welsh were in constant revolt, and King Henry maintained pressure on them by frequent expeditions until they surrendered; also in reliance on an admirable plan for reducing their ebullience, he removed into Wales all Flemings who were living in England. Manu Flemings who had trooped over in his father's time, relying on their kinship of his mother, were lying low in England, in such numbers as to actually seem a burden on the realm itself, and so he collected them all together, as though into some great midden, in the Welsh province of Rhos with all their belongings and relatives, thereby simultaneously purging his kingdom and putting a break on his headstrong and barbarous enemies.] (Mynors et al. 1998, 727, translation; Willelmi Malmesbiriensis Monachi 1840, 628).

A very similar account is given in the *Brut Y Tywysogyon* or the Chronicle of the Princes for 1105 (corrected to 1108):

> "Y vlwydyn gwedy hynny ydanuonet neb un genedyl diadnabydus, herwyd kenedlaeth a moesseu, ny wydit py le yd ymgudyssynt ynyr ynys dalym o vlwynyded, y gan Henri vrenhin y wlat Dyfet. Ar genedyl honno aachubawd holl gantref Ros gyr llaw aber yr avon aelwir Cledyf, gwedy eu gwrthlad o gwbyl. Ar genedyl honno, megys y dywedir, a hanoed o Fflandrys, y gwlat yr honn yssyd ossodedic yn nessaf ger llaw mor y Brytanyeit. O achaws achub or mor agorescyn eugwlat hyt yny ymchoelet yr holl wlat ar agkrynodeb heb dwyn dim ffrwyth gwedy bwrw o lanw or mor di ar tywot yr tir. Ac yny diwed gwedy na cheffynt le y presswylyaw; kanys y mor a diueuassei ar draws yr aruordired ar mynyded yn gyflawn o dynyon hyt na allei bawp bresswylyaw yno a achaws amylder y dynyon a bychanet y tir, y genedyl honno

events, took it from another source or one another. Research by Piper (1998, 319-321) shows that medieval historiographers at Durham used an extensive collection of written sources. The period 848 to 1119 in the *Historia regum* appears to have been mainly based on the work of John of Worcester. This itself, according to McGurk (1998, xix - xxxii), largely depended on the Anglo-Saxon Chronicle and Eadmer's *Historia Novorum*. No references to Flemings in Rhos are, however, stated in these two sources. Based on similarities between entries in Worcester's annals and Welsh Chronicles, this information might equally be derived from these.

> a deissyuawd Henri vrenhin, ac ad adolygassant' idaw kaffel lle y presswylynt yndaw; ac yd anuonet hyt yn Ros drwy wrthlad odyno y priodolyon giwdwtwyr, y rei agollassant eu priawt wlat ae lle yr hynny hyt." [A folk of strange origin and customs, with nothing known of where they had been concealed in the island for many years before that, were sent by king Henry to Dyfed. And they occupied the whole cantref called Rhos, near the estuary of the river called Cleddyf, and drove away all the inhabitants from the land. And that folk had come from Flanders, the land that lies near the Sea of Britain, because the sea had overwhelmed the land and its bounds and had thrown sand all over the ground, so that the whole land was unfruitful. And at last, since there was no place for them to live either on the coast, because of the sea, or in the hinterland, because of the great numbers of people living in it, and because they could not remain all together – therefore that folk came to beg of King Henry a place wherein to live and to dwell. And he sent them to Rhos. And they still remain, the inhabitants having lost their land.] (*Brut Y Tywysogion or The Chronicle of the Princes* 1860, 80-83; Jones 1952, 27-28, translation).

Besides the enforced removal of Flemings from England to Wales, the *Brut Y Tywysogyon* also mentions direct immigration from Flanders following flooding and related population pressure.[10] This reason is also given by the chronicler Caradoc of Llancarvan:

> "The yeare 1108 the rage of the sea did overflow and drowne a great part of the lowe countrie of Flanders, in such sort that the inhabitants were driven to seeke themselves other dwelling places, who came to king Henrie, and desired him to give them some void place to remain in: who being verrie liberall of that which was not his owne, gave them the land of Ros in Dyvet or West Wales." (Powel 1783, 162-163).

[10] The idea that flooding caused Flemish migration to the British Isles is disputed. Based on the work of Dept, a Dutch specialist in coastal erosion, and Chotzen, a librarian of the Peace Library in The Hague, Toorians (1990, 107) states that there had been no severe floods in Flanders since the fourth and fifth centuries. In contrast, the Dutch historical geographer Gottschalk (1971, 55) refers to Polydorus Vergilius' Historia Anglica (1555), in which he claims that lands were flooded twice in 40 days due to high tides in 1108. Since Vergilius also refers to the British sources cieted above, his information is quite probably second-hand rather than independently authentic. No Primary Flemish sources describing flooding in 1108 exist. Buisman (1995, 283) follows Gottschalk (1971) only in noting the probability of flooding in 1108 in Flanders. Whatever did or did not happen in this year, large storm surges and flooding were not unusual in the region. Based on contemporary Flemish and non-Flemish annals and non-contemporary primary sources, both Gottschalk (1971) and Buisman (1995) mention severe inundations in 1014, 1024, 1042 and 1134. Toorians (1990, 107) concludes that these are either too early or too late to be linked to the Flemish migration at the beginning of the twelfth century.

Following the example of Camden and Owen, nineteenth-century antiquarians and topographers, such as Fenton and Laws also based their work on that of medieval chroniclers contemporary to this Flemish migration (Fenton 1811; Laws 1888, 107-119).[11] Well into the twentieth century, members of the Cambrian Archaeological Association and amateur historians published on the Flemish presence in Pembrokeshire, relying on a host of chroniclers, such as Ordericus Vitalis, Alfred of Berverley, Brompton and Higden (Allen 1851, 315-317; Dawes 1902; Owen 1895). All of them attest that the Flemish immigration to the south of Wales took place between 1106 and 1111. Being granted the Pembrokeshire *cantref* of Rhos by King Henry I, the Flemish settlement would have been originally concentrated around what is now the town of Haverfordwest. However, there are also indications of Flemish settlements in the neighbouring *cantref* of Daugleddau (Dungleddy) and across southern and western Wales (Oksanen 2012, 213-218; Rippon 2008, 220-221; Toorians 1990, 110-111).

A contemporary witness of the Flemings in Pembrokeshire, Gerald of Wales, writing around 1191 in his *Journey Through Wales* says:

> "The folk who lived in the neighbourhood [of Haverfordwest] came from Flanders, for they had been sent there by Henry I, King of the English, to colonize the district. They are a brave and robust people, but very hostile to the Welsh and in a perpetual state of conflict with them. They are highly skilled in the wool trade, ready to work hard and to face danger by land or sea in the pursuit of gain, and, as time and opportunity offer, prompt to turn their hand to the sword or the ploughshare." (Gerald of Wales 1978, 141-142).

This indication of the troublesome relationship between Flemings and Welshmen is strengthened by references to the latte fighting the men of Rhos in panegyrics written for the welsh princes. These twelfth- to thirteenth-century poems depict the Flemings as important enemies, describing the campaigns against them and glorifying the princes who fought them (*The Poets of the Princes Series* 1994-1996).[12] Clearly, Flemings were depicted as foreign strangers who came to Rhos to impose their rule and ideas on the land. It is,

[11] Although Fenton wrote "I found the materials [on the Flemish presence in Dyfed] so scanty as to be compressed in the compass of a dozen lines" (Fenton 1811, 202), this Flemish colony has been relatively well-documented, compared with the Flemish presence in other parts of the British Isles.

[12] Special thanks to Rhun Emlyn (Department of History and Welsh History, Aberystwyth University) for these references and translations.

however, unclear if these Flemings experience this the same way.[13] Nor is there clear information about the differences between Flemings who were forced to Rhos by king Henry and those who immigrated there from Flanders.

In his *Speculum Duorum*, Gerald of Wales describes how his brother was addressed in Flemish by a knight in Haverfordwest:

> "Ad mentem etiam revocare vos volumus […] quod miles quidam modestus et prudens de partibus illis, cui nomen Ernaldus, cognomina Rheting, patri vestro Flandrensica lingua de viro quodam tam sanguine vobis quam moralitate convinctissimo quondam apud Haverfodiam dixit." [We want to recall to your mind […] what a knight from those parts, a moderate and sensible man, called Ernaldus Rheting, once said in Flemish at Haverfodwest to your father of a man who was very close to you in both blood and moral outlook] (Gerald of Wales 1974, 36-37, written around 1216).

According to Toorians (1990, 105 and 112; 2000, 185), this is the only recorded incident of Flemish being spoken in Rhos and Daugledday around the time of the Flemish immigration. Three centuries later, around 1570, some still spoke Flemish well, according to the Ghent painter Lucas de Heere (Toorians 2000, 184). Not much later, Camden (1725, 755) claimed that these Flemings could be distinguished from the welsh by their language and customs. Fewer than twenty years later, George Owen of Henllys (1994, 39) wrote that there were no remnants of the Flemish presence or language left though. Yet, he jauntily claims to recognize Flemish characteristics in the attitude of the people of southern Pembrokeshire. Owen's ideas about the absence of a distinguishable Flemish language and culture were largely followed by later antiquarians and historians. In the late nineteenth century, however, Laws (1888, 119) romantically claimed that he could recognize Flemish characteristics in the physical appearance of some Pembrokeshire women:

> "[…] certain fair haired, light eyed women, considerably inclined to embonpoint. If young, many of them have a complexion of strawberries and cream, and might have come direct from Antwerp, or for the matter of that stepped out of a picture drawn

[13] It should be questioned to what extent the Flemish immigrants experienced this migration as "strange", given the fact that there were already contacts between the County of Flanders and the British Isles before 1066, as described by Oksanen (2012). Moreover, Flemings equally colonized regions in Central and Eastern Europe during the twelfth century (cf. infra). It thus can be stated that migration was not an unknown or strange thing to people from the County of Flanders.

> by Peter Paul Rubens. Such to my fancy are the prettiest relics left by the Flemish immigrants for our delectation."(Laws 1888, 119).

Furthermore, he lists several Dutch or Flemish influences in the dialect of South Pembrokeshire, which is still a much disputed topic (Davies 2000, 82-107; Fenton 1811, 107-119; Toorians 1990, 112-118; 2000, 184-186).

Although the settlement in Pembrokeshire proved to be the most long-lived and/or best described (Oksanen 2012, 214), the *Brut Y Tywysogyon* also mentions Flemings in other Welsh regions, such as Ceredigion and Carmarthen (Jones 1952, 42-97). Davies (2000, 98-99) states that the core region of these Flemings still would have been in Rhos and other parts of Pembrokeshire, but that they also settled in *Talacharn* (Laugharne) and *Cydweli* (Kidwelly) on both sides of the Carmarthenshire Tywi estuary. Regarding their presence in Carmarthen, the *Brut Y Tywysogyon* explicitly stated that these Flemings originally came from Rhos (Jones 1952, 44). The same consideration can be made for the Flemings in Ceredigion. Based on charter and place name research, Coplestone-Crow (2018) was able to identify several Flemings in the region, who all originally had settled in Rhos. He states that they all had land in the cantref of *Is Coed* near Cardigan and Blaenporth. This would have been the main area of Flemish presence in Ceredigion. Besides their settlement in Southwest Wales, Davies (1990, 11) considers these Welsh Flemings also to have had a major contribution to the twelfth-century colonisation of Ireland. Finally, Coplestone-Crow (forthcoming) also suggest a twelfth-century Flemish presence in Whitson on the Gwent Levels in Southeast Wales.

Apart from some nineteenth-century interest in Flemish place names and major towns such as Haverfordwest and Tenby, Flemish rural settlements in South Wales (Figure 7) did not receive much attention (Allen 1851; Dawes 1902). It was only in the 1980s, following the research on village morphology by Roberts (1987, 199-200), that a Flemish planning was proposed as one of the possible origins for villages such as Wiston and Letterston. Research on these Flemish plantations, however, remained limited until the early 1990s. Toorians (1990) dedicated an article to the figure of Wizo Flandrensis, a Flemish locator who came to Pembrokeshire before 1112 to settle in the village of Wiston. The remains of a motte and bailey castle at the site of his stronghold are still visible in the modern-day village (Turner 1996). Research by Kissock (1990, 219-241) on the origins of the village in South Wales indicated that many villages in the region were planted settlements. A Flemish plantation was again suggested as one of the possible origins. He restated this hypothesis more explicitly in later publications, studying the morphology of Letterston, Angle and Templeton (Kissock 1995; 1997). At the same time, both Lilley (1995, 80-84; 2000; 2017) and Murphy (1995; 1997) study the morphology of Wiston and other post-Conquest villages and towns in Dyfed. They present different interpretations concerning

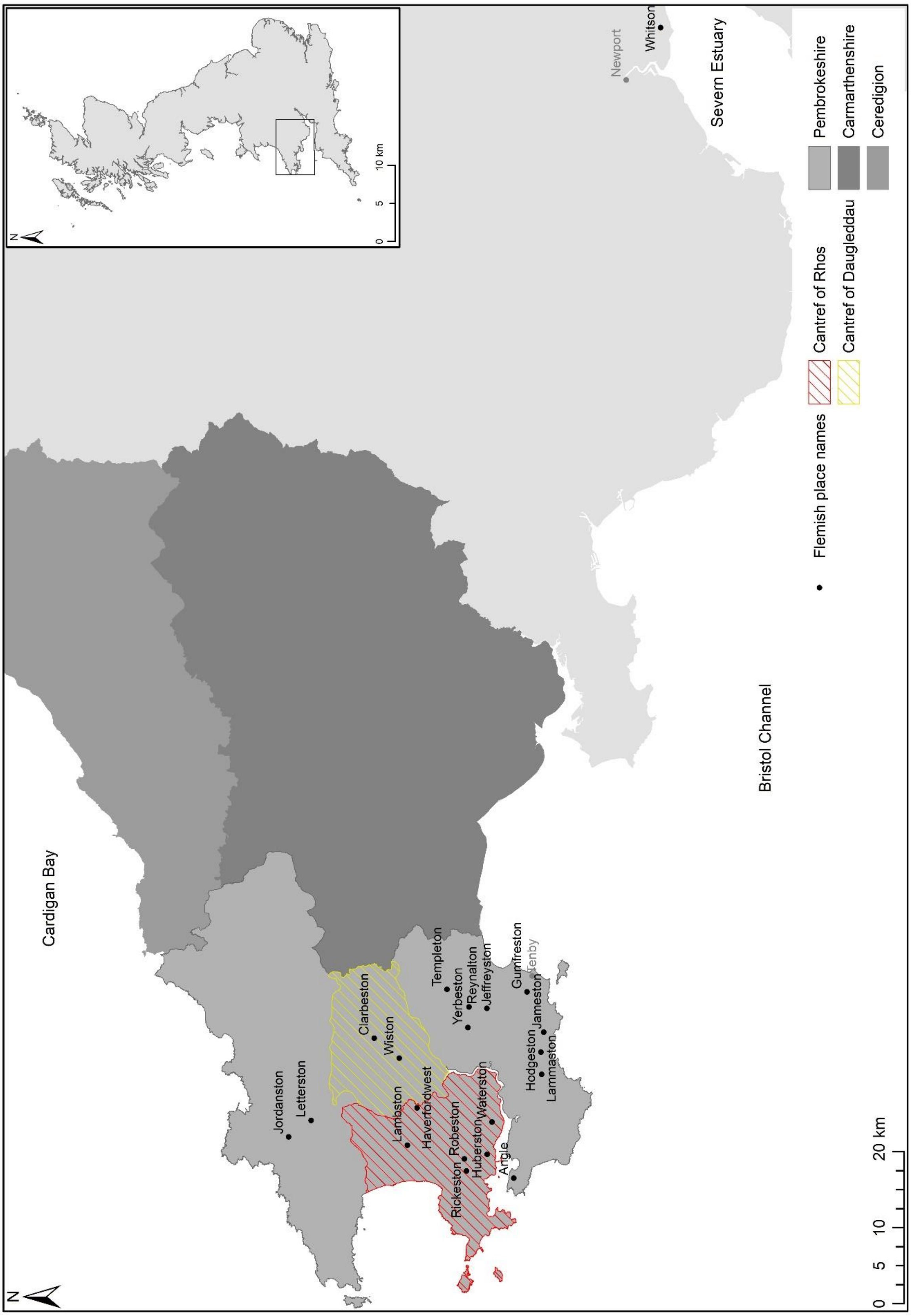

Figure 7: Settlements with place names referring to Flemings in South Wales (after Toorians (1990, 110 and 114) and Roberts (1987, 199-200)).

the lay-out of medieval Wiston, though. According to Lilley (1995, 80-84), the settlement would have been planned to the south of the current village, perpendicular on the main street. Murphy (1995) on the other hand states that, based on the presence of earthworks, small scale geophysical prospections and trial excavations, the settlement plots were located around the castle in the current village centre, also perpendicular on the main street.

Dyfed is not the only region in Wales where settlement patterns resembled those in Flanders. In the south-east of Wales, on the Gwent Levels near Newport, lies Whitson (Figure 7). Consisting of a series of long narrow plots aligned perpendicular to the east of a funnel shaped green or common, this planned village is unique in all of the wetlands around the Severn estuary. The settlement was extended eastwards on several occasion, resulting in the remarkable series of long, narrow tenements. Rippon (1996, 86; 2008, 221 and 242-247) states that parallels are to be found in the Low Countries. A recent example in archaeological context in Flanders is the site of Zele (Brouwer et al. in press).

3.4 Flemish settlements elsewhere

Although the focus of this research is on the Flemish settlements in Britain and more specifically in South Wales, it should be stressed that the Flemish migration to the British Isles was not unique in its kind. Davies (1990, 12) describes it as "no more than the western branch of a remarkable Flemish diaspora". Throughout the high medieval period, Flemings are recorded as having migrated across Europe and beyond (Bartlett 1993, 113). In 1081, for example, a certain Raymond the Fleming was chief guardian and keeper of the city gate in Constantinople, while during the 1160s a Gerard Fleming was described as a settler in Palestine (Bartlett 1993, 113 and 116). The migration of Flemings in the context of the so called *Östsiedlung*, the germanisation of lands east of the river Elbe, is best document. The Kührener Gündungsurkunde, for example, describes how Bishop Gerung of Meissen in 1154 recruited men from Flanders to settle in uncultivated lands:

> "[…] strenuous viros ex Flandrensi provincial adventates in quodam loco inculto et pene habitatoribus vacuo […]." [robust men from Flanders in a certain uncultivated and nearly uninhabited place] (Bünz 2008, 95).

In his *Slawenchronik* (c. 1170) Helmold von Bosau describes how in 1143 Flemings, together with people from Holland, Utrecht, Westphalia and Frisia, were requested by Count Adolf II of Schauenburg to settle lands in the region around Lübeck:

> “Quia autem terra deserta erat, misit nuntios in omnes regions, Flandriam scilicet et Hollandriam, Traiectum, Westfaliam, Fresiam, ut, quicumque agrorum penuria artarentur, venirent cum families suis accepturi terram optimam, terram spaciosam, uberem fructibus, […] et commode pascuorum gratia.” [Because the land was abandoned, he send out messengers to Flanders, Holland, Utrecht, Westphalia and Frisia to call upon everyone with not enough land, for they could come with their families and get the nicest, most spacious and most fertile fields […] and good pastures] (Helmold von Bosau 1963, 210-213).

According to the same *Slawenchronik*, Margrave Albert the Bear also summoned inhabitant from the Low Countries, among whom also Flemings, to reclaim forests along the river Havel in 1157:

> “Ad ultimum deficientibus sensim Slavis misit Traiectum et ad loca Reno contigua, insuper ad eos qui habitant iuxta occeanum et patiebantur vim maris, videlicet Hollandros, Selandros, Flandros, et adduxit ex eis populum multum nimis et habitare eos fecit in urbibus et oppidis Slavorum.” [And finally, as the Slavs gradually lost influence, he sent for Utrecht and the Rhine region, as well as for those who lived by the ocean and suffered from the violence of the sea, like the people from Holland, Zeeland and Flemings, and brought in a lot of people from there and het let them live in the settlements of the Slavs] (Helmold von Bosau 1963, 312-315).

Here, Flemings were specifically sought after because of their experience in the exploitation of forests and wetlands. An example of the former is the sandy and forested region to the south of Berlin, which until today is called Fläming (Klápště 2012, 215; Luck 2010, 37). As stated by Klápště (2012, 212), these settlers brought with them two skills. They knew how to reclaim wastelands and implemented their own legal framework within their communities, related to their system of settlement and reclamation (Luck 2010, 39; van der Linden 1982). It is these legal frameworks, which considered rights of freedom, property, jurisdiction, inheritance and use of measurements, that have been studied intensively (Bünz 2008; Luck 2010; Petri 1974; Rietschel 1901; Schlesinger 2008; van der Linden 1982; 2000; Van Winter 1953, 206). Important in attracting people to reclaim these difficult lands would have been an equal improvement of the settlers material, social and legal position. This equality would have been incorporated in the settlements as well, by granting equal sizes of land (Bünz 2008, 102-103). Regarding the related settlements, traditionally a distinction is made between *Waldhufendörfer* for the reclamation of forested areas, *Marschhufendörfer* in coastal areas and river valleys and the more general *Strassendörfer* (street villages) and *Angerdörfer* (green villages)(Mayhew 1973). In his research on the morphology of the villages of Flemmingen and Kühren, Schlesinger (2008) considers the German catchall *Langstreifen*, which refers to the long narrow plots of land perpendicular on the main axis of exploitation and in the *Flur* (the cultivated lands or infields related to a settlement). However, he further nuances the ascription of certain settlements to one of the above morphologies and states that *Waldhufendörfer* were mainly planted in large extensive complexes. The inland settlements related to settlers from the Lowlands, in contrast, can be characterised as individual villages. He therefore considers that these settlement systems were adapted to the local landscape, but still related to the original concept (Schlesinger 2008, 249-251).

Chapter 4 Research questions, aims, objectives and methodological framework

Building on the theoretical framework and state of the art as presented above, this chapter presents the research questions, aims and objectives of this dissertation, followed by an overview of the applied multi-proxy dataset and methodologies.

4.1 Central research question, aims and objectives

This dissertation makes a contribution to the study of rural settlement landscapes both in the County of Flanders and South Wales, more specifically to Flemish medieval row settlements. As has been presented in the previous chapters, there are large hiatus in the current insights on the origin, distribution and socio-economic context of row settlements in the County of Flanders, as well as on the Flemish origin of planned row settlements in South Wales. In general, the central question of this dissertation is therefore twofold and relates to the state of the art on medieval grouped rural settlements in both regions. The two main research questions are:

- Can a cross-disciplinary landscape archaeological approach, applying state-of-the-art archaeological, historical-geographical, geophysical and remote-sensing methodologies, offer new insights in the development of row settlements in the County of Flanders and its translocation to other regions (i.e. South Wales)?
- To what extent were medieval settlement systems translocated in the context of migratory processes and can they thereby be considered as an expression of cultural identity?

Based on these central research questions, different aims and related objectives are formulated.

The first aim of this dissertation is to improve the understanding of the nature and evolution of row settlements in the County of Flanders. The main objective thereby is the primal identification of row settlements in the county in order to analyse the geographical and chronological distribution as well as the morphological characteristics of these grouped rural settlement types. The second objective is to integrate the expanding dataset of archaeological fieldwork on high medieval rural settlement sites into the overall research on medieval grouped settlements. Thirdly, following Verhulst (1967b), the archaeological potential of the lost settlements along the northern border of West and East Flanders is explored.

The second aim is to verify the working hypothesis that there has been a translocation of a Flemish settlement morphology, i.e. that of the planned row settlement in the context of landscape reclamations, to the British Isles following immigration within Britain and directly form Flanders. The aim is not to prove migration happened, but to analyse to what extent spatial planning traditions were being translocated as part of cultural traditions of migrants. This is based on the logic of common practice or habitus model as described by Bourdieu (1977), in which practices and material culture are shaped by past conditions and are embedded in cultural tradition (cfr. theoretical framework above). The objective thereby is to set up an integrated historical and landscape archaeological comparative methodology, supported by quantitative and qualitative analysis, to allow to identify (dis)similarities between the row settlements in South Wales and those in the County of Flanders. This way, the new insights on the row settlements in the County of Flanders provide a baseline to assess evolution in the settlement framework for the county and potentially to identify hybridisation or adaptation to local and changing circumstances in Wales. The second objective is thereby to take the discussion beyond purely describing metrical and morphological (dis)similarities, but also to explore and understand transformation processes in the presence and characteristics of row settlements in both regions through time.

4.2 Methods and case studies

In the set-up of this dissertation, a wide range of source materials and techniques is used, in order to achieve the objectives described above. These are rooted in longstanding research histories for the fields of geography, history and archaeology which, on their own and by contributing to each other, have allowed to develop the study of the rural settlement and its landscapes. Different methodological approaches have been considered and incorporated in the research design of this dissertation. Of great influence and importance was the work of historian Adriaan Verhulst, who stressed throughout his research that a cross-disciplinary approach is key. Inspired by the work of John Hurst and Maurice Beresford at Wharram Percy (Wrathmell 2012), Verhulst (1967b) urged to incorporate historical and archaeological research when studying rural settlements. Furthermore, together with his English colleague W.G. Hoskins (1955), he moved historical and archaeological research from the studying of sites to the level of the surrounding landscape. This cross-disciplinary approach in studying landscapes is brought forward by geographers Marc Antrop and Veerle Van Eetvelde in their study of traditional landscapes in Flanders (Antrop 1997; Antrop & Van Eetvelde 2017, 71-77; Van Eetvelde & Antrop 2005) and by archaeologist Stephen Rippon's (2004) approach on Historical Landscape Analysis. More recently, the incorporation of non-destructive Electromagnetic Induction (EMI) surveys in Flemish archaeological research has allowed to map archaeological features within the wider context of their surrounding landscapes (De Clercq, De Smedt, et al. 2012; De Smedt, Saey, et al. 2013; De Smedt, Van Meirvenne, et al. 2013), an approach that has been explored to the fullest in Jan Trachet's doctoral research on the medieval outports of Bruges, executed within the Historical Archaeology Research Group (HARG) at Ghent University (De Clercq et al. 2017; De Reu et al. 2016; Trachet et al. 2017).

4.2.1 Methodological approach

In line with the approaches describe above, a twofold methodology is followed, consisting of desktop- and fieldwork-based research components (Figure 8), in two study areas: the medieval County of Flanders and South Wales. The desktop research aims at collecting, managing, integrating, analysing and visualising all available spatial and non-spatial data for both study areas in a Geographic Information System (GIS) (i.e. ESRI ArcMap). The use of a GIS environment thereby allows to create a multi-layered model of the study areas including archaeological, historical, pedological, geological and geographical data. Based on this desktop research, case studies are selected for further analysis at site level. This can include further desktop studies as well as dedicated fieldwork. The collected data for the desktop research can be subdivided into four aspects: (1) The body of literature on the Flemish presence in South Wales and on the medieval rural settlement landscape in the County of Flanders, (2) available historical maps (online and in record offices) and primary sources for both study areas, (3) spatial data layers and remote sensing data (LiDAR and aerial photographs) when available, and (4) archaeological data/reports. The main aspect of this fieldwork are large-scale geophysical surveys, using frequency-domain multi-receiver Electromagnetic Induction (EMI). When possible, this is supported by manual augering (gouge and Edelman) and artefact-accurate fieldwalking, following the methodology that has been perfected by Wim De Clercq and Jan Trachet (De Clercq, De Smedt, et al. 2012; De Clercq et al. 2019; Trachet et al. 2017). This way, new high resolution datasets for the selected case studies are created, which are linked back to the desktop-based data and vice versa.

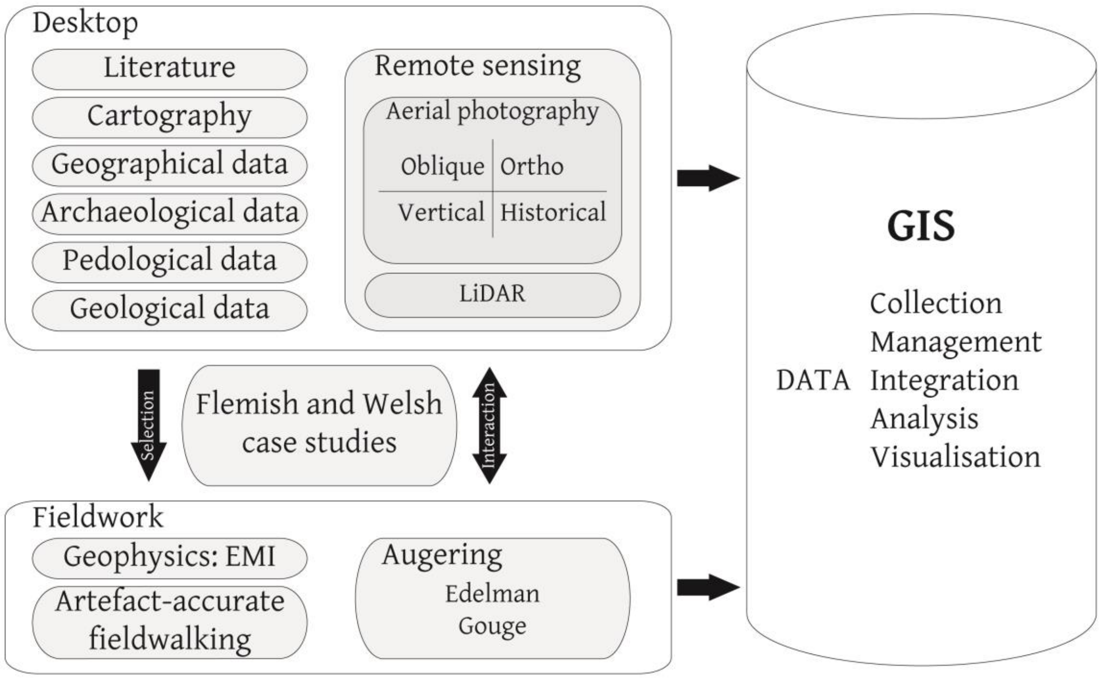

Figure 8: Schematic representation of the twofold research approach.

4.2.2 The build-up of a comparative framework in Flanders

To gain new insights on the character of row settlements in the County of Flanders and to provide a detailed contextual and comparative framework to interpret the Flemish character of planned row settlements in South Wales, the geographical and chronological dispersal of planned row settlements in the County of Flanders is reviewed and constructed. Given the socio-political context of the early-twelfth century, in which the Flemish migration would have taken place, the historic boundaries of the County of Flanders at the beginning of this twelfth century are considered as the demarcation of the study area in this dissertation (Figure 9). This approximate delineation is based on geographical research data of the Diplomata Belgica-GIS[14], which follows the modern-day topography of the coastline and river systems.

Although Verhulst (1991a; 1991b) stated that this settlement morphology played an important role during the so called 'Great Reclamation Period', only two examples have been studied in-depth: Kluizen and Woesten. Dussart (1957), Lefèvre (1964b) and Van De Velde et al. (2012) indicate a wider geographical distribution of this settlement morphology in Flanders though. Because of Flanders's highly built-up character to date and strict legislation regarding archaeological interventions in currently inhabited villages (De Groote et al. 2018; Tys et al. 2010), only limited archaeological data is available to add to the scarce historical studies on the subject. It will be argued in this dissertation that the following case studies offer more potential to add to the archaeological dataset and understanding of the socio-economic context related to the origin and development of these settlements.

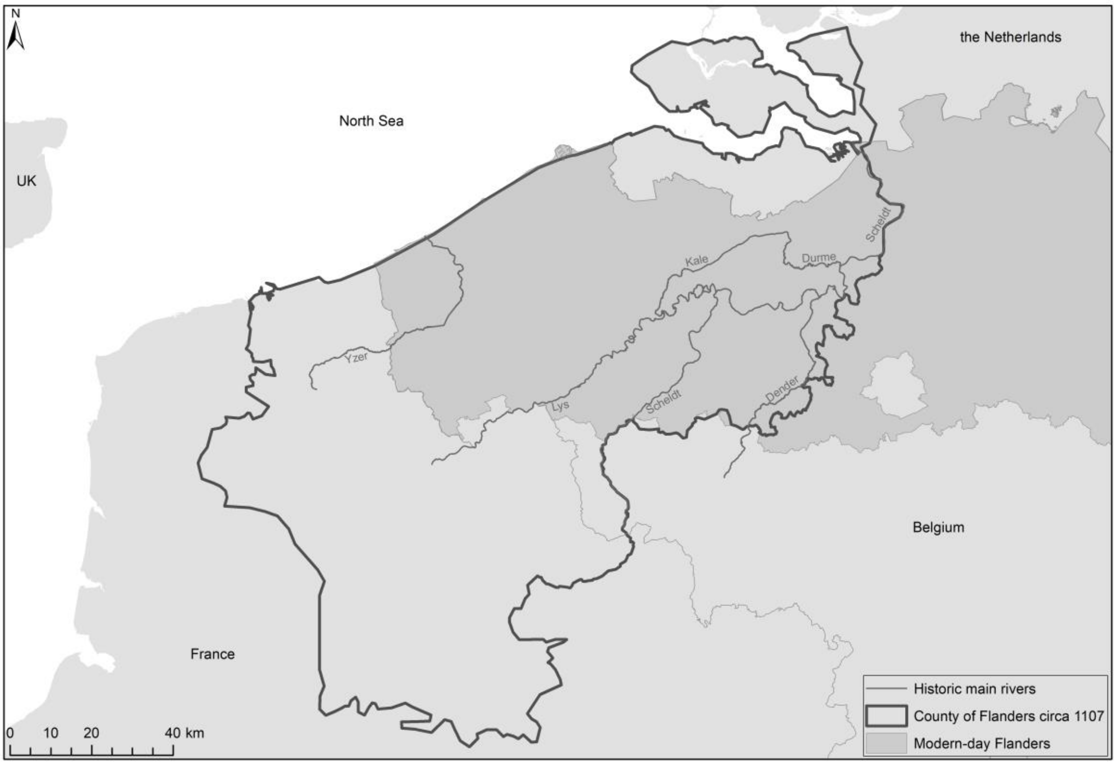

Figure 9: Approximate demarcation of the early-twelfth-century County of Flanders.

First, in chapter 5, historical maps and place name registers are used to identify and locate row settlements in the County of Flanders. New insights are thereby to be found

[14] Ghent University and Commission Royale d'Historie/Koninklijke Commissie voor Geschiedenis, www.diplomata-belgica.be.

through assessing the geographical and chronological distribution in relation to the physical and topographical landscape of the county. These aspects offer information on their period and socio-economic context of origin and development.

In chapter 6, a following step for the Flemish aspect of this research consists of compiling an inventory of archaeological fieldwork on high medieval rural settlements to date. As indicated above, limited archaeological data is available for grouped medieval settlements. Yet an increase in the number of attested high medieval rural habitation sites through archaeological interventions outside the currently inhabited villages is coming available in Flanders and can offer renewed interest and insight on the matter (De Clercq 2017). The focus has long been on the individual farms, so called Einzelhöfe, as key element of rural habitation during the high medieval period. Sites such as Zele-Wijnveld (Brouwer et al. in press) and Sijsele-Stakendijke II (Deconynck et al. 2019), however, also indicate the occurrence of grouped settlements with a relatively planned lay-out. Following the compiling of this inventory, a twofold approach is followed. First the geographical distribution of high medieval rural habitation sites is analysed at a regional level. The increased number and geographical distribution of archaeological sites allows to study their relative topographic position in a wider landscape context throughout time, pointing at eventual changes in settlement locations during the high medieval period. Second, the overall settlement morphology and characteristic elements are studied and compared across West and East Flanders. Special attention is hereby given to grouped settlements.

Subsequently, in chapter 7, the archaeological potential of the lost settlements along the northern border of West and East Flanders are explored. The first study in this context, during the 1970s, was done on the village of Nieuw-Roeselare. Due to limited finances, only small segments of the site (i.e. that of a moated site and the church) were excavated and studied. No insights in the settlement itself were therefore available. Given the methodological development of landscape archaeological methodologies, Nieuw-Roeselare is revisited as case study in the context of this dissertation, to firmly locate the settlement and study its morphological characteristics in relation to historical research on the socio-economic context of its foundation. This settlement is understood to have been founded ab nihilo during the final phase of the Great Reclamation Period. Although founded a century later than the settlements in Wales, its context is highly similar. It therefore not only offers the potential to contribute to the research on lost settlements in Flanders, it also holds the potential to gain further insight in settlement morphologies related to these reclamations and the foundation processes involved in both study regions.

4.2.3 Planned row settlements in South Wales

Based on the research by Roberts (1987) and Kissock (1990), it is suggested that the occurrence of planned row settlements in South Wales can be related to a Flemish presence in the region, following a twofold migration. This Flemish migration to Wales is believed to initially have focussed on Rhos and other *cantrefs* in the county of Pembrokeshire. Although Flemings are described in neighbouring counties Carmarthenshire and Ceredigion, their presence in Pembrokeshire has been best documented by antiquarians and modern-day researchers such as Kissock (1990) and Toorians (1990). Therefore Pembrokeshire is the main study region in Wales for this dissertation (Figure 10).

In Chapter 8, following a literature review on the Welsh Flemings and their assumed settlements, two villages are selected for large-scale geophysical prospection and cross-disciplinary mapping. Given its relatively high level of documentation, Wiston (Pembrokeshire) has the strongest indications of confirmed Flemish presence. Furthermore, the village of Whitson, on the Gwent Levels near Newport (Monmouthshire) is considered as well. Rippon (1996) had already suggested a link with the Low Countries, possibly Flanders, for this settlement.

Figure 10: Pembrokeshire in Wales.

4.2.4 Comparative analysis

Together with the three Flemish case studies, the Welsh aspects of this research represent multiple landscape archaeological manifestations of high medieval rural row settlements, each with their own contribution to the identification of geographical, socio-economic and cultural processes involved. Over the course of this dissertation, these case studies are first considered individually within the context of their relevant theoretical framework.

Subsequently, in chapter 9, they are integrated into a comparative analysis. Besides Wiston and Whitson, all planned rural settlements in Pembrokeshire are thereby incorporated, together with a selection of planned row settlements in the County of Flanders.

4.2.5 Overall discussion and interpretation

Finally, in chapter 10, the individual case studies and comparative analysis are integrated into an overall discussion and interpretation in relation to the research questions, the theoretical and contextual frameworks as described previous to this chapter and future research prospects.

Part 2: Unearthing the high medieval settlement landscapes of the County of Flanders

Chapter 5 Row settlements and landscape reclamations in the medieval County of Flanders

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5.1 Introduction

The rural settlement landscapes of modern-day Flanders are highly dynamic and undergo constant change, influenced by the ever-increasing urbanisation and transport infrastructure in the region (Antrop 2000, 257-270; Van Eetvelde & Antrop 2005, 127-141). However, landscapes have always been the dynamic result of interactions between human activities and natural processes. Throughout history, landscape changes are believed to have occurred gradually over longer periods, intermixed with temporary phases of sudden and often intensive change (Antrop & Van Eetvelde 2017, 142; Clark et al. 2003, 16; Muir 2003). During the nineteen-eighties though, awareness rose that the speed and scale of these changes had significantly increased since the revolutionary eighteenth century and especially since the Second World War. This acceleration severely affected the diversity and (historic) identity of landscapes (Antrop 1997, 105-106; Antrop & Van Eetvelde 2008, 184). Antrop (1997) stated that these successive large-scale changes resulted in the loss and deformation of traditional structures of the landscape, resulting in a largely uniformed space. He made a distinction between traditional landscapes, which resulted from a slow and long evolving history, and new landscapes resulting from fast and intensive changes removing traditional characteristics. It was in the context of increasing human pressure on the landscape that the mapping and inventory of 293 traditional landscapes and 21 landscape regions in Flanders started in 1985. This showed that, despite its high level of urbanisation, Flanders was still characterised by an exceptionally high diversity of distinct landscapes (Antrop 1997, 128; Van Eetvelde & Antrop 2009).[15] This certainly is the case for the rural settlements and their surrounding countryside (Van De Velde et al. 2012). Historic settlement structures are therefore an important aspect in the understanding and characterisation of actual landscape patterns (Antrop 2000, 260). However, previous geographical research on Belgian settlement typologies and classifications by Dussart and Lefèvre did not include historical characteristics and were fairly low in geographical resolution. Single settlement types were thereby ascribed to large regions without considering variations within those regions (Dussart 1957; Lefèvre 1964b; Van De Velde et al. 2012, 94). In contrast, the description of traditional landscapes in Flanders used the Carte de Cabinet by count de Ferraris to incorporate a historical depth. Being the oldest detailed map covering the whole territory of Flanders and dating back to around 1770, it shows the Flemish territory just before the dramatic landscape changes following the industrial revolution. This allowed reconstructing the pre-industrial spatial framework of the early-eighteenth century (Antrop 1997; Van Eetvelde & Antrop 2005).

However, from a historical-geographical and archaeological perspective, the Roman and medieval settlement patterns, which are believed to form the basic framework for the actual settlement pattern in highly urbanised Flanders, were not very much taken into account. Especially the high medieval landscape reclamations are generally accepted to severely have influenced the Flemish settlement landscape up until today (Antrop 1997, 109; Antrop & Van Eetvelde 2017, 145; Szabó et al. 2017, 90). As Thoen and Soens (2015, 226) state, most existing parishes and villages today were founded in this period. Predominantly, based on the historical-geographical research by Verhulst (1953, 349-351); (Verhulst 1991a; 1991b; 1995, 130-133; 1998a, 12), the planted row settlement is considered as the main settlement morphology in the context of high medieval landscape reclamations in the County of Flanders. In the framework of this chapter, planted settlements are defined as a settlement type that is characterized by a deliberate ab nihilo foundation. Although its morphology may be either regular or irregular, the research by Verhulst (1953; 1991a; 1991b; 1995) shows that these settlements, such as Kluizen (Figure 11), mainly had a regular row plan with habitations and related fields perpendicular on the

[15] The idea of traditional landscapes being the result of a long and slow evolving history has been criticised by Renes (2015), who stated that pre-industrial events had a severe impact on landscapes as well and urged for a better understanding and incorporation of historic landscape processes into the concept of traditional landscapes. More recently, following the 2018 PECSRL, four key guidelines have been formulated in order to safeguard the traditional landscapes for future dynamics (Renes et al. 2019, 98).

axis of exploitation. This axis could be a road or longitudinal water body. In some cases, such as Doornzele (Figure 11), a *dries* or green was incorporated or developed as a widening of this axis. But although their seemingly large impact on the formation of past and present Flemish settlement and village structure, remarkably few studies have systematically addressed their origins, distribution and socio-economic history. Only the villages of Kluizen and Woesten (Figure 11) have been the subject of in-depth historical research (Verhulst 1991a; 1991b). Moreover, archaeological data on existing villages is limited due to the highly built-up character of modern-day Flanders and legal restrictions (De Groote et al. 2018; Tys et al. 2010). Dussart (1957), Lefèvre (1964b) and Van De Velde et al. (2012), however, indicate a wider geographic distribution of the row settlement morphology in Flanders.

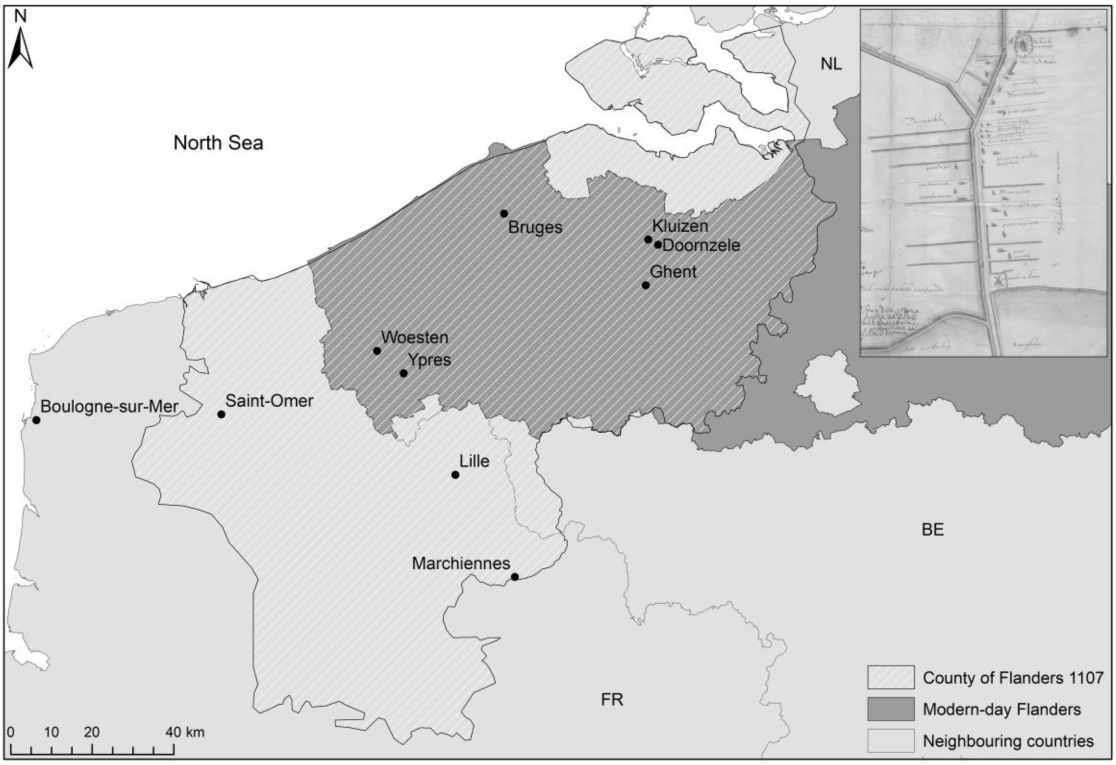


Figure 11: Visualisation of the early-twelfth-century delineation of the County of Flanders in relation to the modern-day region of Flanders with indication of the main locations cited in the chapter and 1654 map of Kluizen as also presented in figure 5 (State archive Ghent, Kaartenverzameling P. De Reu, nr. 1784).

The aim of this chapter is, therefore, to assess the geographical dispersal and historical time-depth of this settlement morphology within the former County of Flanders. It is questioned whether its geographical and chronological diffusion is related to the intensification of medieval landscape reclamations in the county. Based on historical maps, the pre-industrial distribution of row settlements within the county is mapped in

GIS. This allows analysing the geographical pattern and its relation to the physical landscapes. The first mention and related age of the place names is examined, which offers a time-depth to the settlement foundations and dates their dispersal throughout the county. Both the geographical and chronological datasets are then combined and statistically analysed to determine whether a link between the physical landscape and the geographical location of row settlements can be observed through time. The idea is that, if there indeed is a link with the medieval reclamations, a shift of settlement location towards the less fertile soils should be observed.

5.2 Study area

The study area comprises the approximate early-twelfth-century boundaries of County of Flanders. This specific demarcation was chosen because the twelfth century has been considered as the optimum of the landscape exploitations in order to extend the cultivated areas across Europe (Aberth 2013, 92-97; Hoffmann 2014, 119-133; Williams 2000). Nowadays the idea of ab nihilo landscape reclamations causing a shift from natural towards cultural landscapes is widely abandoned in favour of a more nuanced conceptualisation considering extensive landscape use versus intensification (Behre 1988, 648; Thoen & Soens 2015, 227; Verhulst 1957; 1966a, 55; 1966b, 77-79; Wickham 1994, 170; Williams 2000). For the County of Flanders, Verhulst (1966a, 74-78; 1966b, 99-109; 1995, 128-133) recognised different phases of intensification and stagnation. Where in the tenth century, reclamations and clearances were localised around the existing settlements, the eleventh and twelfth centuries brought an intensification and further systematic approach. The growing wealth and power of the Flemish counts, urban development and an increase in population induced the need for larger agricultural yields, fuel and timber. In coastal Flanders, the counts played an important role in the exploitations, through large comital estates and early embankments from the tenth and early-eleventh century onwards (Tys 2010; 2012b). It is during this phase, though, that the comital elites and their close allies started to take up an active role in the reclamations by planting new settlements in Inner Flanders as well. Sometimes these were granted with fiscal, legal and political benefits (Thoen 1993a; Thoen & Soens 2015, 226-229; Verhulst 1966a, 74-78; 1991a, 763-771; 1991b, 47-62; 1992a; 1992b; 1995, 128-133).

The villages of Kluizen (planted between 1115 and 1140) and Woesten (planted in 1161) are the only examples of these comital settlements that have been studied historically. However, this settlement morphology occurs more widespread throughout the county, as will be demonstrated by this chapter. Besides these comital plantations, ecclesiastical and lay landlords also planted settlements. Research on the Saint-Bavo's abbey in Ghent by Verhulst (1953, 321-359; 1958) has demonstrated that these mostly were large farms that acted as the centre for further reclamation. Following an intermediate phase of consolidation at the end of the twelfth century, the thirteenth century brought a final phase in which renewed intensification and further geographical extension of the reclamations took place. Lands were now sold or given in concession to lay elite entrepreneurs who also planted new settlements. These reclamations, however, declined around 1280 (Verhulst 1966a, 79-80; 1966b, 99-116; 1995, 134-139).

5.3 Methods and materials

The methodology consists of three steps: (1) mapping of the row settlements, (2) dating of the individually mapped settlements, and (3) the GIS analysis of its distribution within the County of Flanders. The first two steps are executed at the level of the site (i.e. the settlement), while the third step covers the settlement pattern. This corresponds to scales 1 and 3 of the 'three scale settlement analysis' as developed by Antrop and Van Eetvelde (2017, 216). It should be taken into account that the study area covers three countries and five departments or provinces. This offers major differences in the availability, resolution and inventory (e.g. discrepancies in the legends that are used) of raw geographical data, older historical-geographical and archaeological research (e.g. scientific reports and data files) and historical maps.

5.3.1 Mapping of the row settlements

In order to map the individual row settlements within the County of Flanders, the rural settlement typology developed by Van De Velde et al. (2012) was applied. This is based on the principles of the classification of rural settlement types in Europe according to Antrop and Van Eetvelde (2017, 223-229, especially Fig. 229.210), which themselves build upon international typological and terminological work (Lebeau 1996; Renes 1981; Roberts 1982b; Schröder & Schwarz 1969; Uhlig & Lienau 1972). The main focus in this study was the subgroup of different types of row settlements, which are classified according to their continuity of built-up areas and the presence of greens or squares.

Conducive to get the most historical insight into the distribution of the row settlement morphology, historical maps were used instead of maps displaying the modern-day settlement structures. The historical maps were selected based on their geographical extent, covering larger regions of the study area. Hence, a systematic and consistent manner of symbolising settlements, buildings and landscapes was available for these regions. In practice, this meant selecting maps that covered the four main subregions (West and East Flanders, parts of the Belgian province of Hainaut, parts of Northern France and the southern parts of *Zeeland*) of the study area. The selection of the cartographical sources was, however, severely dependent on the digital availability of georeferenced historical maps in order to use them in GIS. Hence, the Carte de Cabinet by Count de Ferraris was selected for the Flemish and Hainaut territories within the study area. Made at the end of the eighteenth century by Habsburgian artillerists under command of Count de Ferraris, it is the oldest detailed map covering the whole territory of what is now modern-day Belgium (De Coene et al. 2012). The location of the settlements on the digitised historical map was used. Given historic geometrical distortions during the process of cartography, these locations not necessarily correspond with the actual locations of settlements (Vervust 2016). This is however not problematic since the differences are only limited regarding the extensive scale of the total study area, thereby not affecting the distribution pattern. For northern France, the early-nineteenth-century Carte d'Etat-major was used through the geoportal of the French *Institut National de l'Information Géographique et Forestière* (IGN). In contrast to the older map of Cassini, the settlement structures are presented in a similar way to Count de Ferraris's Carte de Cabinet, showing the effective morphology instead of single point locations. This allowed ascribing the row settlement typology to the individual settlements on the map. For *Zeeland*, the late-nineteenth-century topographical map of the *Topografisch Bureau* was the oldest available map consistently covering the whole of *Zeeland* and visualising settlement morphologies.

The mapping was done in ESRI ArcMap by allocating a point location to each row settlement. The place-name on the historical map, the modern-day place name, related place-names and morphology code according to the classification by Van De Velde *et al.* were added as attributes. However, it needs to be considered that the application of a settlement classification has a certain factor of subjectivity related to it, despite straightforward delineations of the subcategories. A strict following of the categorisation method and regular comparing with the unpublished work of Van De Velde on the *Meetjesland* region to the north of Ghent, however, aimed at reducing this subjectivity to a minimum. Moreover, it needs to be taken into account that, although the oldest settlements morphologies offered by historical maps were used, these not necessarily exactly correspond to the medieval situation. As demonstrated by Termote (2014) in his cultural-historical atlas of the villages in the *Westhoek*, settlements tended to change extent and form over time. In this context, it also needs to be considered that the maps used in this study cover a period of circa 100 years between them. Given that each of them displays a time frame of settlement morphologies in one part of the study area, changes might have occurred in other parts of the county that were not incorporated on a specific map.

5.3.2 Dating the settlements

The dating of the settlements was achieved through the use of ten toponymical dictionaries and place name registers (Carnier 1999; De Flou & De Smet 1914-1938; De Potter & Broeckaert 1877-1881; Gysseling 1960; Gysseling & Van Durme 2016; Hasquin et al. 1980; Nègre 1990; Poulet 1997; Van Berkel & Samplonius 2006; Vincent 1937). This offered the opportunity to study the whole study area in a relatively consistent way and short time period based on secondary literature, instead of archival work for all the individual settlements. If indicated in the toponymical dictionaries or place name registers, the first written mention of each settlement was added as an attribute in the geodatabase. Whenever different dates were given in the different dictionaries and registers, the oldest was used in this study. Given that the dictionaries and registers always described an exact date/year and not a time frame or historical period, these dates were considered as the date of the first mention and not as the hypothetical age of the place name. As also indicated by Szabó et al. (2017), however, this first mention of a place name does not necessarily corresponds to the actual foundation of the related settlement. It rather gives the latest possible date of origin. This certainly is the case for the settlements with a first mention in the eighteenth and nineteenth centuries. Their presence on the historic maps indicates an older age then suggested by their first mention. However, to make the distinction with the undated settlements, their first mention is incorporated in the database. This does not influences the further classification according to century or phase of reclamation (cf. infra), since both these first mentions and the historic maps are from the same period.

Moreover, in the context of the County of Flanders, the first written indication of a place name can refer to the foundation of the parish, the foundation of a church or the plantation of the settlement. Based on the historical sources cited in the different toponymical dictionaries and place names registers, this distinction is not always clearly interpretable. Even when for example the foundation of a church is mentioned, it is unclear whether there already was a settlement or the foundation corresponded with the simultaneous foundation of a related settlement. Furthermore, archaeological data, if at all available, was not included in order to avoid differences in the dataset related to variable archaeological coverage. Because of these considerations, it was opted to interpret the first mention as a tentative indication of habitation at that specific location. Following Szabó et al. (2017), the dating of the settlements based on the first mention does not indicate the real age of the individual settlements. Instead, it offers an indication of the general trend on the wider landscape level. Since not all settlements can be dated, the required sample size in order to allow statistically significant conclusions regarding this landscape level was calculated using the formula **$(z^2 \times p(1-p)/e^2)/(1+(z^2 \times p(1-p)/e^2N))$**.[16]

Following the attributing of the first mention for each settlement, the settlements were grouped twice. First, a basic grouping was related to the century in which they were first mentioned in written sources. A second grouping followed the different phases that were recognised by Verhulst (1966a, 74-78; 1966b, 99-116; 1995, 128-133) in the medieval landscape reclamations and clearances, as described above (e.g. local reclamations during the tenth century versus wider intensification during the eleventh and late-twelfth century). This must allow clarifying whether there is a link between the distribution of row settlements and the intensification of the landscape use during the high and late medieval period in the county.

5.3.3 GIS analysis of the settlement distribution

Following the mapping and dating of the individual row settlements on the historical maps and to objectively assess the geographical distribution of this settlement morphology in the county, the spatial autocorrelation was measured using the Global Moran's I statistic. This gives an indication of the degree of correlation between the settlement locations and the spatial distance between them (Conolly & Lake 2006, 158), based on both settlement location and studied feature values (i.e. century/reclamation phase of first mention). The null hypothesis thereby states that the respective attributes are randomly distributed within the dataset. Given Verhulst's indications on the relation between row settlements and medieval landscape reclamations, however, it can be expected that the mapped settlement locations are not randomly dispersed within the County of Flanders related to

[16] This is a commonly used formula for the calculation of sample sizes for categorical data (Bartlett et al. 2001, 47). In this formula, N = population size (in the context of this study 720), e = margin of error (% in decimal form) (in the context of this study 0.05), z = the critical value of the Normal distribution for a given confidence level (in the context of this study 1.96), p = sample proportion or expected result (given that no results of previous surveys are available to relate to, 50% is used in the context of this study in order to calculate the largest sample size needed).

their morphology and date of first mention. Rather a clustered dispersal would be expected in relation to the intensified exploitation of forests and wastelands. In order to test this, a Moran's I statistic was used, incorporated in the **Spatial Autocorrelation (Morans I)**-tool in ArcMap, and measures the spatial autocorrelation based on the geographical point location of the settlements and feature values from the attributes (ESRI 2019b). This Moran's I value of 1 corresponds to a clustering of the objects (in this chapter the settlement locations), while a value of -1 indicates a checkerboard pattern and value 0 a perfect spatial randomness (Fu et al. 2014). This analysis was done first for only the dated settlements and subsequently for the dated and undated settlements combined. In both cases, although unspecified for the undated settlements, the century and reclamation period in which the first mention of a settlement occurs where chosen as feature value of the geographical data-input.

In a consecutive phase, in order to define and map the location and extent of the clusters of row settlements within the County of Flanders, a density analysis was performed. This must allow deducing whether and in which regions row settlements cluster, in order to further test the relation between the presence of these row settlements and medieval reclamations in the county. A Kernel Density Estimation (KDE), based on a probability density function, was chosen in order to get a smooth plot of the approximation of the settlement distribution (Conolly & Lake 2006, 173). The null hypothesis thereby states that the distribution of row settlements within the study area is random. The **Kernel Density**-tool was used in ArcMap with a search distance of 9840m (corresponding to the longest distance between two neighbouring point locations of two mapped settlements) and output cell size of 25 (resulting in a high-resolution raster data plot). In contrast to a purely visual approach, the output is a high resolution mathematically calculated continuous surface, which allows to locate the areas with the highest densities of these row settlements in the county as well as mapping the geographical variation in settlement density within the study area.

In order to statistically test whether the density clusters in the row settlement distribution are significantly higher or lower than average (*hot* versus *cold spots*) and thus deviate from the average trend within the county, a Getis-Ord Gi* statistic was performed following the KDE (Conolly & Lake 2006, 177 and 302), for which the null hypothesis states that there is a scattered pattern (Antrop & Van Eetvelde 2017, 252, Fig. 9.37). In practice, this Getis-Ord Gi* indicates whether there are regions within the County of Flanders where the presence or absence of row settlements are statistically different to the rest of the county. Given that these regions represent the strongest trend, locating them can offer meaningful insight in the processes that influenced the presence of this settlement morphology. The **Optimized Hot Spot Analysis**-tool in ArcMap was used, which automates the process and calculation (ESRI 2019a; 2019c). As Incident Data Aggregation Method, the *SNAP_NEARBY_Incidents_to_create_weighted_points* was used, resulting in aggregated points which can be interpolated to create a continuous surface. Based on the results of the Moran's I autocorrelation statistic, Kriging was used as interpolation method. According to Conolly and Lake (2006, 97-100 and 158), this offers good results when there is a strong spatial autocorrelation in the dataset.

According to Verhulst (1966a, 58-90; 1966b, 99-116; 1995, 128-147), the different phases in the reclamation of the landscape were strongly related to the soil and its suitability for farming. This research aims to test whether and how strongly this relation does indeed occurs within the County of Flanders. Therefore, the location of the row settlements is statistically studied in relation to the main soil textures in the study area, using χ^2-tests. The different soil types are thereby compared to the different centuries and exploitation phases of the settlement locations. The null hypothesis for these χ^2-tests states that there are no significant relations between the soil textures and the distributions of the row settlements. Given the difference in availability and resolution between the soil data for Belgium, France and the Netherlands, the data from the European Soil Database was used to achieve a mutual classification of the soils and an equal covering of the whole study area (Figure 12).[17] It needs to be taken into account that this dataset is built on a regional scale and does not incorporate local small scale variations in soil textures. Along the North Sea coast, marine clays, peat and dunes occur. In the southern part of the county (Nord-Pas-de-Calais and the southern areas of East Flanders) loam and loess soils are predominant, intermixed with sedimentary rocks. The county's central areas are characterised by sandy loams soils, while sand soils are dominant more to the north. Along the rivers, which cross the whole county, riverine clays occur. This pedological variation has resulted in different types of landscapes, as indicated by the variation in traditional landscapes in Flanders and *paysages* in Nord-Pas-de-Calais (Antrop et al. 2001; Dabaut & Van Eetvelde 2015; Direction Régionale de L'environnement Nord-Pas-de-Calais 2005).

[17] The European Soil Database distribution version 2.0, European Commission and the European Soil Bureau Network, CD-ROM, EUR 19945 EN, 2004.

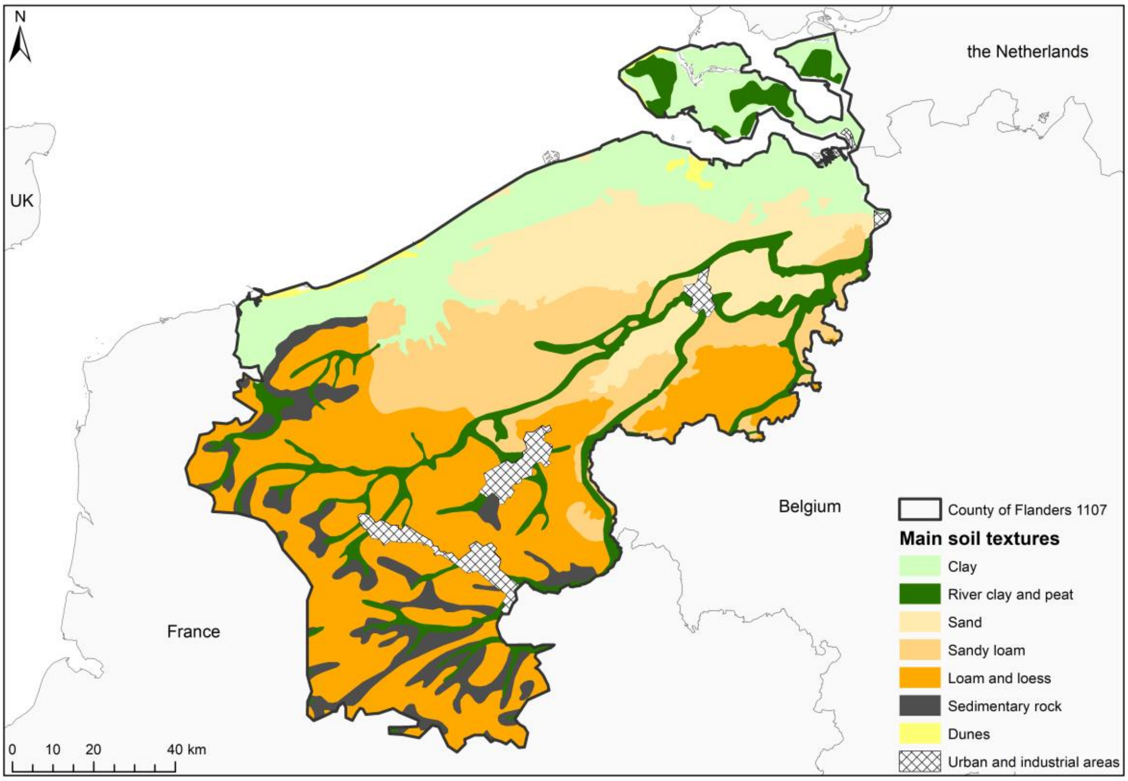


Figure 12: Main soil textures within the County of Flanders based on the European Soil Database (distribution version 2.0, vector) classified according to Parent Material Dominant (PARMADO) attribute.

5.4 Results

The mapping of the row settlement morphology based on three historical maps for Northern France, Flanders and *Zeeland* resulted in 720 individual settlement locations (see Figure 13). Following the rural settlement typology developed by Van De Velde et al. (2012), 13 different subtypes could be discerned (see Table 1 and Figure 14). The basic 'Continuous row settlement' and 'Discontinuous row settlement' occur most in the study area with respectively 251 and 285 individually mapped locations. Apart from the 'Reclamation settlement' morphology, which was recognised in 10% of the mapped settlements, other subtypes are considerably less present.

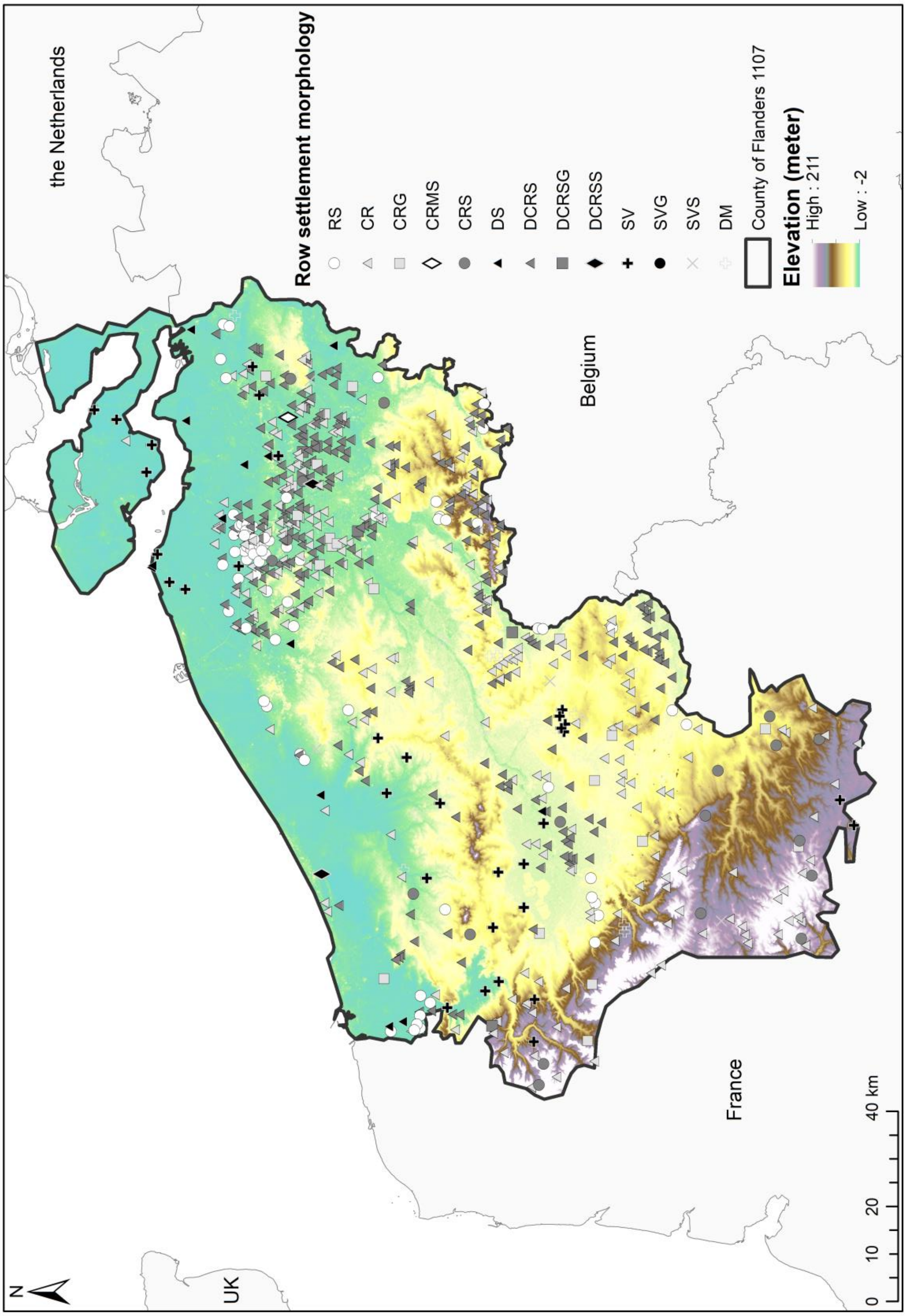


Figure 13: Visualisation of the 720 mapped row settlements, classified according to 13 subtypes, on a Digital Elevation Model (SRTM, visualised using Percent Clip stretch with defined min and max = 2) for the county.

Subtype of row settlement (based on Van De Velde et al.)	#	%
Reclamation settlement (RS): Habitation and long perpendicular strips of land along an axis of exploitation	72	10,0
Continuous row settlement (CR): Continuous row of detached habitation along a road (space between buildings).	251	34,9
Continuous row settlement with Green (CRG)	21	2,9
Continuous row settlement with multiple squares without green (CRMS)	1	0,1
Continuous row settlement with square (CRS)	19	2,6
Dikesettlement (DS): Continuous row of habitation along a dike.	13	1,8
Discontinuous row settlement (DCRS): Discontinuous row of detached habitation along a road.	285	39,6
Discontinuous row settlement with green (DCRSG)	6	0,8
Discontinous row settlement with square (DCRSS)	2	0,3
Streetvillage (SV): Continuous row of attached habitation along a road (no space between buildings).	33	4,6
Streetvillage with green (SVG)	2	0,3
Streetvillage with square (SVS)	3	0,4
Dual morphology (DM): Combination of row settlement morphologies.	12	1,7

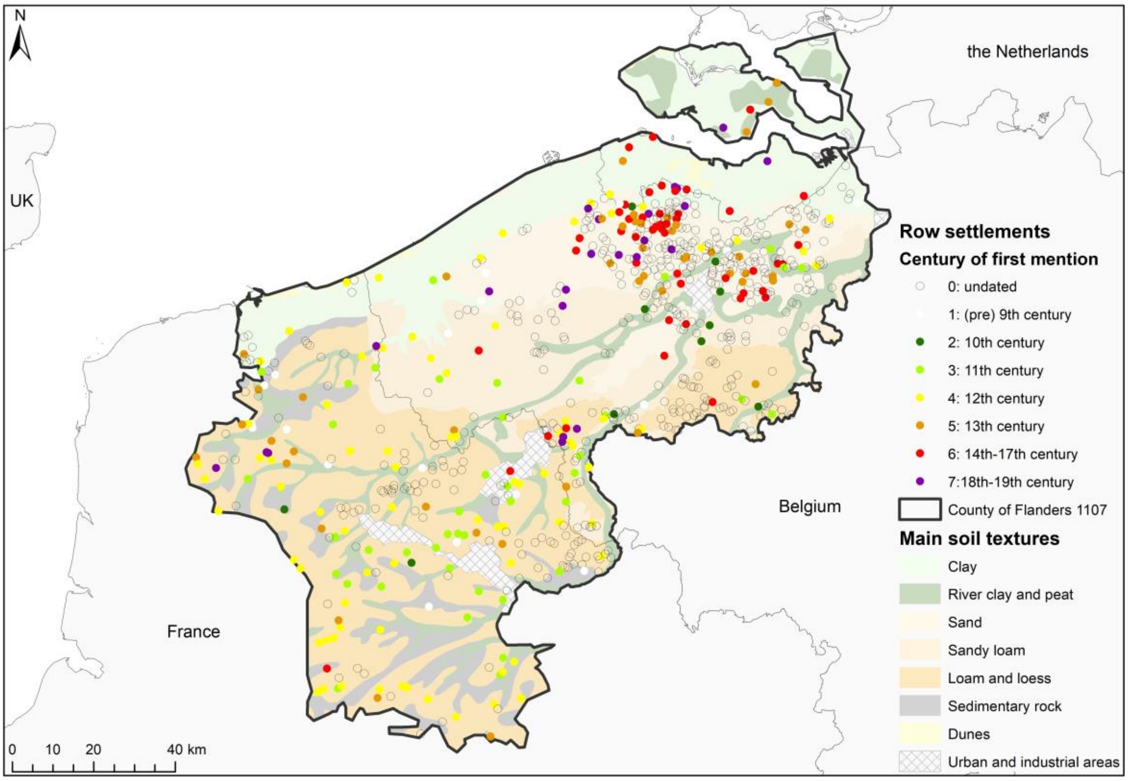
Table 1: Different subtypes of row settlements following Van De Velde et al. (2012): number and percentage of total (N=720). See examples in Figure 14.

Only 266 of these mapped settlements could be dated (37% of the total dataset), based on available place name registers and toponymical dictionaries. The required sample size in order to achieve a statistically significant result is 251. These dated settlements thus allow making a statistical significant interpretation for the whole population. Tables 2 to 5 shows the dated settlements grouped according to the century and phase of reclamation in which they were first mentioned. The basic map of both groups offers the first indication of temporal distribution (Figure 15 a and b). At first sight, those settlements with an older first mention tend to be mainly located in the south and centre of the county. The settlements with a more recent first mention are located between the cities of Ghent and Bruges and towards the east of Ghent. However, older settlements are also located in the close neighbourhood of both cities. A similar preliminary conclusion can be drawn from the settlements plot in relation to the different phases of landscape reclamation. Based on the number of individual settlements per century, an increase from the eleventh (42 settlements) towards the twelfth century (76 settlements) can be discerned, followed by a slight decrease during the thirteenth to seventeenth centuries (see Tables 2 to 5). When the phases of reclamation are considered, however, 85 settlements (32% of the dated row settlements) are linked to the eleventh to the late-twelfth century.

Based on individual χ^2-tests[18] between the different types of row settlements and the century/phase of reclamation groups, several statistically significant relations between settlement morphology and date of the first mention can be discerned (see Tables 2 to 5). The dated reclamation settlements (RS), continuous row settlements (CR) and discontinuous row settlements (DCRS) show a significant connection with the fourteenth to the seventeenth century. In contrast, continuous row settlements with multiple squares without a green (CRMS), continuous row settlement with a square (CRS) and continuous row settlements with a green (CRG) show a relation with respectively the eleventh, twelfth and thirteenth century. When the different phases of reclamation are considered, the post-thirteenth century seems the most important given that 5 subtypes show a significant relationship with this period. However, it should be taken into account that several of these morphologies were only mapped once for a certain century or reclamation phase and therefore do not offer much relevant insight in the possible relations between origin and period, despite the clear statistical relevance.

[18] The assumption that no more than 20% of the expected values should be less than 5 was not met for all observations in the individual χ^2-tests. A subsequent Fishers Exact Tests confirmed the reliability of the individual tests.

Figure 14: Examples of the different row settlement morphologies, used in this research, on the Count de Ferraris's Carte de Cabinet (KBR, The Royal Library of Belgium).



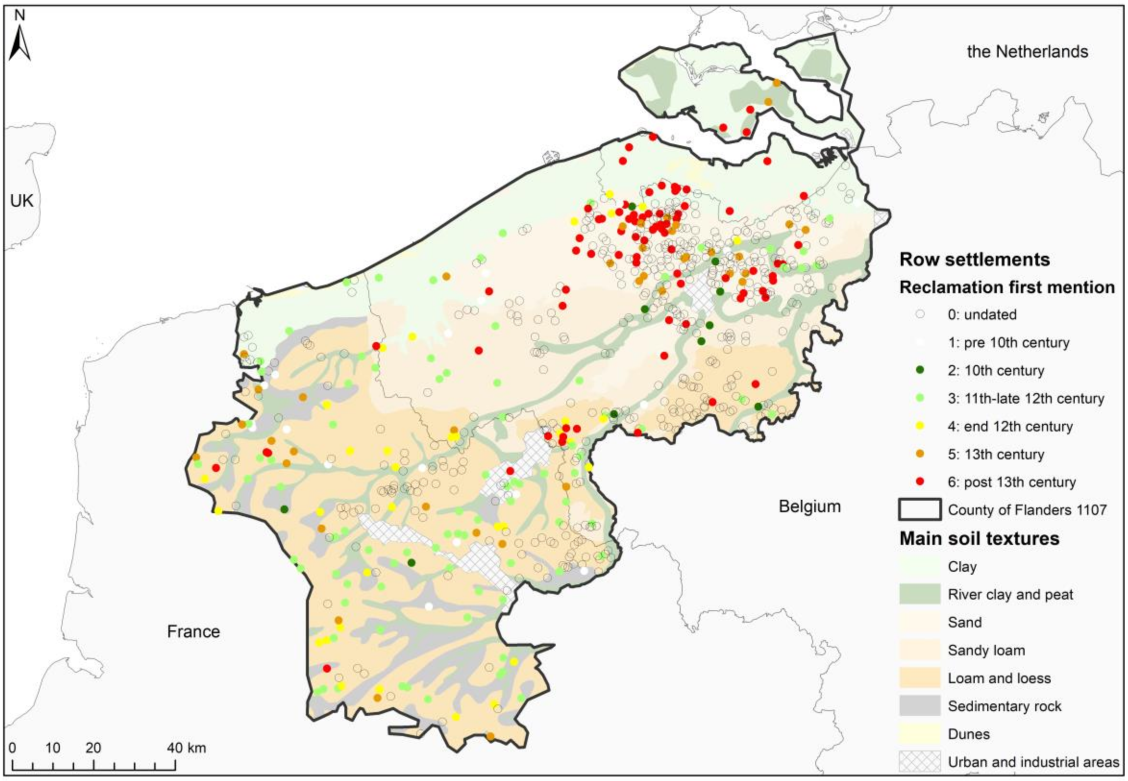


Figure 15: Visualisation of the 720 mapped row settlements, classified according to the century of their first mention (a, upper) and phase of reclamation (Verhulst 1995) of their first mention (b, lower), in relation to the main soil textures in the county.

The overall geographical distribution offers other insights. Based on the Global Moran's I Indexes for all the settlements in relation to the century (Moran's I = 0.12, $p < 0.05$) and phase of reclamation (Moran's I = 0.12, $p < 0.05$) in which the settlements were first mentioned (thus including the undated settlements), significant positive spatial autocorrelations could be observed. Similar results are given when only the dated settlements are considered in relation to the century (Moran's I = 0.36, $p < 0.05$) and reclamation phases (Moran's I = 0.42, $p < 0.05$). The null hypotheses of spatial randomness can therefore be rejected. In both cases, this indicates a relatively clustered spatial pattern in the geographical distribution of these row settlements in the whole study area in relation to their century and reclamation phase of first mention.

The consecutive plot of the Kernel Density Estimation (KDE) (Figure 16) shows several zones with a higher density of row settlements within the County of Flanders, thereby equally rejecting the null hypothesis of random distribution. The most important zones are located to the north of the county, between the cities of Bruges and Ghent, and to the east of Ghent. Other smaller clusters occur in the *Westhoek*, southern East Flanders, to the north of Marchiennes and the upper valley of the river Lys.

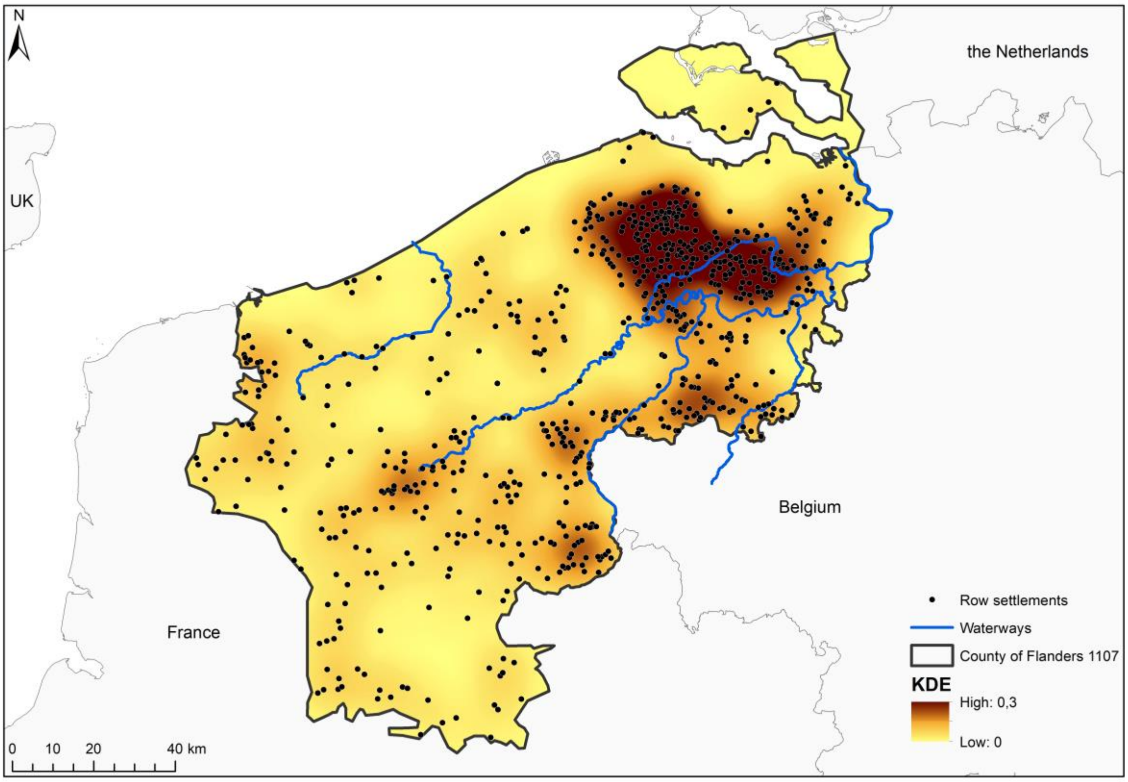


Figure 16: Kernel density estimation of the 720 mapped row settlements in the County of Flanders (Visualised using 2.5 Standard Deviations stretch).

Only the areas between Bruges and Ghent and to the east of Ghent, however, corresponds to a statistically significant hotspot (ranging from a 99 to 90% confidence level) based on the Getis-Ord Gi* statistic (Figure 17). In contrast, the regions around Saint-Omer and to the northwest of Arras are characterised by a significant low density of row settlements at a 99% confidence level. The southern part of the county and coastal areas can be considered as cold spots at a 90% confidence level, while the regions around the rivers Lys, Scheldt and Dender are not significantly clustered. Both hot and cold spots indicate that the null hypothesis of spatial randomness can be rejected and that the spatial distribution of the row settlements within the county is more spatially clustered than would be expected if the underlying processes related to the settlement locations were truly random (ESRI 2019a). Moreover, the absolute positive value for the hot spots are higher than the absolute negative values for the cold spots, which indicates that the clustering within the hotspots is stronger than in the cold spots.

When the geographical distribution of these row settlements is plotted on the diversity in soil textures within the study area, certain relations become visible (Figure 15 a and b). At first sight, the large cluster of more recent row settlements in the north of the county corresponds with the presence of sandy soils, while the smaller concentrations of older settlements towards the south of the county are located on loam and loess soils. This corresponds to the results of individual χ^2-tests[19] between the different soil textures and the century/phase of reclamation in which the dated settlements were first mentioned (see Tables 4 and 5). Before and during the tenth century, the relation between the location of the settlement and the pedological matrix, namely the distribution of sedimentary rock and sandy loams is statistically significant (respectively χ^2 = 8.382 and χ^2 = 12.147). During the eleventh and twelfth centuries, the relation with loamy/loess soils (20 and 41 individuals and a respective χ^2 value of 4.233 and 19.226) as well as sandy soils (1 and 8 individual and χ^2 values of 18.190 and 19.335) become significant. In contrast, during the thirteenth century, only the number of settlements on sandy soils appears to be statistically significant (χ^2 value of 8.865). Sand remains important during the fourteenth to the seventeenth century with 31 individuals (χ^2 = 34.951), supported by loamy/loess and river clay/peat.

Similar conclusions can be drawn from the χ^2-test between soil texture and reclamation phases (see Table 5). From the eleventh century until the post-thirteenth century phases both Sand and Loam/Loess soils are significantly related to the location of the row settlements. Based on the number of individuals, however, focus shift from loam/loess in

[19] The assumption that no more than 20% of the expected values should be less than 5 was not met for all observations in the individual χ^2-tests. A subsequent Fishers Exact Tests confirmed the reliability of the individual tests.

the eleventh to the late-twelfth century (42 individual settlements) to sand in the thirteenth century (18 point locations) and post-thirteenth century (47 settlements).

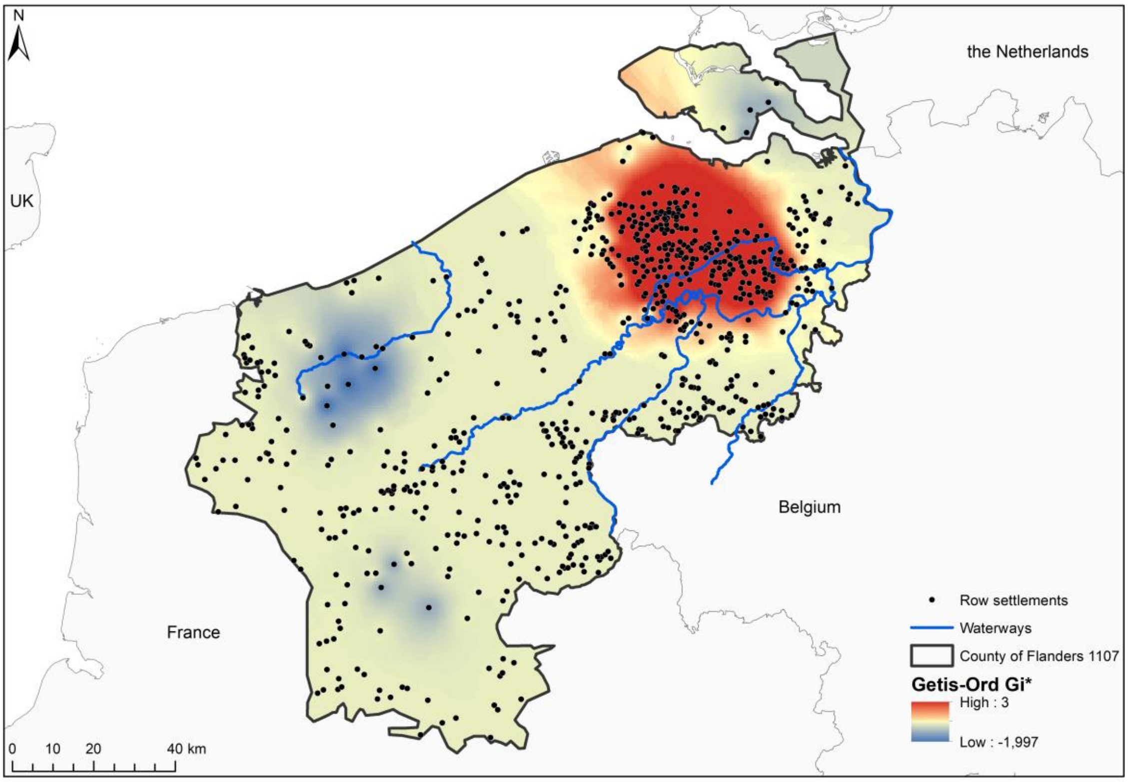


Figure 17: Visualisation of the Getis-Ord Gi* statistic for the 720 mapped row settlements in the county (Visualised using 2.5 Standard Deviations stretch).

5.5 Discussion

Throughout his historical economical and historical-geographical research, Verhulst (1953; 1991a; 1991b; 1995) has indicated the importance of axes of exploitation and row settlements in the context of landscape reclamations and clearances during the medieval period in the County of Flanders. The comital planted settlements of Kluizen and Woesten were his prime examples. Strong morphological similarities can, however, been found across Europe, mostly related to expanding landscape exploitations. Research by van der Linden (1955; 1982; 2000) on the Cope reclamations in the Holland-Utrecht lowlands has indicated the influence of a strong legal system on the highly structured layout of the settlements and surrounding landscape. Similar legal frameworks would have been used by Flemish, Dutch and Frisian settlers in central and eastern Europe during the so-called high medieval *Ostsiedlung* (Klápště 2012, 215-227; Luck 2010). In the regions where these settlers were active, similar settlement morphologies oriented along the exploitation axis occurred (Nitz 1983, 105; Schlesinger 2008). In these contexts, an important role has been ascribed to *locatores* or land agents who were responsible for the planting of settlements and attracting settlers (Nitz 1983, 105; van der Linden 1982). However, research by Nitz (1962, 83-112; 1983) also showed a strong influence by the Abbey of Lorsch on the distribution of this settlement morphology in these regions, apart from the work of these settlers or *locatores*. References to these *locatores* can also be found in the place names and morphology of several settlements in Pembrokeshire (South Wales) (Kissock 1997; Rippon 2008, 241-243; Roberts 1987, 199-200).

The results of the mapping of row settlements in this chapter support the statement by Dussart (1957), Lefèvre (1964b) and Van De Velde et al. (2012) that this rural settlement morphology is more widespread within the County of Flanders as well. The geographical distribution, however, is far more complex than the generalised interpretations of zones with equal settlement morphologies offered by Dussart (1957, 12-18) and Lefèvre (1964b).

5.5.1 The Colonisation of the sandy soils

Historical research has indicated that during the so-called 'Great reclamation period', the interaction between demographic changes, urbanisation, the growing number of city dwellers and rural development induced the need for new lands to come under cultivation (Thoen & Soens 2015; Verhulst 1995; Verhulst 1999, 113-118). The number of row settlements indeed increases from the eleventh century (42 settlements) onwards with a maximum during the twelfth century (76 settlements) (see Table 2). The results of this study in the County of Flanders indicate an evolution from the fertile, higher soils in the south of the county towards the densely urbanized yet low-lying and less fertile northern parts. Czech research in Moravia has shown the dichotomy between the fertile lowlands, which were settled first, and the less fertile highlands, which were to be settled at a later stage in the colonization (Szabó et al. 2017, 95). In the County of Flanders, the opposite is true. Although the difference in elevation is only around 200 meters, the higher areas are characterised by the older first mentions while the more recent first mentions are mainly located on the northern lowlands. Despite this apparent contrast between Flanders and Moravia, similar processes can be discerned. The higher Flemish regions are characterised by fertile loam and loess soils, while the lowlands are formed of sandy soils. In both regions, a movement from fertile towards less fertile arable lands can thus be attested, based on the first mentions of settlements or township boundaries. For these less fertile arable lands, Thoen (1993a, 268; 1993b, 73-74; 2010, 368-387) states that up and down husbandry or *dries* agriculture would have been in use, similar to the system used on the outfields he attests around *kouters* or micro-open fields across the county (cf. infra). In this *dries* system, arable lands were left unploughed for a certain period during which they were used as extensive grazing lands, allowing the land to regenerate. Elsewhere in Europe, a similar shift towards the less fertile arable lands occurred, as can be attested by research on the fen- and moorlands in central and eastern Europe, Britain and the Netherlands (Barber & Priestley-Bell 2008, 13-15; Darby 1983; Müller-Wille 1984; Nitz 1983; Rippon 1996, 39-96; van der Linden 1982).

When the distribution of the row settlements in relation to the soil texture is taken into consideration for Flanders, both loam/loess and sandy soils are characterised by the highest number of mapped row settlements, with respectively 90 and 80 settlements (see Tables 4 and 5). However, the number of mapped and dated settlements only becomes large on the sandy soils in comparison to the loam/loess soils from the thirteenth century onwards (see Tables 4 and 5). This corresponds with the final phase of intensification according to Verhulst (1995, 134-136). During the previous phases, in which systematisation and intensification first became important, row settlements appear to have been mainly located on the loam and loess soils. Moreover, both loam/loess and sandy soils show statistically significant relations with the location of row settlements during the 'Great reclamation period'. This would suggest that both in the newly reclaimed lands as well as in the already reclaimed lands, new row settlements were founded. This observation was also made in the Moravian research, where numerous smaller, though post-medieval, settlements were founded in the already settled areas (Szabó et al. 2017, 95). Research on the location of monastic complexes in Germany also showed that, although they were believed to have been founded in a wilderness or hostile environment, in reality, these lands were already cultivated by local populations before the monasteries imposed an institutional organisation on the landscape (Schreg 2018).

Furthermore, the largest number of row settlements located on sandy soils date to the fourteenth- to seventeenth-century interval. The majority of these settlements on the sandy soils thus were first mentioned only after the period of medieval intensification of the landscape reclamations.

5.5.2 Geographical clusters

Although, at first sight, the row settlement morphology seems to be widely distributed across the County of Flanders, the geostatistical analysis presented in this chapter has indicated a clustered pattern with several regions with a high density of row settlements. Especially the large cluster between the cities of Bruges and Ghent is striking in relation to the rest of the county. Both the KDE and the Getis-Ord Gi* indicate that the density of row settlements in this region is much higher than elsewhere in the county. This can be related to the colonisation of the sandy soils which, as already mentioned, appears to have taken flight from the thirteenth century onwards with a strong increase between the fourteenth to seventeenth centuries. The presence of thirteenth-century settlements corresponds with the statements of Verhulst regarding the reclamation of the so-called *Veld* areas in the north of the county. In these highly unfertile heathlands, the counts of Flanders no longer would have taken the initiative to plant settlements themselves. According to Verhulst, Eeklo was an exception and planted as a row settlement by countess Joan of Constantinople in 1240. Instead, lands were sold or given in concession to lay elite entrepreneurs, resulting in numerous small settlements such as Nieuw-Roeselare (Verbrugghe 2019; Verhulst 1995, 138). Furthermore, major landlords such as the important abbeys of Ghent started to take over the comital role of initiating large-scale reclamations (Verhulst 1995, 138).

The role and influence of the cities of Bruges and Ghent in the settlement distribution should, however, not be underestimated. Around these cities, row settlements with an older first mention occur, as early as the tenth to the eleventh century for Ghent and the twelfth century for Bruges. This indicates an earlier dynamic close to these cities than in the heathlands in between them. Important to mention is the location of the settlements with this older first mention along the edges of the main river valleys of the Lys, Scheldt and Kale-Durme. Past historical research has been disputing the influences or interactions between the countryside and cities in the County of Flanders (Thoen 1993a; 2001; Verhulst 1993). Nowadays, however, it is generally accepted that the growth of towns and cities was related to increased agricultural production and development in relation to population growth (Dumolyn, Declercq, et al. 2018). The town-countryside interaction thus would have influenced the presence of settlements around the cities.

5.5.3 Other processes at work?

A large number of post-thirteenth-century row settlements in the sandy region suggest that also late to post-medieval processes were influential in the founding and distribution of this settlement morphology. In this northern region, for example, several row settlements with very long and wide streets are understood to be related to the cloth industry (Verhoeve & Verbruggen 2006). Furthermore, other areas outside this high-density cluster are indicated as more empty or 'cold spots' regarding the presence of row settlements. The regions around Saint-Omer and to the northwest of Arras are considered statistically significantly characterised by lower numbers of this settlement morphology.

However, based on visual interpretations, the number of row settlements along the North sea coast seems to be lower as well. This observation has not been supported by the Optimized Hot Spot Analysis though, which indicates it as a cold spot at a lower confidence level.

Other processes thus must have been at work, resulting in the absence or continued creation of row settlements. Research by Verhulst and Thoen on the presence of *Kouter* place names has indicated a major cluster on the sandy loam soils in southern East Flanders and to the north of the river Lys. From the ninth century onwards, these *Kouter* place names referred to an agricultural system in which the most important croplands of a settlement were grouped in one big complex which was intensively cultivated and manured, called *kouter*. The settlement itself existed of a group of randomly ordered farms, sometimes around a green, nucleated at the edge of this *kouter* (Thoen 1993b, 71-92; 2010; Verhulst 1995, 121). The main region of this type of settlements is characterised by the absence or a low number of row settlements. Elsewhere, in the coastal areas, the agricultural system of large scale sheep and cattle farms might have influenced the settlement morphologies, resulting in a majority of relatively large single farms (Thoen & Soens 2015, 224). Outside the County of Flanders, other types of reclamation also occurred which were highly dependent on the socio-economic and political circumstances (Curtis & Campopiano 2014, 93-94). In south-western Germany, the formation of nucleated settlements characterised by open fields and commons, similar to the *kouter* settlements described by Verhulst and Thoen, is strongly related to population increase and intensification of the rural economy (Rösener 1999). In contrast, a French case study on clearances in Bretagne shows how these did not result in the plantation of a new settlement but was rather based on two existing habitation centres (Chédeville 1995).

5.5.4 Considerations

This study confirms that high medieval landscape reclamations indeed have been a determining factor for the origin and distribution of row settlements in the County of Flanders. However, some considerations have to be made.

The identification of row settlements in the County of Flanders was based on eighteenth an nineteenth century maps. Although these predate the largescale landscape changes as indicated by Antrop (1997), changes in settlement morphology may have occurred since the high medieval period. In order to incorporate these possible evolutions, in-depth analysis of each individual settlement is necessary for further analysis.

As has been indicated in the research by Szabó et al. (2017, 98) on the Moravian township boundaries, the use of first mentions offers a valuable contribution to the study of medieval landscape reclamations at a wider landscape level. The date of the first mention allowed to add an element of time-depth to the analysis of the geographical patterns. As was the case for the research by Szabó et al. (2017, 94), the greatest weakness of the use of first mentions was its poor coverage. However, the 266 dated settlements allowed statistically significant interpretations for the whole dataset. More importantly, though, it needs to be considered that the availability of the written sources is not equally chronologically distributed. Given that administration was far less developed in the eleventh century in comparison to the twelfth and thirteenth centuries, the number of first mentions would rather increase in time, eventually resulting in more available sources for the more recent periods (Clanchy 1993, 1-7; Heirbaut 2007, 97-101; McKitterick 1989, 1-6 and 25-27; Menant 2006, 33-37). Therefore, it should be expected that there are generally fewer mentions for the older periods. As quoted by Szabó et al. (2017, 95) it thus evokes an impression rather than an exact description.

The impressionist character of these first mentions might, however, seem to contradict with the exact descriptive character of the GIS analysis. Nevertheless, the considerations mentioned above exist for the whole study area and should thus allow for this kind of analysis on a landscape scale of the medieval County of Flanders. The trends presented in this chapter should be interpreted as indications for regional processes. In order to firmly explain the geographical distribution of row settlements in the county, historical research of the processes on a more local scale need to be considered as well. Considering the differences between the coastal area and Inland Flanders, for example, can be of added value for further research. For the County of Flanders, historical research has offered much insight into the regional variability in economic systems, property rights, the use of credit and leaseholds during the medieval and post-medieval period (Thoen 1993a; Thoen & Soens 2015, 224), however, these do not always allow a link with the actual settlement system.

Furthermore, it is important to consider that the County of Flanders was used as the study area, which excludes the surrounding regions from the analysis. Edge effects related to the presence and density of row settlements outside the county have thus not been incorporated.

Finally, it needs to be considered that, apart from the row settlement morphology, also other grouped and dispersed settlement types were present during the same period in the County of Flanders. For example, archaeological research mainly attests individual or grouped farm holdings for the high medieval period in the same regions where row settlements were present. This indicates that row settlements, although important, were not the only settlement type used for landscape reclamations (De Clercq 2017).

5.6 Conclusion

The high medieval landscape reclamations have been considered a major influence on the presence and distribution of settlements in the County of Flanders. Especially the row settlement morphology has been linked to the intensification and systematisation of reclamations and clearances. Therefore, the aim of this chapter was to map the geographical distribution of this settlement morphology and all its subtypes in order to determine to what extent this has indeed a high medieval origin. Based on the first mention of the mapped row settlements, an increase of this settlement type can be attested during the high medieval period, continuing into the post-medieval period as well. Furthermore, strong geographical relations with loam, loess and sandy soils can be described, suggesting a shift of arable lands from the highly fertile to less fertile soils from the thirteenth century onwards. Based on this research, a link between the high medieval landscape reclamations and the distribution of row settlements can be attested. However, also post-medieval socio-economical processes will have influenced the continued use of this morphology. Furthermore, outside the regions with a high density in row settlements, other political or economic processes must have influenced the absence of this settlement morphology. It must be concluded that, although row settlements must have played an important role in the reclamation of certain regions within the county, other settlement types were equally present in the same regions or more important in others. The use of eighteenth- to nineteenth-century maps in combination with place name registers and toponymical dictionaries, however, allowed to study the historicity of the settlement landscape in the County of Flanders and offers the potential to clarify its time depth and relation to medieval landscape reclamations.

Morphology vs Century of first mention

			Century							Total	% of Total
			pre 9th century - 9th century	10th century	11th century	12th century	13th century	14th - 17th century	18th - 19th century		
Morphology	Reclamation settlement	Count	0	1	1	2	1	12	2	19	7,1%
		Chi-Square	1.664	0.128	1.705	3.265	2.260	26.105	0.092		
		Sig. (2-sided)	0.197	0.721	0.192	0.071	0.133	0.000	0.762		
	Continuous row settlement	Count	8	5	18	36	19	11	9	106	39,8%
		Chi-Square	0.000	0.447	0.188	2.509	0.002	6.441	0.005		
		Sig. (2-sided)	0.989	0.504	0.664	0.113	0.967	0.011*	0.941		
	Continuous row settlement with green	Count	1	1	3	3	7	0	0	15	5,6%
		Chi-Square	0.017	0.371	0.212	0.572	8.805	3.412	1.505		
		Sig. (2-sided)	0.897	0.542	0.645	0.449	0.003*	0.065	0.220		
	Continuous row settlement with multiple squares without greenfunction	Count	0	0	1	0	0	0	0	1	0,4%
		Chi-Square	0.082	0.039	5.353	0.402	0.221	0.215	0.095		
		Sig. (2-sided)	0.775	0.843	0.021*	0.526	0.638	0.643	0.758		
	continuous row settlement with square	Count	1	1	1	9	1	0	1	14	5,3%
		Chi-Square	0.003	0.468	0.831	9.236	1.188	3.171	0.042		
		Sig. (2-sided)	0.956	0.494	0.362	0.002*	0.276	0.075	0.837		
	Dikesettlement	Count	0	0	0	0	1	2	1	4	1,5%
		Chi-Square	0.330	0.159	0.761	1.624	0.133	2.918	1.375		
		Sig. (2-sided)	0.566	0.690	0.383	0.202	0.716	0.088	0.241		
	Discontinuous row settlement	Count	3	2	9	12	11	18	9	64	24,1%
		Chi-Square	0.972	0.094	0.189	3.983	0.042	6.334	3.130		
		Sig. (2-sided)	0.324	0.759	0.664	0.046	0.838	0.012*	0.077		
	Discontinuous row settlement with green	Count	0	0	0	1	1	0	0	2	0,8%
		Chi-Square	0.164	0.079	0.378	0.453	1.391	0.432	0.191		
		Sig. (2-sided)	0.686	0.779	0.539	0.501	0.238	0.511	0.662		
	Discontinous row settlement with square	Count	0	0	0	1	0	0	0	1	0,4%
		Chi-Square	0.082	0.039	0.188	2.509	0.221	0.215	0.095		
		Sig. (2-sided)	0.775	0.843	0.664	0.113	0.638	0.643	0.758		
	Streetvillage	Count	4	0	4	8	5	3	1	25	9,4%
		Chi-Square	2.854	1.078	0.001	0.159	0.071	0.610	0.754		
		Sig. (2-sided)	0.091	0.299	0.976	0.690	0.789	0.435	0.385		
	Streetvillage with green	Count	0	0	0	0	1	0	0	1	0,4%
		Chi-Square	0.082	0.039	0.188	0.402	4.559	0.215	0.095		
		Sig. (2-sided)	0.775	0.843	0.664	0.526	0.033*	0.643	0.758		
	Streetvillage with square	Count	1	0	1	1	1	0	0	4	1,5%
		Chi-Square	1.785	0.159	0.259	0.025	0.133	0.872	0.384		
		Sig. (2-sided)	0.182	0.690	0.611	0.873	0.716	0.351	0.535		
	Dual morphology	Count	2	0	4	3	0	1	0	10	3,8%
		Chi-Square	2.328	0.406	4.581	0.010	2.288	0.420	0.983		
		Sig. (2-sided)	0.127	0.524	0.032*	0.919	0.130	0.517	0.321		
Total		Count	20	10	42	76	48	47	23	266	100,0%
		% of Total	7,5%	3,8%	15,8%	28,6%	18,0%	17,7%	8,6%	100,0%	

*. Significant at the 0.05 level (2-sided)

Table 2: Chi-square tests for settlement morphology and first mention (grouped as century). The relation between morphology and first mention is indicated by Count (number of sites), Chi-Square (Chi-square value) and Sig. (2-sided) (p-value for the Chi-square test). Values for the latter, that are indicated with a * represent statistically significant relations at the 0.05 level.

Morphology vs Reclamationphase of first mention										
			Reclamation						Total	% of Total
			pre 10th century	10th century	11th - late 12th century	end 12th century	13th century (until 1280)	post 13th century (post 1280)		
Morphology	Reclamation settlement	Count	0	1	1	2	0	15	19	7,1%
		Chi-Square	1.664	0.128	6.704	0.067	3.515	23.769		
		Sig. (2-sided)	0.197	0.721	0.010*	0.796	0.061	0.000*		
	Continuous row settlement	Count	8	5	39	15	16	23	106	39,8%
		Chi-Square	0.000	0.115	1.545	0.263	0.000	4.785		
		Sig. (2-sided)	0.989	0.504	0.168	0.482	0.871	0.020*		
	Continuous row settlement with green	Count	1	1	5	1	6	1	15	5,6%
		Chi-Square	0.017	0.371	0.014	0.482	8.157	4.039		
		Sig. (2-sided)	0.897	0.542	0.906	0.488	0.004*	0.044*		
	Continuous row settlement with multiple squares without greenfunction	Count	0	0	1	0	0	0	1	0,4%
		Chi-Square	0.082	0.039	2.137	0.142	0.172	0.424		
		Sig. (2-sided)	0.775	0.843	0.144	0.706	0.678	0.515		
	continuous row settlement with square	Count	1	1	7	3	1	1	14	5,3%
		Chi-Square	0.003	0.468	1.424	0.404	0.668	3.601		
		Sig. (2-sided)	0.956	0.494	0.137	0.293	0.414	0.058		
	Dikesettlement	Count	0	0	0	0	1	3	4	1,5%
		Chi-Square	0.330	0.159	1.907	0.575	0.347	3.992		
		Sig. (2-sided)	0.566	0.690	0.167	0.448	0.556	0.046*		
	Discontinuous row settlement	Count	3	2	15	6	9	29	64	24,1%
		Chi-Square	0.972	0.094	2.812	0.712	0.024	9.840		
		Sig. (2-sided)	0.324	0.759	0.094	0.339	0.876	0.002*		
	Discontinuous row settlement with green	Count	0	0	1	0	1	0	2	0,8%
		Chi-Square	0.164	0.079	0.302	0.285	2.011	0.851		
		Sig. (2-sided)	0.686	0.779	0.583	0.593	0.156	0.356		
	Discontinous row settlement with square	Count	0	0	1	0	0	0	1	0,4%
		Chi-Square	0.082	0.039	2.137	0.142	0.172	0.424		
		Sig. (2-sided)	0.775	0.843	0.144	0.706	0.678	0.515		
	Streetvillage	Count	4	0	8	4	3	6	25	9,4%
		Chi-Square	2.854	1.078	0.000	0.328	0.156	0.429		
		Sig. (2-sided)	0.091	0.299	0.996	0.567	0.693	0.512		
	Streetvillage with green	Count	0	0	0	0	1	0	1	0,4%
		Chi-Square	0.082	0.039	0.471	0.142	5.842	0.424		
		Sig. (2-sided)	0.775	0.843	0.492	0.706	0.016*	0.515		
	Streetvillage with square	Count	1	0	2	0	1	0	4	1,5%
		Chi-Square	1.785	0.159	0.608	0.575	0.347	1.716		
		Sig. (2-sided)	0.182	0.690	0.435	0.448	0.556	0.190		
	Dual morphology	Count	2	0	5	2	0	1	10	3,8%
		Chi-Square	2.328	0.406	1.556	0.551	1.785	1.931		
		Sig. (2-sided)	0.127	0.524	0.212	0.458	0.182	0.165		
Total		Count	20	10	85	33	39	79	266	100,0%
		% of Total	7,5%	3,8%	32,0%	12,4%	14,7%	29,7%	100,0%	

*. Significant at the 0.05 level (2-sided)

Table 3: Chi-square tests for settlement morphology and first mention (grouped as phase of reclamation). The relation between morphology and first mention is indicated by Count (number of sites), Chi-Square (Chi-square value) and Sig. (2-sided) (p-value for the Chi-square test). Values for the latter, that are indicated with a * represent statistically significant relations at the 0.05 level.

Soiltexture vs Century of first mention

			Century							Total	% of Total
			(pre) 9th	10th	11th	12th	13th	14th-17th	18th-19th		
Soiltexture	clay	Count	2	0	2	7	4	7	4	26	9,8%
		Chi-Square	0.001	1.126	1.421	0.038	0.138	1.696	1.656		
		Sig. (2-sided)	0.972	0.289	0.233	0.845	0.710	0.193	0.198		
	loam/loess	Count	6	1	20	41	13	3	6	90	33,8%
		Chi-Square	0.142	2.637	4.233	19.226	1.192	19.217	0.675		
		Sig. (2-sided)	0.706	0.104	0.040*	0.000*	0.275	0.000*	0.411		
	riverclay/peat	Count	2	1	7	8	5	0	1	24	9,0%
		Chi-Square	0.025	0.012	3.550	0.293	0.139	5.661	0.670		
		Sig. (2-sided)	0.874	0.912	0.060	0.588	0.710	0.017*	0.413		
	sedimentary rock	Count	4	1	2	5	2	1	0	15	5,6%
		Chi-Square	8.382	0.371	0.072	0.177	0.239	1.323	1.505		
		Sig. (2-sided)	0.004*	0.542	0.788	0.674	0.625	0.250	0.220		
	sand	Count	3	3	1	8	23	31	11	80	30,1%
		Chi-Square	2.337	0.000	18.190	19.335	8.865	34.951	3.772		
		Sig. (2-sided)	0.126	0.996	0.000*	0.000*	0.003*	0.000*	0.052		
	sandy loam	Count	3	4	7	5	1	3	1	24	9,0%
		Chi-Square	0.941	12.147	3.550	0.774	3.436	0.485	0.670		
		Sig. (2-sided)	0.332	0.000*	0.060	0.379	0.064	0.486	0.413		
	dunes	Count	0	0	0	1	0	0	0	1	0,4%
		Chi-Square	0.082	0.039	0.188	2.509	0.221	0.215	0.095		
		Sig. (2-sided)	0.775	0.843	0.664	0.113	0.638	0.643	0.758		
	Urban and industrial areas	Count	0	0	3	1	0	2	0	6	2,3%
		Chi-Square	0.499	0.240	5.403	0.426	1.352	1.035	0.581		
		Sig. (2-sided)	0.480	0.624	0.020*	0.514	0.245	0.309	0.446		
Total		Count	20	10	42	76	48	47	23	266	100,0%
		% of Total	7,5%	3,8%	15,8%	28,6%	18,0%	17,7%	8,6%	100,0%	

*. Significant at the 0.05 level (2-sided)

Table 4: Chi-square tests for soiltexture and first mention (grouped as century). The relation between morphology and first mention is indicated by Count (number of sites), Chi-Square (Chi-square value) and Sig. (2-sided) (p-value for the Chi-square test). Values for the latter, that are indicated with a * represent statistically significant relations at the 0.05 level.

Soiltexture vs Reclamationphase of first mention

			Reclamation						Total	% of Total
			pre 10th century	10th century	11th-late12th century	end 12th century	13th century (until 1280)	post 13th century (post 1280)		
Soiltexture	clay	Count	2	0	7	2	3	12	26	9,8%
		Chi-Square	0.001	1.126	0.336	0.589	0.225	3.737		
		Sig. (2-sided)	0.972	0.289	0.562	0.443	0.636	0.053		
	loam/loess	Count	6	1	42	19	12	10	90	33,8%
		Chi-Square	0.142	2.637	13.540	9.485	0.192	22.510		
		Sig. (2-sided)	0.706	0.104	0.000*	0.002*	0.661	0.000*		
	riverclay/peat	Count	2	1	10	5	3	3	24	9,0%
		Chi-Square	0.025	0.012	1.144	1.724	0.099	3.738		
		Sig. (2-sided)	0.874	0.912	0.285	0.189	0.754	0.053		
	sedimentary rock	Count	4	1	6	1	2	1	15	5,6%
		Chi-Square	8.382	0.371	0.473	0.482	0.022	4.039		
		Sig. (2-sided)	0.004*	0.542	0.492	0.488	0.881	0.044*		
	sand	Count	3	3	4	5	18	47	80	30,1%
		Chi-Square	2.337	0.000	38.230	3.990	5.618	46.245		
		Sig. (2-sided)	0.126	0.996	0.000*	0.046*	0.018*	0.000*		
	sandy loam	Count	3	4	11	1	1	4	24	9,0%
		Chi-Square	0.941	12.147	2.337	1.648	2.322	2.146		
		Sig. (2-sided)	0.332	0.000*	0.126	0.199	0.128	0.143		
	dunes	Count	0	0	1	0	0	0	1	0,4%
		Chi-Square	0.082	12.147	2.137	0.142	0.172	0.424		
		Sig. (2-sided)	0.775	0.843	0.144	0.706	0.678	0.515		
	Urban and industrial areas	Count	0	0	4	0	0	2	6	2,3%
		Chi-Square	0.499	0.240	3.402	0.869	1.055	0.039		
		Sig. (2-sided)	0.480	0.624	0.065	0.351	0.304	0.844		
Total		Count	20	10	85	33	39	79	266	100,0%
		% of Total	7,5%	3,8%	32,0%	12,4%	14,7%	29,7%	100,0%	

*. Significant at the 0.05 level (2-sided)

Table 5: Chi-square tests for soiltexture and first mention (grouped as phase of reclamation). The relation between morphology and first mention is indicated by Count (number of sites), Chi-Square (Chi-square value) and Sig. (2-sided) (p-value for the Chi-square test). Values for the latter, that are indicated with a * represent statistically significant relations at the 0.05 level.

Chapter 6 High medieval grouped rural settlements in the archaeological record

6.1 Expanding the dataset

From a European perspective, grouped rural settlements with village-like characteristics are considered to originate during the high medieval period (Chapelot & Fossier 1980, 139-144; Roberts 1996b, 112-113; Verhulst 1995, 159). As considered in Chapter 1, defining a village is an ongoing semantic discussion. Instead, the concept of grouped rural settlements is used. These are defined as agglomerations of habitation and people who live and work in a rural context of subsistence and/or commercial production, and who are subject to hierarchical socio-economic structures. Although the process of *Villagization* (*Dorfballung*, *Incastellamento* or *Congregación*) has been widely studied and is considered not to be a uniform but rather complex process of social, economic, political and local factors, an in-depth understanding of the origin of the wide array in village and hamlet morphologies and the causes for a geographical distribution between grouped and dispersed settlements is still a subject of debate (Chapelot & Fossier 1980; Curtis 2013; Kissock 1990; Renes 1981; Rippon 2008; Roberts 1977; 1987; 1992; Verspay et al. 2018). Archaeological test pitting and excavations of still inhabited villages in for example France, the United Kingdom, Spain and Germany, and of deserted settlements such as the iconic site of Wharram Percy, have significantly contributed to the dating and understanding of the evolution of the respective settlements and settlement systems (Aston & Gerrard 2013; Fernández Mier & Fernández-Fernández 2019; Lewis 2019; Peytremann 2003; 2019; Rünger 2019; Wrathmell 2012). As previously indicated in this dissertation regarding the County of Flanders, however, a constructive incorporation of archaeological data into the historical narrative on grouped rural settlements has been lacking because of the highly built-up character of modern-day Flanders and difficult archaeological circumstances and legislations in still inhabited villages (De Groote et al. 2018; Tys et al. 2010).

Yet, over the last decade, the implementation of the European Valletta treaty has resulted in a considerable increase in the number of attested high medieval rural habitation sites through archaeological interventions outside these villages in Flanders (Figure 18) (De Clercq 2017, 47-48). Research and interpretations have long been focused on individual farms, so called *Einzelhöfe*, as key element of the rural habitation during the high medieval period (e.g. De Gryse et al. 2012; Hollevoet 1992a). Based on the sites in the dataset it becomes clear that the overall image and extent of the habitation is often missed within small scale excavations. An increase in larger-scale archaeological interventions (a geographical threshold of 1ha is used to illustrate this in Figure 19), also indicates the occurrence of grouped settlements with a relatively planned lay-out, which can offer renewed interest and insight on the matter of grouped rural settlements in the County of Flanders during the high medieval period.

This chapter considers the inventory and first topographical and morphological characterisation of high medieval rural settlements for the northern part of the County of Flanders, here corresponding to the modern-day provinces of West and East Flanders. The fact that most information of high medieval rural settlements is geographically clustered in modern-day Flanders makes that the focus hereby lies on these two provinces. Besides this purely source-based consideration, the selected study area corresponds to the historic reality of covering the county's very core area around the urban triangle of the main towns of Bruges, Ghent and Ieper. The inventory is made up of all archaeological research in which features of rural settlement structures dating to the high medieval period (tenth to mid-thirteenth century) have been attested through watching briefs, trial trenching or full excavations both in the context of development and non-development-led archaeological fieldwork. The Flemish archaeological heritage management database CAI (*Centrale Archeologische Inventaris*/Central Archaeological Inventory) is used as a starting point of the inventory, which is further completed with published research, archaeological reports, mentions of archaeological fieldwork in review journals and personal communications with archaeological services and private excavation companies. Since the legal implementation of the Valletta treaty principles in Flanders, the latter have increasingly become the main archaeological agents on the field. It is the inventory's ambition to be as complete as possible, yet it is not possible to be exhaustive. The archaeological data is highly dispersed and not necessarily incorporated in the current version of the CAI. Moreover, data processing for many recent sites is still ongoing by the respective excavators and reports are not always available. Hence the apparently strong decrease in excavated sites over the last four years (Figure 18) can be ascribed to unfinished reports. Incorporation of sites, especially those that were excavated over the last five years, in the inventory is therefore strongly influenced by the communication with the archaeological services and companies. Nevertheless, the list of 186 sites (Figure 20 and Table 6) offers the most complete overview of archaeological settlement research on the high medieval period to date (the inventory was finalised on 01/05/2020). The inventoried sites can be ascribed to two categories, habitation sites and structure sites. The former includes those sites for which effective building structures were excavated that were interpreted as habitation or large secondary buildings. In contrast, structure sites comprise sites where the excavated features, such as posted granaries, enclosure systems or large amounts of find material, only strongly suggest nearby presence of habitation. Based on this division, 135 habitation sites and 51 structure sites were identified.

Following the compiling of the inventory, a twofold approach was followed. First, the geographical distribution of the sites is analysed at a regional level in relation to the soil characteristics and topography. This must allow a general characterisation of the topographical site locations. Second, at the site level, the overall settlement morphology and characteristic elements are identified to describe general morphological characteristics of the rural settlement sites in the study area. The focus thereby lies on the overall settlement structures in relation to grouped settlements, rather than on in-depth site analysis at the domestic level. This research is solely based on the available reports and does not aim at an in-depth reconsideration of the excavation data. It therefore needs to be understood that the observations and data registration by the respective field archaeologists are used as a starting point, which may already be an interpretation in itself.

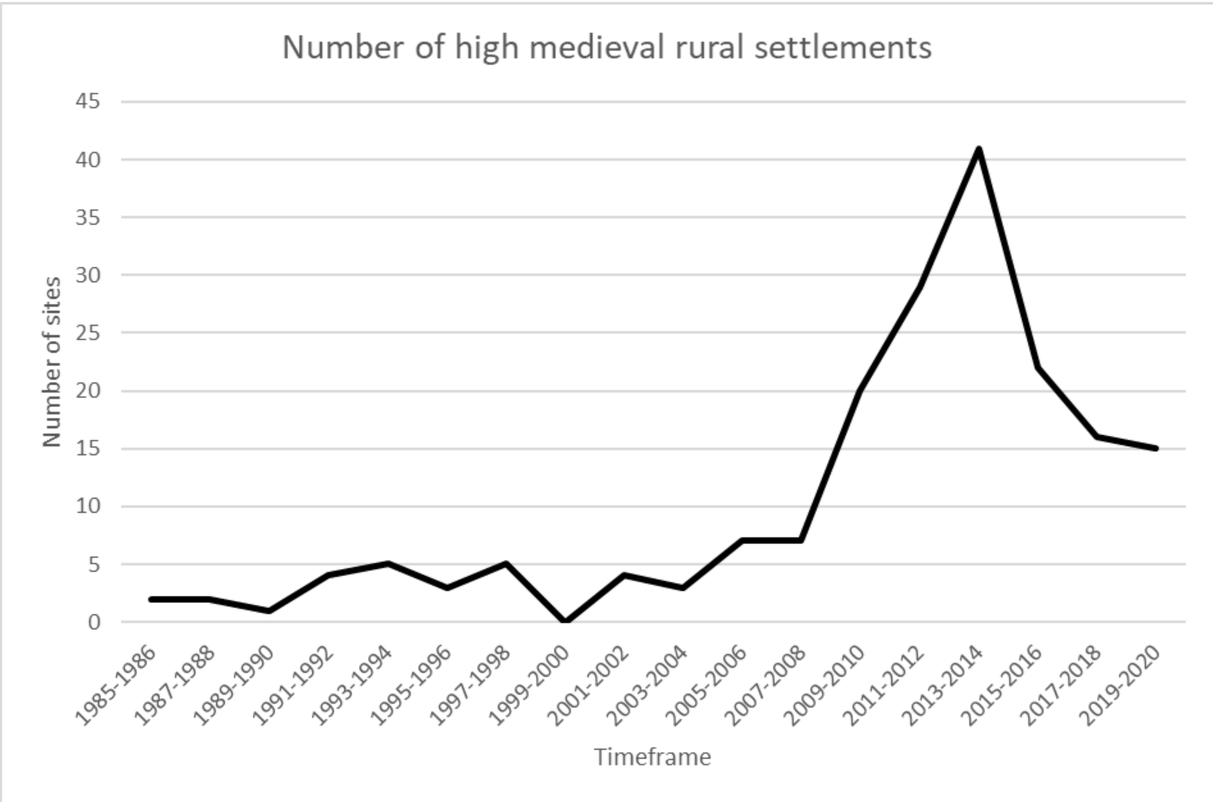


Figure 18: Number of high medieval rural settlement sites excavated since 1985 in the study area, grouped in periods of two years.

Figure 19: Number of sites with an excavated area equal or larger than 1ha.

The build-up and structure of this chapter is driven by the analysis of inter- and intra-site geographical and topographical relations, thereby integrating the twofold approach at the regional and site level mentioned above. In a first section, the geographical distribution and topographical location of the inventoried sites are analysed at a regional level in relation to soil characteristics and relative topography within the nearby landscape. Observations made at this regional scale are subsequently confirmed and illustrated by an example at the level of the individual site and its closely surrounding area. At the interface of both levels, the inter- and intra-site chronological spatial variability and environmental contexts are subsequently explored. In a second section, the focus shifts to the characteristic elements at the site level, offering insight into the potential of the archaeological dataset in identifying and studying grouped rural settlements.

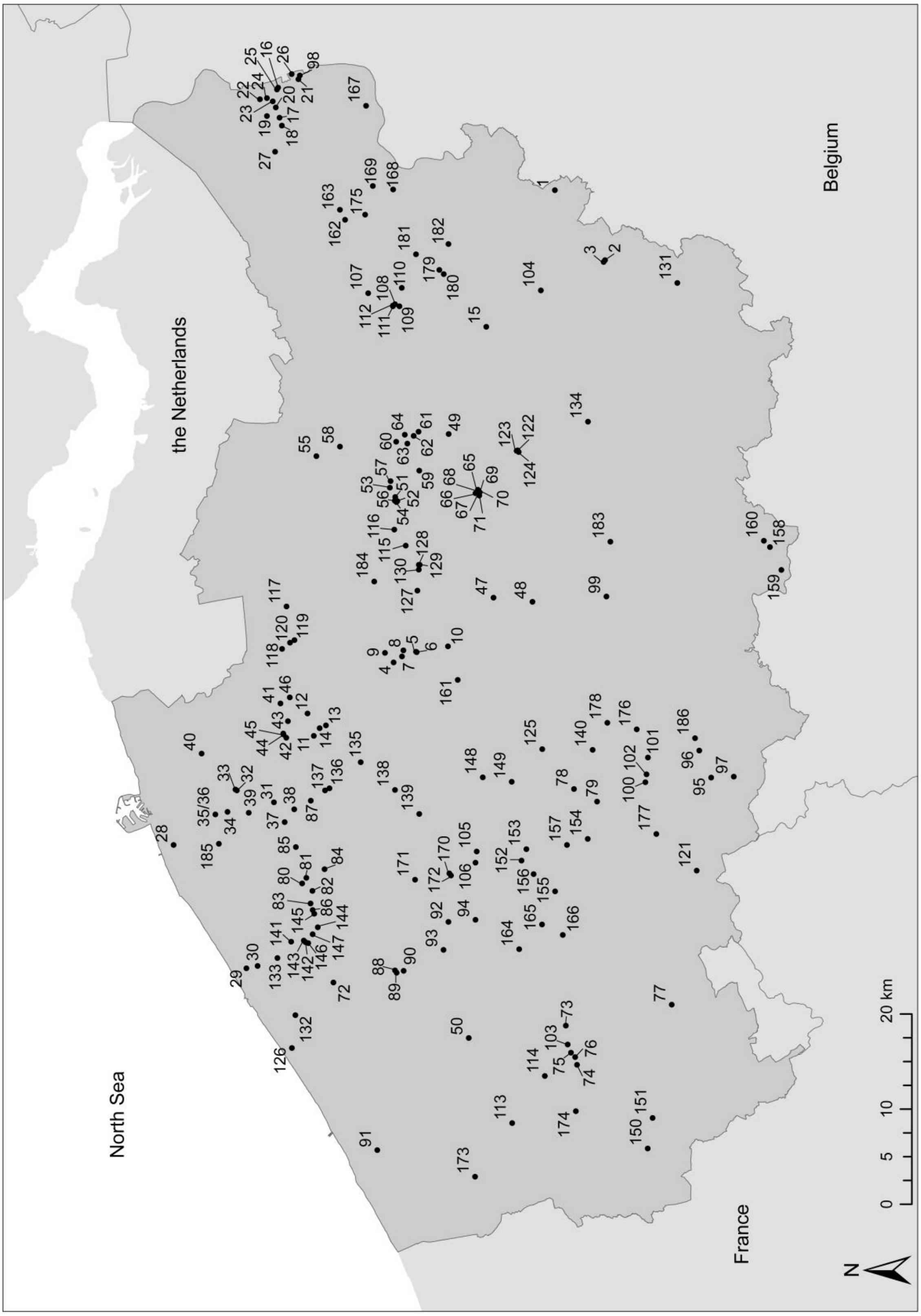


Figure 20: Point locations of the inventoried high medieval settlement sites in the northern part of the County of Flanders (Provinces of West and East Flanders).

ID	Site	Type	X_Belgian Lambert 72	Y_Belgian Lambert 72	Year	(Concept) report available to date
1	Aalst - Baardegem - Faluintjes	Habitation	134010,893	182661,759	2015	No (SOLVA)
2	Aalst - Erembodegem - Zuid IV fase 1	Habitation	126646,938	177408,254	2007	No (SOLVA)
3	Aalst - Erembodegem - Zuid IV fase 3	Habitation	126472	177534	2011	Yes (Verbrugge et al. 2013)
4	Aalter - Aalter - Langevoorde	Habitation	84339,699	199609,419	2000-2001	Yes (De Clercq & Mortier 2001)
5	Aalter - Aalter - Lostraat I	Habitation	85452,094	197260,431	2012	Yes (Van Campenhout & van der Velde 2014)
6	Aalter - Aalter - Lostraat II	Habitation	85415,52	197181,48	2016	Yes (Van der Kelen et al. 2018)
7	Aalter - Aalter - Manewaarde	Habitation	84961,754	198731,273	2008	Yes (De Logi & Messiaen 2013)
8	Aalter - Aalter - Oostmolenstraat/Stationsplein	Habitation	85609,519	198578,102	2015	No (DL&H)
9	Aalter - Aalter - Woestijne	Habitation	85331,061	200537,796	2010	Yes (De Groote & Van de Vijver 2019)
10	Aalter - Lotenhulle - Congostraat	Habitation	86022,60832	193893,9008	2012	Yes (Derieuw et al. 2014)
11	Beernem - Beernem - Fluxys Lot 3/Beernem 1 werkput 2 to 13	Structures	76600,8	208001	2014	Yes (Baeyens et al. 2017)
12	Beernem - Oedelem - Fluxys Lot5 FLSM-26	Structures	78967,4573	208673,811	2014	Yes (Deconynck & Laloo 2017)
13	Beernem - Oedelem - Haverbilken	Structures	77699,269	206725,943	2010	Yes (Huyghe 2010)
14	Beernem - Oedelem - Oudeputstraat	Habitation	77404,7	207383	2018	Yes (Acke et al. 2019a)
15	Berlare - Uitbergen - Wijmeers I	Habitation	119640,3866	189880,8284	2012	Yes (Messiaen et al. 2013)
16	Beveren - Melsele - Pauwstraat	Habitation	144818,511	211751,349	2017	Yes (Van Neste & De Puydt 2017)
17	Beveren - Beveren-Waas - Donkvijverstraat	Habitation	141639,271	211616,676	2017	Yes (Van Neste & De Puydt 2019)
18	Beveren - Beveren-Waas - Meerminnendam	Habitation	140812,418	211366,746	2011	Yes (Wuyts et al. 2011)
19	Beveren - Beveren-Waas - Polderdreef	Habitation	141808,847	212939,051	2009	No (ADW/Erfpunt)
20	Beveren - Beveren-Waas - Viergemeet	Habitation	142734,863	212012,939	2013	Yes (van de Glind & Verbeek 2014)
21	Beveren - Melsele - Biestraat/Penitentiair Complex	Habitation	145692,655	209617,016	2011	Yes (Alma & van der Velde 2013)
22	Beveren - Melsele - Brielstraat	Habitation	143591,938	213666,099	2011	Yes (Derieuw et al. 2012)
23	Beveren - Melsele - Farneselaan	Habitation	143356,491	212330,165	2012	Yes (Derieuw, Reyns, et al. 2013)
24	Beveren - Melsele - Gaverlandwegel	Habitation	143705,027	212933,551	2013	Yes (Derieuw, Bruggeman, et al. 2013)
25	Beveren - Melsele - Pauwstraat/Perzikenlaan	Habitation	144621,138	211869,058	2012	No (ADW/Erfpunt)
26	Beveren - Melsele - Schaarbeek	Habitation	146224,777	210332,448	1993	Yes (ADW 1993; 1994)
27	Beveren - Vrasene - Daalstraat	Habitation	138070,399	212088,13	2012	No (ADW/Erfpunt)
28	Blankenberge - Uitkerke - Lissewegestraat	Structures	65116,897	222734,35	2014	Yes (Van Remoorter et al. 2016)

29	Bredene - Bredene - Ebbestraat	Structures	52150	215100	2016	Yes (Deconynck et al. 2016)
30	Bredene - Bredene - Noord-Ede	Structures	52393,186	213911,284	2010	Yes (Ryssaert et al. 2010)
31	Brugge - Brugge - Ezelstraat/Klaverstraat (The absolute rural character of this site is to be questioned given its location just outside the enclosed urban are of Bruges at the time. However, for completeness, this site has been included in the dataset).	Habitation	69603,234	212196,817	2016	No (ADeDe & Raakvlak)
32	Brugge - Dudzele - Kruisabelestraat I	Habitation	70863,30096	216109,6607	2015	No (Raakvlak)
33	Brugge - Dudzele - Kruisabelestraat II	Structures	70964,69	216257,84	2019	Yes (Verbrugghe & Saey 2019)
34	Brugge - Dudzele - Lentestraat/Krinkelstraat	Structures	68602,379	217073,142	2012	Yes (Roelens et al. 2015)
35	Brugge - Lissewege - Stationsweg/Zeelaan I	Structures	68349,171	218356,659	1997	Yes (In 't Ven, Hollevoet, Hillewaert, et al. 2005)
36	Brugge - Lissewege - Stationsweg/Zeelaan II	Structures	68349,171	218356,659	2014	Yes (Roelens et al. 2014)
37	Brugge - Sint-Andries - Refuge	Habitation	67526,17734	211082,4692	1995-1997	Yes (Hollevoet & Hillewaert 1997/1998)
38	Brugge - Sint-Michiels - Barrièrestraat	Habitation	68873,3	210067	2014	Yes (Verwerft et al. 2018)
39	Brugge - Sint-Pieters - Blankenbergse Steenweg	Habitation	68501,13	214854,51	2018	No (Monument Vandekerckhove nv)
40	Damme - Oostkerke - Eienbroekvaart	Structures	74748,355	219809,159	2016	Yes (Lambrecht, Roelens, Verwerft, et al. 2016)
41	Damme - Sijsele - Bolakkerstraat	Habitation	80004,948	211504,085	1997	No (CAI)
42	Damme - Sijsele - Dorpsstraat	Habitation	76395,391	210900,21	2019	Yes (Pype et al. 2018)
43	Damme - Sijsele - Gentse Steenweg	Structures	78148,6	210736	2012	Yes (Verwerft et al. 2015)
44	Damme - Sijsele - Stakendijke I	Habitation	76760,604	211200,889	2009-2010	Yes (De Gryse et al. 2012)
45	Damme - Sijsele - Stakendijke II	Habitation	76854,1	211224	2018-2019	Yes (Deconynck et al. 2019)
46	Damme - Sijsele - Veldhoekstraat	Habitation	80644,967	210533,765	1997	Yes (In 't Ven, Hollevoet, Cooremans, et al. 2005)
47	Deinze - Meigem - Lange Akkerstraat	Habitation	91149,71	189120,71	2018	No (DL&H)
48	Deinze - Petegem-aan-de-Leie - Sint-Hubertstraat	Habitation	90702,073	185029,549	2011	Yes (Bruggeman & Reyns 2012)
49	Destelbergen - Destelbergen - Eenbeekeinde/Panhuisstraat	Habitation	108373,5563	193837,74	2011	Yes (De Logi & Dalle 2013)
50	Diksmuide - Diksmuide - Sportsite de Pluimen	Structures	44822,75	191722,2	2018-2019	Yes (Lefere, Beke, et al. 2017)
51	Evergem - Belzele - Koolstraat	Habitation	101729,055	199450,313	2008-2009	Yes (De Logi et al. 2009)
52	Evergem - Belzele - Molenhoek	Habitation	101302,388	199226,417	2008	Yes (Schynkel & Urmel 2009)
53	Evergem - Belzele - Ralingen/Schoonstraat	Habitation	102729,941	200022,627	2009	Yes (Van de Vijver et al. 2009)
54	Evergem - Belzele - Steenovenstraat	Habitation	101196,739	199321,008	2008	Yes (De Logi & Schynkel 2008)

55	Evergem - Ertvelde - Molenstraat	Habitation	106037,731	207745,863	2016	Yes (Scheltjens 2018b)
56	Evergem - Evergem - Schoonstraat 201	Habitation	101347,0991	199492,7691	2009	Yes (Vanhee 2011)
57	Evergem - Evergem - Spoorwegstraat	Habitation	103403,21	199948,88	1987-1988	Yes (Bourgeois et al. 1989)
58	Evergem - Kluizen - Kluizendok	Structures	107047,9554	205251,0938	2005-2009	Yes (Laloo et al. 2009)
59	Gent - Gent - Zeilschipstraat	Habitation	104512,973	196911,804	2015	Yes (Swaelens & Baeyens 2017)
60	Gent - Oostakker - Eekhoutdriesstraat	Habitation	107561,94	199341,086	2014	Yes (Demey & van den Dorpel 2017)
61	Gent - Oostakker - Groenstraat	Habitation	108606,32	196997,67	2018-2019	Yes (Acke et al. 2019b)
62	Gent - Oostakker - R4 Eksaarderijweg	Habitation	108170	197519	2014	Yes (Herreman 2014)
63	Gent - Oostakker - Wolfputstraat/Gentstraat	Habitation	107347,4369	198180,3451	2013	Yes (Derieuw & Reyns 2014)
64	Gent - Oostakker - Wolfputstraat/Muizelstraat	Habitation	108282,673	198446,687	2013	Yes (Bruggeman et al. 2017)
65	Gent - Sint-Denijs-Westrem - Expo-vliegveld	Habitation	102493,74	190774,65	1986	No (Bourgeois & Vermeulen 1986)
66	Gent - Sint-Denijs-Westrem - Flanders Expo/zone 2 veld 12	Structures	102160,48	190809,76	2012	Yes (De Logi et al. 2012)
67	Gent - Sint-Denijs-Westrem - Flanders Expo/zone 2 veld 13	Structures	102003,19	190674,63	2010	Yes (Hoorne 2010)
68	Gent - Sint-Denijs-Westrem - Flanders Expo/zone 2&3	Structures	102128,304	191021,454	2008	Yes (Hoorne, Bartholomieux, et al. 2008)
69	Gent - Sint-Denijs-Westrem - Flanders Expo/zone 3 IKEA	Habitation	102278,241	190608,542	2008	Yes (Hoorne, Schynkel, et al. 2008)
70	Gent - Sint-Denijs-Westrem - Flanders Expo/zone 3 IKEA parking	Habitation	102233	190561	2013	No (DL&H)
71	Gent - Sint-Denijs-Westrem - Poortakkerstraat-Zuid	Habitation	101889,23	190625,2736	2012	Yes (Stoops et al. 2013)
72	Gistel - Gistel - Steenbakkersstraat	Habitation	50666,888	205957,888	2010	Yes (Demey 2011)
73	Houthulst - Houthulst - Groenestraat Fluxys Lot1&2 FLAZ-16	Structures	46121,29258	181527,1418	2014	Yes (Verdegem & Bracke 2017)
74	Ieper - Ieper - Middelstraat Fluxys Lot1&2 FLAZ-35	Habitation	41993,39275	180330,2831	2014	Yes (Verdegem & Bracke 2017)
75	Ieper - Ieper - Oostpoeselstraat Fluxys Lot1&2 FLAZ-46	Structures	43268,43548	180967,4378	2014	Yes (Verdegem & Bracke 2017)
76	Ieper - Ieper - Westpoeselstraat Fluxys Lot1&2 FLAZ-25	Habitation	42804,18	180542,45	2014	Yes (Verdegem & Bracke 2017)
77	Ieper - Zillebeke - Zandvoordestraat	Structures	48314,813	170386,23	2014	Yes (Bracke 2015)
78	Ingelmunster - Ingelmunster - Groenstraat/Zandberg	Habitation	71007,30881	180662,7153	2012	Yes (Eggermont & Derweduwen 2014)
79	Izegem - Izegem - Hondekensmolenstraat	Habitation	69696,683	178224,012	2011	Yes (Ryssaert 2014)
80	Jabbeke - Jabbeke - Graaf De Renesselaan I	Structures	61070,264	209244,076	1996	No (CAI)
81	Jabbeke - Jabbeke - Klein Strand	Structures	61668,154	208799,04	1988/1992	No (CAI & Hollevoet 1990)
82	Jabbeke - Jabbeke - Koornblomme	Habitation	60283,071	208163,321	2016	Yes (Lambrecht, Roelens, Huyghe, et al. 2016)
83	Jabbeke - Jabbeke -Gemeneweidestraat III	Structures	58980,357	208350,388	1996	No (CAI)
84	Jabbeke - Snellegem - Meersbeekstraat	Habitation	62575,797	206869,925	1992	Yes (Hollevoet 1992a)

85	Jabbeke - Varsenare - Hooghe Noene	Habitation	64905,887	209889,328	1995	Yes (Hollevoet 1997/1998)
86	Jabbeke - Zerkegem - Noordstraat I	Structures	58277,999	208124,1	1991	No (CAI &Hollevoet 1990)
87	Knokke-Heist - Westkapelle - A11 ruilverkaveling/fietspad	Structures	69790	208330	2017	Yes (Laloo et al. 2018)
88	Koekelare - Koekelare - Aquafin	Habitation	51931,71	199477,76	2003	Yes (Sturtewagen et al. 2008)
89	Koekelare - Koekelare - Barnestraat	Habitation	51686,28674	199292,5518	2012	Yes (Demoen et al. 2014)
90	Koekelare - Koekelare - Oostmeetstraat 63	Habitation	51875,895	198560,83	2019	No (Ruben Willaert bvba)
91	Koksijde - Koksijde - Golf	Habitation	33021,889	201344,545	2010	Yes (Lehouck et al. 2014)
92	Kortemark - Kortemark - Pijplijn Nieuwpoort-Lichtervelde-vlak I	Habitation	57023,32	193855,77	1994	Yes (VIOE 1994)
93	Kortemark - Kortemark - Pijplijn Nieuwpoort-Lichtervelde-vlak K	Structures	54098,07	194372,33	1994	Yes (VIOE 1994)
94	Kortemark - Kortemark - Voshoek	Structures	57248,58	190997,905	2004	Yes (Dewilde & Wyffels 2004)
95	Kortrijk - Kortrijk - President Kennedylaan I	Structures	72222,299	166227,392	2005	Yes (Wyffels et al. 2005)
96	Kortrijk – Kortrijk - Morinnestraat	Habitation	75053,674	167491,067	2015	Yes (Monument Vandekerckhove nv 2015a)
97	Kortrijk - Rollegem - Klijtberg	Habitation	72317,7213	163872,465	2017	Yes (Dyselinck 2018)
98	Kruibeke - Kruibeke - Hogen Akkerhoek	Habitation	146095,055	209483,875	2010	Yes (ADW 2011b)
99	Kruishoutem - Kruishoutem - Containerpark	Habitation	91267,88917	177253,2537	2013	Yes (Vanholme et al. 2015)
100	Kuurne - Kuurne - Pieter Verhaeghestraat I	Structures	71722,468	173143,619	2013	Yes (Kalshoven & Verbeek 2015)
101	Kuurne - Kuurne - Pouckeweg/De Vlasschuur	Habitation	74326,371	172895,876	2012	Yes (Reyns & Dierckx 2012)
102	Kuurne - Kuurne - Sint-Pieterstraat	Habitation	72551,7466	173020,623	2014	Yes (Dyselinck & Fredrick 2018)
103	Langemark-Poelkapelle - Langemark-Poelkapelle - Diksmuidestraat Fluxys Lot1&2 FLAZ-50	Structures	44121,43822	181325,9326	2014	Yes (Verdegem & Bracke 2017)
104	Lede - Lede - Kleine Kouterrede	Habitation	123480,68	184140,629	2013	No (SOLVA)
105	Lichtervelde - Lichtervelde - Leysafortstraat Durabrik	Habitation	64446,1	190883,95	2018-2019	Yes (Demey 2019)
106	Lichtervelde - Lichtervelde - Stegelstraat	Habitation	63252,85549	191001,9084	2016	Yes (Dyselinck et al. 2015)
107	Lokeren - Daknam - Pontweg	Habitation	123188,274	202294,798	2015	Yes (Scheltjens 2018a)
108	Lokeren - Daknam - Touwstraat	Habitation	122017,844	199461,634	2015	Yes (Lauwers 2018)
109	Lokeren - Lokeren - Eekstraat	Habitation	121808,761	199014,534	2015	Yes (Monument Vandekerckhove nv 2015b)
110	Lokeren - Lokeren - Hoedhaar	Structures	123728	198755	2011	Yes (Gierts 2014)
111	Lokeren - Lokeren - Hoogstraat	Habitation	121801,57	199683,86	2018	No (DL&H)
112	Lokeren - Lokeren - Hoogstraat 89	Habitation	121870,168	199685,074	2016	Yes (Hertoghs et al. 2019)

113	Lo-Reninge - Lo - Schaerdeke	Structures	35870	187150	2013	Yes (Janssens 2016)
114	Lo-Reninge - Noordschote - Noordschoteplein	Habitation	40817,87	183737,078	2013	Yes (Verdegem 2014)
115	Lovendegem - Lovendegem - Kerkelare/Larestraat	Structures	96626,82599	198349,1414	2013	Yes (Hertoghs et al. 2016)
116	Lovendegem - Lovendegem - Supra Bazar	Habitation	98305,096	199542,153	2008	Yes (De Logi 2013)
117	Maldegem - Adegem - Oude Staatsbaan	Habitation	90204,393	210879,921	2012	Yes (Gierts & Cornelis 2014)
118	Maldegem - Maldegem - Kannunik Andrieslaan I	Habitation	85756,802	211331,089	2006	Yes (Pype 2006)
119	Maldegem - Maldegem - Krommewege I	Habitation	86685,837	210035,47	2017	Yes (Dierckx & Pype 2017)
120	Maldegem - Maldegem - Oude Molenweg	Habitation	86405,39	210508,223	2017	Yes (van Engeldorp-Gastelaars et al. 2018)
121	Menen - Menen - Kortewaagstraat II	Structures	62432,605	167748,992	2006	Yes (Dhaeze & Verbrugge 2007)
122	Merelbeke - Merelbeke - Caritas	Habitation	106650	186593	2001	Yes (De Clercq et al. 2004)
123	Merelbeke - Merelbeke - Poelstraat	Structures	106593,407	186682,99	2015	Yes (Hoorne & Heynssens 2015)
124	Merelbeke - Molenhoek - Molenkouter	Habitation	106465,99	186482,09	2020	No (Ruben Willaert bvba)
125	Meulebeke - Meulebeke - Marialoopsteenweg/Haandeput	Habitation	75199,828	183997,02	2016	No (ABO)
126	Middelkerke - Middelkerke - Kalkaert	Structures	43754,41	210317,16	2011	Yes (Reniere et al. 2012)
127	Nevele - Hansbeke - AquafinV	Structures	91878,899	197115,629	2009	Yes (Hoorne et al. 2009)
128	Nevele - Merendree - Gerolfsweg	Habitation	94604,746	196969,596	2014	Yes (De Logi 2015)
129	Nevele - Merendree - Merendree dorp	Habitation	94604,368	196873,537	2010	Yes (De Logi & Van Cauwenbergh 2010)
130	Nevele - Merendree - Molenkouterslag	Habitation	94078,162	196976,153	2004-2005	Yes (Vanhee 2007)
131	Ninove - Outer - Stuypensveld	Habitation	124255	169795,53	2019	No (SOLVA)
132	Oostende - Oostende - Bedrijventerrein Leemstraat/Torhoutesteenweg	Structures	47212,358	209952,567	2010-2011	Yes (Labiau et al. 2013)
133	Oostende - Zandvoorde - Plassendale III	Structures	53223,6688	211842,3336	2001	Yes (Vanhoutte & Pieters 2001)
134	Oosterzele - Balegem - Nederstenberg/Huckerstraat	Habitation	109660,74	179181,53	2018	No (DL&H)
135	Oostkamp - Driekoningen – Fluxys Lot3 Hazelaarstraat-E40-werkput 3	Habitation	73841,907	203066,287	2014	Yes (Baeyens et al. 2017)
136	Oostkamp - Oostkamp - Rodenbachstraat	Habitation	71092,1	206360	2019	No (Monument Vanderkerckhove nv)
137	Oostkamp - Oostkamp - Zwarte Gat	Habitation	70860,37595	206821,7367	1994	Yes (Hollevoet 1994)
138	Oostkamp - Ruddervoorde - Fluxys Lot5 FLSM-18	Structures	70920,56	199471,31	2014	Yes (Deconynck & Laloo 2017)
139	Oostkamp - Ruddervoorde - Fluxys Lot5 FLSM-30	Structures	68389,32923	196908,9801	2014	Yes (Deconynck & Laloo 2017)
140	Oostrozebeke - Oostrozebeke - Leegstraat	Habitation	75139,135	178709,506	2011	Yes (Eggermont & Van Heymbeeck 2014)
141	Oudenburg - Oudenburg - Ambachtelijke zone/Steengoed	Structures	54958,48445	210374,0567	2006	Yes (Decorte 2006)

142	Oudenburg - Oudenburg - Bekestraat	Habitation	54905,079	208893,711	1990-1991	Yes (Hollevoet 1992b)
143	Oudenburg - Oudenburg - Riethove	Habitation	55067,67	209057,7861	2007-2009	Yes (Dhaeze 2018)
144	Oudenburg - Roksem - Pastoriestraat	Habitation	56464,98	207586,08	2020	No (Acke & Bracke)
145	Oudenburg - Roksem - Hogendijke	Structures	57881,183	207952,175	1988-1989	Yes (Hollevoet 1991)
146	Oudenburg - Roksem - Nieuwstraat I	Structures	54793,577	208600,515	2011	Yes (Dhaeze & Degryse 2011)
147	Oudenburg - Roksem - Zeeweg	Habitation	55730,91261	208121,3976	1986	Yes (De Meulemeester & Dewilde 1987)
148	Pittem - Egem - Paardestraat	Habitation	72245,661	190237,375	2017	Yes (Lefere, Polfliet, et al. 2017)
149	Pittem - Pittem - Posterijlaan	Habitation	71782,498	187214,694	2013	Yes (Derweduwen & Bracke 2016)
150	Poperinge - Poperinge - Appelgoedje	Structures	33181,985	172909,623	2014	Yes (Mestdagh 2016)
151	Poperinge - Poperinge - Sappenleen	Habitation	36399,095	172386,723	2013	Yes (Beke et al. 2014)
152	Roeselare - Beveren - Onledegoed/Wagenbrugstraat	Habitation	63477,788	186172,018	2016	Yes (Hazen & Vossen 2019)
153	Roeselare - Beveren - Vloedstraat/Noord-Oost	Habitation	64672,869	185660,764	2015	Yes (Mostert & Bakx 2016)
154	Roeselare - Oekene - Kwadestraat	Habitation	65757,38306	179216,1377	2013	Yes (Wuyts et al. 2013)
155	Roeselare - Roeselare - Bietstraat	Structures	60246,045	182636,457	2013	Yes (Demey 2014)
156	Roeselare - Roeselare - Gitsestraat/Robaardstraat	Structures	62064,06	184894,4	2018	Yes (Belis & Siemons 2018)
157	Roeselare - Rumbeke - Regenbeek/Mandelstraat	Habitation	65129,25	181393,071	1997	Yes (Vanhecke 2013)
158	Ronse - Ronse - De Stadstuin	Habitation	96460,05887	160054,227	2011	Yes (Pede et al. 2015)
159	Ronse - Ronse - Pont West	Habitation	94062,009	158845,607	2013	No (SOLVA)
160	Ronse - Ronse - Savooistraat	Habitation	97134,569	160686,056	2014	No (ADeDe)
161	Ruiselede - Ruiselede - Poekestraat	Habitation	82489,14	192878,87	2019	No (BAAC)
162	Sint-Niklaas - Belsele - Mierennest	Habitation	130902,555	204727,733	2006	No (ADW/Erfpunt)
163	Sint-Niklaas - Belsele - Westelijke Tangent	Habitation	131952,295	205256,917	2010	Yes (ADW 2011a)
164	Staden - Staden - Nijverheidstraat	Structures	54150,327	186413,624	2011	Yes (Labiau et al. 2011)
165	Staden - Staden - Oostnieuwkerkstraat Fluxys Lot 4 FLPL-66	Habitation	56770,72	184029,19	2014	Yes (Beke et al. 2017)
166	Staden - Staden - Provinciebaan	Habitation	55646,59	181841,32	2017	Yes (Acke et al. 2018)
167	Temse - Steendorp - Blauwhof	Habitation	142895,409	202521,923	1998-2001	Yes (ADW 2007)
168	Temse - Temse - Klein Broek	Habitation	134088,5	199677,73	2017	Yes (Monument Vandekerckhove nv 2017)
169	Temse - Temse - Landbouwstraat	Habitation	134456,74	201809,04	2018-2019	Yes (Internal report RAAP België)
170	Torhout - Torhout - Fluxys Lot 5 FLSM-29	Structures	62122,987	193752,74	2014	Yes (Deconynck & Laloo 2017)
171	Torhout - Torhout - Oude Gentweg I	Habitation	61472,71	197351,436	2010	No (Raakvlak)
172	Torhout - Torhout - Pijplijn Nieuwpoort-Lichtervelde-vlak C	Structures	61911,31	193579,5	1994	Yes (VIOE 1994)

173	Veurne - Vinkem - Gouden Hoofdstraat	Structures	30216,62	191054,49	2018	Yes (Verbeke & De Decker 2018)
174	Vleteren - Vleteren - Halve Reningestraat Fluxys Lot 4 FLPL-29	Habitation	37121,663	180453,74	2014	Yes (Beke et al. 2017)
175	Waasmunster - Waasmunster - Herkstraat	Habitation	131448,4	202616,75	2018-2019	Yes (Internal report RAAP België)
176	Waregem - Beveren-Leie - Schoolstraat/Roestraat	Habitation	77277,564	174069,474	2013	Yes (Van Remoorter et al. 2012)
177	Wevelgem - Gullegem/Moorsele - Industrieplein	Habitation	66289,07	172000,68	2019	Yes (Lefere et al. 2018)
178	Wielsbeke - Wielsbeke - Vaartstraat	Habitation	77978,368	177162,25	2005	Yes (Hoorne 2006)
179	Zele - Zele - Eekstraat	Habitation	125633,892	194813,54	2014	Yes (Wyns & Scheltjens 2017)
180	Zele - Zele - Kouterbosstraat	Habitation	125192,353	194356,563	2010	Yes (Wyns et al. 2017)
181	Zele - Zele - Wijnveld	Habitation	127281,67	197269,218	2016	Yes (Brouwer et al. in press)
182	Zele - Zele - Zuidelijke Omleiding	Habitation	128352,819	193861,491	2003	Yes (Mortier et al. 2003)
183	Zingem - Zingem - Lange Aststraat	Habitation	97043,71799	176824,51	2010	Yes (Wyns et al. 2010)
184	Zomergem - Oostwinkel - Rijvers	Habitation	92837,563	201643,632	2011	Yes (Bruggeman et al. 2012)
185	Zuienkerke - Zuienkerke - Kerkstraat I	Habitation	65255,516	217997,052	1987	No (Hillewaert 1988)
186	Zwevegem - Zwevegem - Losschaert	Habitation	76358,795	167923,345	2015	Yes (Hertoghs & Bakx 2015)

Table 6: Inventory of high medieval rural settlement sites in the study area (until 01/05/2020).

6.2 Some remarks about settlement dating

Before further considering high medieval rural settlements in the northern part of the County of Flanders, it should be noted that the dating of settlement structures is often limited to vague timeframes. As already stated by De Clercq (2017, 49), in-depth ceramic studies in combination with ^{14}C-dating or other forms of direct dating remains scarce, hence in many cases hampering any more precise chronological qualification reaching beyond the general notion of 'high medieval'. The rather general broad dating range of 'tenth to twelfth centuries' is therefore frequently used in archaeological reports. 61% Of the inventoried sites is dated within a timeframe that covers two or more centuries. In contrast, only 3% has been dated to half a century. This lack of chronological accuracy causes difficulties to gain more insight into the chronological evolution both on the intra and inter site level. For instance, it becomes impossible to determine whether buildings are contemporary or consecutive. Considering excavated buildings, only 76 ^{14}C-dates on building structures are available. These correspond to 32 sites (24% of the 135 inventoried habitation sites) and 53 buildings. Yet, as demonstrated by the excavations at Aalter-Langevoorde, ^{14}C-dates offer an excellent opportunity for detailed dating of buildings and there mutual relation (Figure 21). Nine ^{14}C-dates on two high medieval buildings indicated two consecutive phases of occupation. The dating of Building 2 has been supported by ^{14}C-dates on two nearby wells, which have been demonstrated to be contemporary (De Clercq & Mortier 2001; De Clercq personal communication). Additional potential for qualitative dating is available through dendrochronology on excavated structures in wells that are located near building structures. However, so far only 18 sites yielded successful dendrochronological dates (27 in total). Because of this limited level of detailed dating, the following analyses and observations should be considered in their wide chronological range.

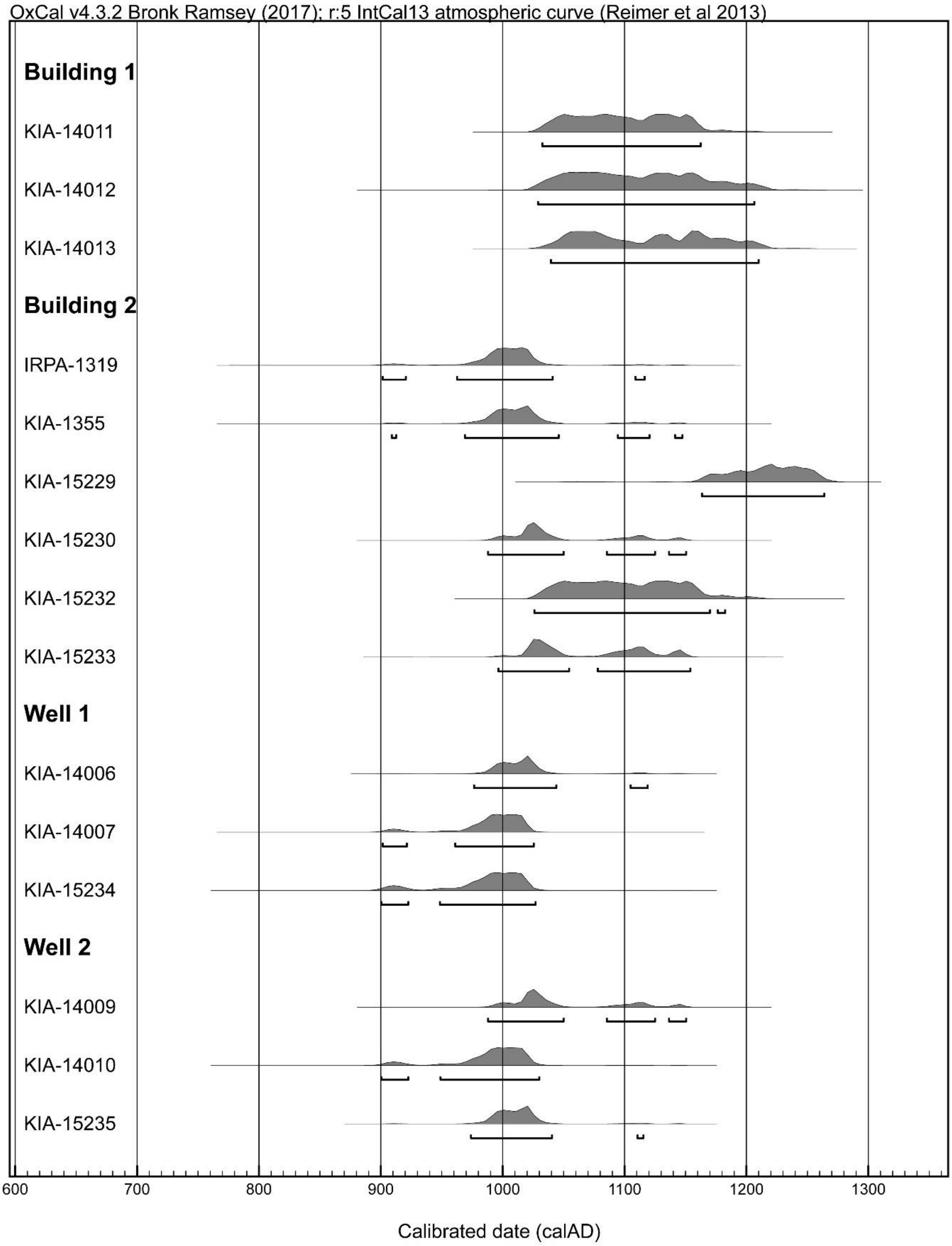


Figure 21: Calibrated ^{14}C-dates for Aalter-Langevoorde (De Clercq personal communication).

6.3 Geographical distribution and topographical location of the sites

Local topography is considered as an important and determining attribute for the location of a settlement (Antrop & Van Eetvelde 2017, 217; Uhlig & Lienau 1972, 65). Yet, in a Flemish archaeological context, the location of high medieval settlement sites at the wider landscape scale has been rather unexplored. The increased number and geographical distribution of excavations across the study area now allows to study their relative topographic position in a wider landscape context throughout time, pointing at eventual changes in settlement locations during the high medieval period. Furthermore, this same methodology allows to explore (chronological) changes at the site level as well.

6.3.1 Geographical distribution

In order to statistically assess the geographical distribution of the high medieval settlement sites in the inventory, a threefold approach was followed. First, the distribution within the study area is analysed through an Average Nearest Neighbour analysis. Rejecting the null hypothesis of a random distribution, this indicates a non-random distribution of the inventoried sites across the study area (Nearest Neighbour Ratio = 0,67). A NNR value lower than 1 represents clustering, while a value higher than 1 indicates dispersion (Conolly & Lake 2006, 164-166; Crema 2020, 158; Pinder et al. 1979; Whallon 1974). Similar to the study of the row settlements in the County of Flanders (Chapter 5), it can be expected that the distribution of the rural settlement sites is related to the medieval landscape reclamations and therefore not random, but rather linked to certain physical environments (e.g. soil texture). Consecutively, a Kernel Density Estimation (KDE) was executed to identify and map clusters in the dataset (Conolly & Lake 2006, 173). The **Kernel Density**-tool in ArcMap was used with a search distance of 11355m. This value corresponds to the longest distance between the point locations of two neighbouring sites. An output cell size of 25m was used to achieve a visually smooth and high resolution data plot. Rejecting the null hypothesis, which considers the geographical distribution to be random and therefore not clustered, this KDE shows several areas of high density of sites within the study area (Figure 22). The most dense areas are located around the cities of Ghent and Sint-Niklaas (Waasland) and between Bruges and Oudenburg. Some less dense zones can be attested around Kortrijk, Roeselare and Zele. A Getis-Ord Gi* statistic was calculated using the **Optimized Hot Spot Analysis**-tool in ArcMap with the SNAP_NEARBY_Incidents_to_create_weighted_points as Incident Data Aggregation

Method (ESRI 2019a; 2019c). None of the aggregated points, however, show statistically significant values. Therefore none of the identified clusters can be considered as a statistically significant hotspot. Nor are there significant cold spots in the dataset (Conolly & Lake 2006, 177 and 302; Getis & Ord 1992; Ord & Getis 1995).

6.3.2 Soil texture and drainage

Based on the observed relation between the distribution of row settlements and the main soil textures (Chapter 5), and in accordance with Verhulst's (1966a, 58-90; 1966b, 99-116; 1995, 128-147) interpretations regarding the different phases of landscape reclamations to be related to soil characteristics, the relation between the point location of the sites and the main soil texture and drainage is statistically studied using χ^2-tests. The null hypotheses for these tests state that there is no significant relation between the site location and the characteristics of the soil. In contrast to the dataset used for the analysis of the row settlements, a more detailed data layer of soil texture and drainage is available for the study area. This allows to incorporate local small scale variations in soil characteristics. For this analysis, the digitised version of the Belgian Soil Map was used (Databank Ondergrond Vlaanderen (DOV) 1973/2015). Although this dataset has a higher spatial resolution than the one used in chapter 5, it still is mapped on a regional scale. For the mapping of the Belgian Soil map an average of 2 augerings per hectare were executed (Ameryckx et al. 1995, 190). The texture classes were grouped into five categories following the *Bodemeenheidsniveaus* as developed by Van Thienen (2016) (Figure 23). Similarly, the drainage classes were grouped into four categories based on the research by Crombé et al. (2011, 461) and Van Ranst and Sys (2000, 14) (Figure 24). The corresponding classes were consecutively identified for each point location. This was done for all sites and separately for the habitation sites and the structure sites.

Statistically significant relations can be attested, when the geographical distribution of the high medieval rural settlement sites in the northern part of the study area is compared to these different classes of soil textures and soil drainage. Based on a preliminary visual analysis, the high density zones around Bruges, Ghent, Sint-Niklaas and Zele all correspond to the sandy soils in the north of the study area. In contrast, the zones with relatively lower density in the southern part of West Flanders (around Roeselare and Kortrijk) correspond to the sandy loam soils, while the loamy soils in the south of the study area seem to be devoid of high medieval settlement sites. The calculation of a Monte-Carlo simulation of 100 sets of random points corresponding to the number of analysed points (for all sites, habitation sites and structure sites respectively 186, 135 and 51) allows to consider the random background landscape (Crombé et al. 2011, 460).

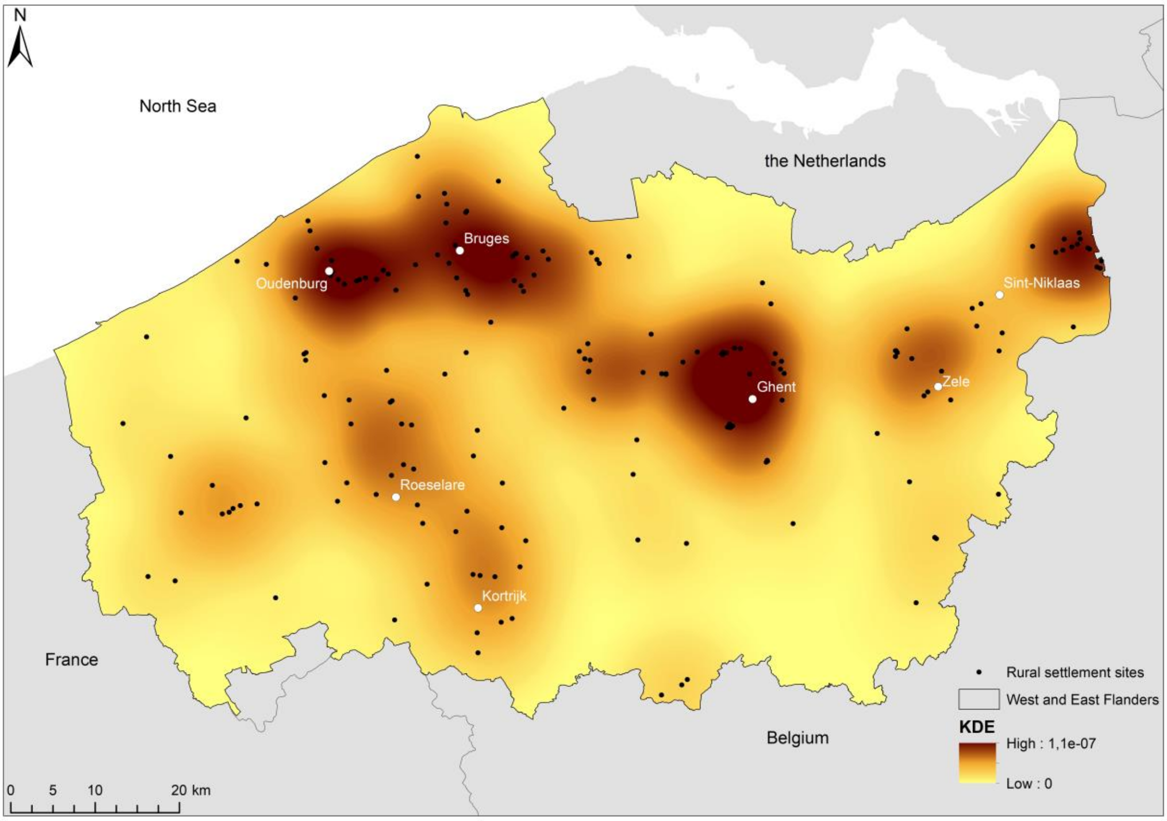


Figure 22: KDE of the 186 inventoried high medieval rural settlement sites in the study area (Visualised using 2.5 Standard Deviations stretch).

This background landscape provides an estimation of the texture and drainage attributes for non-site locations and allows to determine whether the calculated attributes are different for the sites and the average values of the background landscape (Bevan 2020, 69; Conolly & Lake 2006, 161). When applying this Monte-Carlo simulation, some discrepancies become apparent (Figure 25 and 26). Considering the soil texture of sandy soils (loamy sand/sand/dunes), an overrepresentation of the inventoried sites against the random background values can be observed in Figure 25. The percentage of observed sites for the three categories is considerably higher than what can be expected based on the random calculated points and does not represents a random relation to the soil texture in the study area. The same is true for the structure sites in relation to heavy clay/clay/peat textures. In contrast, an underrepresentation is attested of sites on the loam soils (Figure 25). Considerably fewer sites have been observed on this soil texture in regards to the randomly calculated points representing the background landscape. Similar overrepresentations can be found for the dry and moderate dry soils, where only the structure sites are underrepresented on the dry soils (Figure 26). On the other hand, the whole dataset is underrepresented on the moderate to wet soils, except for the structure sites in relation to the moderate wet soils. Based on these observations an overall preference for dry to moderate dry sandy and sandy loam soils can be identified. This is supported by χ^2-tests, which indicate significant relations between the geographical locations of the high medieval rural settlement sites and the prevalent soil textures and drainage classes. For both the analysis of all sites (χ^2_4 = 62,78; $\chi^2_{0.05}$ = 9,488) and habitation sites (χ^2_4 = 60,46; $\chi^2_{0.05}$ = 9,488) the hypothesis of random distribution in relation to the soil textures can be rejected. This is not the case when only the structure sites are considered (χ^2_4 = 8,815; $\chi^2_{0.05}$ = 9,488). The same observations can be made for the relation between the site locations and the soil drainage. For all the sites (χ^2_3 = 22,5; $\chi^2_{0.05}$ = 7,815) and habitation sites (χ^2_3 = 25,65; $\chi^2_{0.05}$ = 7,815) the randomness can be rejected, while for the structure sites (χ^2_3 = 5,117; $\chi^2_{0.05}$ = 7,815) no significant relation with the soil drainage can be attested. Given the difficulties regarding detailed dating of the high medieval settlements sites in general, no temporal attributes have been included in this analysis.

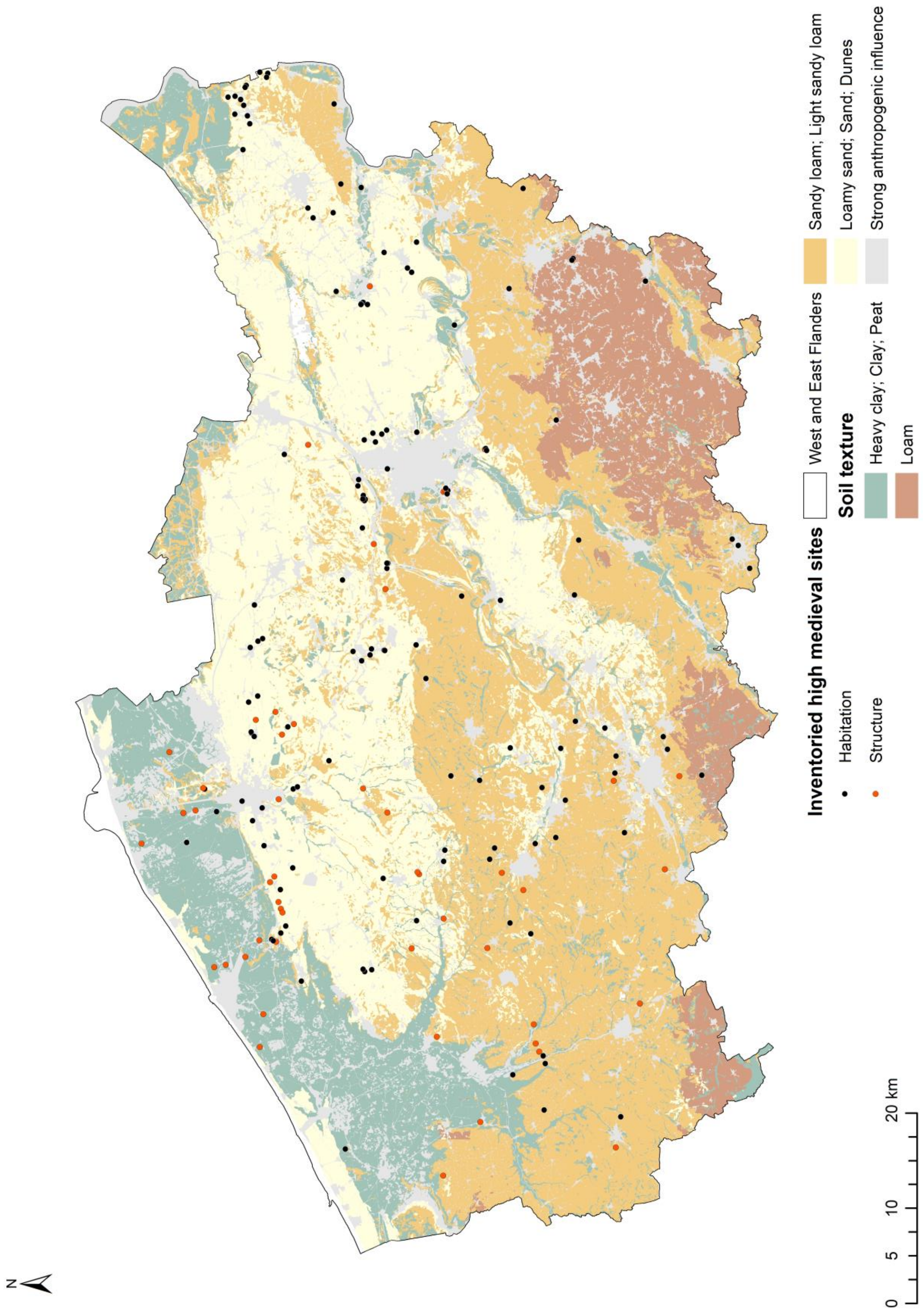


Figure 23: Distribution of the high medieval rural settlement sites in relation to the classified soil textures.

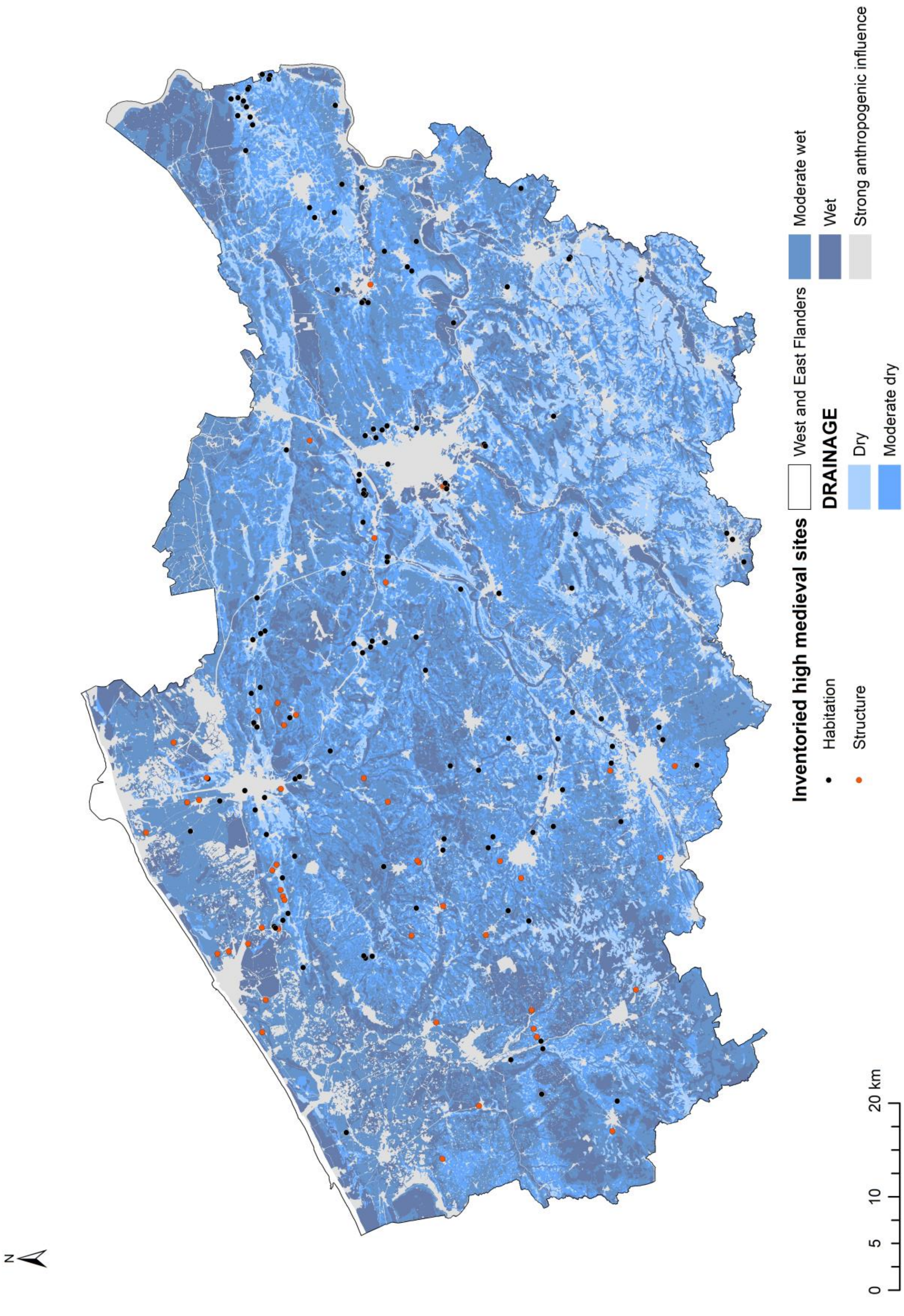


Figure 24: Distribution of the high medieval rural settlement sites in relation to the classified soil drainage.

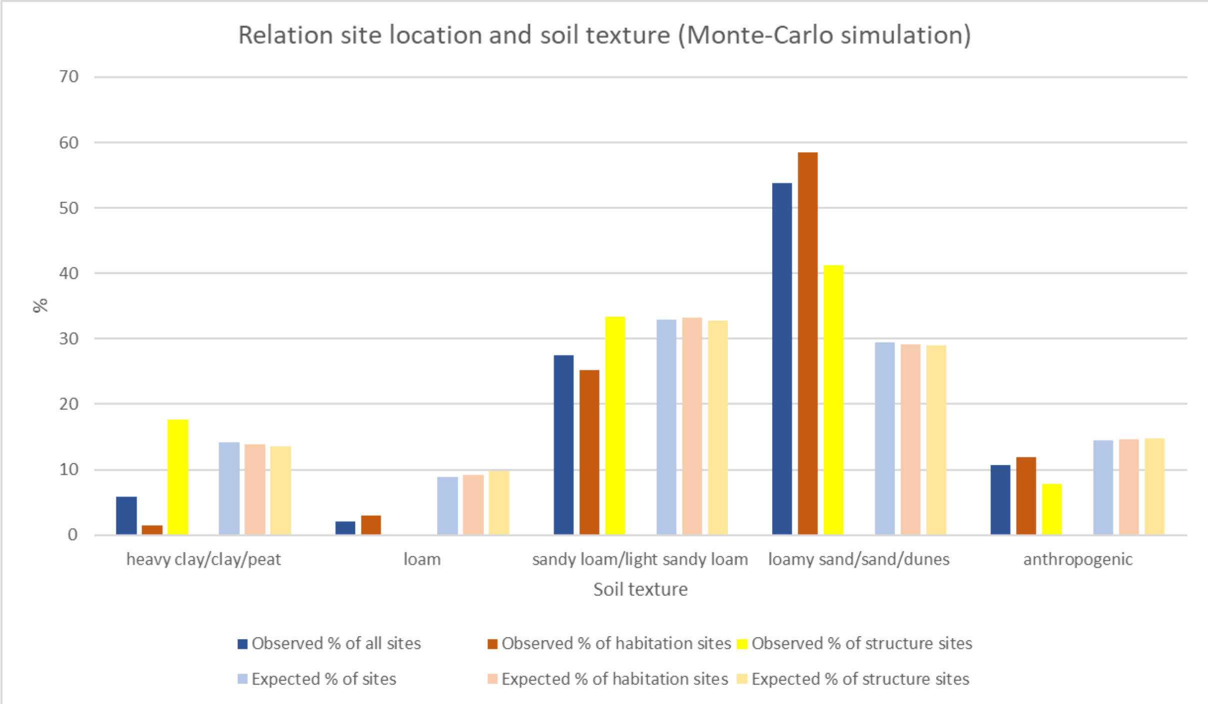


Figure 25: Monte-Carlo simulation of the relation between site location and soil texture.

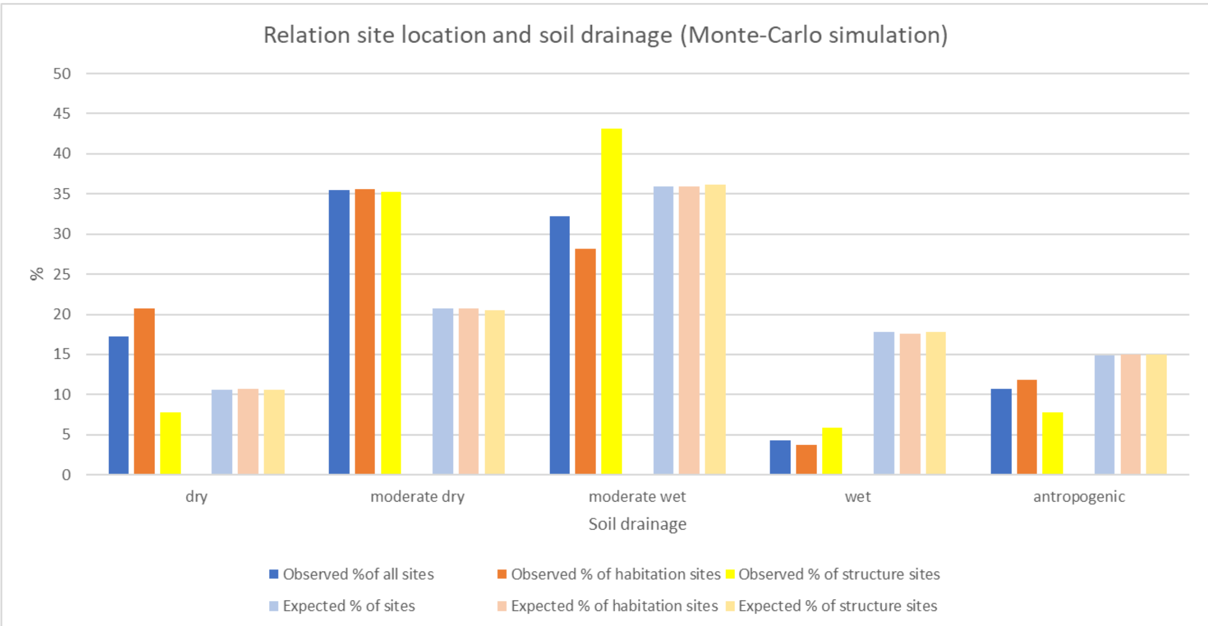


Figure 26: Monte-Carlo simulation of the relation between site location and soil drainage.

6.3.3 Relative topographic position

Primary topographic attributes to determine a point's relative topographic position in a surrounding landscape have been described by Wilson and Gallant (2000). For Flanders, De Reu et al. (2011) and Crombé et al. (2011) further developed these topographic attributes, concluding that *difference from mean elevation* (DIFF) and *deviation from mean elevation* (DEV) were very useful for the analysis of the relative topographic position of archaeological features in relation to their surrounding topography. The DIFF attribute describes the relative topographic position of a point as the difference between the elevation at that given point and the average topographic elevation within a described radius surrounding it. It is calculated by substracting the mean DTM value in the radius from the DTM value of a point. DEV in contrast measures the relative topographic position as the DIFF divided by the standard deviation of the topographic elevation within the defined radius (De Reu et al. 2011; Wilson & Gallant 2000, 74). When the observed point is located higher than its surrounding radius, the DIFF and DEV value will be positive, while negative values indicate the opposite. In this analysis, a 1m resolution LiDAR DTM was used. For both DIFF and DEV, four circular neighbourhoods were calculated in ArcGIS with radii of 150m, 300m, 600m and 1200m around the individual point locations of the inventoried sites. The 150m corresponds to what is considered to be the general maximum distance between houses to consider them as part of a cohesive settlement (Uhlig & Lienau 1972, 61). Following De Reu et al. (2011, 3438) the following radii correspond to twice the distance of their predecessor. Additionally, a Monte-Carlo simulation of 100 sets containing the number of analysed point data was calculated to be used as a random background landscape (Crombé et al. 2011). Note that for the DIFF the calculated values were transformed from meter to centimetre because of the minimal differences in elevation in large parts of the study area. As presented in Figure 27, the difference between the observed (sites) and expected (random) DIFF within the 150m radius is limited. A similar amount of sites and random points is located higher or lower than their surrounding landscape. This changes within the larger radii, where more sites are located higher than their surrounding landscape in comparison to the random points.

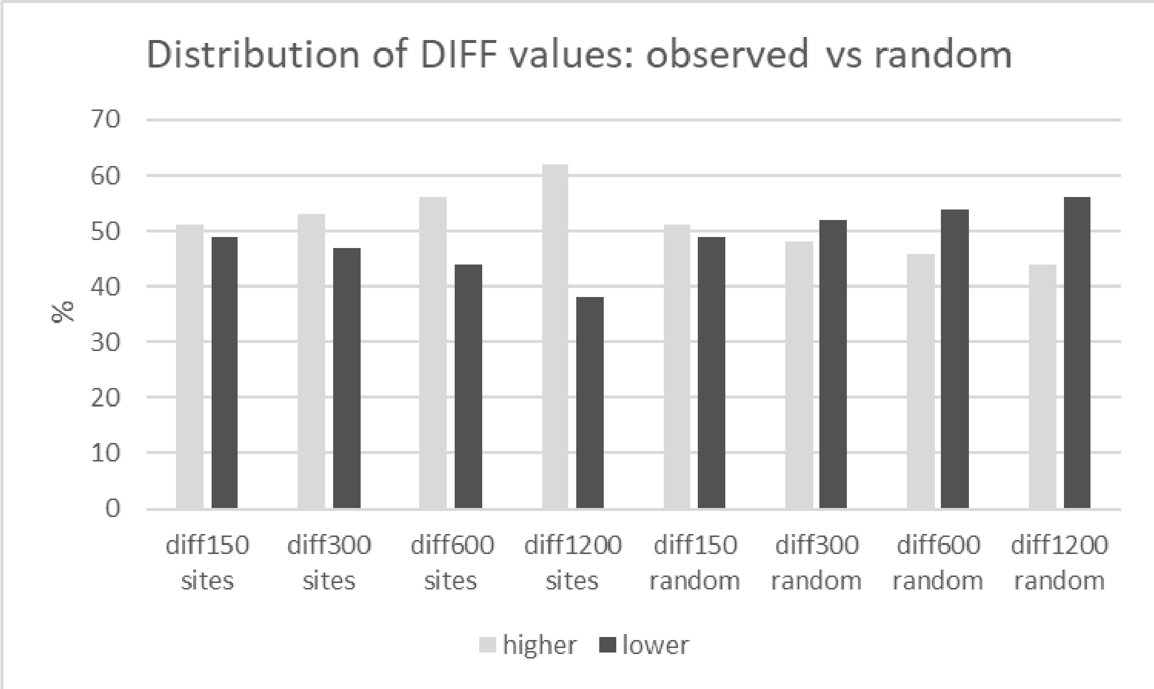


Figure 27: Distribution of observed and random points located higher or lower than their surrounding landscape.

In order to further analyse these differences in DIFF values, the background landscape and observed point values were grouped into nine classes (Figure 28), allowing to analyse the distribution of the settlement sites in the landscape. This allows to compare the distribution of the site values to the random distribution across the topographic landscape, which is represented by the values for the randomly calculated points. Again, this indicates a preference for higher site locations in relation to the surrounding landscape. Given the limited variation in elevation for large parts of the study area, however, the difference between these higher locations and the landscape is only limited. The majority of the sites has a DIFF value between 50cm and -50cm. The significance of these observations is confirmed by a χ^2-test. This shows that no significant difference can be found between the topographical location of the sites and the surrounding landscape within a 150m radius. In contrast, these differences are significant for the 300m, 600m and 1200m radii (Table 7).

χ2-test	**150m**	**300m**	**600m**	**1200m**
df	8	8	8	8
Alfa	0,05	0,05	0,05	0,05
Critical value	15,507	15,507	15,507	15,507
Chi-square	12,66	22,5	33,17	36,41

Table 7: Chi-square tests for DIFF analysis of settlement sites

In order to link these topographical locations to small landscape entities or topographic features, the standard deviation of the DEV values for the random points was used to divide the background landscape into morphological classes. De Reu et al. (2011, 3440-3441) consider the result based on this DEV as more corresponding to the topographic reality. Given that their classification was made for the same lowland landscape, it was used in this study as well (Table 8). This way, the location of high medieval rural settlement sites in relation to the small landscape features can be studied and statistically tested in correspondence with the random calculated points (Figure 29).

Morphology	**Interval**
Ridge	$Z_0 > 1$ SD
Upper Slope	1 SD $\geq Z_0 >$ 0.5 SD
Middle Slope	0.5 SD $\geq Z_0 \geq 0$
Flat Slope	$0 > Z_0 \geq$ -0.5 SD
Lower Slope	-0.5 SD $> Z_0 \geq$ -1 SD
Valley	$Z_0 <$ -1 SD

Table 8: Morphological classes for the background landscape

A clear preference for Middle to Flat slope morphology is visible on Figure 29 for all radii. The majority of the sites are thus not located on the highest locations in the landscape, but relatively higher on the slopes in relation to the surrounding landscape.

A significant difference to the random background landscape can only be attested for the 600m ($\chi^2_5 = 16{,}04$; $\chi^2_{0.05} = 11{,}070$) and 1200m ($\chi^2_5 = 53{,}49$; $\chi^2_{0.05} = 11{,}070$) radii though, suggesting that the differences with the immediate environment are limited.

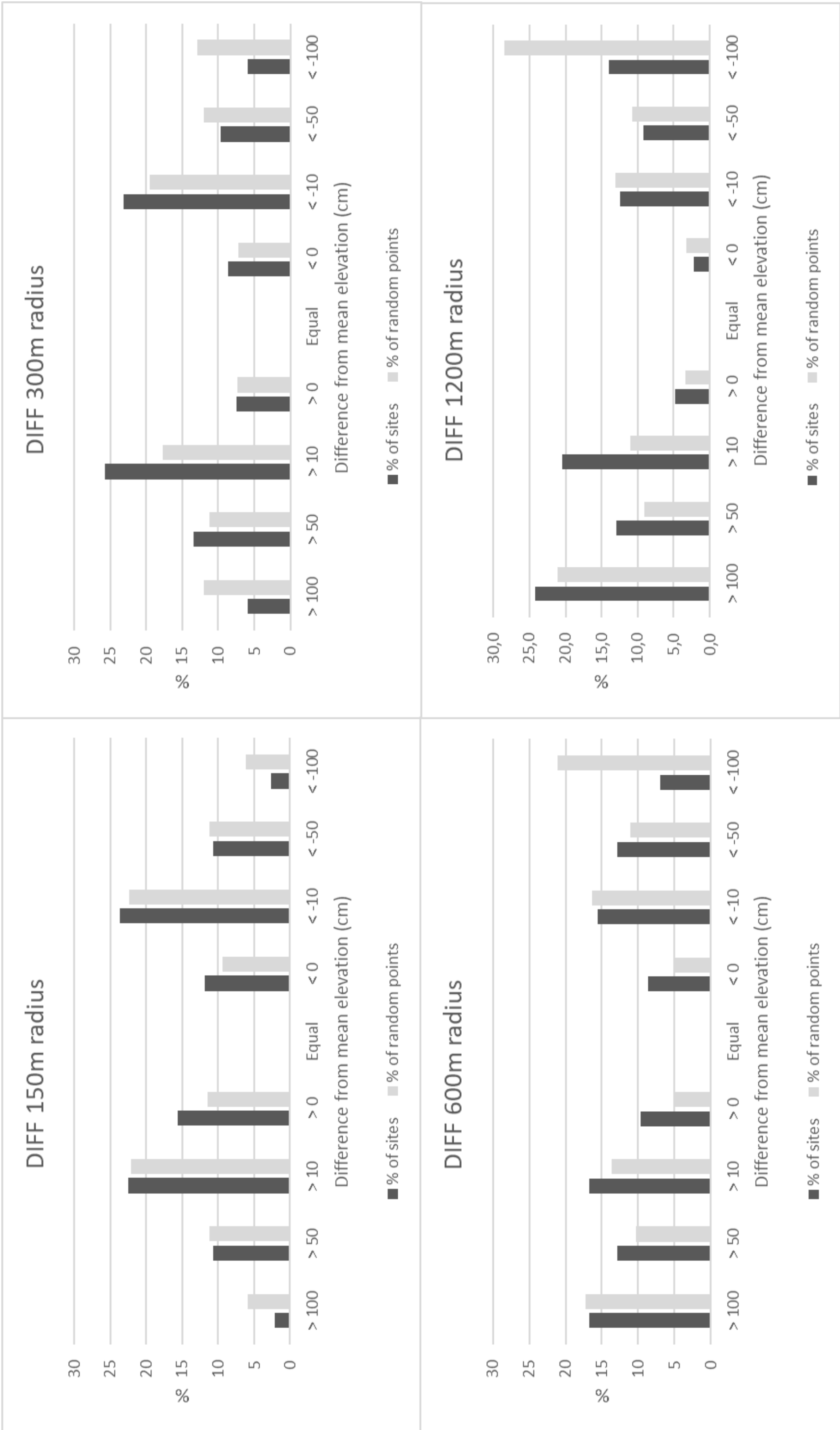


Figure 28: Spatial analysis by means of difference from mean elevation of the topographical location of high medieval rural settlements against 100 sets of random points for radii of 150m, 300m, 600m and 1200m.

This overall preference for site locations on the slope rather than on the highest positions within the landscape or in valleys is for example visible at the site of Brugge-Duzele-Kruisabelestraat. In the context of the underground installation of high-voltage cables for energy transport, a small-scale excavation was undertaken by Raakvlak in 2015. Traces of a three-aisled high medieval building were attested, together with a four-posted granary, pits, five wells and a complex network of ditches. To the north of the excavated area, a second building with strong resemblances to Roman *potstal* or sunken-byre constructions was found. All material, however, was dated in the high medieval period. To date, the processing of the excavation data is ongoing by the archaeological service of Bruges. No dendrochronology, carbon dating or archaeobotanical studies can therefore be incorporated in this analysis. Nevertheless, the excavators have tentatively interpreted the site to be one of many high medieval smallholdings that are believed to be located on slight elevations for the exploitation of the coastal landscape around Dudzele from the tenth to eleventh centuries onwards. No indications for an artificial elevation were excavated though (Decraemer et al. 2015, 67-72).

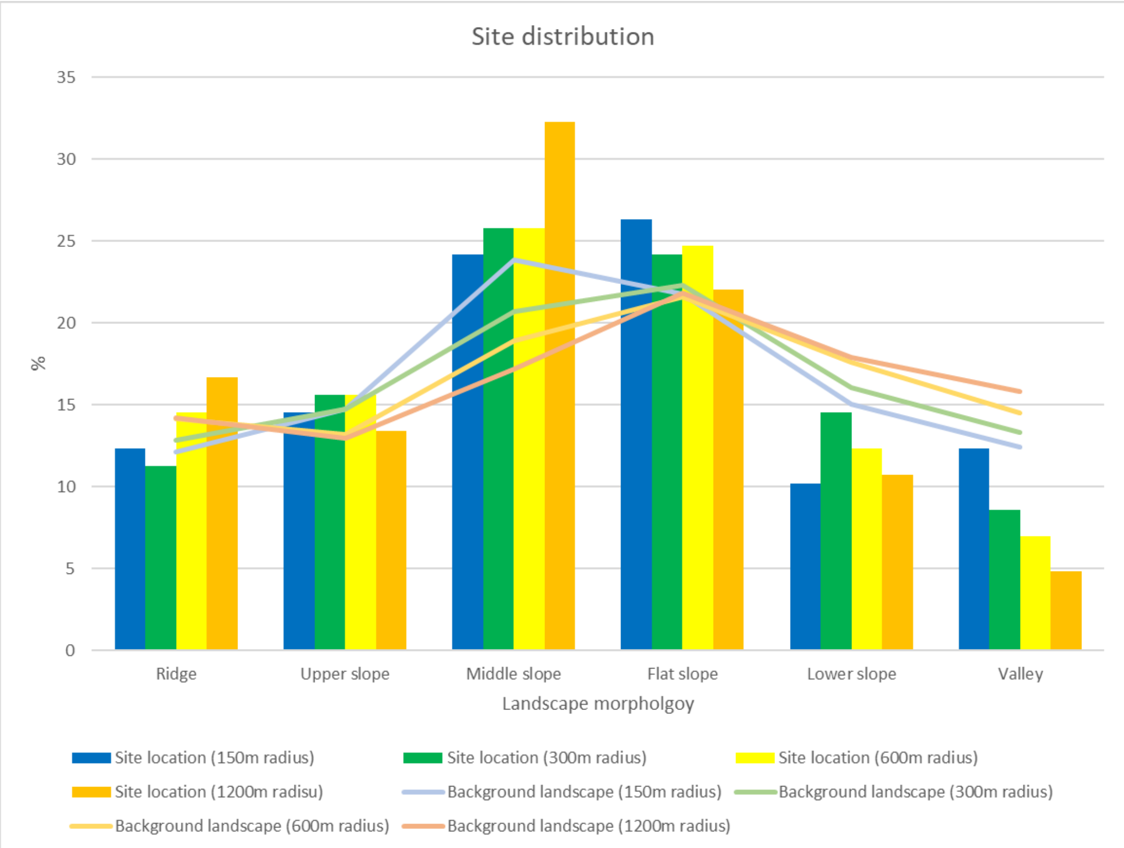


Figure 29: Distribution of high medieval rural settlements in relation to six classes of landscape morphology, based on DEV for observed and random points.

Oblique aerial photography (Figure 30) indicated that the excavated area was only a small part of a more extensive system around the Kruisabelestraat. In order to study this site in relation to its surrounding landscape, the Historical Archaeology Research Group (HARG) executed a 12 hectare large-scale frequency-domain multi-receiver Electromagnetic Induction survey in collaboration with 3Dsoil. A DUALEM-421S soil sensor was used, which incorporates both horizontal coplanar (HCP) and perpendicular (PRP) receiver arrays. The instrument was pulled at a height of 12 cm above the surface by an all-terrain vehicle in parallel lines 1.0 m apart with measurement interval at 0.2 m. The sensor was aligned parallel with the direction of movement and the track was georeferenced using a RTK-GPS (1-2 cm accuracy). Corrections were made for the offset between this RTK-GPS and the instrument and for measurement drift (Delefortrie et al. 2014; Verbrugghe et al. 2020).

Through this survey, a wide and extensive complex of ditch features and building remains could be mapped. Based on their morphological characteristics and available representation on historical maps, recent field boundaries and post medieval features were identified (Figure 31). To the north of the modern-day street, two double linear features could be recognised as former roads/trackways that are represented on the sixteenth-century map of the Franc of Bruges by Pieter Pourbus (A on Figure 32) (Trachet 2018).[20] This map also indicates the presence of several buildings in the survey area. Traces of these were found as highly conductive ditches (A on Figure 33) and highly magnetic anomalies related to brick remnants (A on Figure 34). Based on their curvilinear appearance and relation to the excavated area, other features were interpreted as older and part of the medieval landscape (Figure 31). Combining both the excavation and survey datasets, it becomes clear that the excavated medieval settlement forms part of a wider ditched network, which connects it to at least one other enclosure (A on Figure 31).

Although the differences in elevation are very limited in the survey area, small sandy outcrops are visible on the 1m resolution DTM (Figure 31). These correspond with areas of low electrical conductivity on the EMI data plot (Figure 33). As suggested by Decraemer et al. (2015), these outcrops are understood to have been used as farm site locations for the landscape exploitations around Dudzele. Yet, both identified enclosures are located on the slightly lower flanks rather than on top of the outcrops, corresponding with the observed general pattern for high medieval sites in the northern part of the County of Flanders.

[20] Special thanks to Dr. Jan Trachet for supplying a high resolution excerpt of this map for analysis.

Figure 30: Two examples of georeferenced oblique aerial photographs for the site at Brugge-Dudzele-Kruisabelestraat (Photographs 82208 and 68532 from the collection of the Department of Archaeology at Ghent University).

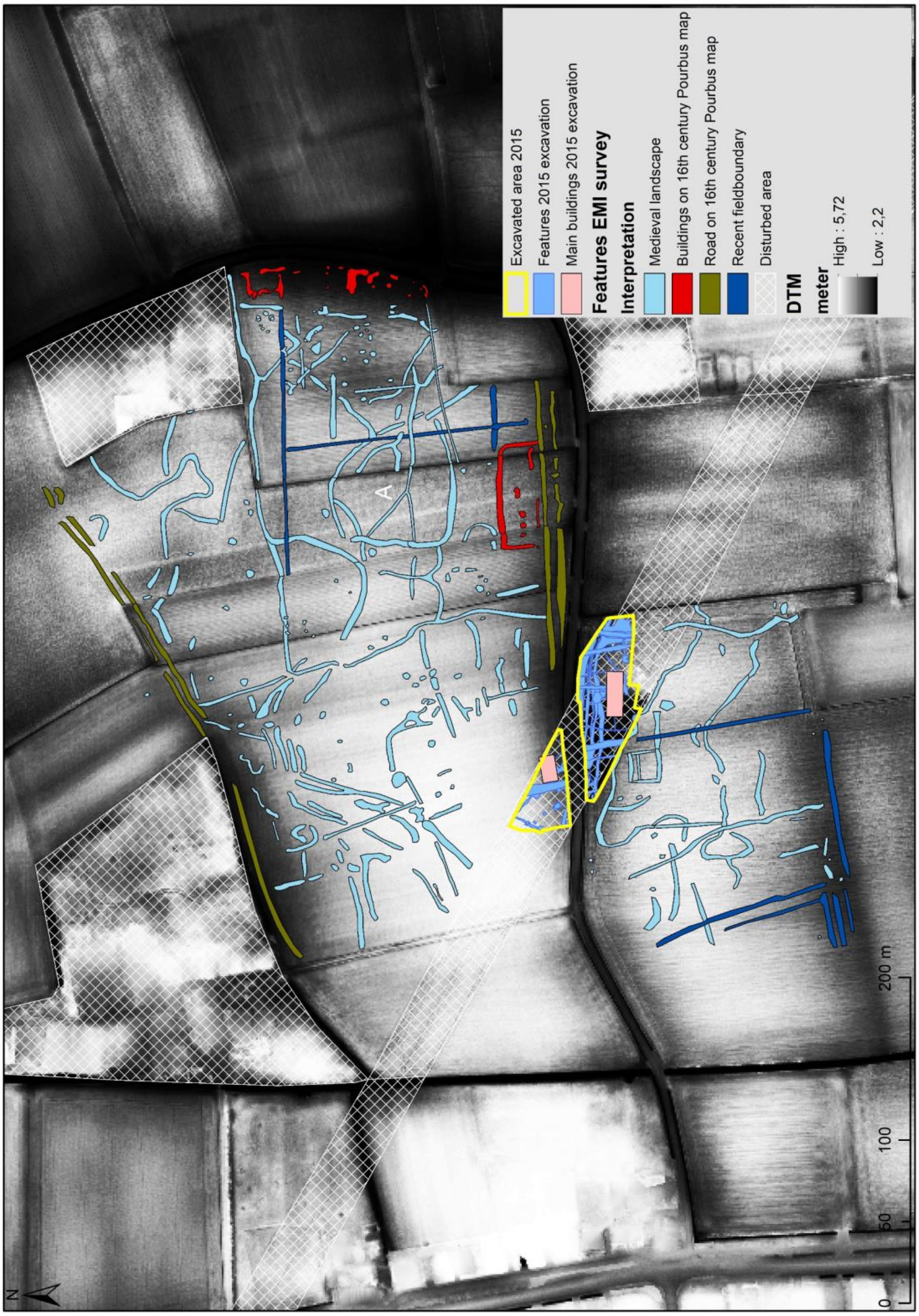


Figure 31: Interpretation of the EMI survey and excavation at Brugge-Dudzele-Kruisabelestraat (DTM visualised using 2.5 Standard Deviations stretch).[21]

[21] Special thanks to Raakvlak for the preliminary maps of their 2015 excavation.

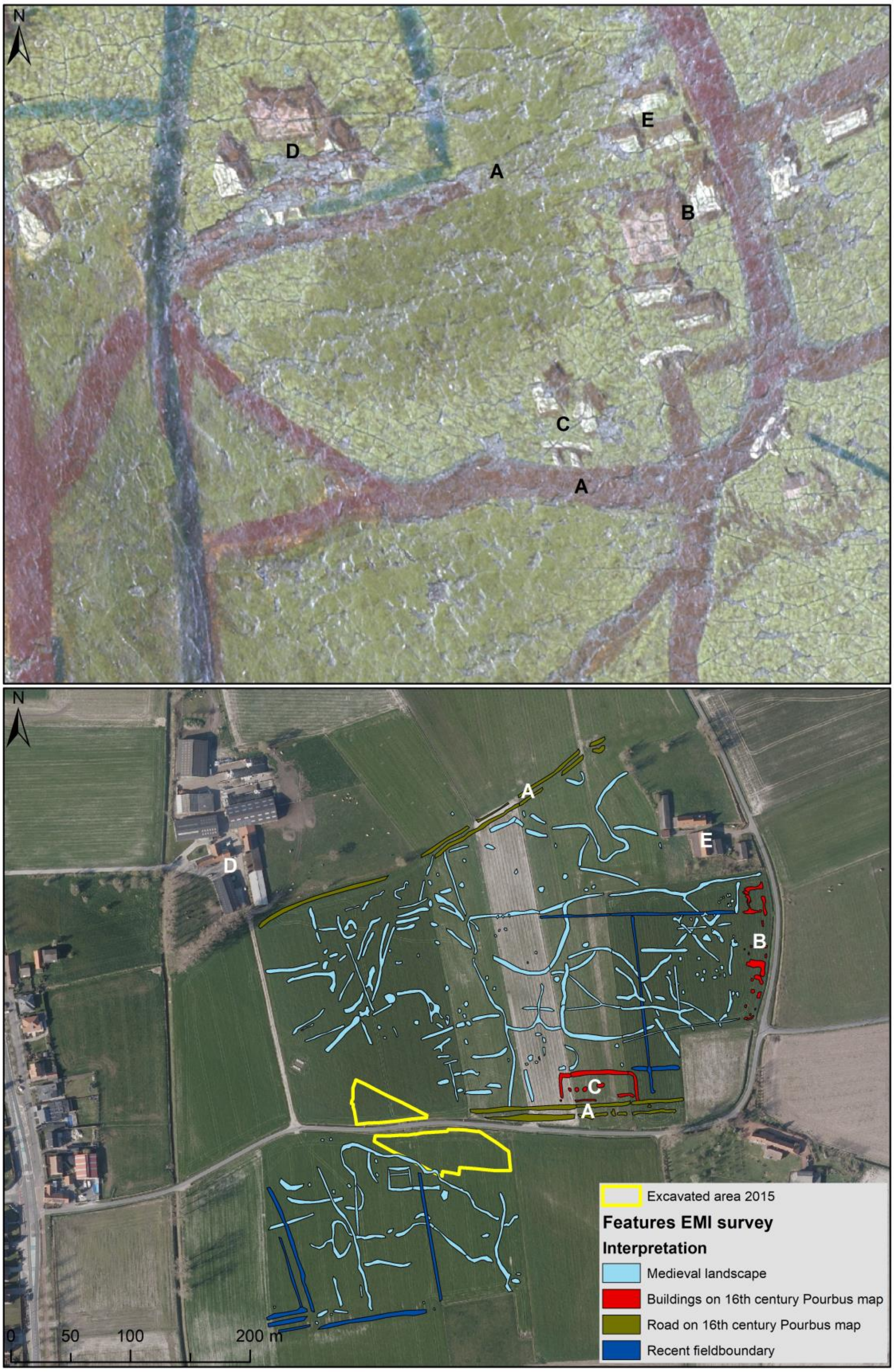


Figure 32: Interpretation of the EMI survey in relation to the sixteenth-century Pourbus Map (Trachet 2018). A: Former roads; B: Former buildings to the east of the survey area; C: Former buildings to the south of the survey area; D and E: Still existing farms.

Figure 33: Eca-HCP1 electrical conductivity plot of EMI survey at Brugge-Dudzele-Kruisabelestraat.

Figure 34: MSa-HCP2 magnetic susceptibility plot of EMI survey at Brugge-Dudzele-Kruisabelestraat.

6.3.4 Assessing inter- and intra-site chronological spatial variability

Large-scale excavations potentially offer further insight in the changing topographical location of settlements across the landscape. Although local context and topography will have influenced the location of occupation, the methodology as described above allows to analyse whether an overall diversity in relative topography throughout the high medieval period can be found. In order to assess chronological spatial variability, building structures were considered as the basic unit of analysis, rather than whole sites. This must allow to incorporate intra-site chronological spatial variability into the dataset as well (e.g. Damme-Sijsele-Stakendijke cf. infra). It thereby needs to be considered that, as described above, detailed dating of individual buildings is limited for this period. Combining exact dating methods, building morphology and finds, the buildings were grouped into three classes: tenth to eleventh centuries, eleventh to twelfth centuries and twelfth to thirteenth centuries. Buildings that were only dated to the eleventh or twelfth century were thereby included in two of the three categories.

For the creation of the geographical dataset, the excavation plans for all sites were digitised in GIS. This was possible for 92 of the 135 habitation sites, which corresponds to 68% of the dataset. For 27 sites there was not yet a (preliminary) report available, while for the remaining 16 sites the cartographical material included in the reports did not allow qualitative georeferencing due to the lack of GCPs. The centre point of the digitised buildings was used as geographical dataset, considering 267 buildings that were interpreted by the excavators as main buildings or secondary buildings larger than posted granaries. For each point location, the difference from mean elevation (DIFF) was calculated within radii of 150m, 300m, 600m and 1200m.

As presented in Figure 35, the differences within a 150m and 300m radius are limited between the tenth-eleventh and eleventh-twelfth centuries. For both periods a similar majority of buildings is located lower than the surrounding landscape, while the opposite is true for the twelfth to thirteenth centuries. This changes when a 600m radius is considered. From the eleventh to twelfth centuries onwards, a majority of the buildings is located higher than the surrounding landscape, an observation that can be attested for all three of the chronological categories within a 1200m radius. This indicates that within the wider landscape, the majority of the buildings are located on higher elevations, while on the site level lower topographies prevail. This was also observed at the site of Brugge-Sint-Andries – Refuge (Figure 36), where at a multi-period settlement site (Roman, early medieval and high medieval) the high medieval occupation was located on the lower parts of the terrain (Hollevoet & Hillewaert 1997/1998, 200).

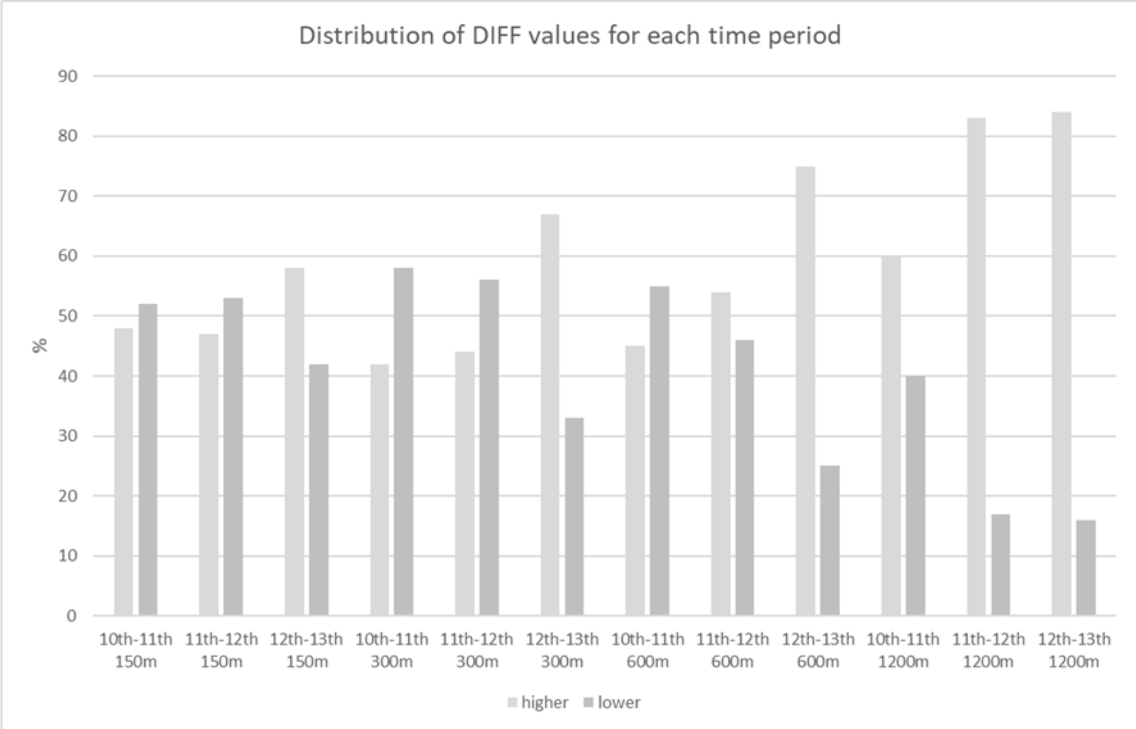


Figure 35: Distribution of DIFF values for three time frames of the high medieval period.

Figure 36: Topographical location of the high medieval features at Brugge – Sint-Andries – Refuge (DTM visualised using 2.5 Standard Deviations stretch).

6.3.5 High medieval rural settlement sites in the wider environment

Generally, these high medieval settlements are considered as ab nihilo settled habitation centres within the relatively unsettled landscape (Verhulst 1966a; 1966b; 1995). Yet, at only 22% of the inventoried sites no features from older or more recent periods were attested. Roman features were found at 47% of the high medieval sites, while only 22% yielded traces dating to the early middle ages (Figure 37). This would suggest a stronger correlation to the topographic location of Roman activities in the landscape, rather than to the early medieval period. At 28 high medieval habitation sites (21%) features of Roman habitation were attested, in contrast to 16 sites (12%) with early medieval habitation (7 of which coincided with Roman habitation), thereby strongly excluding an overall continuation of habitation from the early into the high middle ages. Nevertheless, the presence of features dating to older periods suggests that the high medieval settlements should not necessarily be considered as settlement islands in an unreclaimed landscape. Although the density of early medieval settlement is considered to be lower than during the Roman and high medieval periods, research by Tack et al. (1993, 19-20), Hollevoet and Hillewaert (2019) and Deschepper (2019) indicate that in some regions local reclamations continued from the early medieval well into the high medieval period.

As indicated by environmental data for 43 sites in the inventory, pollen and macro remains suggest an increasing important role of meadowland and arable fields around the settlements over the course of the high medieval period. Equally important indications for heathlands and forests remain, although the latter are diminishing throughout the high medieval period. This paints the picture of these settlements being located in an already relatively open landscape characterised by damp meadowland and arable fields, surrounded by heathlands and diminishing forest groves, suggesting intensification rather than ab nihilo forest reclamation.

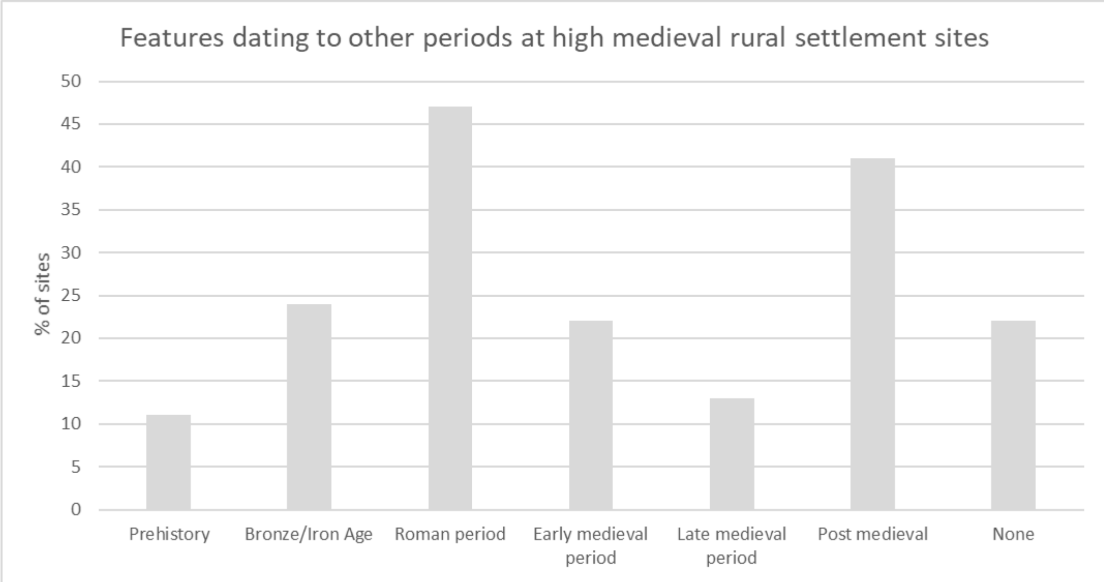


Figure 37: % of high medieval settlement sites with features dating to other periods.

6.4 Characteristics of high medieval rural settlements

6.4.1 Enclosures are an important aspect of the settlement

The overall majority of the excavated high medieval rural settlements in the inventory can be considered as single farms or Einzelhöfe. Characteristically, this type of settlement is considered to be enclosed by ditch features, which can either have a curvilinear, rectilinear or combined form. Based on the dataset of high medieval rural settlements, the relatively rectilinear and structured layout is more common though. A remarkable D-shaped enclosure was found at the sites of Blankenberge-Uitkerke-Lissewegestraat (Van Remoorter et al. 2016), Evergem-Bezele-Koolstraat (De Logi et al. 2009), Poperingen-Poperinge-Appelgoedje (Mestdagh 2016), Ronse-Ronse-Pontwest (personal communication with SOLVA) and possibly at Kortrijk-Rollegem-Klijtbergen (Dyselinck 2018). The character and function of this D-type is, however, unclear.

The ditch features form a singular enclosing system, that would have been adapted and re-dug regularly. The width of these ditches varies from 0.5 to 5 meter and no morphological, geographical or chronological distinction can thereby be made. Further in-depth research at the site and domestic level might clarify possible differences (e.g. functional or status). Wells are often located on or connected to the enclosure ditches, while within the enclosed areas further divisions occur which separate the habitation from other zones within the enclosure.

Although ditch features occur at all inventoried sites, it should be considered that a clear enclosed area was not attested within the excavated area at all sites. Whether or not this means that not all high medieval single farmsteads were enclosed by ditch features is unclear. The limited size of excavation areas in several cases hinders a good assessment of settlement morphology. Furthermore, in those cases when strong indications for an enclosure are present, it can be difficult to determine their full extent. Given that only a limited number of sites has been fully excavated, calculations are based on a Minimum Bounding Geometry (MBG) with convex hull function. This offers relative insights in the enclosed areas. In contrast to De Clercq's (2009, 245) observations for the Roman period, the high medieval enclosures are much smaller. The average MBG covers an area of 0.27 hectare (minimum = 0.04ha, maximum = 0.8ha). This is confirmed by measurements at the few sites with an almost completely excavated enclosure (Table 9).

When a wider area around parts of the enclosure is excavated, it becomes clear that individual enclosures are connected with each other or to the surrounding landscape by long, narrow and straight ditches that seem to structure the environment. Related to this, high medieval features (segments of enclosure or buildings) at three sites consider a (former) track or road segment in their location and orientation. This is the case at Beernem-Oedelem-Haverbilken, Damme-Sijsele-Stakendijke and Aalter-Aalter-Woestijne (De Groote & Van de Vijver 2019; De Gryse et al. 2012; Deconynck et al. 2019; Huyghe 2010). Furthermore it can be noted that most sites show a relatively basic or straightforward layout without a complicated tangle of ditches. Two exceptions are Oudenburg-Oudenburg-Ambachtelijke zone/Steengoed and Brugge-Dudzele-Kruisabelestraat (Figure 31) (Decorte 2006). Here the enclosures are part of an extensive network, most likely related to their position in the polder landscape. Both sites lie on the edge of sandy elevation in the low lying coastal landscape (cf supra for Dudzele-Kruisabelestraat).

Site	Enclosed area (hectare)
Oostkamp-Oostkamp-Zwarte gat	0,1
Jabbeke-Snellegem-Meersbeekstraat	0,08
Ronse-Ronse-De Stadstuin	0,3
Evergem-Belzele-Koolstraat	0,2
Brugge – Sint-Andries - Refuge	0,3
Evergem-Belzele – Ralingen/Schoonstraat 1	0,3
Evergem-Belzele-Ralingen/Schoonstraat 2	0,9

Table 9: Enclosed areas of fully excavated enclosure structures.

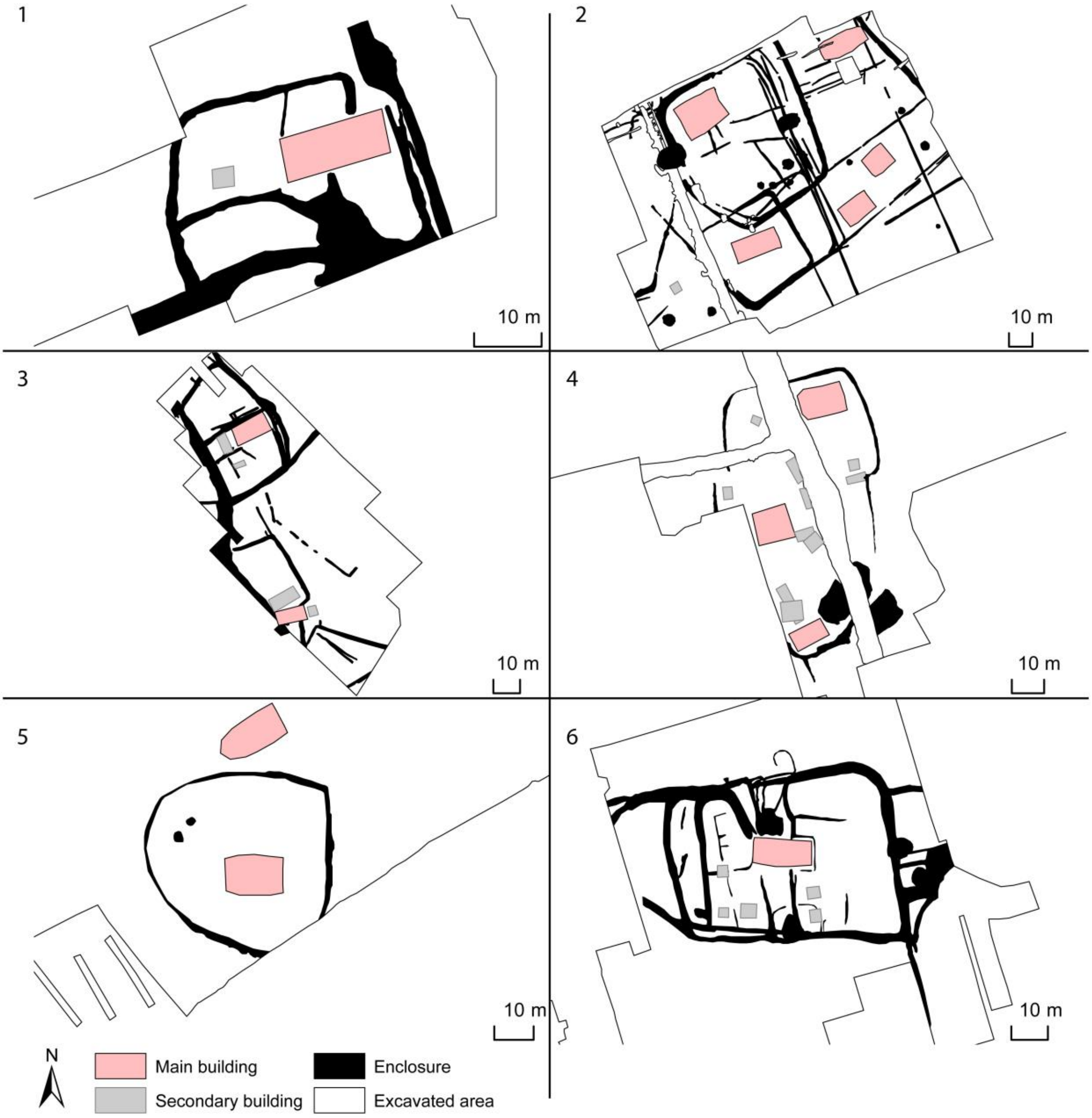


Figure 38: Schematic visualisation of excavated enclosures in Table 9. 1: Jabbeke – Snellegem - Meersbeekstraat, 2: Evergem – Belzele - Ralingen/Schoonstraat, 3: Oostkamp – Oostkamp - Zwarte gat, 4: Ronse – Ronse - De Stadstuin, 5: Evergem – Belzele - Koolstraat, 6: Brugge - Sint-Andries – Refuge.

6.4.2 Main buildings in relation to the enclosures and secondary features

Besides internal divisions by small ditches, the enclosed areas are characterised by the presence of buildings, each constituted of a series of post-holes, often reflecting a three-aisled building-concept. Although the domestic level lies outside the scope of this research, the orientation and location within the settlement of these structures has been considered. The predominant orientation of buildings at the inventoried sites is NE-SW, both for structures that have been interpreted as main buildings and those that are considered as large secondary buildings. 62% And 54% of these respective categories are oriented along a NE-SW axis. NW-SE (16% and 20%) and E-W (19% and 18%) are followed by N-S (just 3% and 9%). Different main buildings within the same enclosure may have a different orientation, which might suggest a different dating. However, given the often broadly assigned dates (cf supra) this could not be attested except by stratigraphy in case they overlap, thereby offering only a relatively horizontal stratigraphy. Secondary buildings occur with the same or a perpendicular orientation to the main buildings.

Given that only a limited number of enclosures has been fully excavated, no clear observations can be made regarding the location of the buildings within the enclosure. In all cases, however, the buildings are closely surrounded or even connected to the ditches, which would suggest a location close to the edge of the enclosure, as is for example the case at Damme-Sijsele-Stakendijke (Figure 39). At other sites, the main building is located in the middle of the enclosed area, but closely connected to water features as well, for example at Brugge- Sint-Andries – Refuge (Figure 36), where a ditch runs into one of the long sides of the building (Hollevoet & Hillewaert 1997/1998, 202). This was also attested at Beernem-Oedelem-Oudeputstraat, Jabbeke-Snellegem-Meersbeekstraat, Staden-Staden-Oostnieuwkerkestraat Fluxys Lot 4 FLPL-66, Roeselare-Beveren-Onledegoed/Wagenbrugstraat, Evergem-Belzele-Ralingen/Schoonstraat, Evergem-Belzele-Schoonstraat 201, Nevele-Merendree-Molenkouterslag and Kuurne-Kuurne-Sint-Pieterstraat (Acke et al. 2019a; Beke et al. 2017; Dyselinck & Fredrick 2018; Hazen & Vossen 2019; Hollevoet 1992a; Van de Vijver et al. 2009; Vanhee 2007; 2011). Further research of the buildingstructures is needed, however, to clarify the functional relation of these perpendicular ditches to the respective buildings itself.

Overall, the secondary buildings, wells and pools are situated within a radius of 20 to 30 meter around the main buildings. Huijbers (2012) stated that spatial clustering and division between the wells and granaries, that were interpreted to be related to differences in gender and social identity, could be identified in the dataset of high medieval rural settlement sites in the Meuse-Demer-Scheldt region. Based on the present dataset for the northern part of the County of Flanders, such strict division cannot be observed. Wells and granaries can be found on the same sides of buildings and/or enclosures. Again, however, the difficulties regarding dating of the structures should hereby be considered. Further clarification of contemporaneity and horizontal stratigraphy might offer a different image. Nevertheless, the secondary buildings and wells are located close to the main buildings.

6.5 Grouped rural settlements in the archaeological dataset

Besides individually enclosed settlements, larger excavations or adjacent research have allowed to clarify that habitation clusters occur as well. This offers the potential to study grouped rural settlements in a context in which archaeological investigations in currently inhabited villages and hamlets are highly limited to non-existent. However, poor dating resolution makes it difficult to assess whether these grouped farmsteads represent contemporary habitation, or rather chronologically different occupation phases. Based on the similar orientation of the buildings, the absence of overlap between the structures and a planned/structured appearance of the overall settlement lay-out, three sites from the inventory are considered here to represent contemporary grouped settlements. Their character and grouped morphology are assessed and described in order to pin-point their contribution to the archaeological understanding of high medieval grouped rural settlements in the County of Flanders.

6.5.1 Sijsele-Stakendijke

The excavated complex at Damme-Sijsele-Stakendijke consists of two excavation areas (I and II), which are adjacent to each other (Figure 39). Stakendijke I was excavated in 2010 and comprises settlement structures from the Roman and high medieval period (De Gryse et al. 2012). The latter is located to the south of the study area and was interpreted as a typical high medieval Einzelhof or single farm. The settlement itself is enclosed by ditches, while the area to the north of this enclosure is characterised by straight long and narrow ditches which seem to structure the landscape. Within the enclosure, two overlapping three-aisled buildings were excavated (ME1 and ME2) which were interpreted as main buildings based on their morphology. ME1 had a northwest-southeast orientation, while ME2 was northeast-southwest oriented. To the east of these main buildings, a smaller two-aisled construction was found with a parallel orientation to building ME1. A second smaller two-aisled building was excavated further east along the border of the then excavated area with the same orientation as ME2. The stratigraphical relation of these two structures indicates that ME1 and ME2 are consecutive, with ME2 being the older construction (De Gryse et al. 2012, 79-87). Around the habitation site up to five wells were found. Although hypotheses about the relation between these wells and the individual habitation phases were formulated by the excavators, no clear indications for defined relations to one of the building phases are available. Based on the finds in the different contexts, limited differentiation in dating can be made as all features date to the twelfth century, with possible extension to the early-thirteenth century (De Gryse et al. 2012, 109-121). Besides this habitation core, a second functional unit was located to the east of the enclosed area, where a smaller building and a four-posted granary were found. A third unit, also separated by a narrow ditch, is located to the west of the two main buildings and consists of eleven systematically laid out pits, which were interpreted as harvest containers.

This Einzelhof interpretation, however, should be reconsidered following the results of the adjacent archaeological research in 2018-2019. Rather than having an isolated placement in the landscape, the combined mapping of both archaeological interventions clearly demonstrates that Stakendijke I was connected to a more extensive settlement, sharing parts of the same enclosure network that continues both east and west outside the excavated areas. The settlement that was excavated in 2018-2019 can be divided in at least two habitation phases, based on building morphology. As further carbon dating and dendrochronological analysis are ongoing (Deconynck et al. 2019, 102-139), only a relative horizontal stratigraphy is available to date. Based on the building structures, a possible tenth to eleventh centuries phase is located along the southern edge of the study area, while a twelfth to thirteenth centuries occupation is located around some eighty meters to the north (Figure 39). A first pottery assessment, however, contradicts this horizontal stratigraphy and suggests a contemporary twelfth-century occupation that only lasted for two generations. The site is situated on the northern slope of the east-west running Maldegem-Stekene coversand ridge (De Moor & Heyse 1978; Derese et al. 2010). Although differences in elevation on site are small (up to 1 meter), the assumed twelfth to thirteenth centuries phase is situated along a NE-SW running trackway that has a slightly higher location in the landscape. This track divides the twelfth to thirteenth centuries phase into two zones. The northern zone is characterised by three three-aisled buildings, four secondary buildings, four wells, one pool and twenty artisanal pits. All features date to the twelfth or early-thirteenth century. As data processing on this site is ongoing, no detailed dating is available yet. It must be noted though that none of the buildings are overlapping and all but one have the same orientation. The southern zone equally has three three-aisled buildings, two granaries, one well, five pools and six artisanal pits. This part of the settlement is more structured as all three buildings are built in line with each other and are separated by ditches. Both zones are further subdivided and structured by smaller ditch features.

Overall, both zones and the habitation that was excavated in 2010 are connected with each other through the same enclosure network, suggesting a contemporary presence in the landscape (Deconynck et al. 2019, 112-144).

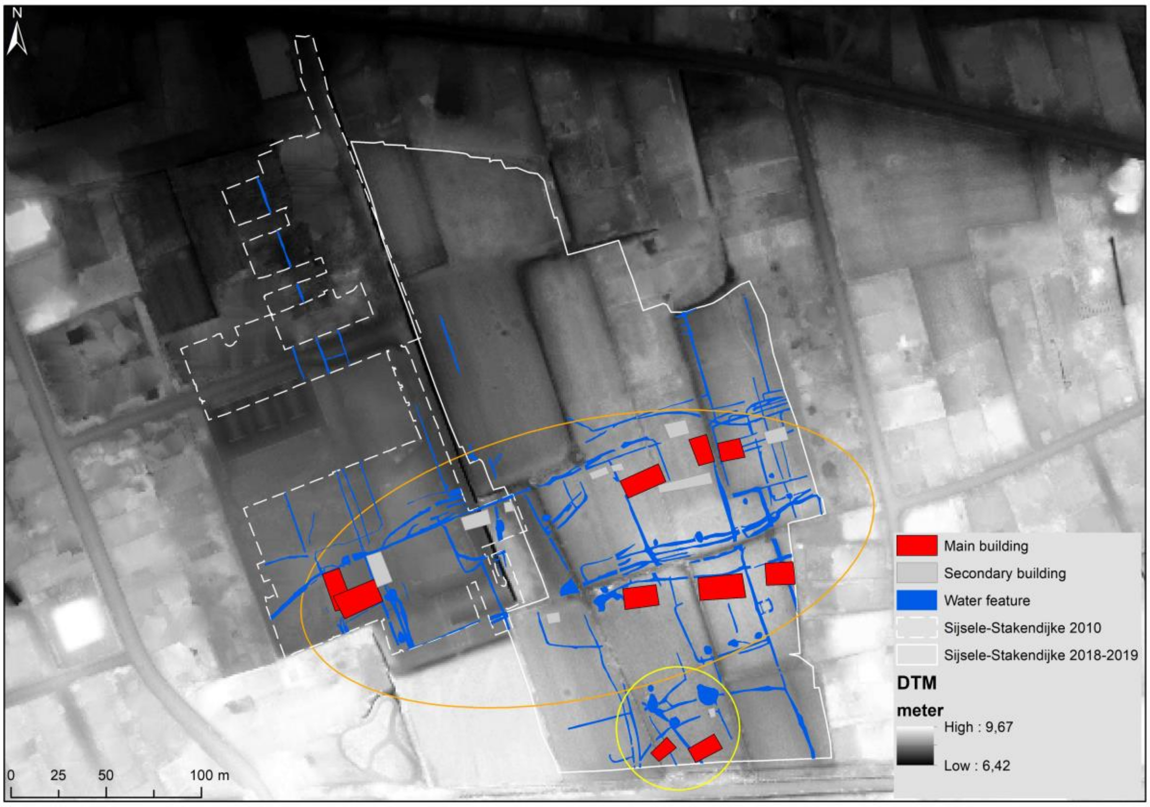


Figure 39: Grouped settlement at Damme-Sijsele-Stakendijke with indication of the assumed tenth to eleventh centuries phase in yellow and twelfth to thirteenth centuries phase in orange. Simplified excavations plans following De Gryse et al. (2012) and Deconynck et al. (2019) (DTM visualised using 2.5 Standard Deviations stretch).

Archaeobotanical analysis of pollen and macro remains in well 3 at Stakendijke I suggests a relatively open wasteland (*wastinae*) landscape with heath and grasslands intermingled with small groups of oak and birch. Pollen and macro remains, however, also indicate a strong presence of rye, wheat, barley, rapeseed, flax and hemp. Flax was also attested during the first assessment of plant materials for Stakendijke II. Furthermore, several agriculture related weeds and manure related fungi were found in the samples taken from the same well. The latter may point at the presence of cattle within the enclosure. The presence of wheat and barley pollen, as well as the high amount of thresh remains of rye suggests a local production and processing of these crops (De Gryse et al. 2012, 121-124). Further indications for farming or processing of crops can be found in a fragment of a millstone in one of the postholes of building 9 and parts of a plough in well 12 at Stakendijke II. Besides farming aimed at local sustenance, the large number of artisanal pits suggests a production for commercial markets as well, most likely related to high fiber crops like flax and hemp, which were important for the production of textiles (Deconynck et al. 2019, 178; Thoen & Soens 2015, 230-232). The settlement's location along a trackway should therefore not be surprising.

6.5.2 Evergem-Belzele

In contrast to Damme-Sijsele-Stakendijke, the archaeological research in Evergem-Belzele exists of five non-adjacent excavations that yielded high medieval settlement structures on a sand ridge along the Kale river (Figure 40). The excavations took place between 2008 and 2010 (De Logi et al. 2009; De Logi & Schynkel 2008; Schynkel & Urmel 2009; Van de Vijver et al. 2009; Vanhee 2011) and have been synthesised by Deschepper (2018) as a settlement in the context of short lived landscape reclamations. Furthermore, it should be noted that traces of a twelfth to thirteenth centuries building were found nearby, at the Spoorwegstraat, during a rescue excavation in 1989 which also yielded traces of late-Iron Age and Roman occupation (Bourgeois et al. 1989).

Based on the dendrochronological studies by Haneca (2010) and Van Daalen (2014), Deschepper (2018, 19-24) proposed a phasing in the settlement features. As for Sijsele-Stakendijke, however, detailed insights in contemporaneity of buildings is limited based on the archaeological record. From the middle of the eleventh century the sand ridge is settled, as indicated by two enclosures at the sites of Koolstraat and Ralingen/Schoonstraat (De Logi et al. 2009; Deschepper 2018, 19; Van de Vijver et al. 2009). From the twelfth century onwards, an increase in settlement can be attested. The already existing enclosure at Ralingen/Schoonstraat is understood to have continued, while further habitations structured around it and new enclosures occur at the sites of Steenovenstraat and Molenhoek (De Logi & Schynkel 2008; Schynkel & Urmel 2009). During the late-twelfth century, habitation at Steenovenstraat develops further as well as at Schoonstraat 201 (De Logi & Schynkel 2008; Vanhee 2011). The settlement of the sand ridge ends at the end of the twelfth or early-thirteenth century (De Logi & Schynkel 2008; Deschepper 2018, 22; Van de Vijver et al. 2009).

In contrast to the site of Damme-Sijsele-Stakendijke, the attested enclosures do not lie closely grouped in the landscape. Only at Evergem-Belzele-Steenovenstraat the individual features are connected by ditches, yet similarities in orientation of enclosures and buildings at the nearby sites of Evergem-Belzele-Molenhoek and Evergem-Evergem-Schoonstraat 201 suggest a close relation between the sites. The sites of Evergem-Belzele-Koolstraat and Evergem-Belzele-Ralingen/Schoonstraat are located much further away, for which they cannot be interpreted as grouped settlements *strictu sensu*. However, these five excavations, together with the indications of high medieval occupation at Evergem-Evergem-Spoorwegstraat, suggest a relatively high settlement density on this small sand ridge and therefore a topographical stability.

Figure 40: Excavations and grouped settlement at Evergem-Belzele. Simplified excavations plans following De Logi et al. (2009), De Logi and Schynkel (2008), Schynkel and Urmel (2009), Van de Vijver et al. (2009) and Vanhee (2011) (DTM visualised using 2.5 Standard Deviations stretch).

Based on the archaeobotanical analysis of three wells by (Verbruggen 2015), strong indications can be given for the reclamation hypothesis (Deschepper 2018, 22). While for the eleventh century the landscape would have been mainly forested, the amount of attested pollen and macro remains for agricultural crops (rye, barley, oats and wheat) and meadowland increases for the twelfth century. Forest seems to diminish gradually, while the representation of heathland remains stable. Similarly to Damme-Sijsele-Stakendijke, thresh remains strongly indicate local production and processing of crops, such as rye, barley, oats and wheat, while flax pollen and macro remains may indicate textile production as well. This is supported by the attestation of artisanal pits (Deschepper 2018, 22-24).

6.5.3 Zele-Wijnveld

A third example of possible grouped settlements in the archaeological record can be found at the site of Zele-Wijnveld. Four zones (2, 3a, 3b and 4) were excavated in 2016 for which high medieval rural settlement structures were found (Brouwer et al. in press). Processing of the site by the excavators is still ongoing, the interpretations are therefore preliminary. 24 buildings were studied, four of which were interpreted as main buildings by the excavators, located over six to seven enclosures. All features date between the eleventh to early-thirteenth century. The oldest features are located in zone 4, where enclosure 4 and 5 are located. Based on building morphology and dendrochronology on the structure of a well, the foundation of enclosure 4 is dated between the end of the tenth century and early-eleventh century. Enclosure 5 is dated between the late-eleventh century to late-twelfth century. Enclosure 3 in zone 3a has a similar lay-out to enclosure 4 and is dated at the end of the eleventh to first half of the twelfth century. Based on the stratigraphy of ditch features, at least three phases were recognised in the enclosure system. Within the enclosed area a three-aisled main building, secondary building and well were excavated. To the north of the enclosure, separated from the habitation structure several pits were attested which were linked to agricultural or artisanal activities. During the third phase of this enclosure, no clearly identifiable habitation structures were identified (Brouwer et al. in press, 79-83).

The main interest regarding grouped settlement, however, can be found in zone 2 (Figure 41), where at least two but possibly three adjacent enclosures were excavated with the same orientation. Again, exact dates for the building structures are not available, but based on the overall excavation data enclosure 1 and 2 are understood to be contemporary. Yet, the excavators consider enclosure 1 to have originated earlier and enclosure 2 to have continued longer. Only for enclosure 1 has a main building been identified. The large secondary buildings on enclosure 1 and 2, however, have the same size, NE-SW orientation and enclosing ditches, as this main building. Furthermore, the posthole configurations of these two buildings are less clear than that of the main building. Based on these observations, their interpretation as secondary buildings might need to be reconsidered. Instead, possibly three main buildings may have been excavated. It thereby should be noted that the ditches surrounding these buildings continue as two parallel features eastwards and thereby cross the possible enclosures. The function of this ditch feature is currently unclear.

Three to four phases for both enclosures can be suggested based on the stratigraphy of the enclosing ditches. To the east of enclosure 1 the presence of differently oriented secondary buildings and ditches suggest a predecessor for these two enclosures. Yet these are also dated in the twelfth century and may therefore represent parts of a third contemporary habitation core that has not been fully excavated (Brouwer et al. in press, 68-79).

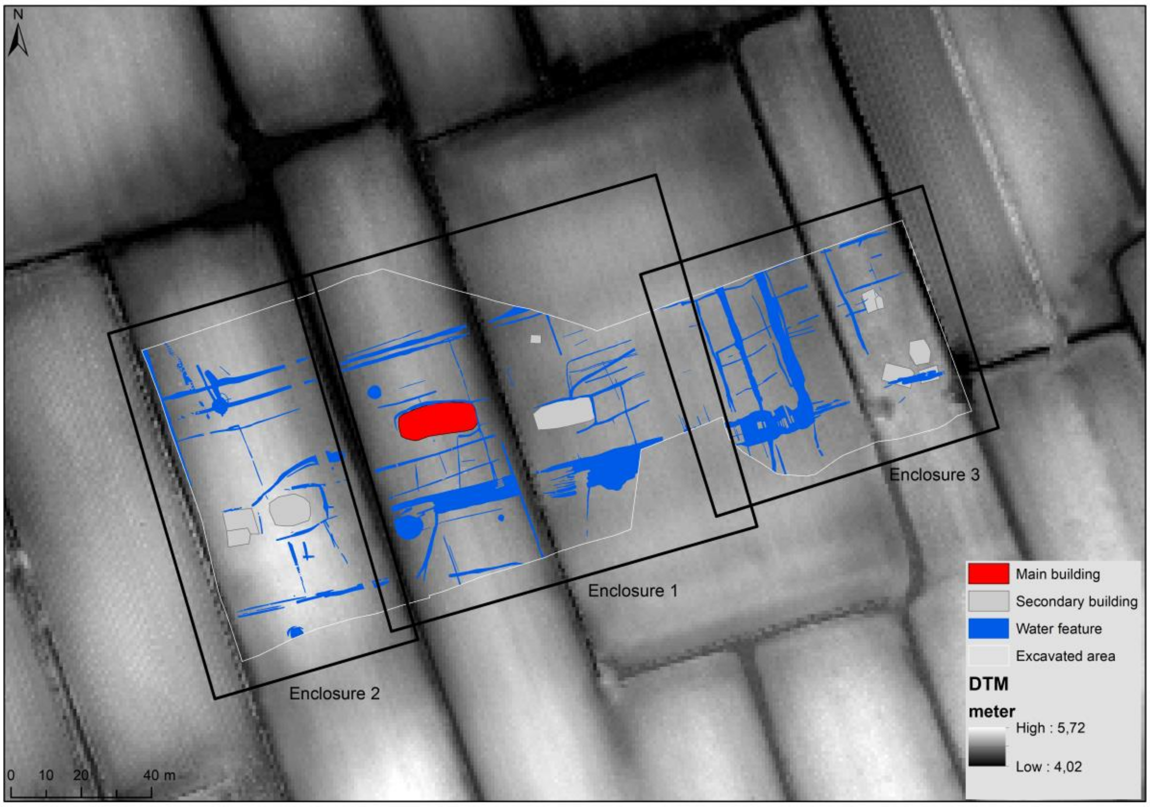


Figure 41: Detail of zone 2 at Zele-Wijnveld. Simplified excavation plan and indication of enclosure systems following Brouwer et al. (in press) (DTM visualised using 2.5 Standard Deviations stretch).

6.6 Discussion

6.6.1 Regional clustering of rural settlements

Although, at first sight, the high medieval rural settlements seem to be widely distributed across the study area, the geostatistical analysis presented in this chapter has indicated a clustered pattern. Between Oudenburg and Brugge and around Ghent, Kortrijk, Roeselare, Zele and Sint-Niklaas clusters were identified through a KDE analysis (Figure 42). Some of these clusters may be explained by differences in research activities before the implementation of the European Valetta treaty on archaeology in Flemish legislation[22] or by large scale development schemes around certain cities or municipalities. The important work of Yann Hollevoet and Bieke Hillewaert in the region around Brugge and Oudenburg, for example, can be identified as high density clusters on maps 1 and 2 in Figure 43. Since the decree of 1993 and the implementation in 2012, however, archaeological research is geographically more dispersed, as shown by the Kernel Density Estimation of archaeological excavations in the study area as included in the CAI (Figures 42 (2) and 43 (1-3)). Indeed, some of the high density clusters in high medieval rural settlements coincide with areas of longstanding archaeological research. Yet, both within and outside these clusters, areas without high medieval settlement sites coincide with zones of higher density in the CAI data. This is especially the case for the southern part of East Flanders and the west coast of West Flanders. Other explanations for the presence of high medieval settlement sites must thus be present as well. As described in relation to the row settlements in the County of Flanders (Chapter 5), political, rural, urban and demographic changes would have induced the need for new lands to be cultivated and a movement of settlements towards the less fertile sandy soils may be expected (Thoen & Soens 2015; Verhulst 1995; Verhulst 1999, 113-118). Indeed, significant relations between the settlement locations and the soil texture and drainage were found. An overall preference for dry to moderate dry sandy and sandy loam soils was observed. As for the row settlements, the role and attraction of cities such as Bruges and Ghent in the distribution of rural settlements should not be underestimated, as higher densities of sites are found around these cities. As presented by the research of Verhulst (1999) and Dumolyn, Declercq, et al. (2018), the growth of towns and cities was strongly related to an increase in agricultural production and rural population growth.

[22] The Valletta treaty has been ratified in Flanders in 2010 and implemented in legislation in 2012. Before this implementation, the 1993 decree for the protection of the archaeological heritage (*Decreet houdende bescherming van het archeologisch patrimonium*) arranged Flemish archaeology only "in the spirit of Malta" (De Clercq, Bats, et al. 2012, 29).

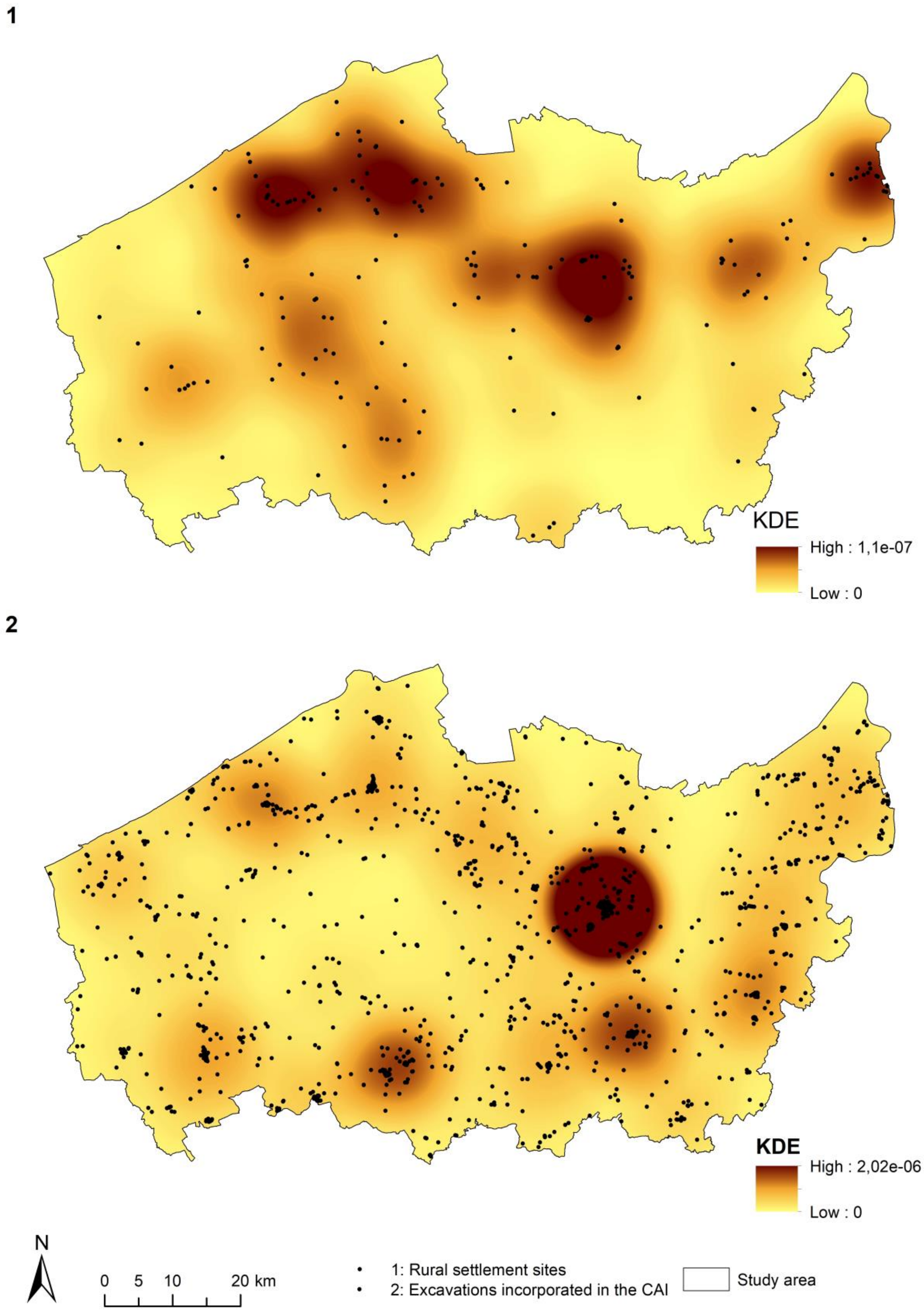


Figure 42: Mapping and KDE of the 186 high medieval settlement sites (1) in relation to the dataset of 1588 excavations until 2018 as made available through the CAI (state of the art April 2020) (2) (Visualised using 2.5 Standard Deviations stretch).

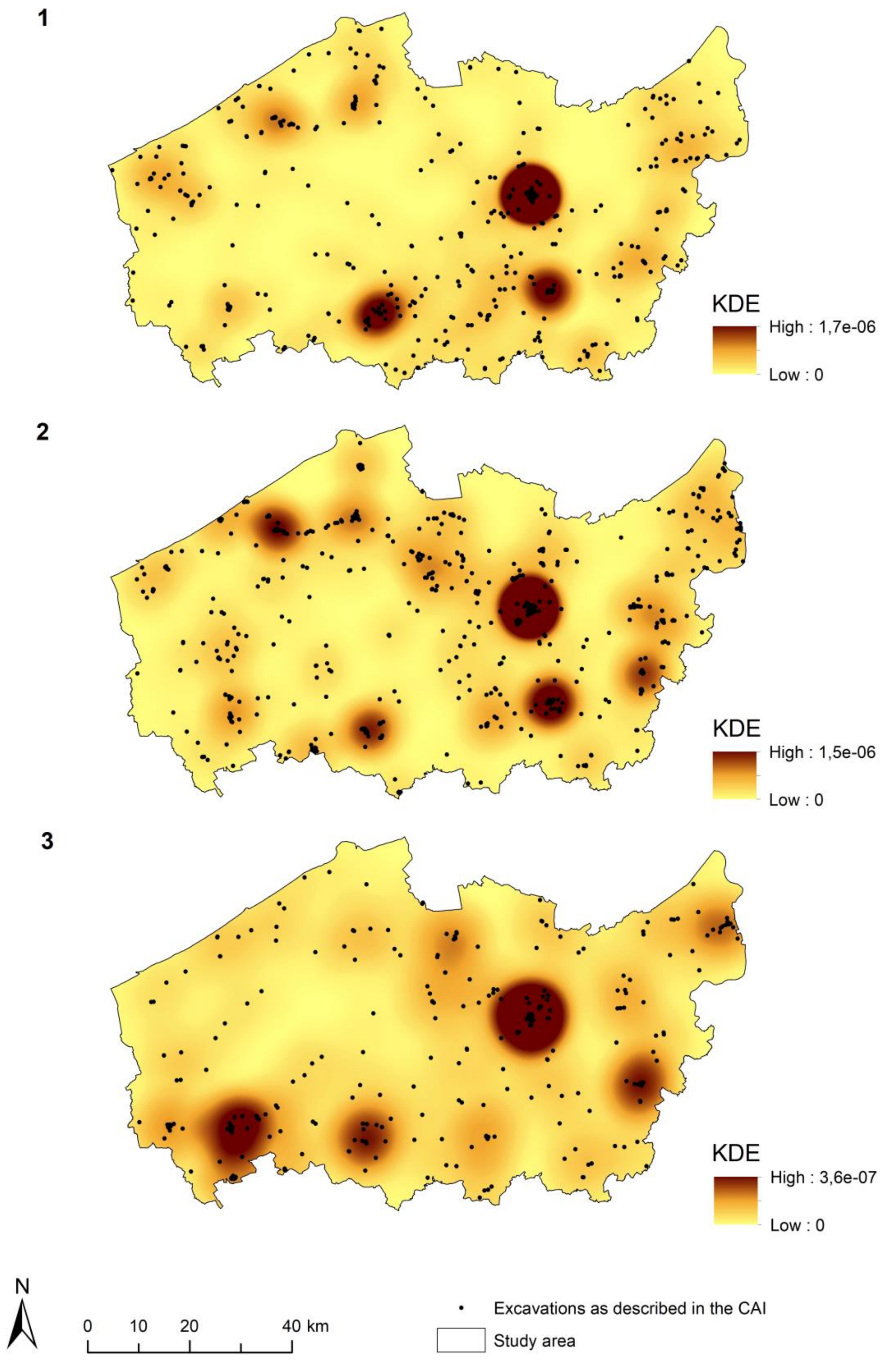


Figure 43: Mapping and KDE of the excavations until 2018 as made available through the CAI (state of the art April 2020). (1) 532 before 1993, (2) 709 from 1993 and before 2012, (3) 306 from 2012 until 2018 (Visualised using 2.5 Standard Deviations stretch).

Given the difficulties related to the detailed dating of high medieval sites and buildings in particular, it has not been possible to confirm a geographical displacement over time during the high medieval period within the study area. At the site level, however, slight differences in elevation are now understood to have played an important role in local changes of the settlement location from the lower slopes during the tenth-eleventh centuries, towards slightly higher grounds during the twelfth-thirteenth centuries. It thereby needs to be considered though that the differences in elevation in large parts of the study area are minimal. Nevertheless, the overall observed preference for middle to lower parts of the landscape corresponds to the observations made by Ball and Jansen (2018, 652-653) for the Dutch province of Brabant where a shift to the lower parts in the landscape and valleys was attested during the high medieval period. This shift might be related to favourable climatic conditions during the so-called Medieval Warm Period, although the overall impact in contrast to local variability still is the subject of debate (Hughes & Diaz 1994; Rüther 2018). As suggested by the environmental data for several excavations, the settlements were located in relatively open landscapes with nearby wet meadowland and agricultural crops. Evidently, this might be expected given the overall topographical position of the inventoried sites on the slopes of minimal elevations. Nevertheless, both the environmental data and the topographical position may indicate a double interest in both stock breeding and arable activities at these rural sites.

6.6.2 The importance of enclosures at rural settlements

Based on the site inventory for the northern part of the County of Flanders, the construction of a singular ditched enclosure, which surrounds the main and secondary buildings, is understood to be an integral part of the high medieval rural settlement sites. Although international research has indicated that the enclosing of medieval rural settlements already started over the course of the early medieval period, the relative regularity and structured rectilinear lay-out appears to be maximised during the high middle ages (Blair 2018, 372; Donat 1980; Hamerow 2012, 67-88; Huijbers 2012). The fact that indications were found at several sites for consecutive and multiple adaptations of the ditch features, may point at a certain geographical stability of the settlement in the landscape. Certainly a strong link can be found between these enclosures and the surrounding landscape, as enclosure ditches continue in or are connected to wells or drinking pools and other water features that structure the environment. Furthermore, examples of two single farms or Einzelhöfe that are located close to each other were excavated. The observation that these were individually enclosed but connected to one another by ditches, suggests a certain cohesion. Differentiation between these individual farmsteads could not be attested. These settlements are different from the grouped settlements as described in this chapter, however, in the way that they lack the (semi) regular lay-out of the individual enclosures and building structures. On the other hand, examples such as Oostkamp-Zwarte Gat, where Hollevoet (1994) excavated a main and secondary enclosure, indicate that multiple enclosures can be part of one individual farmstead.

The reason for the construction of these enclosures seems, above all, to be functional. As demonstrated through the analysis of the relative topographic position at site level, the high medieval rural settlement sites are found at relatively lower locations in the surrounding landscape. Water management would therefore have been of major importance. For the Mid Saxon period in Britain, however, the appearance of enclosures in combination with droveways has been attributed to the need to move animals between grazing land and the settlements while keeping them away from the buildings and the crops. In this context of intensified stock breeding, it is considered that crops were being enclosed rather than the animals (Hamerow 2012, 89). In contrast to the early medieval period[23], these droveways have not been attested around high medieval rural settlement sites in the study area. In combination with the increased presence of arable crops in the environmental data, it therefore might be suggested that a further change in landscape use occurred as the landscapes surrounding the settlements were more intensively reclaimed. The growing importance of enclosures would thereby have served the enclosing of livestock rather than crops.

As stated by Hamerow (2002, 52), however, socio-economic relations are equally influential in the way settlements are structured. First of all, as demonstrated by De Clercq (2009, 259-260) for the Roman period, the enclosure exemplifies the group identity of the family unit living at the farmstead. Enclosing their habitation area results in the creation of a border of inclusion and exclusion. This can equally been interpreted as the distinction between the cultural (inside) and natural (outside) world, or the expression of a social distinction between 'us' (inside) and 'them/the other' (outside), something that is also suggested by Huijbers (2012) for the high medieval rural sites in the Meuse-Demer-Scheldt region.

Related to identity, status would have equally been important in the construction of enclosures. Although most of the high medieval enclosure ditches are limited in width and scale, digging them would have been a major investment in physical action and time. This certainly is the case for interlinked farmsteads and grouped settlements, as described in

[23] For elaboration on the presence of drove ways in early medieval context in the study area, see the ongoing doctoral research of Ewoud Deschepper.

this chapter. The connection between the individual enclosure systems suggests a close collaboration and mutual investment, related to mutual social and/or economic interests. Furthermore, Blair (2018, 372-375) stresses the growing importance of gates in the written sources from the eleventh century onwards. Despite some examples at residential sites, the visibility of these structures in the British archaeological record is limited. This is equally the case for the northern parts of the County of Flanders, where the often limited excavated areas do not allow to clearly identify the whole extent of the enclosures and their entrances.

For the high medieval period, an increased presence of relatively regular and rectilinear enclosures was attested. Based on international comparative research, Hamerow (2002, 52) states that the increasing regularity in settlement structure over the course of the medieval period relates to the growing complexity of the economic systems. This is supported by Brück (2000, 287) who suggests that increasingly planned settlements are related to clearly defined social roles. It should be noted, though, that for the inventoried sites no clearly uniform lay-out can be described. Their regularity is in the presence of rectilinear ditches and recurrent elements of the farmstead. Nevertheless, Hamerow (2012, 90) observes that relatively regular settlements in Britain coincide with prosperous and commercially developed regions. This most certainly is the case for the high medieval County of Flanders with its developing towns and commercial interaction with the countryside (Dumolyn, Declercq, et al. 2018; Thoen 1993a; Verhulst 1999)(Dumolyn et al. 2019; Verhulst 1999).

6.6.3 Grouped settlements

Besides individual farmsteads, large-scale archaeological interventions have allowed to identify grouped settlements of most likely contemporary farmsteads that cluster in the landscape. The neighbouring farmsteads thereby seem the have a similar structured lay-out in which the buildings have the same orientation and the enclosures are partly shared or connected. This certainly is the case for the settlement at Damme-Sijsele-Stakendijke (Figure 44), where an ‘informal regularity’ as described by Roberts (2008, 125) can be found in the way the main buildings of the northern part of the settlement are oriented along a trackway and possible common or green. The respective main and secondary buildings are located on individual settlement plots, which lie perpendicular to the trackway and are interlinked. This is strikingly similar to ab nihilo settlements such as Kluizen as studied by Verhulst (1991a). However, the socio-economic context of settlements such as Sijsele-Stakendijke is unknown because of the lack of written historical sources, nor can their morphology be compared to identified planted row settlements because of the lack of archaeological data for the latter. The southern part of the habitation, which may have an earlier date based on building morphology but is contemporary based on the first pottery analyses, has a different build-up and orientation. Its location along the southern edge of the excavated area, however, suggests a southward continuation which has not been excavated and studied. To the north of this settlement, excavated long narrow ditches indicate a certain level of structuring of the surrounding landscape. Some of the modern-day ditches and field systems had the same orientation. This could also be attested at the sites of Evergem-Belzele-Steenovenstraat and Evergem-Belzele-Molenhoek (Figure 40), where enclosure ditches with a perpendicular orientation to the sand ridge continue in the field systems visible on the DTM. As already indicated above, the individual sites on the sand ridge at Evergem-Belzele cannot be interpreted as grouped settlement *strictu sensu*. Yet, the continued presence of relatively closely related building structures indicates a continuous habitation which is topographically stable in the landscape. Although the continuation of ditches and similar orientation of buildings strongly indicates a close relation of the excavated habitation structures, the dispersed location of the excavated areas does not allow for a clear spatial interpretation of the settlement. The same is true for the suggested grouped settlement at zone 2 of the excavation at Zele-Wijnveld (Figure 45). One, and possibly three, similar main buildings have the same orientation and are understood to date to the same period. Given that the enclosure system surrounding these buildings is only partly excavated limits the potential for spatial interpretation. Equally, the lack of high resolution dates for building- and related well-structures makes an intra site spatio-temporal analysis of contemporaneity of habitation structures problematic. Since only 76 ^{14}C-datings are available for 53 buildings, just over 1.4 dates have been executed in general per selected building. Considering changes to the buildings over the course of their lifespan, it therefore can be questioned to what extent this offers a substantiated contribution to the understanding of the constructions evolution. As already stated by De Clercq (2017, 49), the true dating potential of these features should be fully explored to allow further understanding of settlements at the domestic, site and landscape level.

Figure 44: Interpretational model of the settlement morphology at Damme-Sijsele-Stakendijke (DTM visualised using 2.5 Standard Deviations stretch).

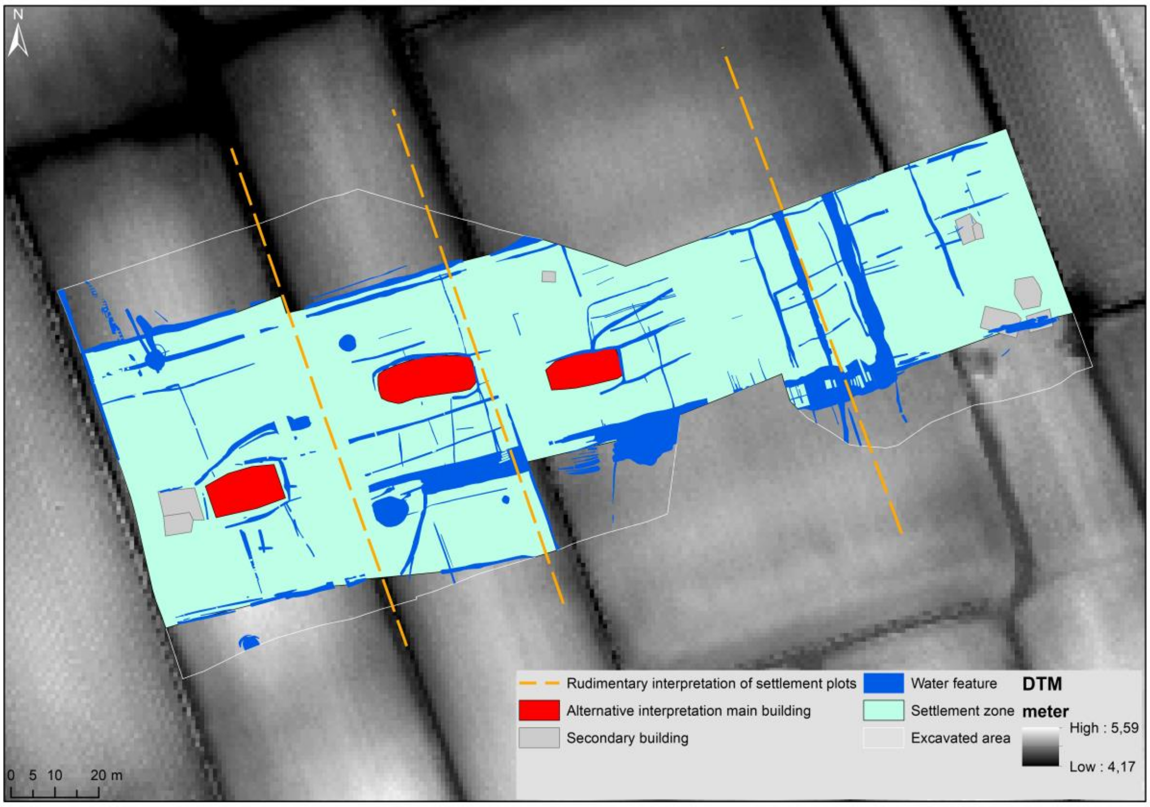


Figure 45: Interpretational model of the settlement in zone 2 at Zele-Wijnveld (DTM visualised using 2.5 Standard Deviations stretch).

The 'semi-nucleated mode' (Blair 2018, 301) of the three settlement discussed above, differs from grouped settlements, as studied in Chapter 5, in that they are less regular and less compact. The occurrence of this type of informally grouped settlements is, however, not a purely high medieval phenomenon. Settlement nucleation has occurred in northern Europe since the Iron Age, as presented by the multiple examples described by Riddersporre (1999), Myhre (1999), Blair (2018) and Hamerow (2002). Over the course of the medieval period, however, settlement locations would have become more stabilised and more relatively structured settlements occurred (Blair 2018; Roberts 1996b; Verhulst 1995). Excavations by the archaeological service of Douai, in France, has attested this so called proto-village type settlement in an early medieval settlement in Vitry-en-Artois. Circa twelve narrow plots with timber buildings dating from the sixth to seventh centuries could be attested, oriented along a pathway (Louis 2004, 494-496). Blair (2018, 371) refers to the research at Stotfold where two successive phases of grouped enclosed farmsteads were attested with a clear change towards structured lay-outs. In her synthesis work on the medieval rural settlements of northern France, Peytremann (2003, 358) concludes for the high medieval period that, although individual farmsteads are still being created, grouped rural settlements become dominant in the archaeological record.

This is in contrast to the archaeological record for the northern parts of the County of Flanders, as studied in this chapter, where only three examples of possible grouped settlements are available. As described by De Groote et al. (2018), this might be related to the modern-day urbanised character of the Flemish landscape and limited number of archaeological interventions within the currently inhabited villages. Furthermore, numerous settlements have been excavated over rather small surfaces, which influences the possibility to recognize grouped settlements. This concern about limited excavated areas was, for example, also made by Hamerow (2002, 106; 2012, 70) in the context of her research on settlement mobility. For the Flemish context, this is demonstrated by the excavations at Damme-Sijsele-Stakendijke, where adjacent fieldwork allowed to change the initial Einzelhof interpretation. On the other hand, the interpretation of the sites at Evergem-Belzele and Zele-Wijnveld are more difficult, due to their limited excavated area surrounding the main buildings.

6.7 Conclusion

This chapter aimed at identifying the topographical and morphological characteristics of high medieval rural settlements in the archaeological record for the northern part of the County of Flanders, studying its geographical dispersal and analysing its potential to study grouped settlements. The dataset of 186 sites has allowed to identify significant relations between the settlement locations and the sandy-loamy and sandy soils within both provinces. This corresponds to the observations made for the distribution of row settlements within the County of Flanders. Within this dataset, only three examples of possibly grouped settlements have been attested. These show a relatively regular lay-out of the enclosed farmsteads as well as for the surrounding landscape. Considerations should be made, however, about the difficulties related to exact dating of settlement structures in the Flemish dataset and its limits in determining contemporaneity. Overall, an increase in rectilinear enclosures can be attested in the dataset, suggesting a more structured approach to the lay-out of the settlements and the intensified landscape reclamations, which might be related to increasingly structured socio-economic relations.

Chapter 7 Lost but revived. Revisiting the medieval village of Nieuw-Roeselare

Parts of this chapter have been published as:

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Verbrugghe, G., Saey, T. and De Clercq, W. (2020) Lost but revived. Revisiting the medieval village of Nieuw-Roeselare (Flanders) using large-scale frequency-domain multi-receiver EMI and landscape archaeological prospection, *Archaeological Prospection* 27(3), 239-252.

7.1 Introduction

From the eleventh century onwards, the County of Flanders witnessed a remarkable increase in urban development, which resulted in the rise of major towns such as Bruges, Ghent, Ypres and Lille. During the twelfth and thirteenth centuries, the county even became the most urbanised region north of the Alps (Dumolyn, Declercq, et al. 2018, 38; Thoen & Dejongh 2006, 177; Verhulst 1999, 113-118). Although it is generally accepted that the first urban centres already developed during the ninth century (Dumolyn, Declercq, et al. 2018, 17-39; Verhulst 1999, 113-118), it was the so-called 'Great Reclamation Period' from the tenth to thirteenth century that shaped and structured the urban and rural landscape of the Flemish county for the centuries to come (Thoen & Soens 2015, 226). During this period, a complex interaction between growing comital power, urbanisation, rural development and demographic changes occurred, which allowed and triggered increased landscape reclamations (Thoen 1993a; van Cruyningen & Thoen 2012).

In this dynamic political, economic and geographical context, the counts and other landlords were actively involved by planting settlements *ab nihilo* in order to organise these reclamations. Besides isolated farmsteads, historical-geographical research by Verhulst (1953, 349-351; 1991a; 1991b; 1995, 130-133; 1998a, 12) has indicated the importance of planted grouped settlements with a planned row morphology in the exploitation of newly reclaimed lands. However, archaeological research on medieval grouped rural settlements in the County of Flanders has been scarce, due to practical and legal restrictions within currently inhabited villages and hamlets. Furthermore, the growing number of archaeological interventions on rural contexts so far have mainly focussed on farmsteads (De Clercq 2017; De Clercq, De Smedt, et al. 2012; De Groote et al. 2018). The few historical studies on the subject thus have been lacking archaeological data to support interpretations on the origin of grouped settlements and their spatio-temporal, socio-economic and morphological characteristics. This concern had already been expressed in 1965 by Verhulst (1967b) at a colloquium on the archaeology of the medieval village. Verhulst (1967b, 125-126) thereby stated that deserted or lost villages in the northern Flemish border area with the Netherlands offered great opportunities for archaeological research. Strongly influenced by the British research of John Hurst and Maurice Beresford at Wharram Percy and of Irwin Scollar at Lampernisse, the site of Nieuw-Roeselare (Figure 46) was selected as the first deserted medieval village to be studied through historical research and archaeology in Belgium (Scollar et al. 1970; Van Doorselaer & Verhaeghe 1974; Wrathmell 2012). Unfortunately, due to insufficient funding and the absence of non-invasive survey methods, the excavations were restricted to the assumed manor site and the church to the northeast of it. The initial goal of the campaigns to locate and study the whole settlements itself was not successful (Van Doorselaer & Verhaeghe 1974; Van Vooren 1980). The data were insufficient to increase understanding of the village site as a whole. Almost 50 years later, Nieuw-Roeselare now serves as a case study on planted settlements to offer new insights into their origin, morphologies and landscape contexts in the medieval County of Flanders and beyond. A cross-disciplinary landscape archaeological approach was applied in order to create a multi-layered image of the settlement landscape of Nieuw-Roeselare, allowing a revaluation and completion of the previous archaeological research.

Cross-disciplinary research on the harbour towns of Bruges (Figure 46) demonstrated the potential of such a combined and integrated use of developing GIS-capabilities, high resolution remote sensing and the successful application of geophysical prospection techniques in combination with artefact-accurate fieldwalking, to study lost settlements. The methodology has proven to be particularly useful on medieval sites where the complementary nature of the various methods applied can be fully exploited (De Clercq et al. 2017; De Clercq et al. 2019; De Reu et al. 2016; Trachet et al. 2017). Planted rural settlements have, however, not been included in these studies so far. The application of this cross-disciplinary landscape archaeological approach is therefore novel in the context of the 'Great reclamation period' and related formation of grouped settlements in Flanders, potentially allowing to fundamentally change the understanding of this type of settlement and its socio-economic context.

The aim of this chapter is therefore to further the research on medieval planted grouped settlements by revisiting the iconic site of Nieuw-Roeselare and finish what had been left unanswered in the 1970s. Through the application of an integrated cross-disciplinary landscape archaeological approach and non-invasive techniques, the medieval planted settlement is entirely mapped and its morphology, evolution and geographical context studied. Moreover, the application of this methodology at the site of Nieuw-Roeselare offers an innovative contribution to the international field of landscape archaeology by showing the important potential of extensive geophysical surveys in integration with a multi-proxy dataset.

7.2 Novum Rollarium

7.2.1 Geographical and historical context of Nieuw-Roeselare

Today, the site of *Novum Rollarium* or Nieuw-Roeselare lies beneath fertile agricultural land to the southwest of the village of Sint-Margriete in the community of Sint-Laureins (Figure 46). No visible features related to a lost settlement are present at the surface. The landscape in this part of northern Flanders is dominated by a series of east-west running coversand ridges and coastal lowlands along the North Sea and the river Scheldt. During the Weichselian, large amounts of fluvial and aeolian sediments were deposited in the central part of an extensive Pleistocene paleo valley. Due to aeolian processes, these sediments were accumulated in east-west oriented ridges among which the Maldegem-Stekene ridge is the largest. It runs over a length of circa 80 km and is characterised by a microrelief of smaller ridges and depressions. Its gentle northern slope runs into the coastal flats where several smaller coversand ridges have been formed. The lost village of Nieuw-Roeselare is located on the piedmont of one of these smaller ridges, on which also the town of Aardenburg is located (Crombé et al. 2012, 715-716; De Moor & Heyse 1978, 343-375; Derese et al. 2010, 175).

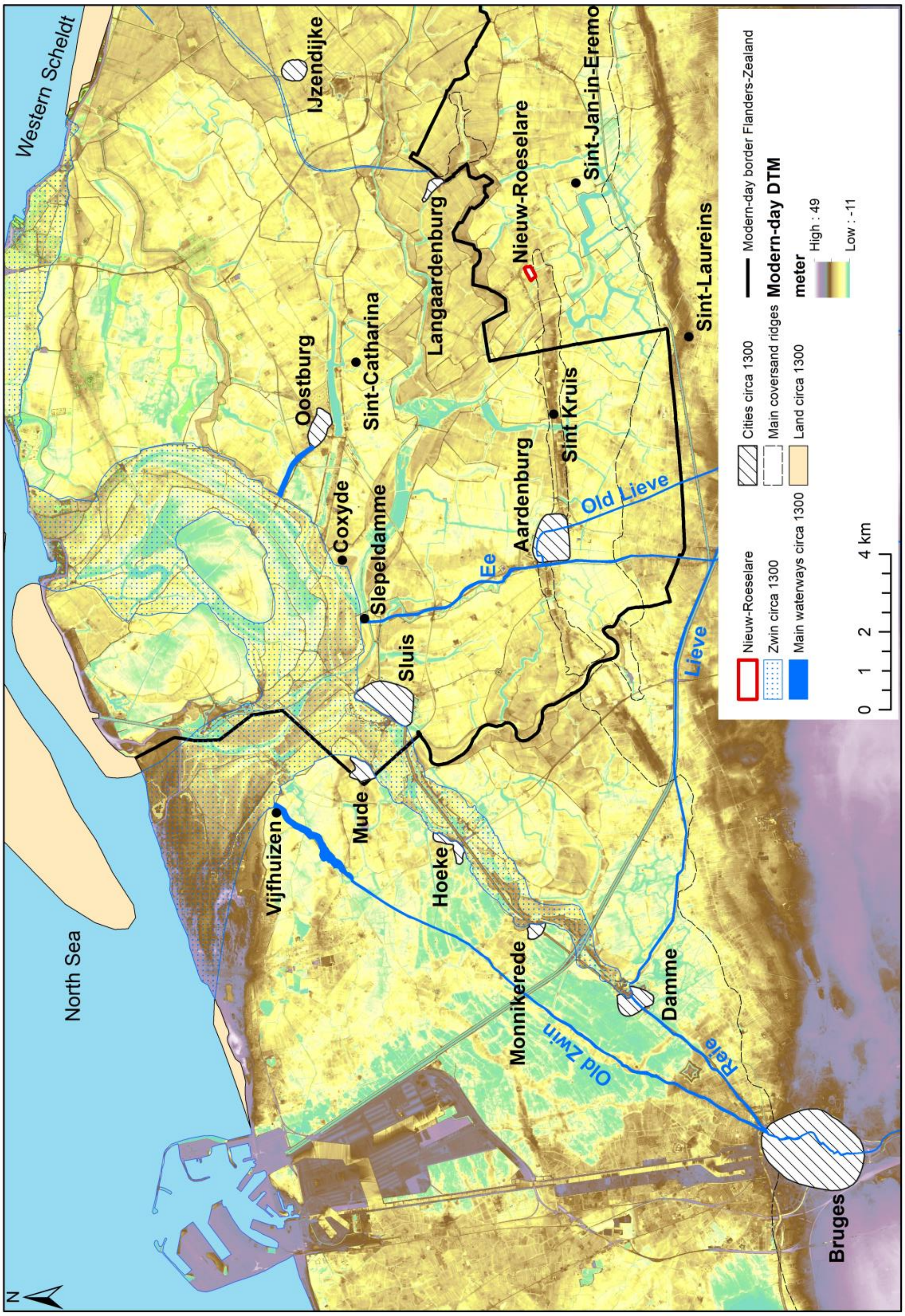


Figure 46: Map of Nieuw-Roeselare in relation to the historic harbour landscape of Bruges (Medieval Bruges and its outports: (Trachet & de Ruijsscher 2019))(DTM visualised using Histogram Equalize stretch).

The earliest reference to the village in historical sources dates back to 1243, when the new church of Roeselare was mentioned for the first time (Gottschalk 1955, 66; 1983, 66; Van Doorselaer & Verhaeghe 1974, 11; Verstraete 1957, 85). That year, the bishop of Tournai redemarcated several parish boundaries in the region, based on the presence of reclaimed and yet unreclaimed lands. The church of Nieuw-Roeselare was used to delimit the parish boundaries of Saint-Bavo's-Oostburg towards the newly reclaimed lands which ran up to the *novam ecclesiam de Rolliers* (new church of Roeselare). It is therefore generally assumed that the church was new at the time (Gottschalk 1955, 64-67; Van Doorselaer & Verhaeghe 1974, 11). Gosuwin de Roeselare, a citizen of Ghent, is generally considered as the founder of this church.[24] Two years earlier, in July 1241, Joan countess of Flanders (1206-1244) granted Gosuwin de Roeselare a fief of *wastinae* or wastelands, which were appurtenances of the Burg of Bruges. Besides the church, he also founded a manor site, which some historians interpret as a large manorial farm (Gottschalk 1983, 66; Van Doorselaer & Verhaeghe 1974, 11; Van Vooren 1980, II.2; Verhulst 1967b, 129; Verstraete 1957, 85). The interaction between these two sites and the rest of the village and its surrounding countryside is, however, unknown.

This redemarcation of parish boundaries, however, caused multiple tithes disputes with the two powerful abbeys in Ghent: Saint-Peter's and Saint-Bavo's. According to Gottschalk (1955, 66-67), one of these conflicts regarding the lands of Nieuw-Roeselare was settled in 1249. It was decided that the bishop and cathedral chapter of Tournai, together with the hospital at Lille, would collect tithes in *que wastina Novum Rollarium appellatur* (the wastelands that are called Nieuw-Roeselare).

Based on the limited historical sources available for Nieuw-Roeselare, its foundation can be related to the final phase of the abovementioned 'Great Reclamation Period'. More systematic exploitations started to take place in the coastal regions, with societal changes and the growing importance of peat as fuel from the mid-twelfth and early-thirteenth century onwards. In contrast to earlier phases, reclamations were no longer initiated by the counts and religious institutions, but lands were given in concession or sold to lay elite entrepreneurs (Tack et al. 1993, 20-21; Thoen 2007b, 65-73; Thoen & Soens 2015, 221-258; Tys 2013; Verhulst 1966a, 79-80; 1995, 134-139). Gosuwin de Roeselare would have been one of many knights and lay elites who acquired lands to reclaim during this final wave of reclamations. In 1249, for example, the nearby coastal parish of Beniardskerke (Coxyde) is mentioned for the first time (Figure 46). With its place name meaning 'church of Beniard', it can be assumed that this Beniard was also locally involved in reclamations and founded a church near his residence (de Ruijsscher 2019a, 83). Indications for the

[24] This is contested by Van Vooren (1980, II.2-8), who ascribes the foundation to the diocese of Tournai.

growing importance and exploitation of the region are also given by the founding of other villages in the early-thirteenth century. In 1218, Joan countess of Flanders granted land to the Ter Doest abbey in order for the monks to build housing on slightly higher grounds. Gottschalk (1955, 62) locates these lands on the coversand ridge running from Aardenburg (Figure 46) towards Nieuw-Roeselare. She interprets this as the possible origin of the village of Sint-Kruis (Figure 46). Similarly, she granted a fief of land to the inhabitants of Sint-Nicolaas-in-Vaerne (Langaardenburg) in 1235. The first mention of the church of this village dates to 1229 (de Melker 1988, 97; Gottschalk 1955, 64-70). Another example is Sint-Catharina near Oostburg (Figure 46), which is first mentioned in 1243 (Gottschalk 1955, 64). The villages of Sint-Laureins and Sint-Jan-in-Eremo (Figure 46) are first mentioned in the late-thirteenth century and are most likely related to a consecutive phase of exploitations (Gottschalk 1955, 149).

Regarding Nieuw-Roeselare itself, little is known about its inhabitants and economic importance. In 1309 the village is mentioned as one of the *smalle steden* (small cities) in the Franc of Bruges. It thus must have been granted city rights, although the reason for its importance is unclear in historical sources (Gottschalk 1955, 68; Stabel 1995, 101; Verhulst 1967b). Verstraete (1957, 87) suggested a harbour function through a possible connection with the Zwin inlet and the sea via a system of creeks. However, no historical sources are available to support this hypothesis. Westwards, the extensive port system of Bruges developed from the twelfth century onwards (Figure 46). Multiple harbour and fishing towns were located along the Zwin inlet as outports of this commercial metropolis. Over the course of the thirteenth century, Bruges's importance in international commerce grew and it became the main commercial hub in the late medieval North Sea area (Dumolyn, Ryckaert, Deneweth, et al. 2018; Dumolyn, Ryckaert, Meijns, et al. 2018; Leloup et al. in press; Trachet et al. 2015). Whether Nieuw-Roeselare as *smalle stede* in the Franc of Bruges and smaller community in the region had a role in this extensive network is, however, unclear.

A connection to the sea might not have been impossible, since just over a century after its foundation, the village was deserted due to a major flood that ravaged the eastern parts of Coastal Flanders from the eight until the tenth of October 1375 (Buisman 1996, 265; Gottschalk 1955, 162-163; 1983, 162; Van Doorselaer & Verhaeghe 1974, 13). The contemporary French *Chronique des quatre premiers Valois* describes:

> "*En cel an, oult es parties de Flandres si grant habundance d'eaue venue soudainement par la mer es parties de Quigent, de L'Escluze, en alant tout au long de la mer selon la coste de Ardenbourc, que plusieurs plates village furent noy: ees [presumably 'noyees'] et plus de trente mille personnes peries*" (Weikinn 1958, 258).
> [In that year, parts of Flanders from Cadzand and Sluis all the way along the coast to

Aardenburg were suddenly flooded by large amounts of water coming from the sea, which cause several villages to drown and over 30000 people died].

After that event, the church was not rebuilt although the cemetery would have remained in use or at least visible, since the presence of gravestones is still mentioned in sixteenth-century sources (Van Doorselaer & Verhaeghe 1974, 13). Despite attempts to reclaim the devastated lands, the village never recovered and was finally, after another flood in 1394, abandoned in favour of the nearby village of Sint-Margriete (Gottschalk 1983, 168-186; Van Doorselaer & Verhaeghe 1974, 13). This in its turn suffered several misfortunes and changed location twice before reaching its current location in the late-seventeenth century, right next to where Nieuw-Roeselare would have been (Gottschalk 1955, 202; 1983, 202; Verstraete 1957, 87-95). Those flooded lands were indeed reclaimed again in 1444 and named the Roeselare polder (Van Doorselaer & Verhaeghe 1974, 13-14). Ever since, the lost village has remained untouched beneath meadows and farmland.

Not only Nieuw-Roeselare's inhabitants and economic importance have left historians and archaeologists in the dark. Little is also known about the character and morphology of Nieuw-Roeselare. The main source of information is an *ommeloper* or proto-cadastral tax register dating from 1531 which is possibly based on an older version from 1444. This register mentions the former manor of Roeselare, two roads called the Woutersweg and Roeselarestraat (Woutersroad and Roeselareroad), a large creek, a dike and the cemetery, despite the fact that all these had already disappeared by then (State archive Brugge - Fonds Jonckheere nr. 1052 ; Van Doorselaer & Verhaeghe 1974, 14; Van Vooren 1980, II.17; Verhulst 1967b; Verstraete 1957, 85-86). Unfortunately, no cartographical material depicting Nieuw-Roeselare or related to the 1531 register is preserved. Previous attempts at determining the exact location of the village and its morphology were therefore solely based on the textual description of relative orientation provided by the ommeloper and have never been synthesised on a map.

7.2.2 First excavations

Following the 1965 Leuven conference on the archaeology of the medieval village, Verhulst suggested an excavation at the site of Nieuw-Roeselare, for which only an approximate location was known (Van Doorselaer & Verhaeghe 1974, 7).

Thus, in 1967, the lost village of Nieuw-Roeselare was the first site to be studied in order to gain more knowledge on medieval lost settlements in Flanders. The Seminar of Archaeology at the State University of Ghent, which now is the Department of Archaeology at Ghent University, carried out three excavation campaigns (1967, 1969, 1970), the purpose of which was to get an idea of the lay-out of this agglomeration. Because of the lack of funding for large-scale area-wide excavations, it was decided to start with the excavation of the manor (Figure 47). A single period occupation dating within the fourteenth century and consisting of three brick buildings was attested. One of these constructions was reinforced with buttresses, which indicates a substantial construction, presumably with high walls (Figure 48). Based on the finds inside this building, the excavators stated that there had been a paved floor of glazed tiles, a tiled roof and possibly and upper floor as well, hence the buttresses. The attested structures were located between 0.5 m and 1.5 m below ground level. All finds dated to the second half of the fourteenth century, corresponding to the end of Nieuw-Roeselare. The pottery finds were not particularly reflective of high status, but in view of the rich construction methods and materials of the buildings, it was assumed that the inhabitants would not have belonged to the poorer classes. Besides the three buildings, traces of several creek arms where attested in its immediate surrounding. The excavators concluded that these were probably traces of the 1375 flood which so abruptly ended the occupation of the village (Van Doorselaer & Verhaeghe 1974).

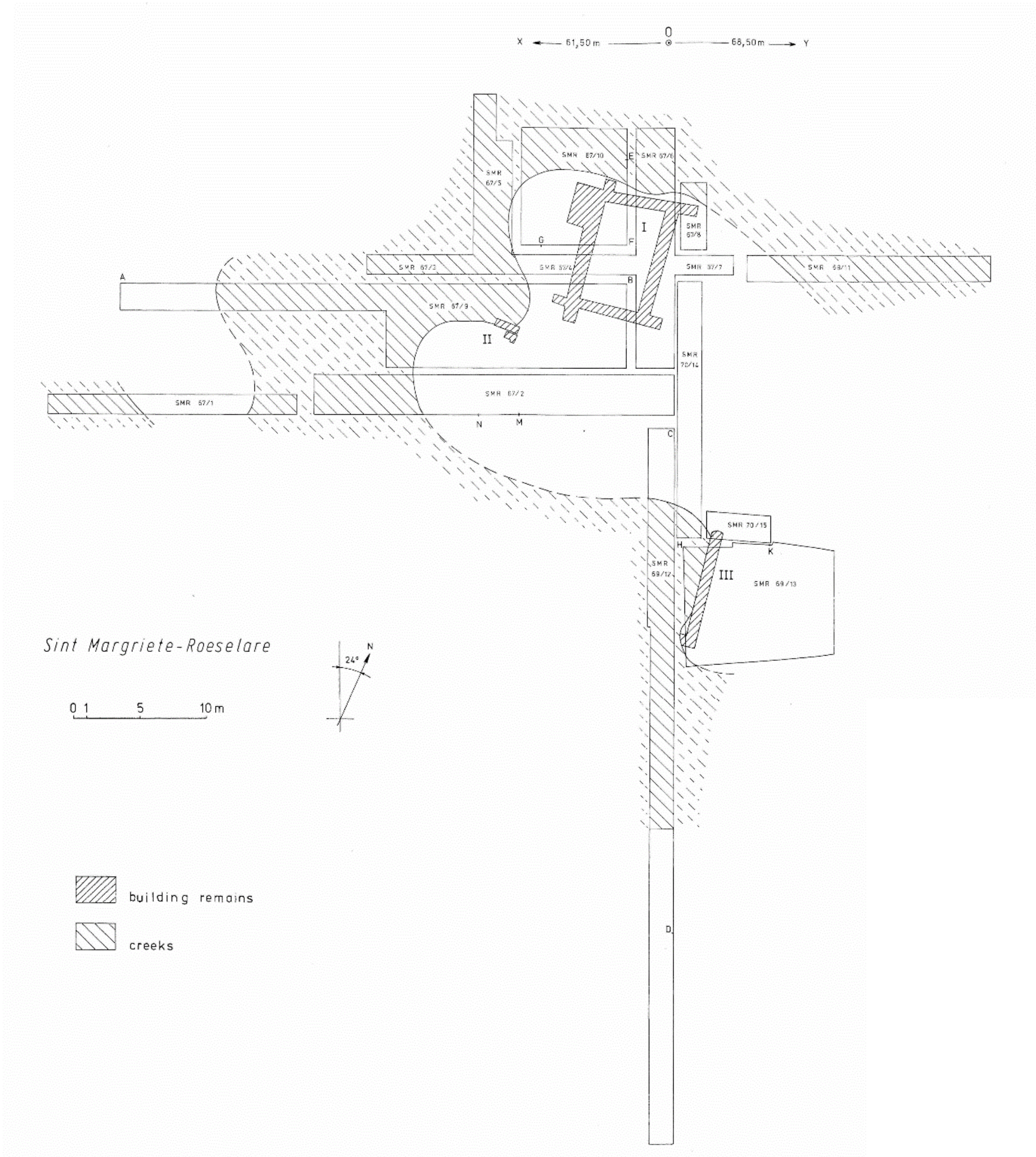


Figure 47: Excavation plan of the first archaeological research (3 campaigns) on the site of Nieuw-Roeselare (Van Doorselaer & Verhaeghe 1974, 16-17).

Figure 48: Original excavation picture showing one of the buttress structures of building I (section EF (eastern section) of square SMR 67/10) at Nieuw-Roeselare (Van Doorselaer & Verhaeghe 1974, 38).

Figure 49: Excavation plan of the archaeological research on the church of Nieuw-Roeselare in 1979 (Van Vooren 1980, Fig. 10).

A second phase in the archaeological research on Nieuw-Roeselare took place in 1979, when Van Vooren (1980) coordinated an excavation on the assumed location of the former church in the context of his master thesis at the University of Leuven, in collaboration with the local historical society. A church building characterised by two construction phases could be discerned by the excavators, as well as several inhumations (Figure 49).

Despite these small-scale excavations, the initial goal to exactly locate the village itself and gain more information about its topographical morphology was not successful. To date, these aspects of Nieuw-Roeselare remain largely unknown and the approximate location of the village has not yet been further specified nor attested.

7.3 The start of a new research: reassessment of historical sources

To locate the exact village site and study its morphology, a new landscape archaeological research project was started. The methodology consists of a review of earlier research on historical documents and historical cartographical sources after which they are compared to the existing archaeological dataset and LiDAR data. This is supported by oblique aerial photography, geophysical prospection through large-scale frequency-domain multi-receiver Electromagnetic Induction (EMI) and artefact-accurate fieldwalking.

The above-mentioned tax register of 1531 offers three important clues about the topography of Nieuw-Roeselare (State archive Brugge - Fonds Jonckheere nr. 1052 ; Van Doorselaer & Verhaeghe 1974; Van Vooren 1980; Verstraete 1957). First, it describes the location of a former concentration of farms:

> "[…] *streckende tot Roeselaerweghe ende oostzyde ande Wouterwegh ende es ziere crom ande zelve wech ende upt noorhende vanden sticke stonden hier voortyts veel hofsteden* […]"(Transcription by Van Vooren (1980, II.17-18) [along the Roeselarestraat and in the east running to the Woutersweg, to the north of this land were a lot of farmsteads].

Furthermore, it gives an indication of the location of the former manor of Nieuw-Roeselare and the creek system around it:

> “[…] *ande oostzyde vanden Wouter weghe ende zuud over ande groote gheule ende es tlant daer wylen thof van Roselaer up stond* […] *streckende vanden voorseiden gheule zuudwaert over den wech tot inden gracht anden zuudzyde dat wylen een dweercreeke was, metter oostzyde ande dycdilve ende de groote creke die vanden Wouterweghe scheet* […]” (Transcription by Van Vooren (1980, II.18)) [To the east side of the Woutersweg and on the south bank of the great creek is the land where the manor of Roeselare once stood, stretching from the front of the creek to the south across the road to the ditch on the southern side, which used to be a creek that crossed to the east side of the dike and the great creek that originated from the Woutersweg].

Thirdly, the cadastral tax register also locates the former cemetery:

> “[…] *tkerchof van Roeselare commende met der zuutzyde ande groote gheule ende de noortzyde ande Roeselaere wech* […] (Transcription by Van Vooren (1980, III.2)) [the cemetery of Roeselare bordered in the south with the great creek and to the north with the Roeselarestraat].

Given that no cartographical material with a direct link to this tax register is available, other historical maps are required for a better understanding of these descriptions. High resolution topographical data from LiDAR imagery offers extra support to allocate and interpret the historical cartographical data.

First of all, three similar figurative maps at the State Archive in Ghent, depicting the polder region to the east of Aardenburg mention *t Kerckhof van Nieuwen Rouselare* (the cemetery of Nieuw-Roeselare). The oldest of these three maps, which dates from 1542, formed the basis for the other 1652 (Figure 50) and eighteenth-century versions. All three maps show the boundaries of the Roeselare polder and give a written description of the former cemetery. However, none of these maps is detailed enough to exactly locate this cemetery on modern-day topographical data or in GIS (State archive Gent - Kaartenverzameling P. De Reu nr. 612, nr. 617 and nr. 618).

In contrast, a 1724 map of the Roeselare polder (Figure 51) gives more information on the place names used in the older tax register. First of all, it depicts the above-mentioned *Roesselaere Straete*, running west to east through the landscape. For the western part of the street, it indicates that it is ‘darkening’ or disappearing (*Verdiijstert*) (A on Figure 52). Further to the east, along a field boundary, it states that the street has already ‘darkened’ or disappeared in that part of the polder (*Verdonkerde Roesselaere Straete*) (B on Figure 52) (State archive Brugge - Kaartenverzameling Mestdagh nr. 2333). To date, the western trace of the Roeselarestraat is preserved in a farmers track called the *Roeselarestraatje* (Small Roeselare Street).

Figure 50: Detail of a 1652 figurative map, depicting the Roeselare polder and the location of the former cemetery of Nieuw-Roeselare (State archive Gent - Kaartenverzameling P. De Reu nr. 612).

Figure 51: 1724 map of the Roeselare polder (State archive Brugge - Kaartenverzameling Mestdagh nr. 2333).

Figure 52: Detail of the 1724 map of the Roeselare polder (State archive Brugge - Kaartenverzameling Mestdagh nr. 2333).

The course of this track is also visible on a 1 meter resolution DTM, 0.25 meter multidirectional hill shade of the DTM and recent topographical maps and orthophotos (A on Figure 53). Furthermore, the DTM clearly shows the main creek running through the polder landscape (B on Figure 53). Today this is called the *Val*, but the 1724 map gives it three different names. To the north of the Roeselare polder, the creek is already called the *Val* (C on Figure 52). The central part, however, is named the creek of the Roeselarestraat (*Creke van Roesselare Straete*) (D on Figure 52). Since this part has the same orientation and forms a precise extension to the disappearing Roeselarestraat, it can be stated that this used to be part of the road as well. It can thereby be expected that streets and especially their related ditches formed an easy passage for incoming floods, which would be why the creek follows the same orientations. The southern part of the creek is marked as the creek of the Woutersweg (Creke vanden Wouters Wegh) (E on Figure 52). Following the same reasoning, it can be stated that this part of the creek is where the former Woutersweg ran (State archive Brugge, Kaarten verzameling Mestdagh nr. 2333).

Furthermore, the 1724 map gives more information regarding the cemetery of Nieuw-Roeselare. Written within the boundaries of a large plot of land (F on Figure 52), it states:

"*Nota: ten midden van dese partije streckende suijt ende noort, heft het Rousselaere kerckhof gheweest volgens ommeloper d'a 1444*" [Note: in the middle of this plot of land was once the cemetery of Roeselare located, according to the register of 1444].

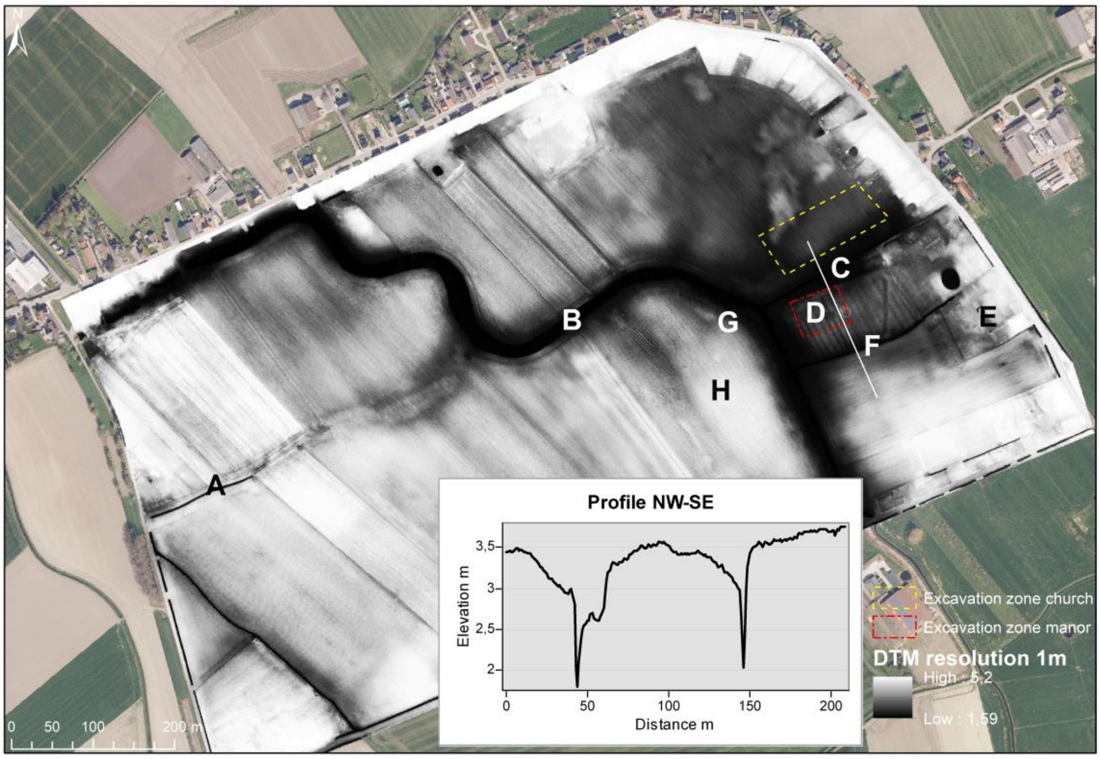


Figure 53: 1m resolution Digital Terrain Model (DTM) of the study area of Nieuw-Roeselare (visualised using Histogram Equalize stretch).

This allowed Van Vooren (1980) to approximatively locate the church before the excavation in 1979. Other historical cartographical sources are only available from the eighteenth century onwards and do not really give much further information about the former village itself. Four more tax registers, of which two have included cartographical material, do not mention former features related to Nieuw-Roeselare (State archive Brugge - Fonds Jonckheere nr. 1164 and nr. 1165; State archive Brugge - Verzameling Omlopers Peper nr. 212, and nr. 429). It is unclear, however, to what extent these remnants would still have been visible during the eighteenth century or were considered important enough to be mentioned. The 1724 map and the eighteenth-century figurative map are the only ones mentioning the cemetery and other historical features. However, both are based on an older exemplar or tax register.

Given that the location of the church on the 1724 map has been attested by Van Vooren (1980) and taking into consideration that the Roeselarestraat would have run in extension from the central part of the major creek, it is possible to identify the modern-day ditch to the south of the church as the remnant of the great creek mentioned in the register of 1531. The slight difference in elevation along this ditch on the DTM suggests that it used to have a more significant character (C on Figure 53).

Having located the possible course of this 'great creek' and assuming that the Woutersweg equalled the creek of the Woutersweg, it should be possible to locate the former manor as well. However, the location that was determined by Van Doorselaer and Verhaeghe (1974) (D on Figure 53) has been contested by (Van Vooren 1980), who places the site of the manor more to the southeast, along the modern Sint-Margrietestraat (Sint-Margriete Street) (E on Figure 53). Taking the information in the tax register into consideration, the initial location as identified in 1974 seems the more plausible one. The land of the manor would therefore have stretched from the beginning of the creek south across a street towards another former creek that crossed the creek of the Woutersweg to the east of a dike. Although the road and dike mentioned are not visible on the historical maps and DTM, there is a ditch to the south of this plot of land (F on Figure 53) that crosses the creek of the Woutersweg. The depression related to this possible former creek is visible on the DTM as well. Furthermore, the assumed and excavated location of the manor lies slightly more elevated in relation to the lowest parts of the study area (D on Figure 53).

Finally, the tax register mentions a location with many farms in the north corner of the plot of land along the Roeselarestraat and to the west of the Woutersweg. This corresponds with the assumed location where both roads would have crossed. Given erosion by the formation of the current creeks, it is most likely that this location is slightly more to the north (G on Figure 53) than the location assumed by Van Doorselaer and Verhaeghe (1974) (H on Figure 53). Aerial photographs taken during the summer of 2018, show a complex cluster of crop marks on this location close along the creek (cf. infra).

This reassessment and GIS integration of past historical geographical research on the village of Nieuw-Roeselare, together with the addition of further historical cartographical and LiDAR research confirmed the site of the nineteen-seventies excavations as the location of the former manor of Nieuw-Roeselare. Given its slight elevated position in the surrounding landscape and the remnants of larger waterbodies visible on the DTM, this is the most likely location correspond to the historical descriptions. In combination with the earlier archaeologically attested location of the village church, a first preliminary and rudimentary layout of the known village features can be proposed (Figure 54). Following Verhulst (1953; 1991a; 1991b; 1995; 1998a), the Roeselarestraat might have acted as the axis of exploitation along which the village farms and church would have been located, suggesting a planted settlements morphology in the context of landscape reclamations.

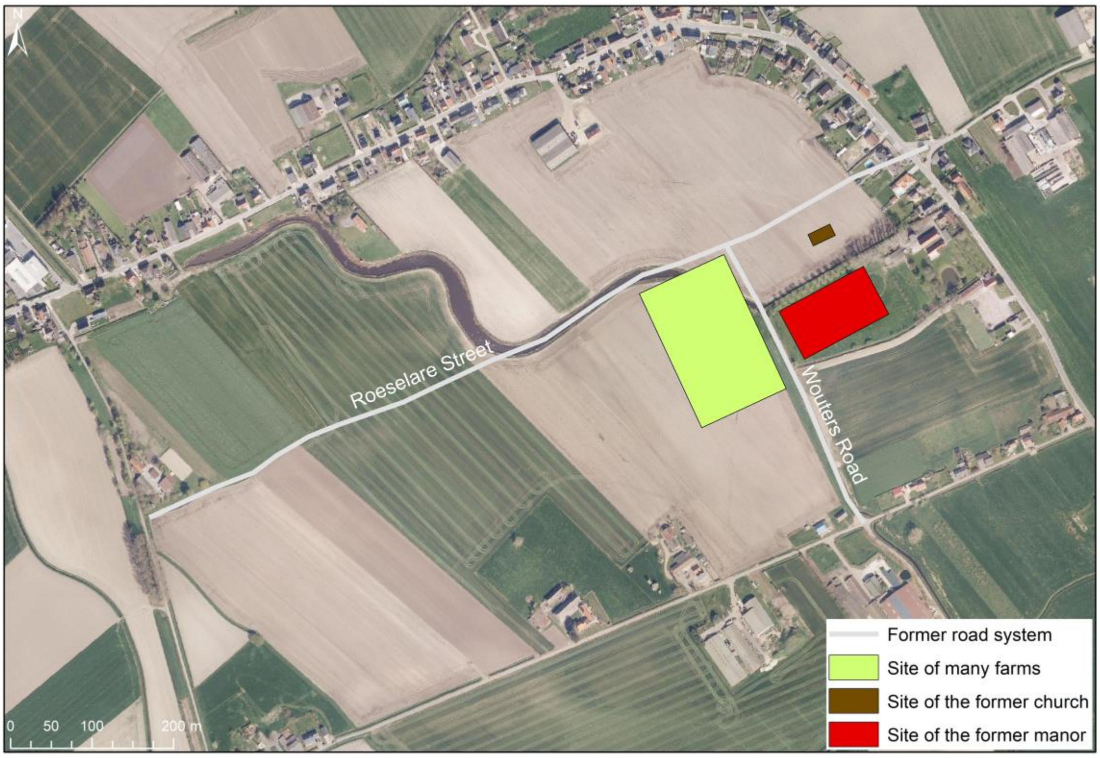


Figure 54: Preliminary interpretation of the village of Nieuw-Roeselare based on the known and attested features in the landscape.

7.4 Archaeological methods and data acquisition

7.4.1 Oblique aerial photography

Oblique aerial photographs from the collection at Ghent University were selected for the study area. This collection contains oblique aerial photographs of crop and soil marks in West and East Flanders, taken and collected from the 1970s onwards (Bourgeois et al. 2005; Bourgeois et al. 2002). Only four photographs (one for 1989, one for 1990 and two for 2003) were available for this location. Therefore, in the context of this project and the continuous updating of the photographical collection, a site-specific flight campaign was organised during the summer of 2018, following a long drought period. Several flights targeting Nieuw-Roeselare produced 211 extra photographs of the site. These were first georectified after which the crop and soil marks were digitised in ArcMap GIS.

In view of the interpretation of these crop marks and the geophysical data, as well as to understand recent changes in the landscape, orthophotos from 1959, 1971, 1979-1990, 200-2003, 2009, 2012 and 2018 covering the study area, were collected and former field boundaries and land use were digitised in GIS.

7.4.2 Frequency-domain multi-receiver EMI

The main aspect of this research was the application of a large scale 35 ha geophysical prospection through frequency-domain multi-receiver EMI. Using an inductive type of electromagnetic geophysical method, direct electrical contact with the ground is avoided by using an insulated wire-loop source. A primary electromagnetic field is induced by the transmitting coil carrying a time-varying electric current at a set frequency, which generates a (primary) magnetic field into the subsurface. The resulting secondary magnetic field is measured together with the primary magnetic field at the receiver coil. The ratio between the secondary and primary magnetic field is recorded as in-phase and quadrature-phase data. Both the apparent electrical conductivity (ECa) and apparent magnetic susceptibility (MSa) of the bulk soil can be obtained through either the quadrature-phase and the in-phase data of EMI instruments, as a depth weighted conductivity or susceptibility value of the affected soil volume (Everett & Weiss 2002; Tabbagh 1986).

In its simplest configuration, a proximal EMI soil sensor consists of two coils separated by a given fixed distance which is put on top of a soil. In order to map the subsoil we used a DUALEM-421S soil sensor (DUALEM, Milton, Canada), which incorporates horizontal coplanar (HCP) and perpendicular (PRP) receiver arrays that operate at a frequency of 9 kHz. This instrument was pulled at a height of 0.12 m above the ground surface behind an all-terrain vehicle at a speed of about 6-10 km h^{-1}, crossing the field at parallel lines 1.0 m apart. Within lines, measurement intervals were at about 0.2 m. The instrument was aligned parallel with the direction of travel. The vehicle track was georeferenced by an RTK-GPS with an accuracy of approximately 1 to 2 cm. All measurements were corrected for the offset between the GPS antenna and the instrument (centre between transmitter and receiver coils) and corrected for measurement drift (Delefortrie et al. 2014).

The DUALEM-421S instrument consists of one transmitter coil and six receiver coils, located at distances of 1.0, 1.1, 2.0, 2.1, 4.0 and 4.1 m from the transmitter coil. The 1.0 m, 2.0 m and 4.0 m transmitter-receiver pairs form a vertical dipole mode (1HCP, 2HCP and 4HCP), while the 1.1 m, 2.1 m and 4.1 m pairs form a perpendicular dipole mode (1PRP, 2PRP and 4PRP).

Both the distance between transmitter and receiver coils and the orientation of the receiver coil compared to the transmitter coil determine the depth and weighting response pattern of the signal. The PRP configurations have a higher sensitivity at shallow depths, while HCP pairs have a higher sensitivity in deeper soil layers. Consequently, depth of exploration (DOE or the depth at the 70 % cumulative response) values are 0.5 m, 1.0 m, 2.0 m, 1.6 m, 3.2 m and 6.4 m for the 1PRP, 2PRP, 4PRP, 1HCP, 2HCP and 4HCP coil configurations, respectively.

The cumulative magnetic susceptibility depth weighting responses are less straightforward to interpret, DOE values cannot be determined in an unambiguous way. In general, the magnetic susceptibility measurements in the PRP coil configurations are characterized by a low signal to noise level, which makes them less appropriate to investigate subtle anomalies compared to the measurements in the HCP mode. Nevertheless, the most informative 1HCP and 2HCP magnetic susceptibility measurements are mainly influenced by soil layers up to respectively 0.5 m and 1.0 m below the soil surface (Saey et al. 2013).

7.4.3 Verifying the EMI results

7.4.3.1 Manual augering

After the survey, 73 augerings were executed on several visible features on the EMI plot in order to further clarify their characteristics and support the different research aspects described above. An Edelmann auger with a diameter of 8 cm was used. Due to the wet conditions, depth of these manual augerings was highly variable and limited. Whenever the C horizon was not reached within two meters, an additional coring was executed using a Gauge auger with a diameter of 3 cm. Following fieldwork, analogue datasheets describing the augerings were digitised as spreadsheets and the data was processed and visualised in Strater.

7.4.3.2 Pseudo-2D tomography

In analogy with Electrical Resistivity Tomography (ERT), and based on the EMI measurements, three pseudo-2D tomography profiles were calculated visualising the gradation in ECa in the subsoil up to 1.8 meter. By combining the different ECa measurements, which represent the different soil volumes based on individual coil configurations, a two-dimensional model of the subsoil was obtained. This way, the soil stratification can be deduced in terms of the ECa. All three profiles were located on an apparently abrupt difference in conductivity running across the centre of the study area.

A two-layered soil model was proposed, based on manual augerings and corings. A layer with high EC (clay) on top of a layer with low EC (sand) was thereby considered as initial model. By iteratively modelling the integrated electrical conductivity up to 1.8 m below the soil surface, a profile distribution of this conductivity was calculated. It should be taken into account that only larger variations in ECa can be determined using this methodology and that the output is a smooth model of the stratigraphy (Saey, Verhegge, et al. 2016).

7.4.3.3 Artefact-accurate fieldwalking

In a final stage, following the geophysical survey and based on its results, a dedicated smaller scale 8 ha fieldwalking campaign was performed following the AAD method of artefact-accurate fieldwalking as applied by the Historical Archaeology Research Group at Ghent University (De Clercq et al. 2019; Trachet et al. 2017). The surveyed field was harvested and ploughed in late autumn and left bare over winter. In early spring, a team of ten archaeologists and archaeology students walked the field in strips 1.5 meter apart. Aiming to determine distribution patterns, the exact location of each individually collected artefact in the field was registered using a Trimble R10 RTK-GPS. Only ceramic material was collected, individually bagged and registered. However, pottery retrieved in the framework of an artefact-accurate survey of diagnostic ceramics (AAD) is not used for a classic pottery study, it only serves purposes related to dating and establishing spatial patterns potentially related to the other data-layers. Therefore, for local grey- and redwares, only fragments diagnostic for shape or chronology were picked up. Hence, only base, rim and handle fragments were registered. For imported wares, which are considered to be chronologically diagnostic, all fragments were collected. Also for the bricks, the diagnostic aspects decided whether something was collected or not. Only large fragments of medieval bricks, still clearly representing the brick shape, were collected and registered. The location of smaller fragments was registered with the GPS but these pieces were not retrieved.

After the survey, the processing of the surface-finds consisted of a basic determination of the ceramic material (coordinates, fragment, type and period) and the integration of these data in a spreadsheet for analysis in GIS. In order to identify spatial variation in the dataset, two local statistics were applied: KDE and Getis-Ord Gi*. The density of all collected ceramics was calculated using the Kernel Density Estimation algorithm in ArcMap (Silverman 1986). Given the limited number of collected material, the maximum distance between two points in the dataset was used as search-distance for neighbouring artefacts at every point location. Given the small dataset and following Trachet et al. (2017, 106), the find spots of pre-fifteenth-century ceramics (related to the occupation of the village) were visualised in GIS as their point locations without calculating the density. This offered a clear overview of their location and concentration in relation to the overall density of the collected ceramics. In order to test whether the density clusters of the collected ceramics within the 8 ha surveyed field are statistically significant, a Getis-Ord Gi* statistic was calculated through the Optimized Hot Spot Analysis function in ArcGIS and subsequently interpolated through Inverse Distance Weighting (IDW) (Conolly & Lake 2006, 94-97 and 177-179). This allows to locate hot spots (where a significant high number of ceramics was attested) and cold spots (with a significant low number or absence of ceramics) in the dataset (Getis & Ord 1992; Ord & Getis 1995).

7.5 Results

7.5.1 Aerial photography

The oblique and orthogonal aerial photographs of the study area show a complex presence of crop and soil marks (Figure 55). Most of which can be related to relatively recent farming activities or field boundaries. However, to the south of the large creek (remnant of a tidal channel) that runs through the study area, several anomalies can be noticed that do not accord with current or recent activities. One of these marks strongly corresponds to the morphology of an enclosure, characterised by a bounding ditch-feature. An area of 274 m^2 is hereby enclosed by an on average 4 meters wide ditch. This corresponds to the morphology of enclosures-structures of moated sites as attested by Verhaeghe (1980; 1981) across Flanders.

7.5.2 Frequency-domain multi-receiver EMI

The different ECa plots (Figure 56) indicate a high variability in soil characteristics, which is also represented on the Belgian Soil Map (Van Ranst & Sys 2000). The study area is characterised by a patchwork of wet to medium dry sandy-loamy soils, clayey soils and sandy soils with and without horizonation. A large number of highly curved features on the ECa plots also suggests the presence of former creeks on both sides of the modern-day large creek. In relation to this, the large variability in EC can be an indication of past floods and sedimentation of clays. Generally, the shallow measurements of the ECa-1PRP (depth of 0.5m), ECa-2PRP (depth of 1m) and ECa-1HCP coil configuration (depth of 1.6m) show a lower conductivity level then the deeper ECa-2HCP (depth of 3.2m) and ECa-4HCP (depth of 6.4m) configurations. This can indicate a higher amount of saline aquifer, clay or organic material in the deeper horizons. The latter two were indeed attested in the subsequent augering campaign. Despite this large variation, multiple linear features are visible on the ECa plots as well (Figure 56). Most of these can be related to recent field boundaries which are also visible on the aerial photographs and orthophotos (Figure 55). Other features are related to recent ground and stabilisation works by the farmers (A on Figure 56). Furthermore, a number of ditches and features that were not visible on the aerial photographs were detected. Based on their discordant orientation, these are interpreted as older features which can be related to the late medieval structure of the former village and surrounding landscape. Regarding that landscape, an abrupt linear difference in ECa (B on Figure 56) to the south of the current creek and curving ditches parallel to it are striking features. They cannot be explained one-to-one by the soil variability which was accounted for by the Belgian Soil Map. The straight linear character of this feature rather suggests a human impact, most likely an early dike structure which resulted in the sedimentation of clay outside the dike corresponding with the higher ECa.

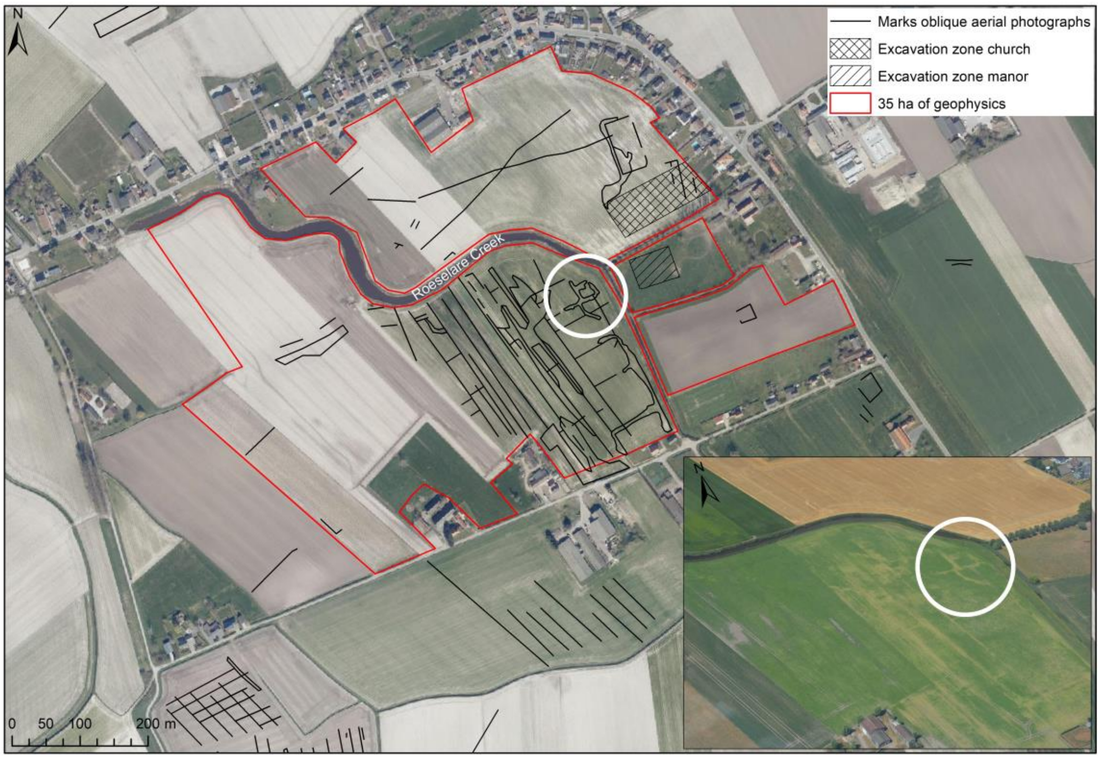


Figure 55: Overview of the mapped crop marks at the site of Nieuw-Roeselare with focus on the enclosures. Oblique aerial photograph from the collection at Ghent University: DSC_0103 taken on 15/07/2018 by Wim De Clercq.

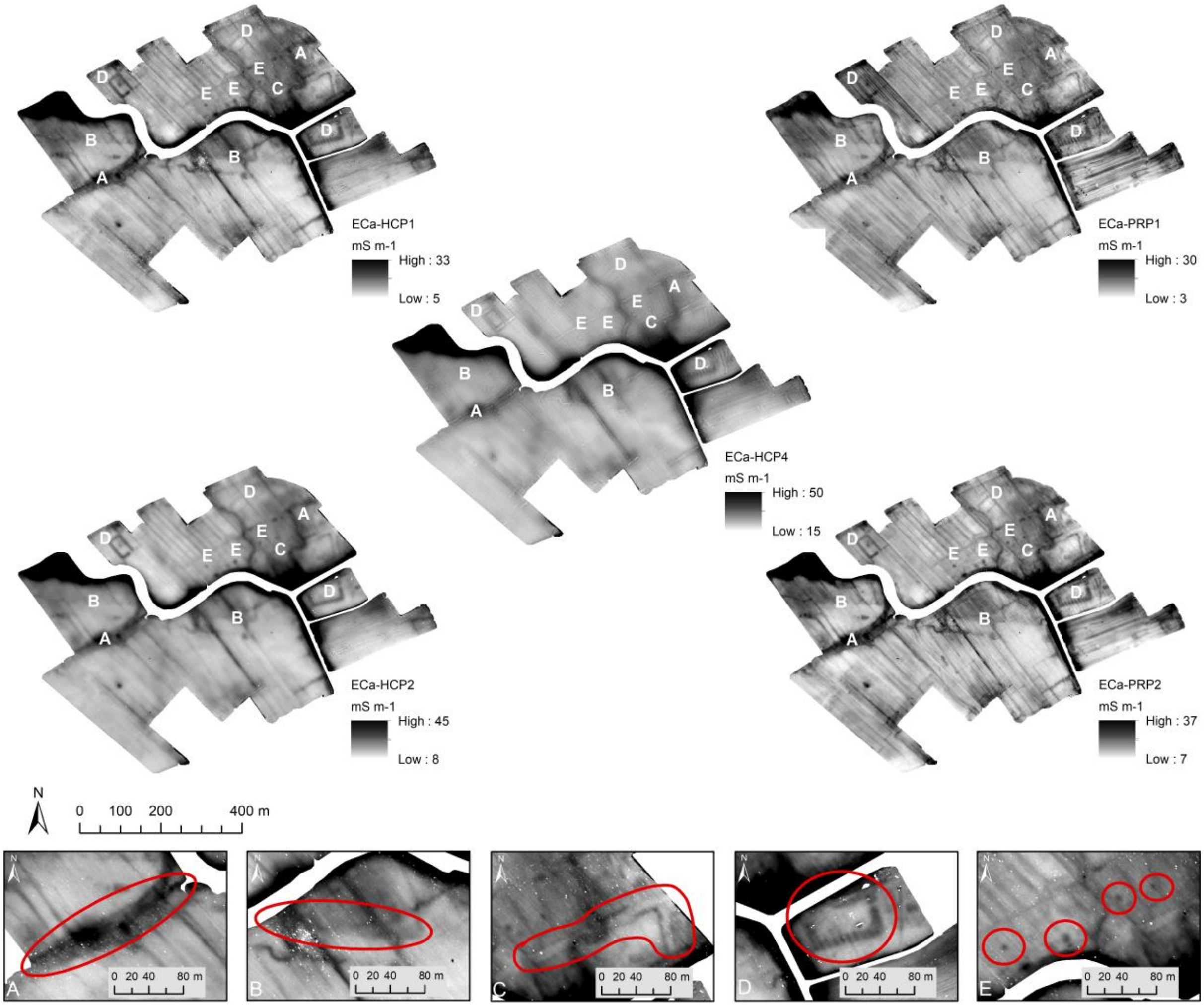


Figure 56: Different ECa data-plots for the EMI survey at the site of Nieuw-Roeselare, with enlargements of representative features. A: recent ground and stabilisation works; B: abrupt linear difference in ECa; C: double-ditched street; D: enclosures; E: former wells.

Moreover, a street lined on both sides by ditches and surrounded by plots of land can be discerned (C on Figure 56). On several of these individual plots, circular features with high ECa are visible (E on Figure 56). Based on the augerings, these correspond with former wells. To the north and south of this road surrounded by plots, three clear enclosures can be discerned, one of which is characterised by a considerable ditch (D on Figure 56).

Furthermore, the southern enclosure that was visible on the aerial photographs was not visible on the different EMI plots, except on the filtered ECa-4HCP (Figure 57). The latter was obtained by running a median filter over the ECa-4HCP data and by subtracting this of the original data-plot. This way, large natural soil variations are minimalised in favour of small archaeological features. Given that the southern enclosure is only visible on the filtered data indicates that the overall soil variability affected the visibility of this feature on the data plot. Augerings on this structure, however, clearly indicate the presence of significant ditches at the spot. These are characterised by a succession of

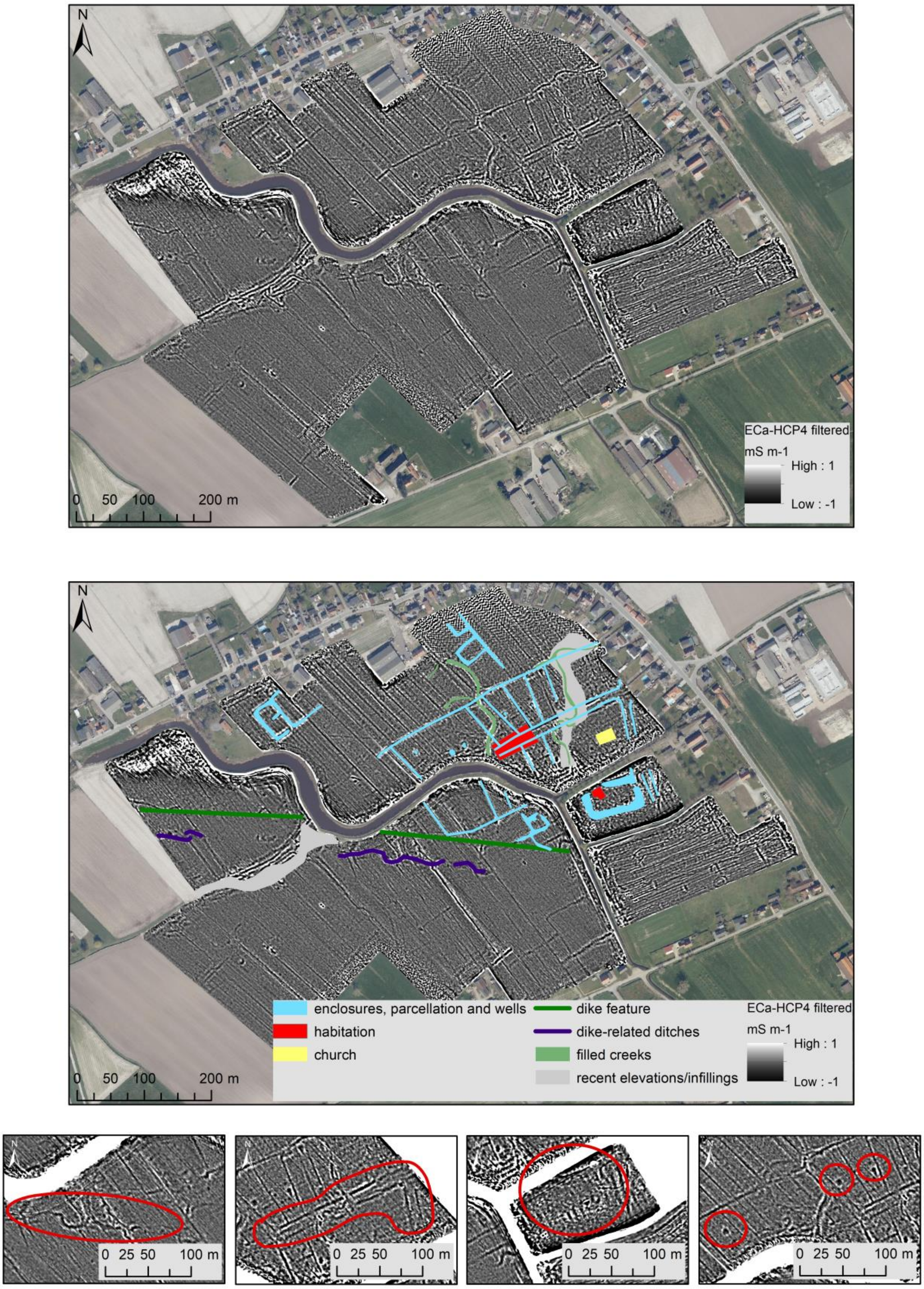


Figure 57: Filtered ECa-HCP4 data-plot and interpretation of the archaeological features related to Nieuw-Roeselare, with enlargements of representative features: dike-related ditches, double ditched street, enclosure and former wells.

organic and clay horizons, increasing in depth towards the centre of the feature, in between the sandy A and C horizons. In one of the augerings, at a depth of 110 cm, a charcoal fragment was found and C^{14}-dated to the end of the occupation period at Nieuw-Roeselare in the first half of the fourteenth century (Figure 58). The sample (RICH-26964; 645±22BP) was calibrated in OxCal, using the IntCal13 atmospheric curve (Reimer et al. 2013).

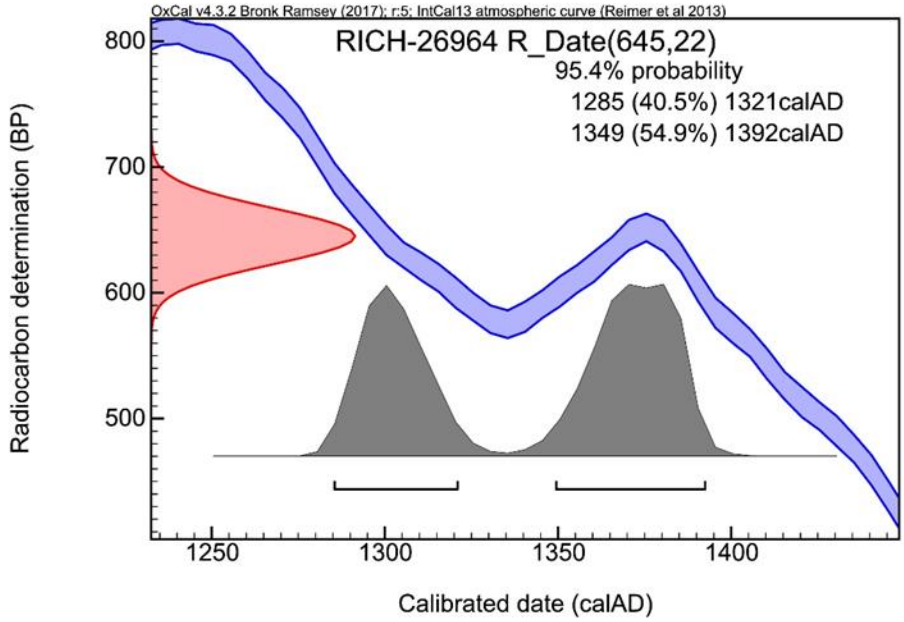


Figure 58: Calibration curve for C14-dated charcoal fragment at Nieuw-Roeselare. The sample (RICH-26964; 645±22BP) was calibrated in OxCal, using the IntCal13 atmospheric curve (Reimer et al. 2013).

The MSa plots reveal two concentrations of in situ brickworks on both sides of the great creek (Figure 59). The southernmost (A on Figure 59) was still visible on the orthophoto of 1971 and is therefore, together with the type of bricks that are regularly ploughed to the surface, considered as recent and not related to the medieval village. Furthermore, several recent groundworks by the farmers (e.g. rubble dumps to fill former depressions and stabilise trackways) are also visible (C on Figure 59). The northern brick concentration (B on Figure 59) gives a negative magnetic response on the shallow MSa-HCP1 configuration (depth of 0.4m) and a positive high magnetic response on the MSa-HCP2 configuration (depth of 0.8m). This indicates that this concentration is situated beneath the plough soil. In contrast, the southern concentration (A on Figure 59) and zones of recent groundworks (C on Figure 59) give a positive magnetic response for both measurements, indicating their shallower depth. Besides, the MSa data also shows the location of the church (D on Figure 59) which was excavated in 1979 and brick features of the manor site which were excavated during the 1960s and 1970s (Van Doorselaer & Verhaeghe 1974; Van Vooren 1980).

On both the ECa and MSa plots, the presence of saline groundwater in the soil is visible along the current creek, resulting in high conductivity values (and magnetic response because the MSa cannot be separated from the ECa in these zones).

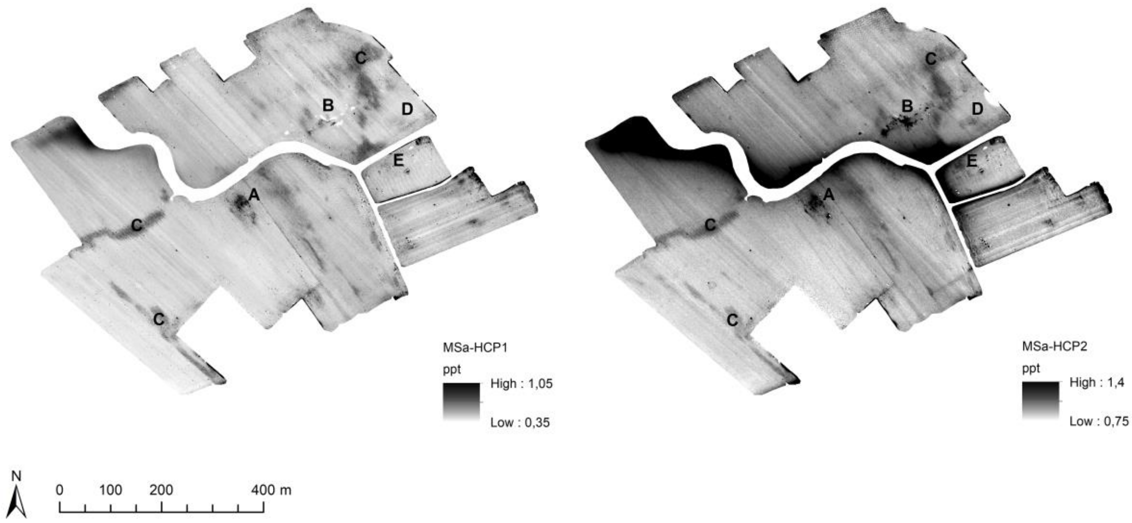
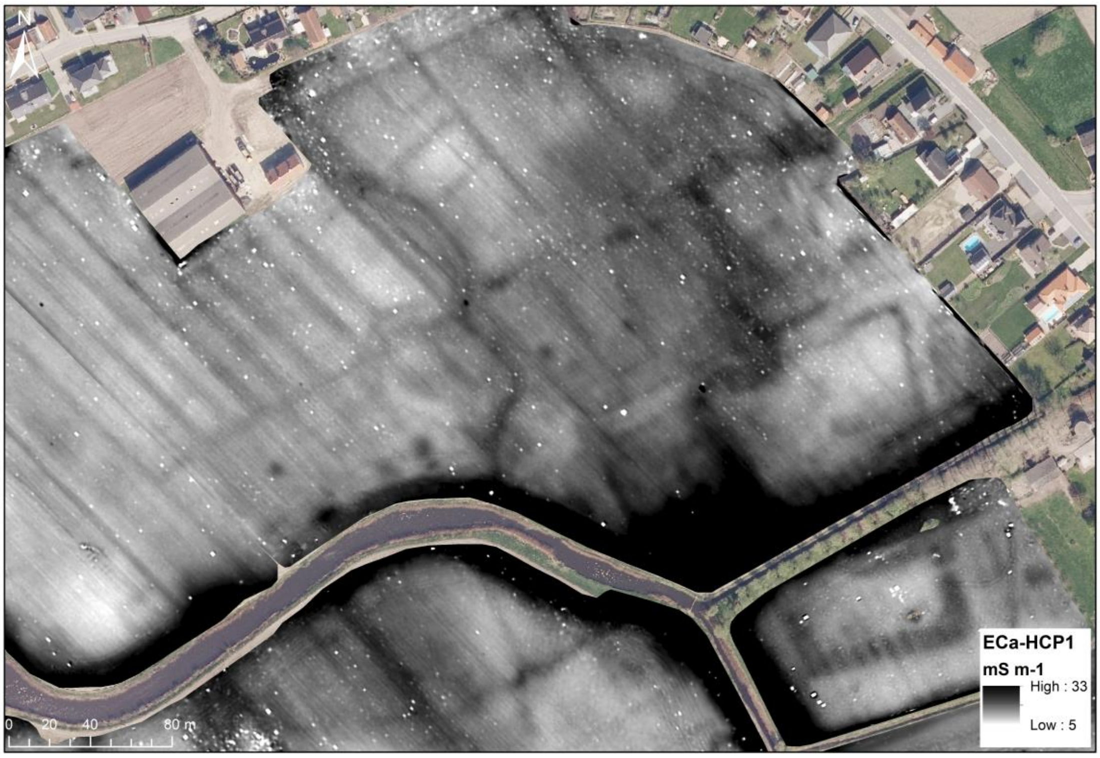


Figure 59: Different MSa data-plots for the EMI survey at the site of Nieuw-Roeselare. A&B: brickworks; C: recent groundworks; D: excavated church; E: excavated manor.

7.5.3 Pseudo-2D tomography

The three transects (82 to 85 meters) on the abrupt change in EC response give more insight in the soil variability up to 1.80 meters (Figure 61). All three transects show a medium conductive topsoil and gradual rise in conductivity of the subsoil towards the north. Based on augerings along shorter transects (6 meters), this corresponds to the presence of a thicker packet of clay along the current creek causing a higher conductivity. This also largely corresponds with the dichotomy between anthrosols (soils with a long farming history) and cambisols (reclaimed *polder* soils with shallow anthropogenic horizons) according to the WRB Soil Units classification (Dondeyne et al. 2014a; 2014b; WRB 2014).



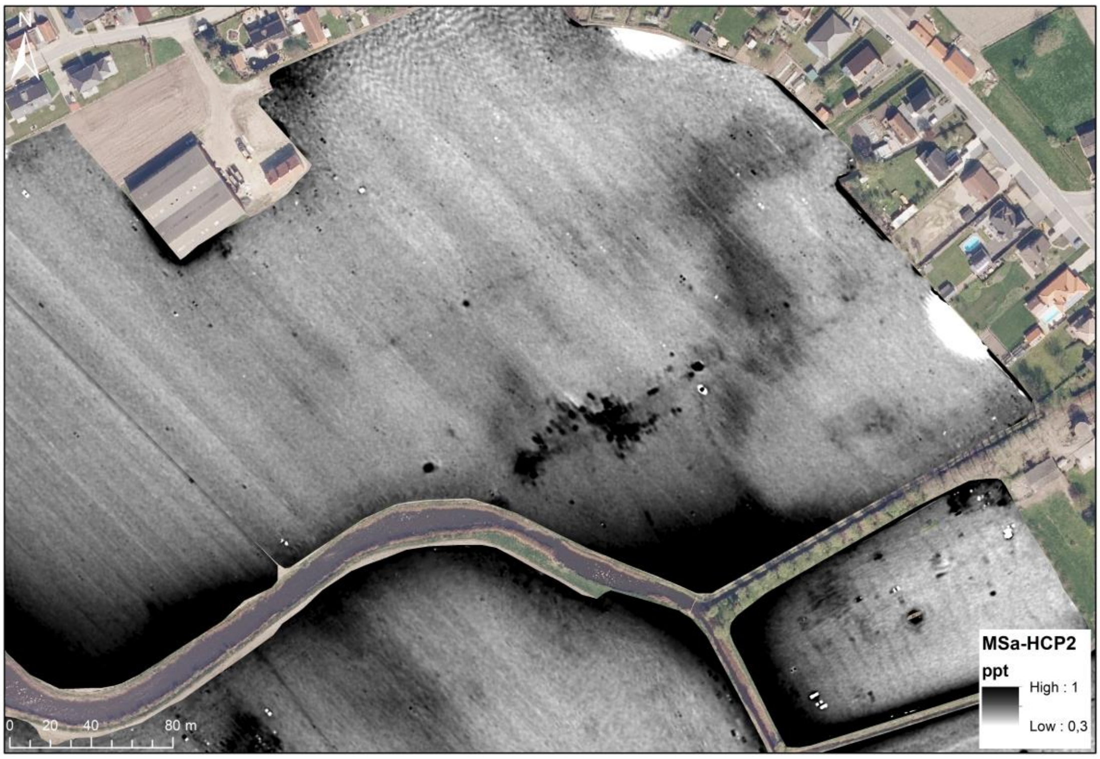


Figure 60: ECa-HCP1 and MSa-HCP2 detail showing the interpreted settlement core at Nieuw-Roeselare. See Figure 64 for interpretation.

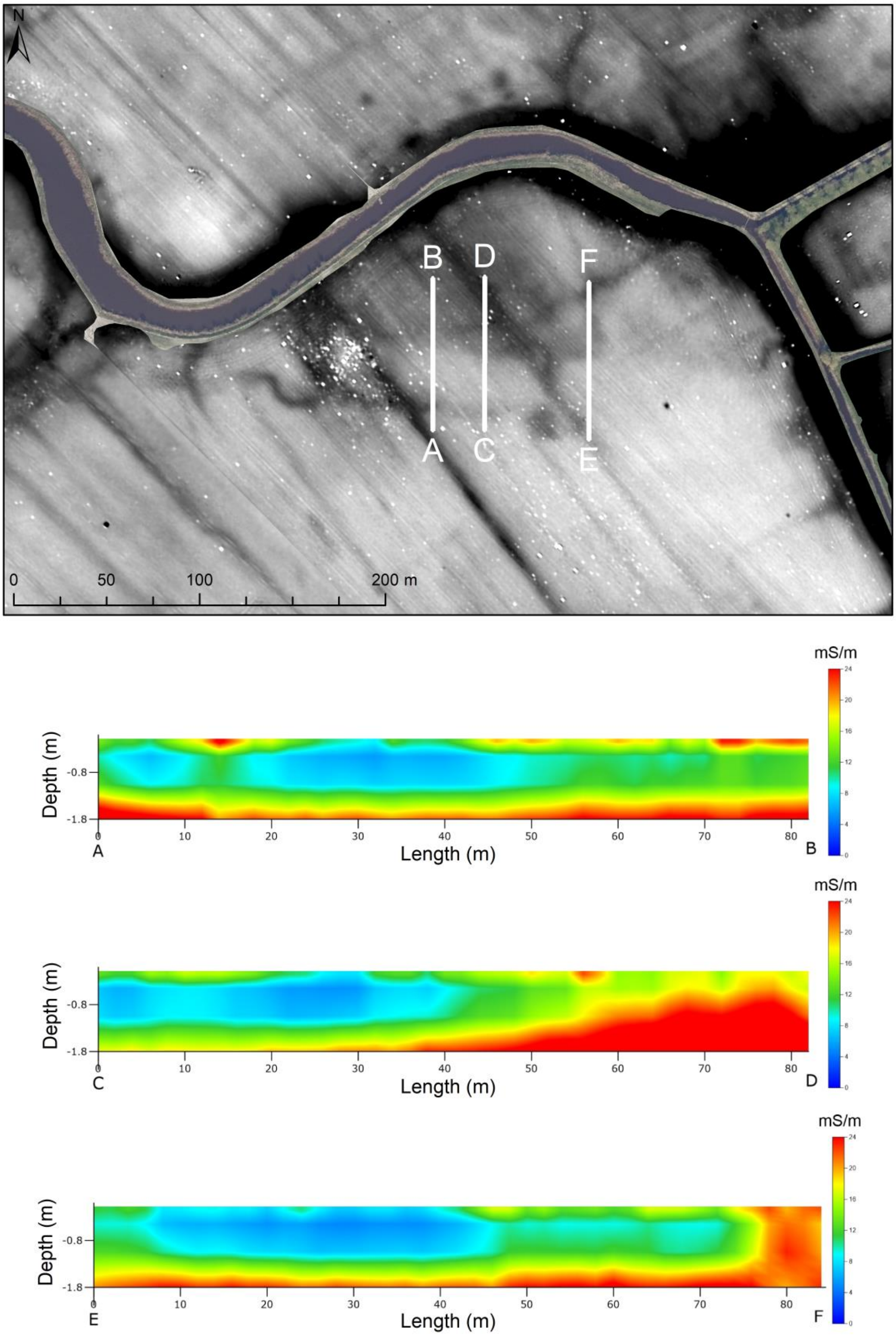


Figure 61: Location and visualisation of the three Pseudo-2D Tomography profiles the on abrupt change in EC.

7.5.4 Artefact-accurate fieldwalking

The KDE plot of the 143 collected ceramic fragments indicates a concentration towards the south of the survey area, which corresponds with the brick structure visible on the MSa plots (Figure 62). In the extension of this cluster, along a northwest-southeast axis, a slightly higher amount of ceramic fragments was collected as well. This, however, does not seem to relate to one of the archaeological features indicated on the other data-layers. As local deep-ploughing might have caused the surfacing of pottery, augerings were applied inside and outside this zone to measure potential variations in plough layer thickness. However, these did not reveal any variations in the depth of the plough soil. Erosion of parts of the site by a former creek, visible on the different ECa plots, might however have caused a larger dispersal of ceramic fragments in the topsoil. When the Getis-Ord Gi* statistic is calculated, only the major density estimation of ceramics is considered as a significant concentration or hotspot (Figure 63), suggesting the other densities to be statistically less significant.

Of the 143 collected fragments, only 12 (8%) date back to the fourteenth century. The other fragments date to the fifteenth century and later. The fragments that can be dated to the occupation period of Nieuw-Roeselare, though, all firmly cluster around the detected brick concentration (Figure 62).

Eight brick fragments were considered large enough to be measured and give an indication of the original full size. None of them, however, had the complete original length. Therefore, only the width and height could be considered as indications of the bricks original size. Although reservations should be made about the dating of bricks based on their sizes, it can form a first indication of its chronology. Based on the research and classification by Debonne (2015), different brick sizes have been linked to clearly and independently dated buildings across the county of Flanders. His doctoral research and older studies have indicated that the brick format used at Nieuw-Roeselare can be dated to the first or second quarter of the fourteenth century, which corresponds to the occupation period at Nieuw-Roeselare (Debonne 2014, 20-21; 2015, 247-254; Devliegher 1979; Van Doorselaer & Verhaeghe 1974, 59-60). The point locations of the registered bricks are clearly located in between the high magnetic responses on the EMI plots, which were interpreted as brick concentrations (Figure 62). This can be an indication of locally deeper ploughing or initially shallower preservation of the structures, as has also been suggested by Trachet et al. (2017, 112). Given that augerings do not indicate a variation in the depth of the plough soil, the former is less plausible.

Figure 62: KDE of registered ceramics at Nieuw-Roeselare, in relation to the dispersal of ceramics, bricks and MSa-HCP2 data-plot (Visualised using 2.5 Standard Deviations stretch).

Figure 63: Getis-Ord Gi* statistic of registered ceramics at Nieuw-Roeselare, in relation to the dispersal of ceramics and MSa-HCP2 data-plot (Visualised using 2.5 Standard Deviations stretch).

7.6 Discussion

7.6.1 Planted settlement morphology

The application of geophysical survey integrated in landscape archaeological methodologies has allowed to obtain innovatory insights in the lost village of Nieuw-Roeselare. In line of the observations made during previous applications of this methodology on other sites (De Clercq et al. 2019), the complementary nature of the various techniques used is also well demonstrated for this particular case. Whereas in other cases aerial photography yielded considerable information on the structure and lay-out of the settlements, in the Nieuw-Roeselare case it was not the most successful method, probably because of the clayish nature of the soil. However, in this case EMI has successfully proven its ability to retrieve elements of the landscape and settlement morphology. Both the ECa and MSa plots have indicated archaeological features that were not visible on aerial photography, DTM or historical cartographical sources. The EMI-data clearly indicated the orientation of building structures along a double ditched street, which runs in the extension of the current large creek (Figures 57 and 60). Historical cartographical research has shown that this segment of the creek overran and followed the former Roeselare Street, which connected Nieuw-Roeselare with nearby Aardenburg to the west and continued towards the east (Van Vooren 1980; Verbrugghe 2019). Along this double ditched street, perpendicular plots of land are visible on all ECa plots (Figures 56 and 60). These are surrounded by narrow ditches and contain wells, pointing to the presence of habitation. This corresponds with the planned row settlement morphology that is regarded by Verhulst (1991a, 1995) as characteristic for planted exploitation settlements in the county of Flanders. Given the settlement's location in the *Moershoofd* of Aardenburg, it might have been related to peat extraction. However, no clear indications for such extractions have been attested by the EMI survey and augerings. Moreover, the historical extraction of peat in the region has been the subject of discussion between soil scientists and historians (Augustyn & Thoen 1987; Verhoeve & Verbruggen 2006). In the context of the Great Reclamation Period (tenth-thirteenth centuries), Verhulst (1953) has stressed the importance of axes of exploitation (e.g. the Roeselare street) for the reclamation of the landscape and the planting of settlements. Similar to the village of Kluizen, habitation in Nieuw-Roeselare is located along this axis with individual plots of land behind it (Figure 64) (Verhulst 1991a). The brick structures that are visible on the MSa plots, however, are only located around a segment of the double ditched street, while the characteristic plots are more numerous. The different ECa plots, however, indicate the presence of two small creeks to the west and east of these brick structures, which might have influenced the in-situ preservation of these features (Figures 57 and 60). However, this did not result in a high amount of ceramic material at the surface, based on the fieldwalking data (Figure 62). The only significant cluster of ceramics is right on top of the in-situ brick constructions, clarifying it as habitation structures of Nieuw-Roeselare. Moreover, the eastern zone of the surveyed field has been raised and levelled over the last four decades, affecting the presence of archaeological material in the topsoil.

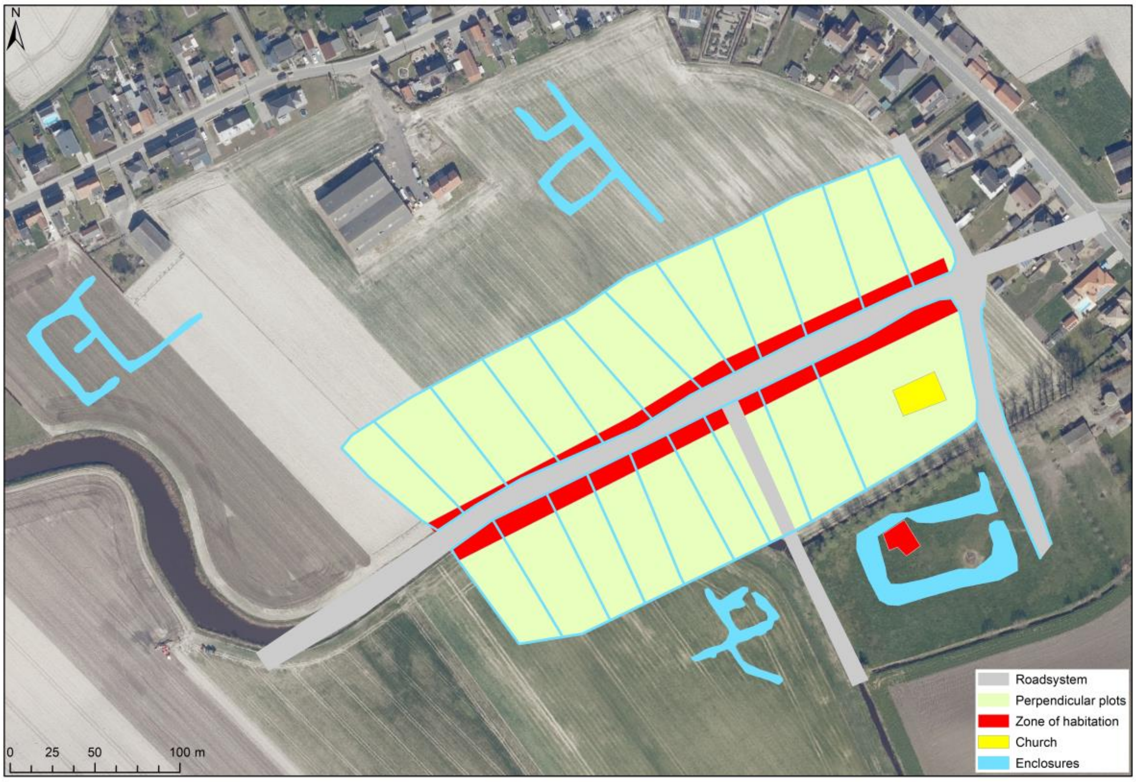


Figure 64: Schematic interpretation of settlement lay-out at Nieuw-Roeselare.

7.6.2 Ceramic frequencies in relation to nearby sites

Despite the much lower number of collected ceramic fragments in comparison to artefact-accurate fieldwalking surveys at the Zwin harbour sites near Bruges (Trachet et al. 2017, 113), the relative frequencies of pottery are similar (Table 10). Redwares are the most abundant, both in rim-counts (87%) and RHB (total of rims, handles and bases)-counts (78%). An increase of the proportion of stonewares in the rim-counts (2%) in comparison to the RHB-counts (9%) is attested as well. However, the proportion of greyware in both quantification methods is considerably lower than at the Zwin-harbour sites and corresponds more with the relative frequency at the site of the nearby lost village of Coxyde (de Ruijsscher 2019a; 2019b). However, at this site, a higher amount of ceramic material was found as well, despite it being flooded and abandoned in the fifteenth and sixteenth centuries. The reason and explanation for the lower amount of ceramic material at Nieuw-Roeselare thus must be found elsewhere. Based on historical research, it is clear that Hoeke, Monnikerede and Coxyde were important harbour towns within the Bruges network of Zwin harbours (Dumolyn, Ryckaert, Deneweth, et al. 2018; Dumolyn, Ryckaert, Meijns, et al. 2018; Leloup et al. in press). Although Nieuw-Roeselare is mentioned in 1309 as one of the *smalle steden* (small cities) in the Franc of Bruges, its importance is unclear. Given that the lands of Nieuw-Roeselare were granted by Joan countess of Flanders as a fief of wasteland to Gosuwin de Roeselare in 1241, the settlement originated in the context of the landscape reclamations in the region (Gottschalk 1955, 68; Verbrugghe 2019, 60-62), rather than as link in the international trading chain along the Zwin. Another explanation might be found in the relatively short period of habitation at Nieuw-Roeselare. From the first mention of the church until the first flood, it lasted just over a century, which is far less in contrast to the several centuries for Hoeke and Monnikerede (Trachet et al. 2015). Furthermore, it should be considered that, following floods, settlements still might have been accessible and were stripped of any re-usable household and building materials (Kuipers 2004, 57-58). Given that seventeenth-century figurative maps depict the former cemetery of Nieuw-Roeselare, for example, suggests that there still would have been remnants visible in the landscape long after the abandonment of the settlement (Figure 50). Finally, recent ground and stabilisation works along the edges of the current waterways, as visible on the EMI-data plots, would have covered parts of the original settlement core and surface material.

	Site	Redware	Greyware	Stoneware	Other Import	n
Rim	Monnikerede	67%	25%	7%	1%	2595
	Hoeke	71%	19%	9%	1%	1355
	Coxyde	87%	9%	2%	2%	519
	Nieuw-Roeselare	87%	9%	2%	2%	82
RHB	Monikkerede	59%	25%	15%	1%	4127
	Hoeke	60%	17%	21%	2%	2124
	Coxyde	86%	7%	4%	3%	751
	Nieuw-Roeselare	78%	10%	9%	3%	120

Table 10: Relative proportions of the rim and grouped RHB for the registered ceramics during artefact-accurate survey in Nieuw-Roeselare in relation to the same relative proportions at Monnikerede, Hoeke and Coxyde (de Ruijsscher 2019a; Trachet et al. 2017).

7.6.3 Re-embankment

The abrupt linear feature in electrical conductivity (B on Figure 56) that was detected through EMI can be interpreted as a possible dike system (Figure 57). Based on the pseudo

2D-tomography and augerings, the area to the north of it is characterised by a higher clay content beneath the plough soil resulting in a high ECa. In contrast, the area to the south is characterised by the lack of clay in the first 1.5 meters. It seems therefore, that the linear feature once constituted a barrier for clay sedimentation and marine influence. The difference north and south of the feature is clearly visible on the PRP1, PRP2, HCP1 and HCP2 plots indicating that the difference in soil characteristics is present up to 3.2 meters deep. Small ditches parallel to this linear feature are located on the inside of the dike. Similar structures were attested following an EMI survey in the north Flemish Prosperpolder. There, consecutive phases of post-medieval dikes and embankments were mapped, showing the same morphology and EMI responses. However, at Prosperpolder, the traces of construction works and extraction pits were more clearly visible and rigorously planned (Saey, Laloo, et al. 2016). This suggests that the dike at the site of Nieuw-Roeselare was less formally constructed and possibly of an older date. Historical cartographical sources do not show any dikes other than those still visible in the modern-day landscape (see above; Verbrugghe 2019). This suggest that the interpreted dike structure is older than the sixteenth century. Historical research by Gottschalk (1955, 168-186) has indicated that, following the first flood in 1375, several attempts were made to reclaim and re-embank the lost lands around the village. The dike structure, visible on the EMI-data, might well be related to these attempts. Although it would have disappeared before the sixteenth century, it is unclear how long it would have been in use. Nevertheless, the site of the lost village lies in the clay enriched area outside the dike. This would mean that the dike had protected parts of the surrounding area during the 1394 flood, but that the village along the Roeselare Street was given up in favour of habitation along the Groenstraat to the south, which still is in use.

7.7 Conclusion

The integration of Frequency-domain multi-receiver EMI and other established landscape archaeological prospection techniques has allowed to, after more than 50 years, map and interpret non-invasively the settlement landscape of the iconic site of Nieuw-Roeselare (Flanders). As first deserted medieval settlement to be studied in Flanders, it played a pioneering role for the historical geographical and archaeological research in this region, without the settlement itself exactly being located and studied. The cross-disciplinary application of new archaeological, historical and geographical methodologies and data has now allowed to reconstruct Nieuw-Roeselare’s topographical morphology and interpret it as a planned row settlement, corresponding to the planted exploitation villages in the County of Flanders. This is not only significant for the understanding of the site itself, but offers an important contribution to the medieval settlement research within the county of Flanders and beyond. The integrated landscape archaeological approach of the geophysical survey in this study has shown the potential of this methodology to locate and study deserted rural settlements, also in areas where earthworks are absent.

Part 3: The Flemish settlements in Wales

Chapter 8 Multidisciplinary mapping of Wiston and Whitson

8.1 Introduction

> "Hunc locum [qui Dungledin uocatur] a tempore Henrici regis ex ipsius dono Flandrenses incolunt, horum princeps quidam nominee Wizo fuit, qui primus ad predictum locum possidendum de Flandria ueniens, transitum per Wigornam fecit […]." [This place, which is called Dungledin, is inhabited by the Flemings since the time of King Henry's gift. The chief of these was a certain man called Wizo, who passed through Worcester on his way to the same place, coming from Flanders] (Darlington 1968, 134).

In his letter to the archbishop of Canterbury, Gilbert earl of Pembroke described how a Fleming called Wizo passed through Worcester on his travels from Flanders to Wales. Wizo is thereby described as a princeps, on his way to take possession of his lands in Dungleddy[25] (Darlington 1968, 134; Toorians 1990, 99-100). Although the letter is dated between 1139 and 1148, Toorians (1990, 100) places Wizo's arrival before 1112, shortly after the forced migration of Flemings to South West Wales by King Henry I (Jones 1952, 27-28; Mynors et al. 1998, 727; Symeon of Durham 2012, 245). Together with other Flemings, Wizo is considered as one of the *locatores* who were responsible for both planting new settlements and attracting colonists (Kissock 1990, 59; Rowlands 1980, 148; Toorians 1990, 111). In this context, Wiston has received much attention as one of the newly planted settlements, supposedly with a planned row morphology, in central and southern Pembrokeshire (Beresford 1967, 570; Kissock 1990; 1997; Lilley 1995, 80-84; Murphy 1997; Roberts 1987, 199-200; Soulsby 1983, 269; Weeks 2002, 27-28). A highly

[25] Dungleddy is a cantref or lordship in south-west Wales.

similar morphology can be attested in the village of Whitson on the Gwent Levels in Monmouthshire. For this specific settlement, Rippon (1996, 86; 2000b, 215-219; 2008, 220-221) has suggested strong comparisons with reclamation settlements in the Low Countries, such as Assendelft (Besteman & Guiran 1987) and the Cope reclamations on the Holland-Utrecht plain (van der Linden 1982). Historical and landscape archaeological research for the medieval county of Flanders, however, has shown an equal importance of this settlement morphology in the context of intensified landscape reclamations during the high medieval period (see part 2 above; Verhulst 1991a; 1995).

As argued by Kissock (1990; 1997) and Roberts (1987, 199-200), a Flemish influence in these settlement morphologies can offer one explanation for the appearance and origin of grouped rural settlements in South West Wales. Until recently and in contrast to Pembrokeshire, however, no clear Flemish presence had been attested in Whitson. An interesting link between Wiston and Whitson was nonetheless pointed out by Crouch (1990, 198-199). Both settlements would have been held by Ralph Bloet/Bluet (III, died 1198x99), steward of Chepstow Castle in the late-twelfth century (Crouch 1990, 198-199; Rippon 2008, 221). Recent historical and place name research by Coplestone-Crow (forthcoming), however, strongly suggests a Flemish origin for Whitson. He states that Whitson is derived from *Widonis*, which is the Latin form of the Old French name *Wido*, *Guido* or *Guy*. The English *Wideston* or Whitson would therefore mean 'the vill of Guy'. Coplestone-Crow (forthcoming) considers it to be related to a Fleming named Guy fitzTice, who came to Wales in the early-twelfth century.

Archaeological, geophysical and historical-geographical research on both Wiston (Lilley 1995, 80-84; Murphy 1995, 97-99) and Whitson (Rippon 1996, 84) has offered several theses regarding their morphology. To date, however, their former lay-out is still unclear, not allowing a comparative study to similar Flemish contexts. Through a large-scale frequency-domain multi-receiver Electromagnetic Induction (EMI) survey, supported by LiDAR data, this research therefore aims to map former field-systems in and around the modern-day settlements of Wiston and Whitson, thus bringing the research on the village morphology further and allowing comparison of their morphology with similar settlements in the former County of Flanders.

8.2 Morphological hypotheses

8.2.1 Wiston

The village of Wiston is located on top of an east-west running ridge to the north-east of Haverfordwest in Pembrokeshire. The ridge's steep south flank runs into Fenton Brook (Figure 65). The first mention of a settlement at Wiston dates to 1220, when the destruction of the town and Wizo's castle is described in the *Brut Y Tywysogyon* (Murphy 1997, 145).

> "And thereupon he [Llywelyn prince of Gwynedd] destroyed Wizo's Castle and he burned the town" (Jones 1952, 97)

Today, the village consists of several larger farms, Saint-Mary's church and modern housing developments. The ruins of a motte and bailey castle (Figure 66), one of the finest examples of its kind in Wales, dominates the settlement landscape (Murphy 1995, 71; Turner 1996).

Figure 65: Topography of the landscape around Wiston (Hill shade visualised using 2.5 Standard Deviations stretch).

Figure 66: Oblique aerial view of Wiston from the east (Driver 2007).

Several archaeological investigations and watching briefs have been undertaken in and around the village (Figure 67), which have been described by Murphy (1995) for the period until 1995. More recently, major geophysical and archaeological interventions took place in the context of the South Wales Gas Pipeline Project in 2006 and 2007 (Hart 2013; 2014; Hart & Busby 2014; Leonard 2013), at the site of a Roman fort to the northeast of the village centre in 2012-2014 (Meek 2014; Meek & Wilson 2013; Poucher 2013) as well as aerial surveys by the RCAHMW which identified an Iron Age defended enclosure at Conkland Hill in 2013 (Driver 2013). Features of this enclosure were excavated during the 2006 and 2007 investigations. Although most ditches were undated by finds, carbon dating confirmed their Iron Age origin. Moreover, indications of limited Early Bonze Age activity as well as a possible early medieval sunken-floored building and metal processing were attested (Hart 2014). Of principal interest for the study of the high medieval settlement morphology are, however, the archaeological excavation in Church Field (1990), the geophysical survey within the bailey of the castle (1991) and an earthwork survey of The Green (1995). The investigations at Church Field were initially prompted by a planning application, with geophysical prospection offering indications of parcellation. A follow-up through trial excavation revealed features of ditches, pits and buildings and suggestions of a regular division into plots (Murphy 1995, 83-85 and 98). The 1991 geophysical survey on the motte and bailey castle, executed by Geophysical Surveys of Bradford, did not however offer clear indications of a regular division into plots. Multiple circular and irregular anomalies were attested in three zones in and around the castle but their character is unclear (Ovenden 1991). Based on his own earthwork survey in the village and on The Green, Murphy (1995, 97-98) identified several building platforms indicating former house plots along the road. He therefore ascribes a formal lay-out to the original borough. At first, the settlements may have been located within the castle bailey. By the thirteenth century, however, it would have extended around it as well, following a planned morphology of burgage plots along the roads (Figure 68). The lack of later and post medieval archaeological material as well as documentary records suggests the abandonment of burgage plots and the decline of the borough by the end of the fourteenth century. This would explain why Wiston had the status of a borough well into the nineteenth century despite its strong rural and scarcely populated character (Beresford 1967, 570; Murphy 1995; Soulsby 1983, 269; Weeks 2002, 27-28). Murphy (1995, 98) supports his hypothesis by referring to the 1577 purchase of twelve burgage plots in the village by John Wogan, who is considered to have consolidated them in order to create a garden on The Green next to Manor House. Lilley (1995, 80-84), on the other hand, has another vision on Wiston's morphology, based on his research on Norman town morphologies. He ascribes a north-south orientation of burgage-plots to the south of the church and castle between existent Conkland Hill road and a footpath, which would have been part of the road system (Figure 69).

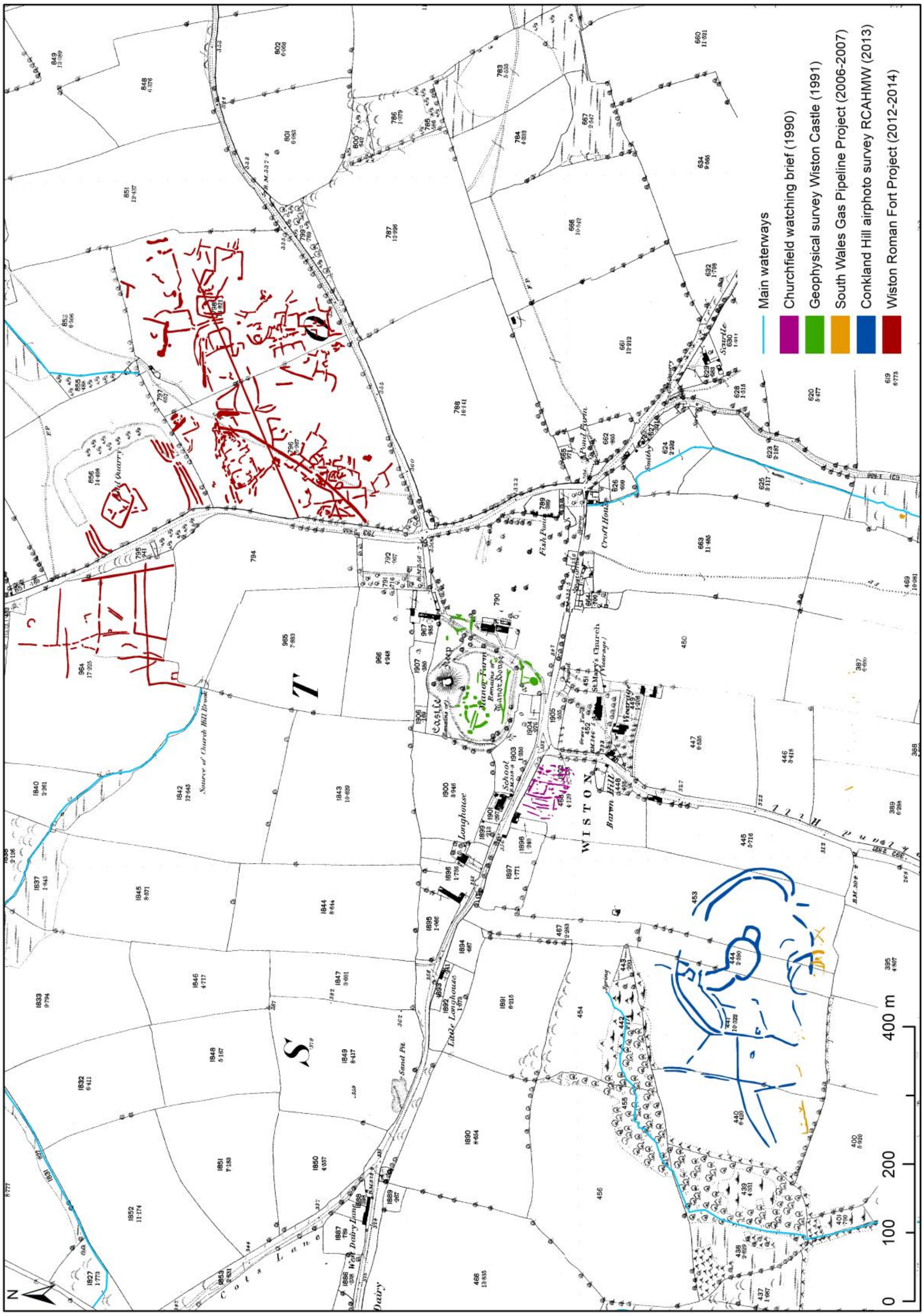


Figure 67: Previous archaeological research in Wiston.

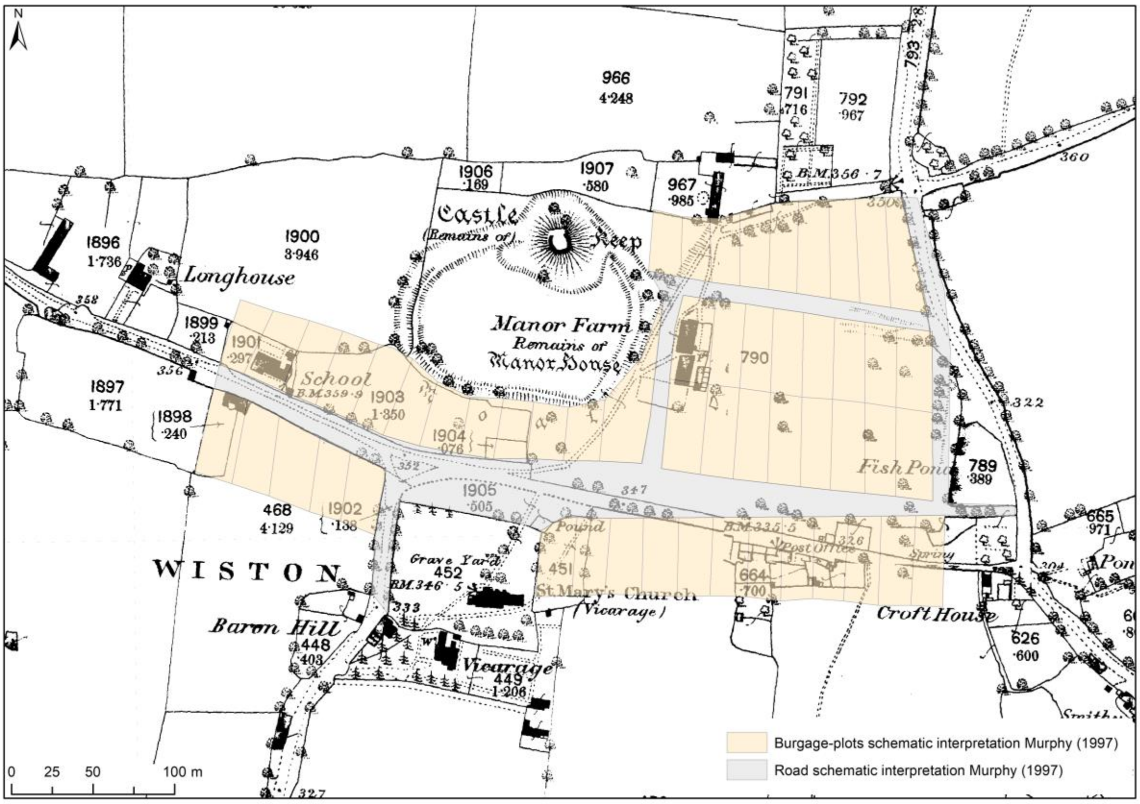


Figure 68: Schematic interpretation by Murphy (1995, 98) on the first edition OS map.

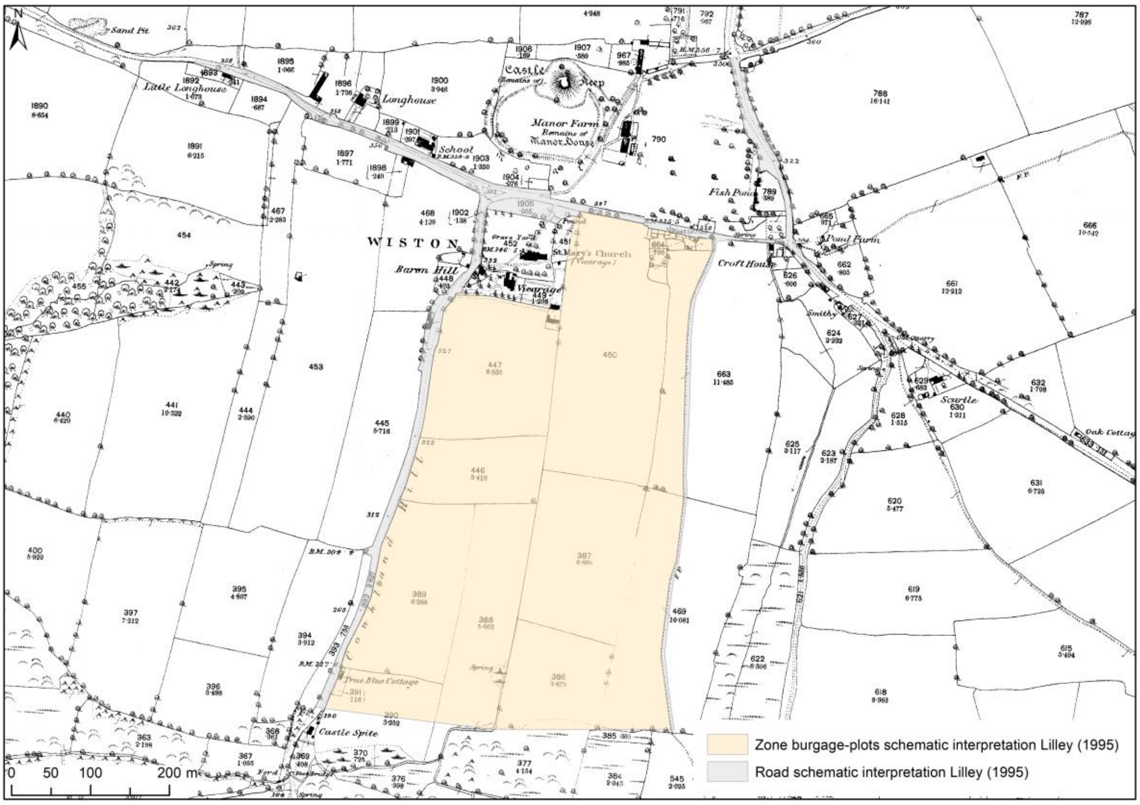


Figure 69: Schematic interpretation by Lilley (1995, 80-82) on the first edition OS map.

8.2.2 Whitson

The village of Whitson is located on the Caldicot levels along the Severn estuary in Monmouthshire (Figure 70). This embanked area of former coastal marshland and mudflats forms the eastern part of the Gwent levels on either side of the river Usk (Allen 2000; 2001; Allen & Fulford 1986).

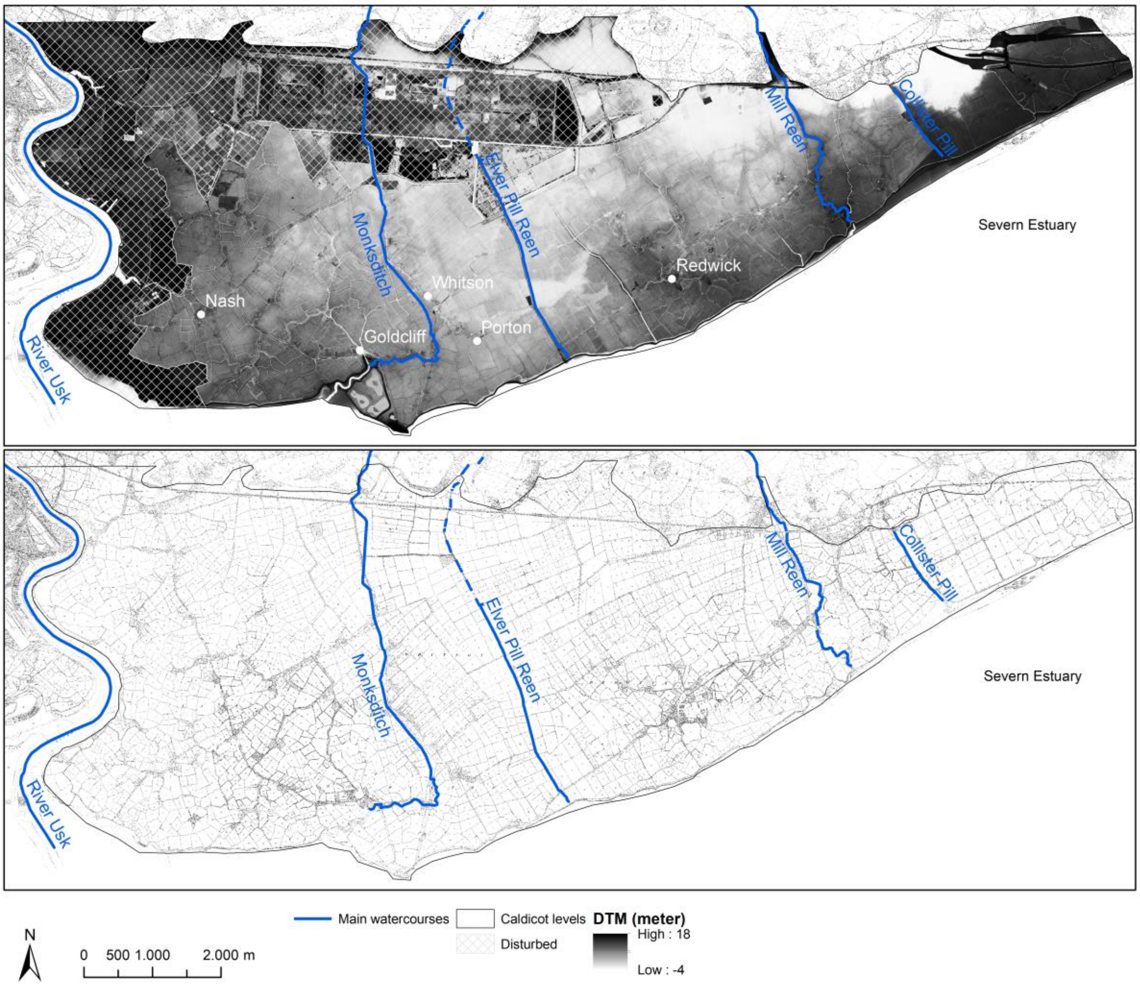


Figure 70: Topography of the Caldicot Levels (DTM visualised using Histogram Equalize stretch).

As part of the Cadw[26] funded 'Gwent Levels Historic Landscape Study', Rippon (1996, 84-87) studied the historic settlement landscape of Whitson and thereby highlighted the distinctively planned morphology of the village. Offering a model for its development, using the Ordnance Survey First Edition Six Inch maps of 1881-2, he describes the settlement landscape as:

[26] The Welsh government's historic environment service

> "consisting of a block of very long narrow fields, running perpendicular to a funnel-shaped common. Though longitudinally these strips extend for some 1 km, they are divided laterally by three boundaries, at least one of which was formerly a lane." (Rippon 1996, 84)

Before its medieval reclamations, the Caldicot levels would have been characterised by coastal saltmarshes, tidal creeks and estuarine alluvial deposits, covering the (pre)Roman landscape (Bell 1994; Locock 1998; Locock & Walker 1998). The modern-day landscape, however, finds its origin in the reclamation and embankment from the early medieval period onwards (Kissock 2008; Rippon 2008, 213). Given that the history of these reclamations has been elaborated on elsewhere by Rippon (1996; 2000a; 2008), our focus lies on the context of the planned landscape of Whitson. Generally, the earliest structural interventions in the coastal landscape would have been oval-shaped enclosures to protect small infields, possibly as local and individual initiatives (Rippon 2000a, 153). The origins of the first extensive sea wall at the Caldicot levels, however, are unclear. Rippon (1996, 81; 2000a, 153) dates it to the early-twelfth century since a 1113 foundation grant of Goldcliff Priory refers to a church and chapel on the levels. He considers it to be unlikely that such buildings would be constructed on an intertidal saltmarsh. The first part of the Caldicot levels to have been subsequently reclaimed would have been the higher grounds along the estuary and to the west of Monksditch (Figure 71). In a sixteenth-century copy of a thirteenth-century deed, this watercourse is mentioned in the context of Goldcliff Priory, suggesting that it was embanked by the monks in order to avoid flooding of their lands at Goldcliff (Rippon 1996, 69-71). Settlement would have expanded around the already existing infields, forming focal points for settlement interlinked by a network of streets and droveways. The latter also linked the common pasture lands in the backfen with the settlements on the higher lands along the estuary (Rippon 2000a, 153-155). An exception in this was the land around the hamlet of Porton, to the south of Whitson. Based on its regular landscape, Rippon's model (1996, 66 and 83) links the embankment in this area to the first stages of the further reclamation of the backfen (Figure 71). The oldest mention of Porton dates to 1245, when its church was granted to Goldcliff Priory by William de Burgh, bishop of Llandaff (Bradney 1932, 275). There is uncertainty about the location of this church. Local folklore speaks of it as being submerged, for which no archaeological indications can be found. Another thesis is that Whitson church used to be part of Porton. This leaves the discussion of where the church of Whitson would then have been (Bradney 1932, 275; Rippon 1996, 83). The sequence of reclamation between Porton and Whitson is unclear. Both settlements are located on the edge of the backfen, though, and can be considered as first initiatives to reclaim these low-lying fenlands (Figure 71). Rippon (1996, 84) recognises at least four phases in the development of the settlement at Whitson. Initial habitation would have been located on the higher grounds along the eastern edge of the funnel shaped common, which can be considered as one of the above mentioned droveways. Perpendicular to the common, narrow plots extended into the low lying backfen ending at a back lane, which is preserved in today's landscape as two perpendicular narrow ditches. The narrow plots would have been extended eastwards in consecutive phases, eventually reaching the modern-day extent (Figure 72).

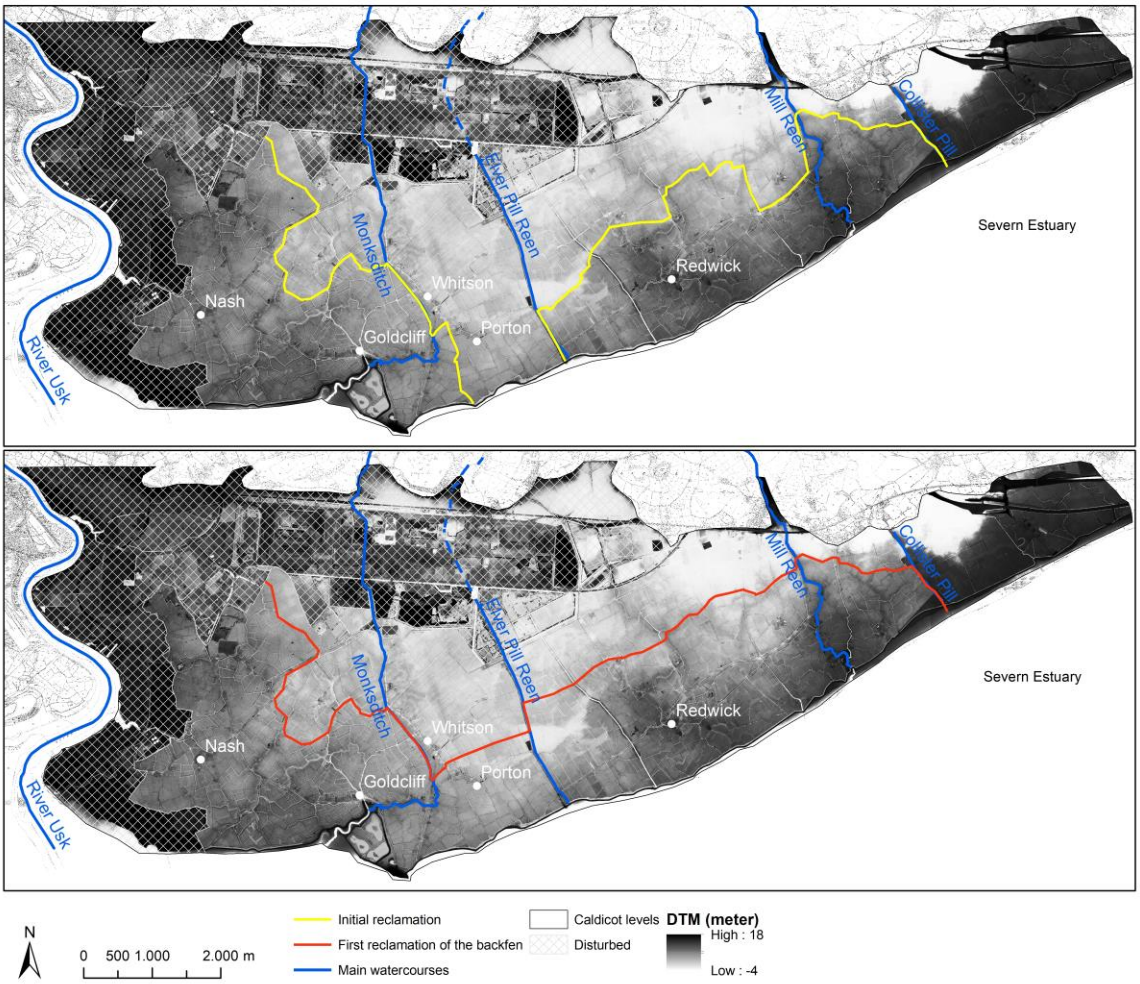


Figure 71: Phases of first reclamations of the Caldicot Levels following Rippon (1996, 66) (DTM visualised using Histogram Equalize stretch).

Two recent projects have induced more archaeological research on Whitson: the planning of a new M4 motorway and the planning of the Gwent Farmers' Community Solar Scheme (Beddoe 2018; Cooke 2010; Wessex Archaeology 2011). Using LiDAR in 2007-2008, Cooke (2010) was able to locate multiple creeks and 52 ditched sites on the Gwent Levels, five of which lie in the constraints of the village of Whitson. His research offered the first indications of the huge potential of the application of LiDAR data on the Levels. However, little attention was given to former field-boundaries related to the lay-out of Whitson. Eight years later, in 2016, in the context of a planning application for a large solar farm, partly located in Whitson, Stratascan conducted a magnetometry survey but this showed no archaeological anomalies (Figure 73). Mainly modern and physical features could be detected, added with the characteristically grip system on the Levels[27] (Davies 2016). Neither study added to Rippon's interpretations.

[27] A rectangular network of small and shallow open ditches for carrying of water into the field-ditches (Turner 2016, 4)

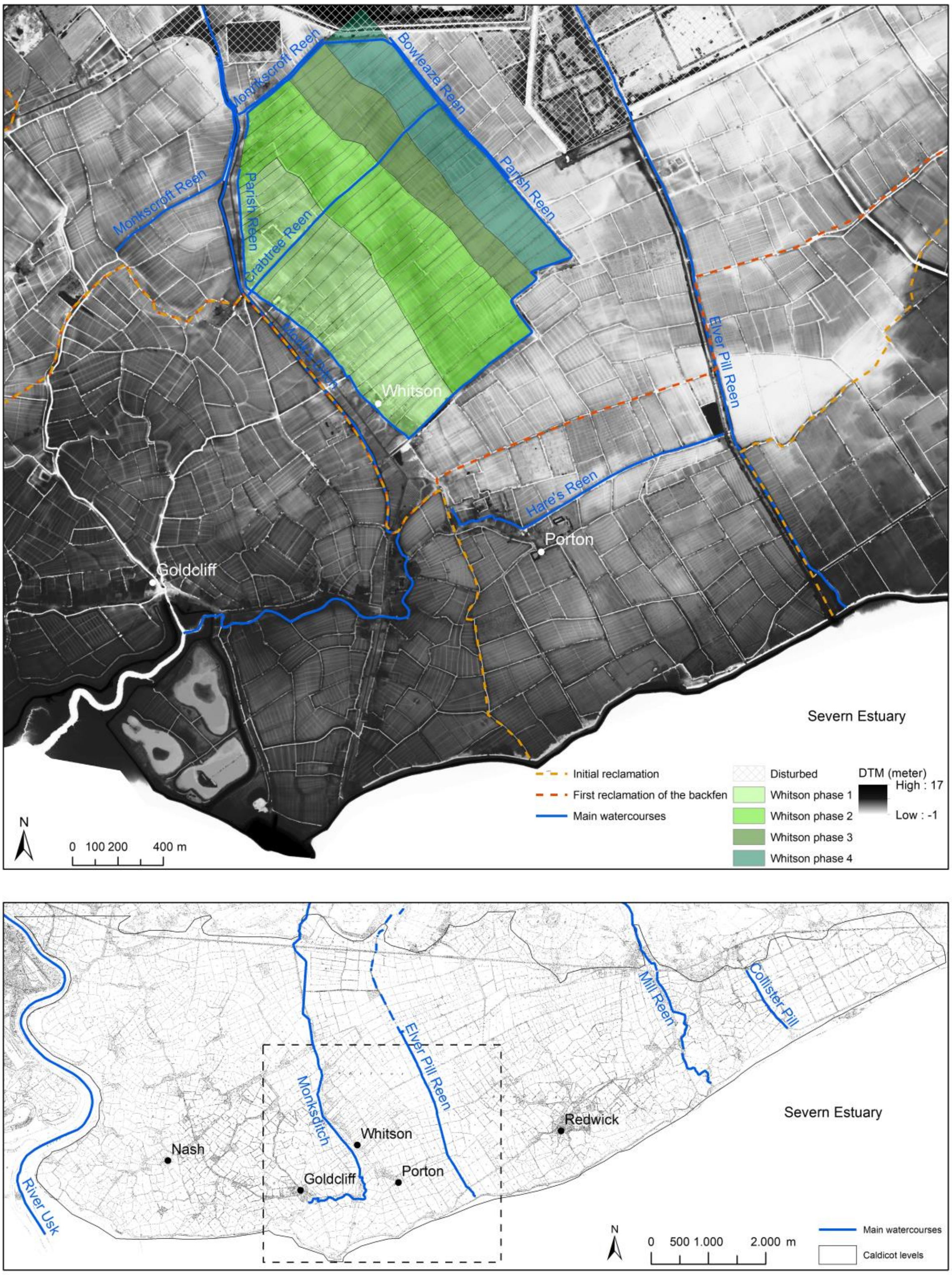


Figure 72: Schematic reclamation phases of Whitson following Rippon (1996, 84) (DTM visualised using Histogram Equalize stretch).

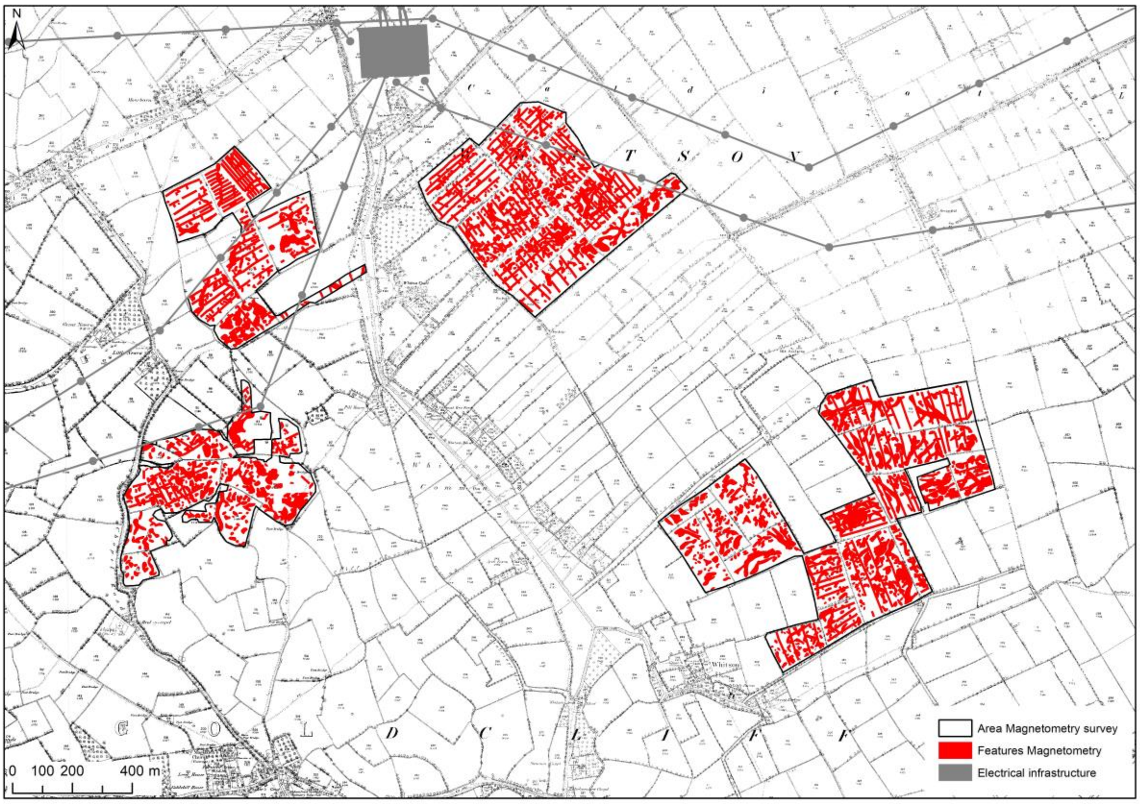


Figure 73: 2016 magnetometry survey in the context of a solar farm planning application following Davies (2016).

8.3 Survey area and methodology

8.3.1 Selection of the survey area

The morphological hypotheses presented by Murphy (1995), Lilley (1995) and Rippon (1996) for Wiston and Whitson, offer both solutions and further questions. In Wiston, the two models are contradictory, and the village's modern-day topography does not yield further insights. Given this unclear morphology, the fields surrounding the village were selected for further survey in order to locate former field-boundaries (Figure 74). Overall, this must allow reconstructing the settlement's former morphology and comparing its morphological and metrical characteristics with similar settlements in the County of Flanders.

In Whitson, however, the survey area has been based on two considerations that can be added to Rippon's 1996 model. First, to the north of Crab Tree Reen the OS map does not show long narrow plots, but rather large blocks (zone 1 on Figure 75). It therefore can be questioned whether this area was part of the original reclamation settlement. Second, to the south of the village in Rippon’s model and in the extension of Half Acre Lane, the third suggested extension phase of the narrow plots does not seem to have taken place. Instead, the lane and reen avoid a square plot of land and shift to the north, suggesting the presence of a feature that did not allow the straight continuation of the system. In order to clarify these two observations, these two zones were selected for further survey (zone 2 on Figure 75).

Figure 74: EMI survey zones Wiston.

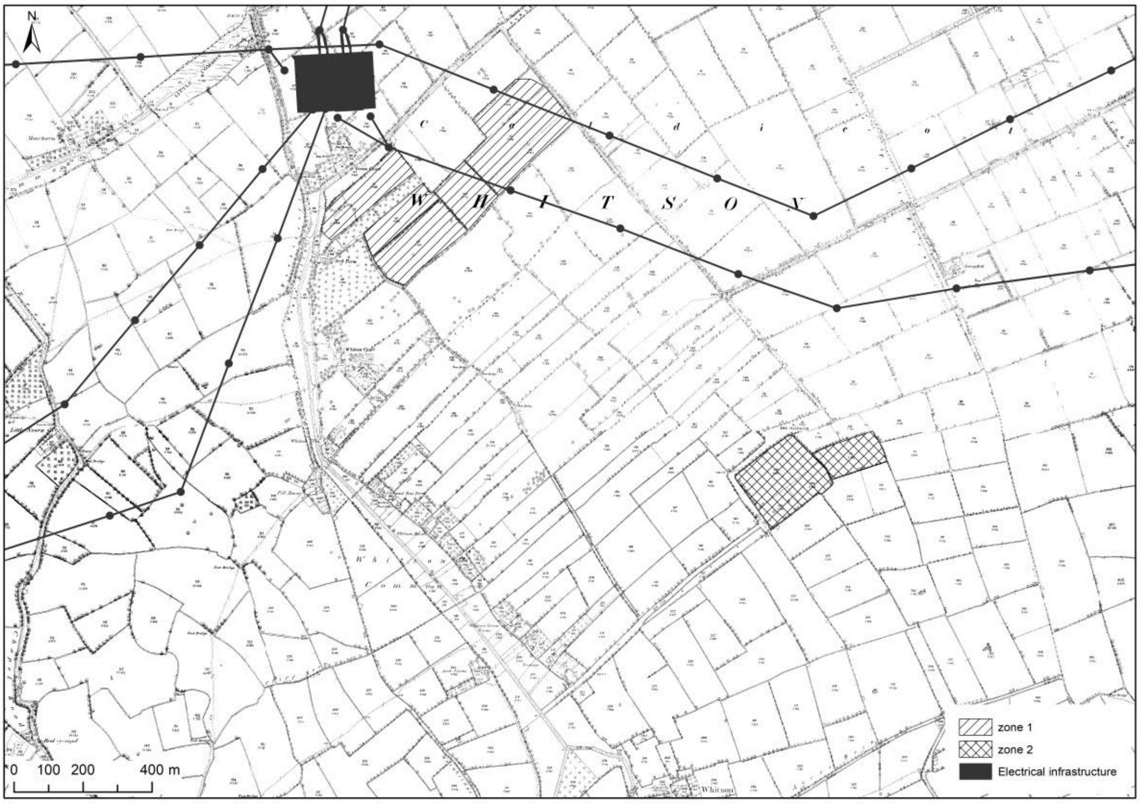


Figure 75: EMI survey zones in Whitson.

8.3.2 Methodology

The methodological approach of this research considers two datasets. The main aspect is a large-scale frequency domain multi-receiver EMI survey, which extended over 45 hectare in Wiston and 20 hectare in Whitson. A DUALEM-421S soil sensor was used, allowing both the apparent electrical conductivity (ECa) and apparent magnetic susceptibility (MSa) of the bulk soil to be obtained (Everett & Weiss 2002; Tabbagh 1986). The sensor was pulled at a height of 0.12m above the ground surface behind an all-terrain vehicle at a speed of about 6-10 km/h, crossing the field at parallel lines 1.0m apart, with measurement intervals at 0.2m within lines. The vehicle track was georeferenced by an Trimble RTK-GPS with an accuracy of approximately 1 to 2 cm. All measurements were corrected for the offset between the GPS antenna and the instrument (centre between transmitter and receiver coils) and corrected for measurement drift (Delefortrie et al. 2014).

The DUALEM-421S instrument consists of one transmitter coil and six receiver coils, located at distances of 1.0, 1.1, 2.0, 2.1, 4.0 and 4.1 m from the transmitter coil. The 1.0 m, 2.0 m and 4.0 m transmitter-receiver pairs form a vertical dipole mode (1HCP, 2HCP and 4 HCP), while the 1.1 m, 2.1 m and 4.1 m pairs form a perpendicular dipole mode (1PRP, 2PRP and 4PRP).

Both the distance between transmitter and receiver coils and the orientation of the receiver coil compared to the transmitter coil determine the depth and weighting response pattern of the signal. The PRP configurations have a higher sensitivity at shallow depths, while HCP pairs have a higher sensitivity in deeper soil layers. Consequently, depth of exploration (DOE or the depth at the 70% cumulative response) values are 0.5 m, 1.0 m, 2.0 m, 1.6 m, 3.2 m and 6.4 m for the 1PRP, 2PRP, 4PRP, 1HCP, 2HCP and 4HCP coil configurations, respectively (Saey et al. 2013; Verbrugghe et al. 2020).

This survey was supported by 2 meter resolution LiDAR data for Wiston and 1 meter resolution LiDAR data for Whitson. This difference is caused by the highly variable availability of high resolution LiDAR data in Wales, both in geographical dispersal and resolution. Natural Resources Wales (2017) offers data covering 70% of Wales, ranging from 25cm to 2m resolutions. The former are only available for areas prone to flooding. Given that Whitson is located along the Severn Estuary, a higher resolution is available than for Wiston, which is located on an inland hilltop.

8.4 Results

The results of the EMI survey in both Wiston and Whitson are presented as greyscale images. Zones with high electrical conductivity or magnetic susceptibility are thereby visualised in black, while zones with lower values are shown as shades of grey running to white (lowest electrical conductivity or magnetic susceptibility). The first edition OS maps for Wiston and Whitson (1880s), the oldest available maps for the whole settlements and their surrounding landscapes as complete coverage by sheet areas rather than parish boundaries, are used as base maps to visualise the interpretations of the survey data[28]. In contrast to the available maps dating to the early-nineteenth century, their coverage by sheet areas allows a continuous visualisation in GIS without fitting together georeferenced maps of individual parishes. Nevertheless, it should be noted that the slightly older Tithe maps (1844 for Wiston and 1845 for Whitson) and the 1830 Commissioners of Sewers map

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[28] 1st Edition County Series Maps 1:2500 of Wiston and Whitson (1853-1904). Crown Copyright and Landmark Information Groupe Limited 2020. All rights reserved.

for Whitson where both used for the interpretation of the EMI survey data (Morris 1830; 1845; "Wiston Tithe map" 1844).

8.4.1 Wiston

The different ECa plots for Wiston indicate limited variation in the overall electrical conductivity of the soils. According to the National Soilscapes map (Cranfield Soil and Agrifood Institute s.d.), two soil types occur in and around the village. The core is build up from freely draining slightly acid loamy soils, while slowly permeable seasonally wet acid loam and clayey soils cover the surrounding fields. The zones with a strikingly high electrical conductivity correspond to wet depressions in the landscape (A on Figures 76 and 77) and modern infrastructure, such as a gas pipeline and water drain (B on Figures 76 and 77). These infrastructure related features are also clearly visible on the different MSa plots (B on Figures 78 and 79). Several linear traces that are characterised by a low electrical conductivity and a high magnetic susceptibility can all be attested in the microtopography on the LiDAR 2m DTM as slight elevations (C on Figures 76, 77, 78 and 79). Most of the anomalies on the ECa and MSa data plots can be found in survey zone 1 (Figure 82), to the south of the modern-day village. The most noticeable of these corresponds with the Iron Age defended enclosure that was attested via oblique aerial photography on Conkland Hill (Driver 2013) and excavation in the context of South Wales Gas Pipeline Project (Hart 2014; Leonard 2013). The ditches related to this structure are most clearly visible through the shallow ECa-PRP1 (depth of 0.5 m) and MSa-HCP2 (depth of 0.8 m) configurations, while only faint on the MSa-HCP1 (depth of 0.4 m), ECa-PRP2 (depth of 1 m) and deeper configurations (Figures 76 and 78). This indicates that these features are shallow but mainly located underneath the plough soil. To the north and east of this structure, multiple curvilinear ditches run towards it, following the topography of the hillside. Together with the fact that several segments of the main structure are incomplete and most likely continue in the southern field, this suggest that the Iron Age landscape to the south of Wiston was far more extensive. Based on the EMI survey data, it has not been possible to identify or differentiate early medieval features from the large Iron Age structures, as was the case during excavation (Hart 2014).

The features to the north of the village are more scarce and cannot clearly be interpreted due to fragmentation (Figures 77, 79 and 83). Those to the east of zone 2 may be related to the Roman camp that was surveyed and partly excavated between 2012 and 2014 (Meek 2014; Meek & Wilson 2013; Poucher 2013).

The highest density of anomalies can be found on The Green to the east of Manor farm. This zone is transacted by a water drain, continuing in zone 2 towards the north. Close to the main road through the village, several concentrations of building material can be found on the MSa data plots (D on Figure 81). These correspond to a building platform that was attested during an earthwork survey by Murphy (1995, 78). Furthermore, parallel linear features occur dispersed across The Green. One of these can be linked to the suggested former route of the main road (Murphy 1995). The character of the other features is unclear.

Of main interest to this specific research, however, are former field-boundaries that would have structured the landscape surrounding the settlement. Although few could clearly be attested, some of these features correspond to former field-boundaries indicated on the first edition of the OS maps. These concern the low conductive linear features on Conkland Hill and to the north of the village (C on Figures 76, 77, 78 and 79). Those on Conkland Hill can be linked to the field-boundaries found in the geophysical prospection of Church Field in 1990 (Murphy 1995). Furthermore, some less visible ditch features can be attested to the south of the church and Cawdor House farm, following the same orientation as those features on Conkland Hill. Despite the high amount of anomalies on The Green, no clear remnants of plots could be attested.

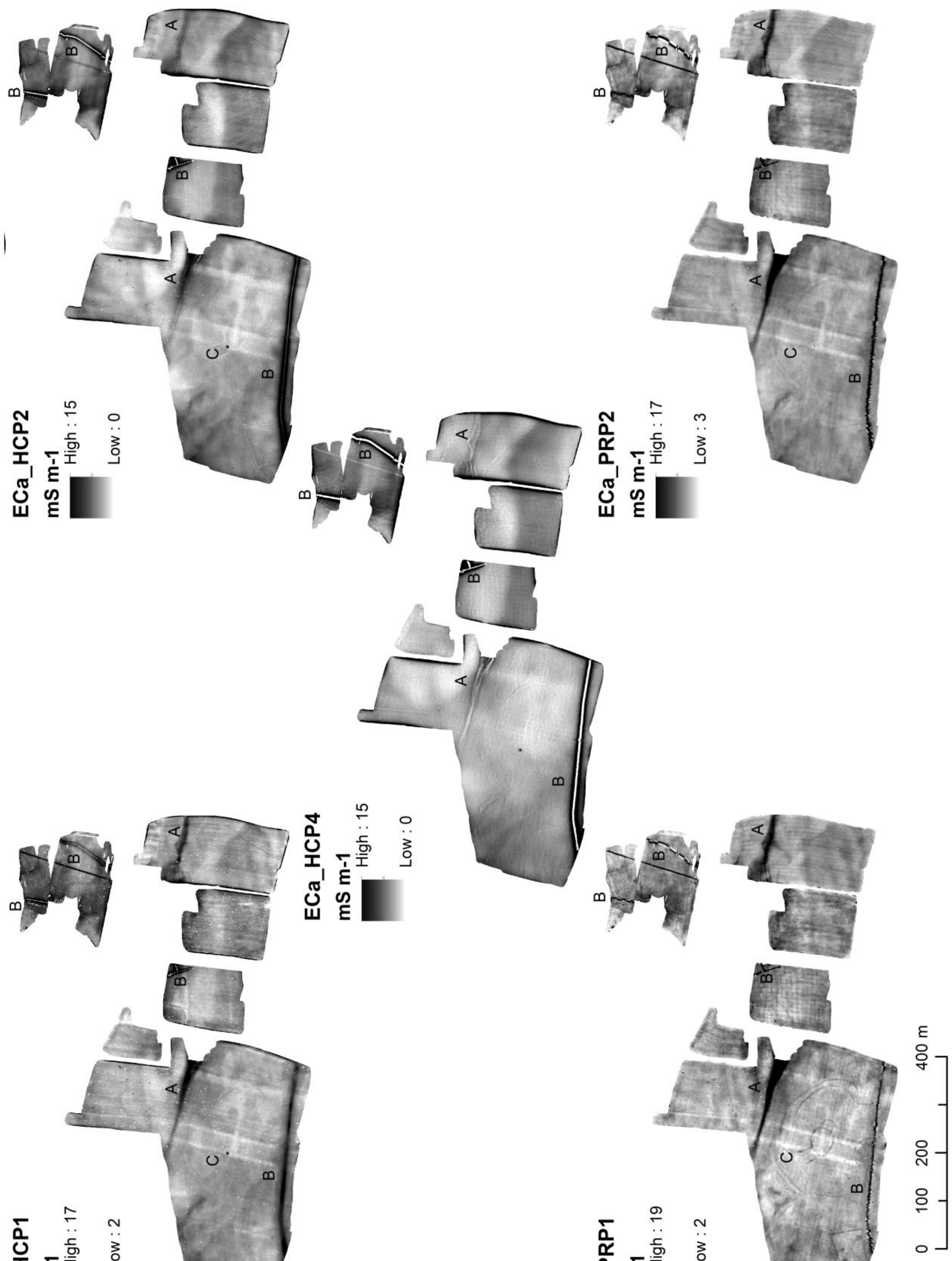

Figure 76: ECa data plots for survey zone 1 in Wiston. A=Wet depression, B=Modern infrastructure, C=Micro-topographic field-boundaries.

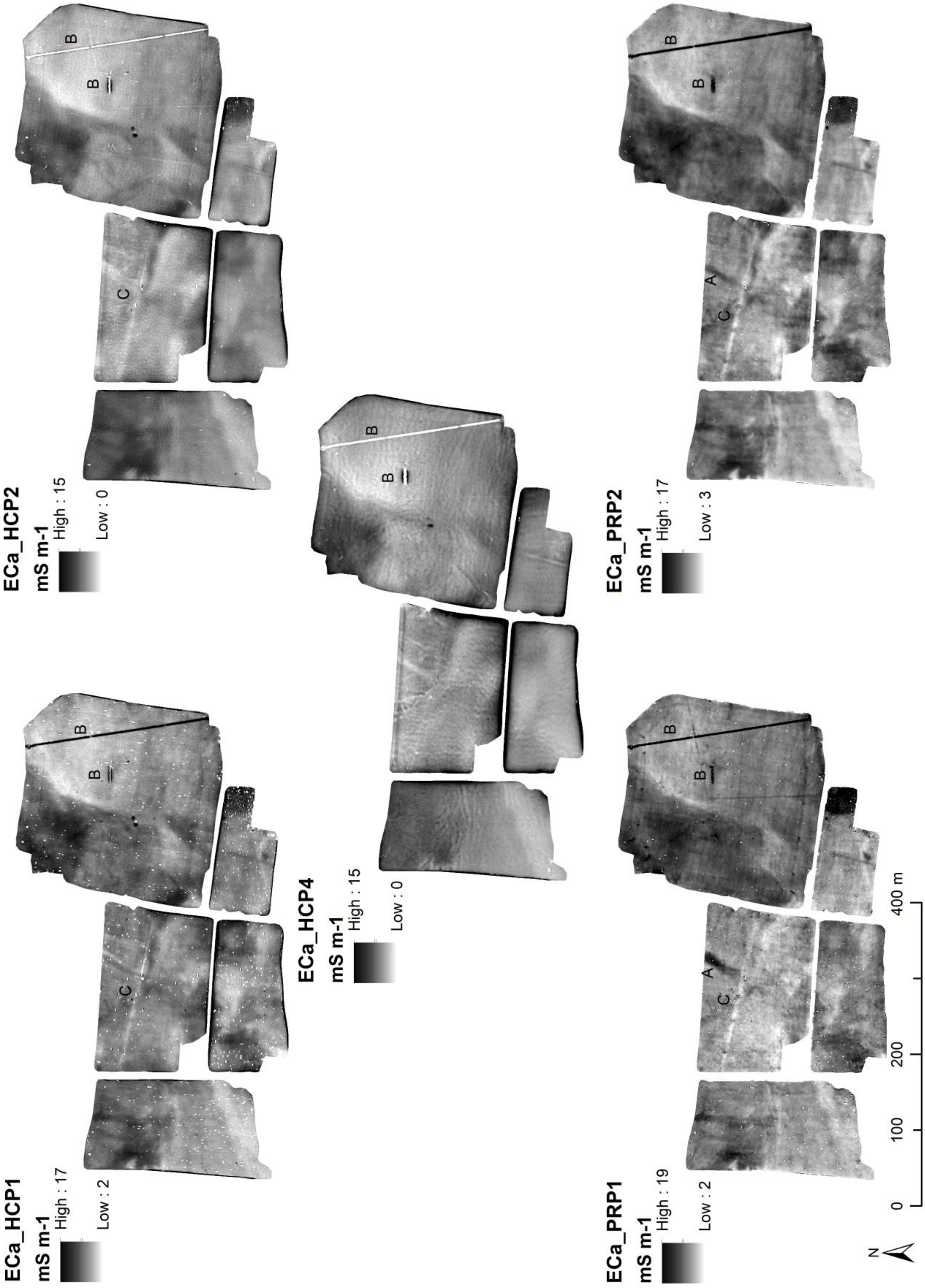

Figure 77: ECa data plots for survey zone 2 in Wiston. A=Wet depression, B=Modern infrastructure, C=Micro-topographic field-boundaries.

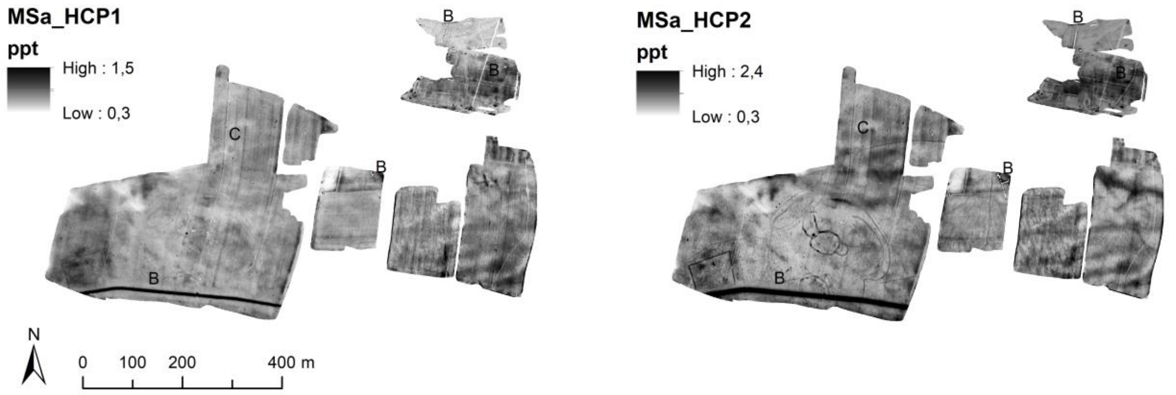

Figure 78: MSa data plots for survey zone 1 in Wiston. B=Modern infrastructure, C=Micro topographic field-boundaries.

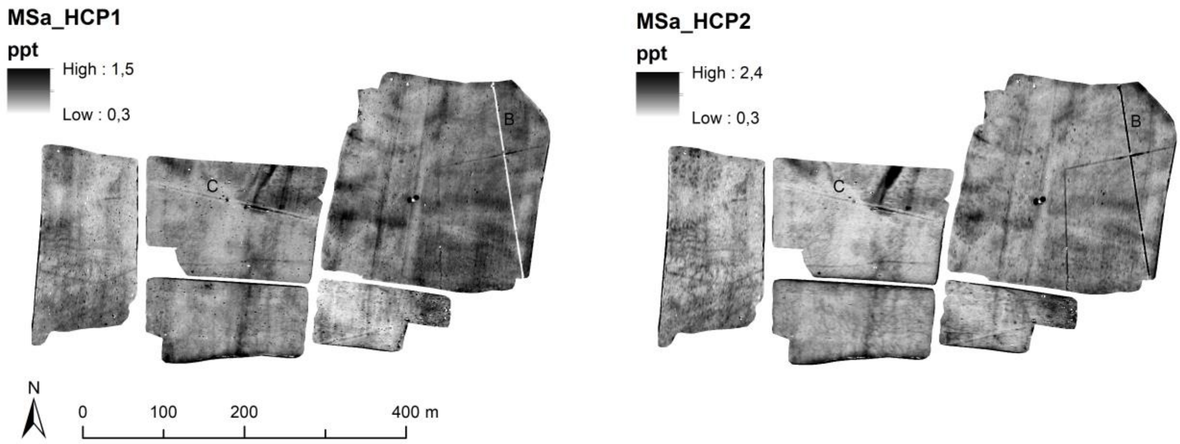

Figure 79: MSa data plots for survey zone 2 in Wiston. B=Modern infrastructure, C=Micro topographic field-boundaries.

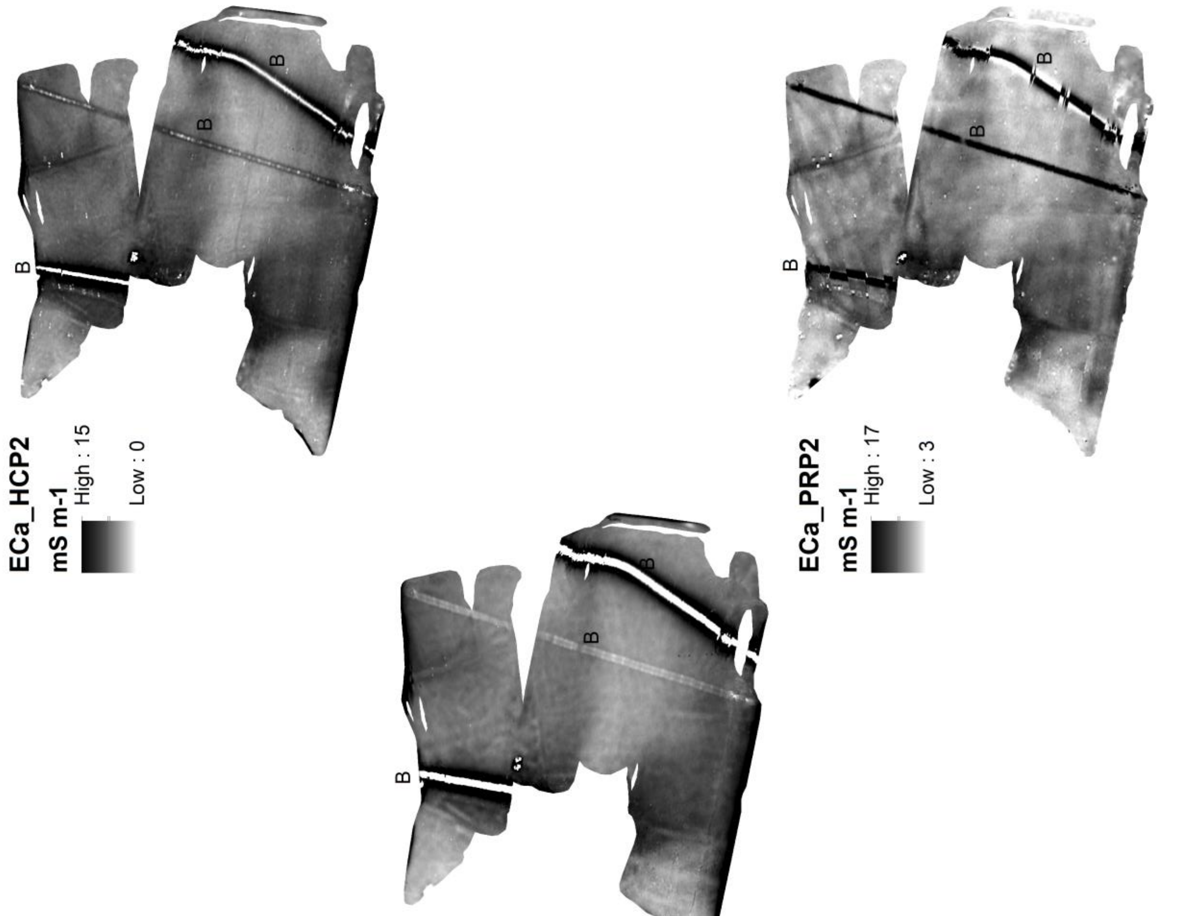

Figure 80: ECa data plots for The Green. B=Modern infrastructure.

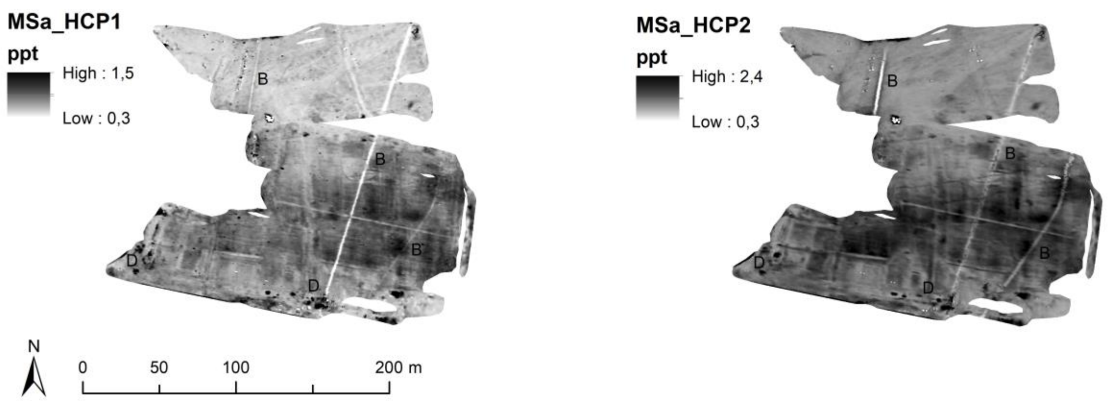

Figure 81: MSa data plots for The Green. B=Modern infrastructure, D=Concentration of building material.

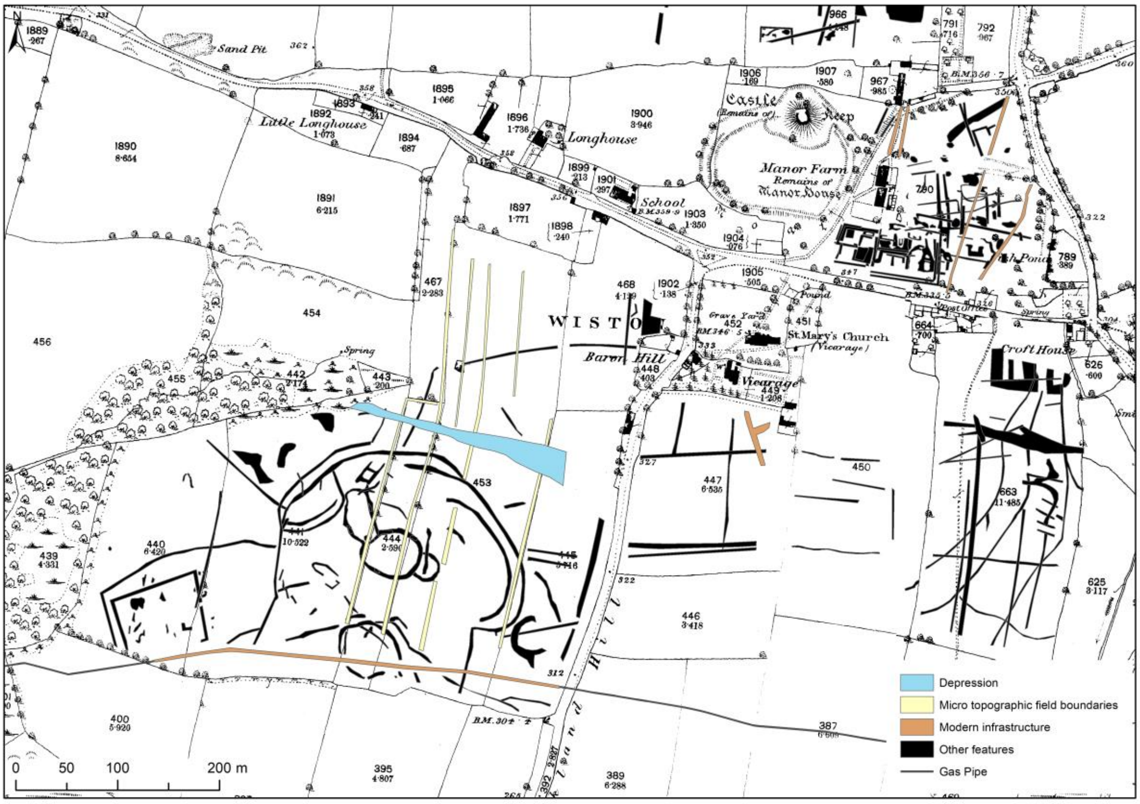

Figure 82: Overview of features visible on EMI data plots in survey zone 1.

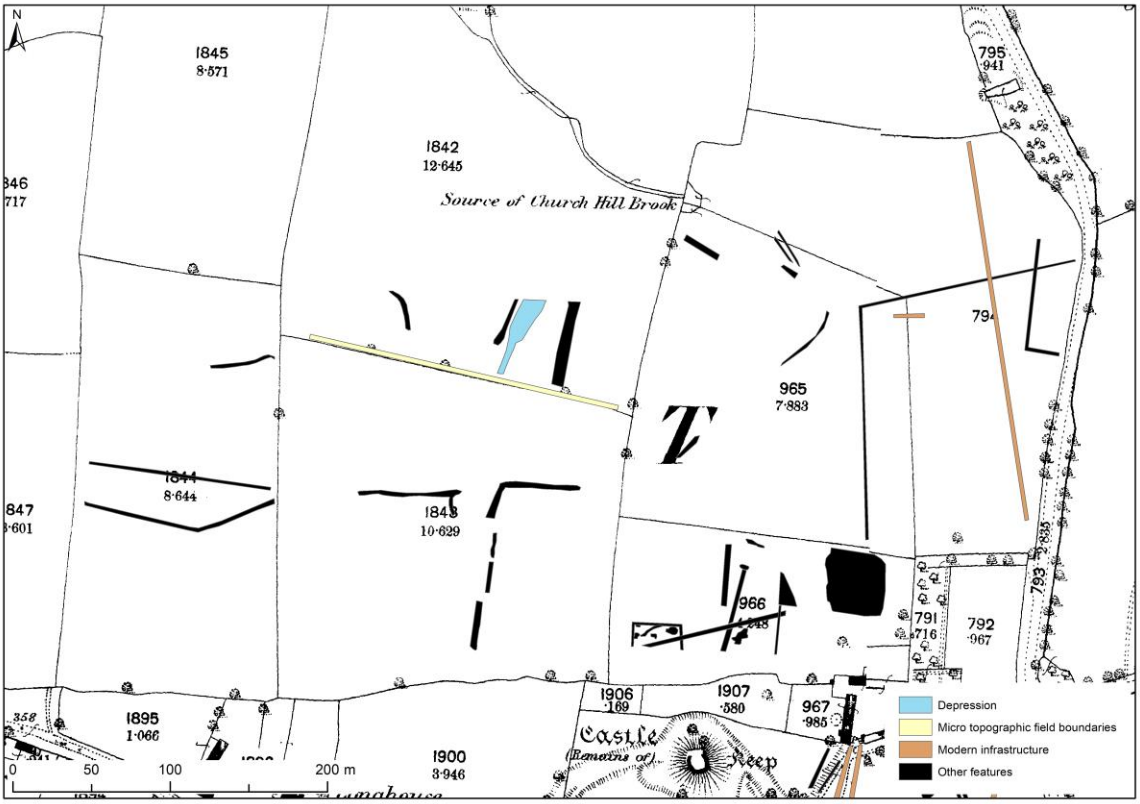

Figure 83: Overview of features visible on EMI data plots in survey zone 2.

8.4.2 Whitson

The different ECa plots north of Crab Tree Reen (Zone 1; Figure 84) and to the south of the village (Zone 2; Figure 85) indicate a high variability in soil characteristics, which are not represented on the National Soilscapes map (Cranfield Soil and Agrifood Institute s.d.) nor on the Geological map (British Geological Survey 1990). Both zones of the study area are thereby described as 'loamy and clayey' soils of coastal flats with naturally high groundwater. Several curvilinear features on the ECa plots suggest the presence of former creeks or tidal inlets. Related to the known landscape history of the study area as tidal flats (Allen 2000; 2001; Allen & Haslett 2006; 2007), the large variability in electrical conductivity can be interpreted as representations of past floods, sedimentations of loam and clay and the formation of peat-silt couplets. Furthermore, the shallow ECa measurements of ECa-1PRP (depth of 0.5m) and ECa-2PRP (depth of 1m) show a considerably lower conductivity level than that of the ECa-HCP1 (depth of 1.6m), ECa-HCP2 (depth of 3.2m) and ECa-4HCP (depth of 6.4m) coil-configurations. This can be considered as an indication for a higher amount of organic material, clay or saline aquifer in these deeper horizons as has been attested by Allen (2000). Despite these variations, however, a high number of linear features are visible (Figures 86 and 87). Based on their straight and regular orientation, these are interpreted as artificial. All of these, except a moated site in the northwest corner of survey zone 1, are related to two water management systems known on the Levels as ‘gripping’ and ‘ridge and vurrow’ (Rippon 1996, 50-52; Turner 2016, 4 and 7). ‘Grips’ are small and shallow open ditches, specifically dug for carrying of water into the field-ditches, laid out in a rectangular pattern (Turner 2016, 4). These were dug by hand and were generally around 20 meters apart (Rippon 1996, 54). This traditional system is being replaced by modern under-drainage systems (Waters 2017). ‘Ridge and vurrow’, in contrast (not to be confused with the ‘ridge and furrow’ of medieval agriculture), is created by the dedicated ploughing of ridges for water management, resulting in a grid of smaller ditches within a grip system (Rippon 1996, 50-52). Besides these smaller ditches and grips, the different ECa and MSa plots (Figures 88 and 89) also reveal larger former field-ditches in both survey zones, indicating a former division of the modern-day plots. These larger ditches are clearly visible in the magnetic susceptibility measurements, which do not indicate other archaeological or physical-geographical features. The ECa-HCP2, ECa-HCP4 and MSa-HCP2 measurements are, however, slightly influenced by the High Voltage Cables in the north eastern part of survey zone 1, which cause a discordant linear trace in the data.

For the whole of Whitson, the 1m resolution LiDAR data (Natural Resources Wales 2017) offers further insights in these former field-ditches and water management systems (Figure 90). North of Crab Tree Reen, the longitudinal plots that could be attested in the EMI data plots continue in the surrounding lands as well. Whitson Common and the farms along its eastern side are clearly located on higher ground, while the topography lowers towards the east. Rippon (1996, 86) noticed how the lateral boundary of the first extent of the village in his model was not parallel to the edge of the common or Monksditch, something that might have expected if one of these was used as an axis for the further planning of the settlement. The LiDAR data, however, indicates that this first boundary runs along the edge of a slight elevation in the landscape, thereby avoiding the higher grounds. Furthermore, the LiDAR data suggests a more clear continuation of these lateral ditches towards the south-southeast of Half Acre Lane, than the Ordnance Survey maps.

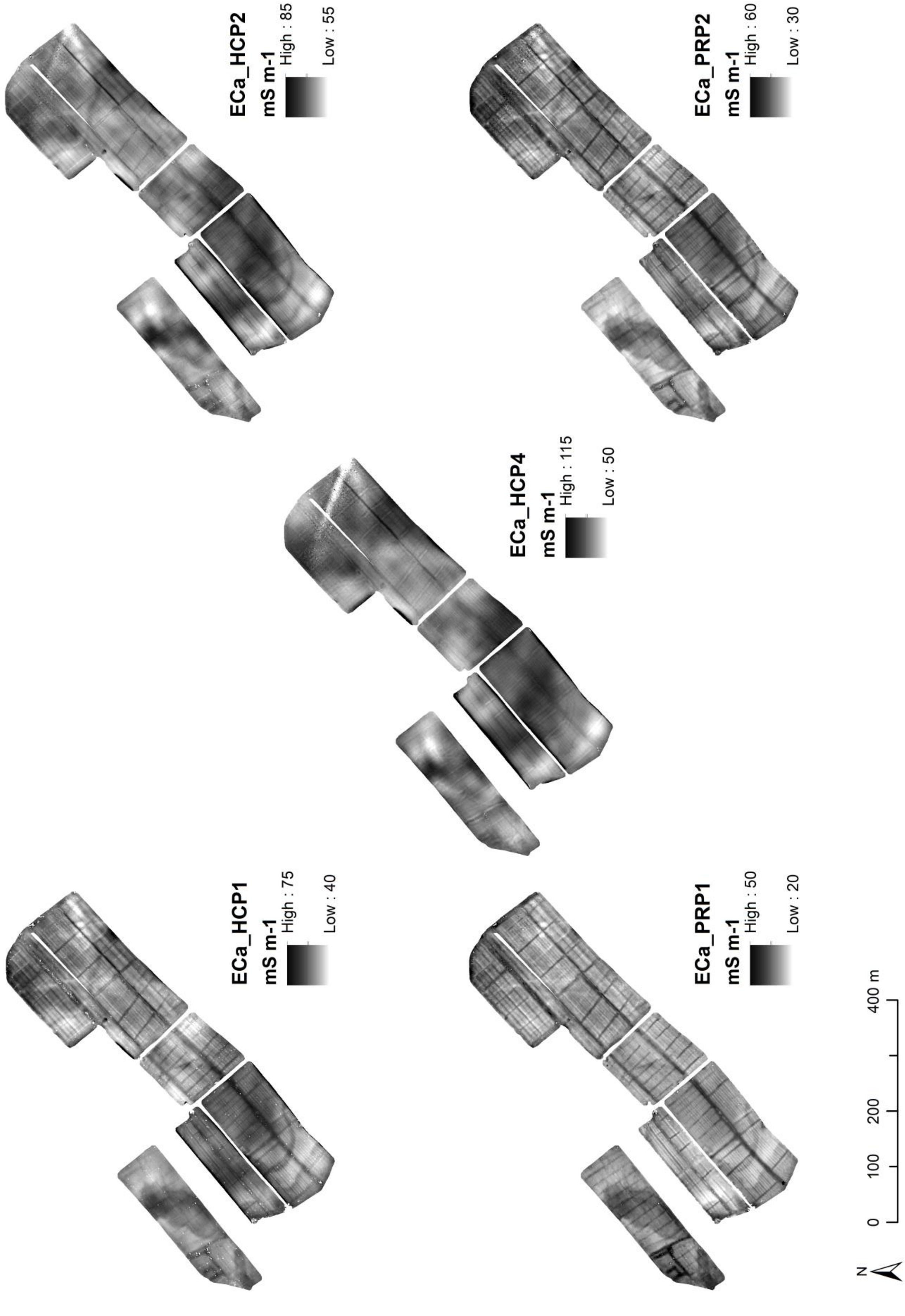

Figure 84: ECa data plots for survey zone 1, north of Crab Tree Reen.

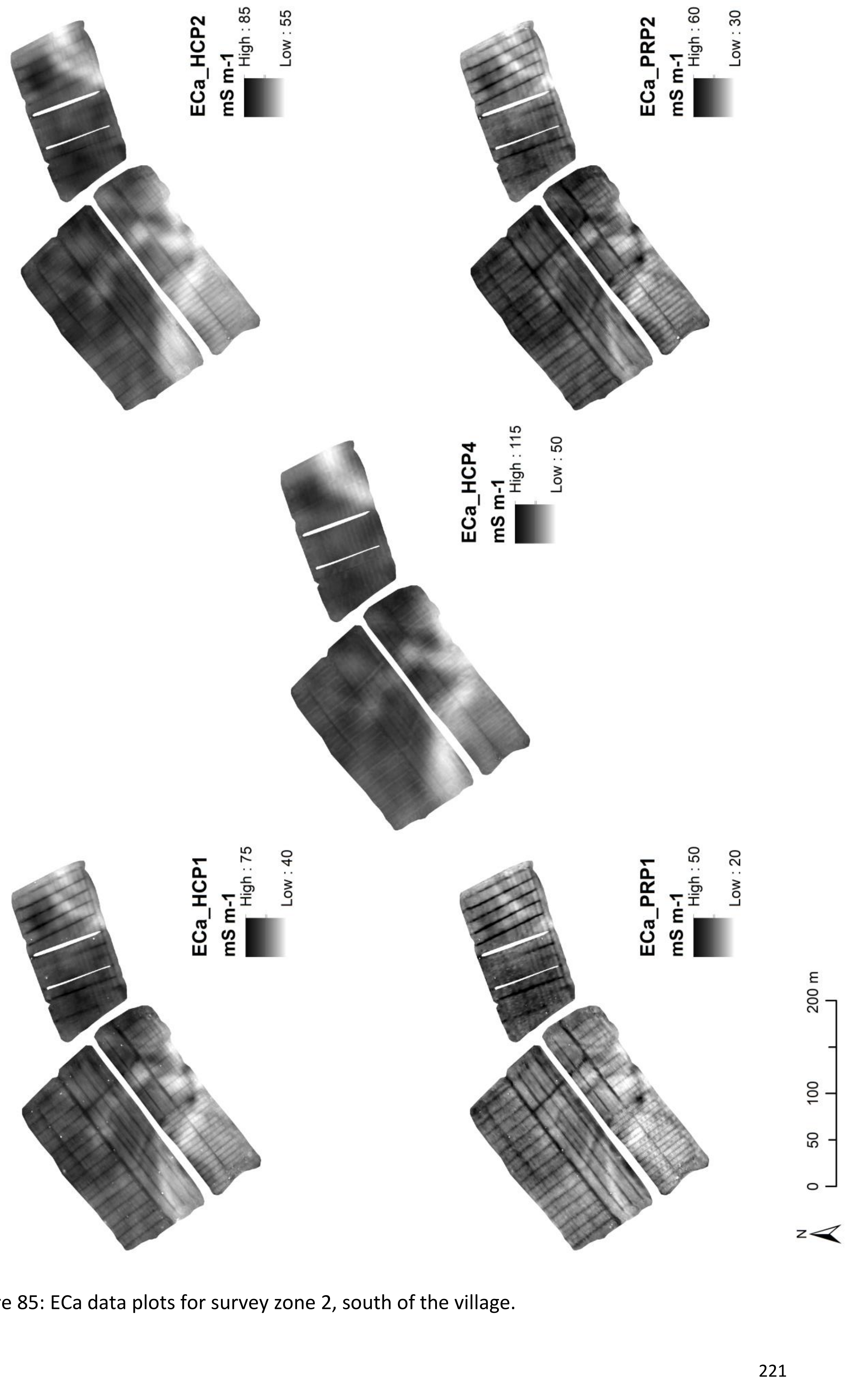

Figure 85: ECa data plots for survey zone 2, south of the village.

Figure 86: Main ditch features visible on ECa and MSa data plots for zone 1.

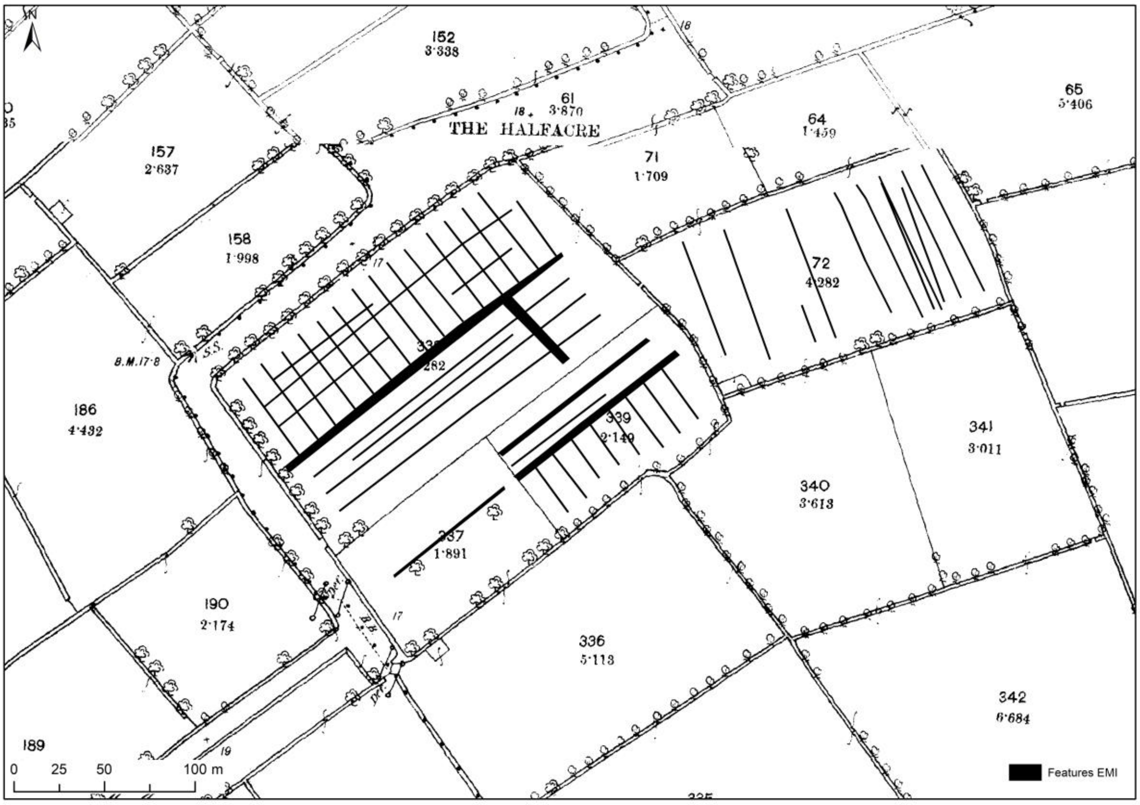

Figure 87: Main ditch features visible on ECa and MSa data plots for zone 2.

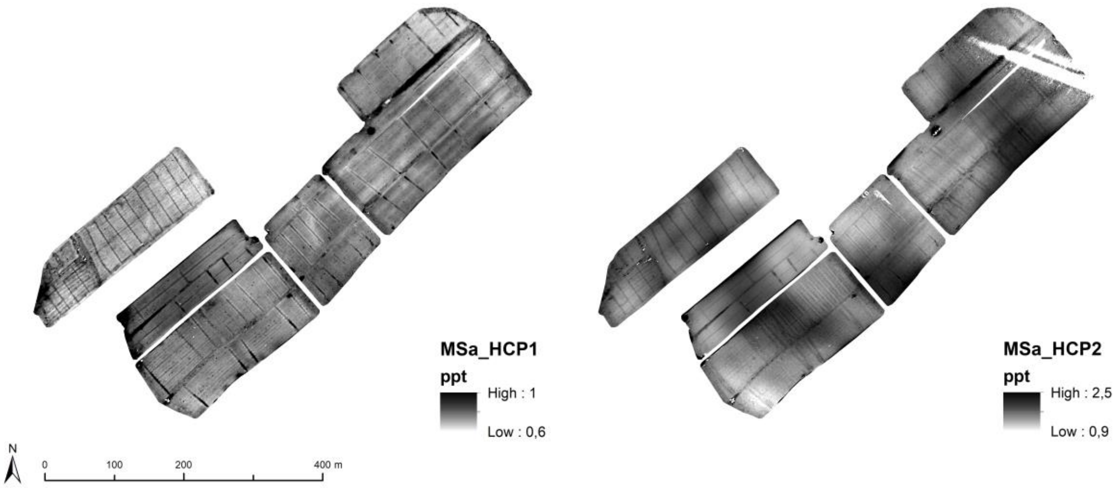

Figure 88: MSa data plots for survey zone 1, north of Crab Tree Reen.

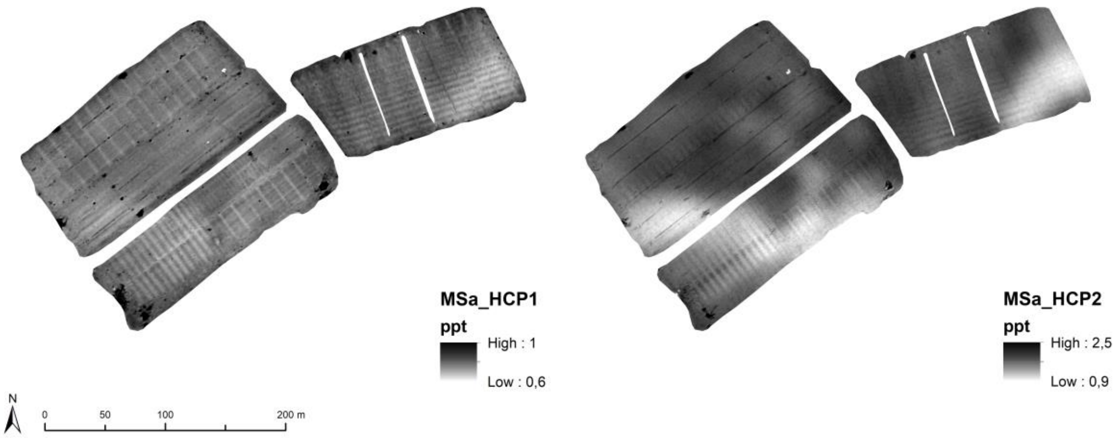

Figure 89: MSa data plots for survey zone 2, south of the village.

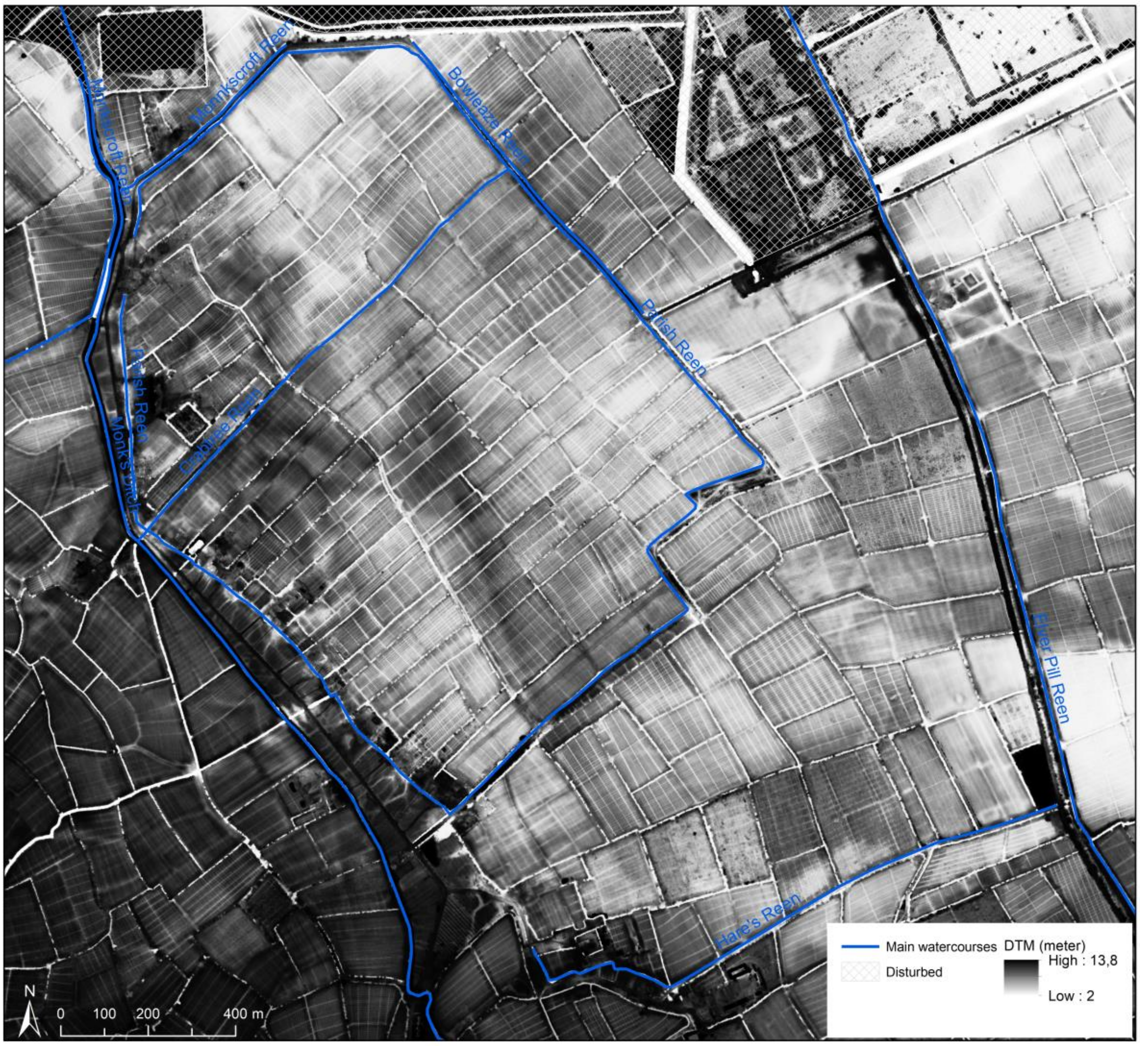

Figure 90: LiDAR Whitson (Visualised using Histogram Equalize stretch).

8.5 Interpretation

8.5.1 Morphology of Wiston

Murphy (1995) and Lilley (1995) each had their own interpretation of the settlement morphology of Wiston. Both considered Wiston as a failed borough, based on historical references, and ascribe the characteristic morphology of a Norman town to the former layout of the village (cf. supra). Based on his comparative research on Norman castle-towns in Britain, Lilley (2017, 38) describes this morphology as a composite, consisting of identifiable characteristic aspects which can be arranged differently. These comprise a motte and bailey castle, a market street, planned lay-out and a strategic topographic position. These can indeed all be attested in Wiston, apart from a clearly identifiable planned lay-out of burgage plots. Indications of these plots were studied in the 1990 geophysical survey and archaeological excavation of Church Field (Murphy 1995, 83-84). In addition, one of the related field-boundaries could be attested through the large-scale EMI survey on Conkland Hill. In the same field, other longitudinal anomalies were interpreted as former field-boundaries. All have the same orientation, perpendicular to the road running east-west through the village. Elsewhere around the settlement, however, indications of burgage plots are scarce and seem to be limited to the south of the village. In all these cases the orientation is similarly perpendicular to the main east-west road. This strongly supports Murphy’s 1995 model, although no clear indications for field-boundaries could be attest through EMI on The Green.

Using these findings, an interpretative model (Figure 91) of the field-boundaries in Wiston was mapped in GIS in order to allow further morphological and metrical analysis of the settlement lay-out (Figure 92), based on the identified field boundaries through the EMI-survey.

Figure 91: Interpretative model of settlement morphology at Wiston.

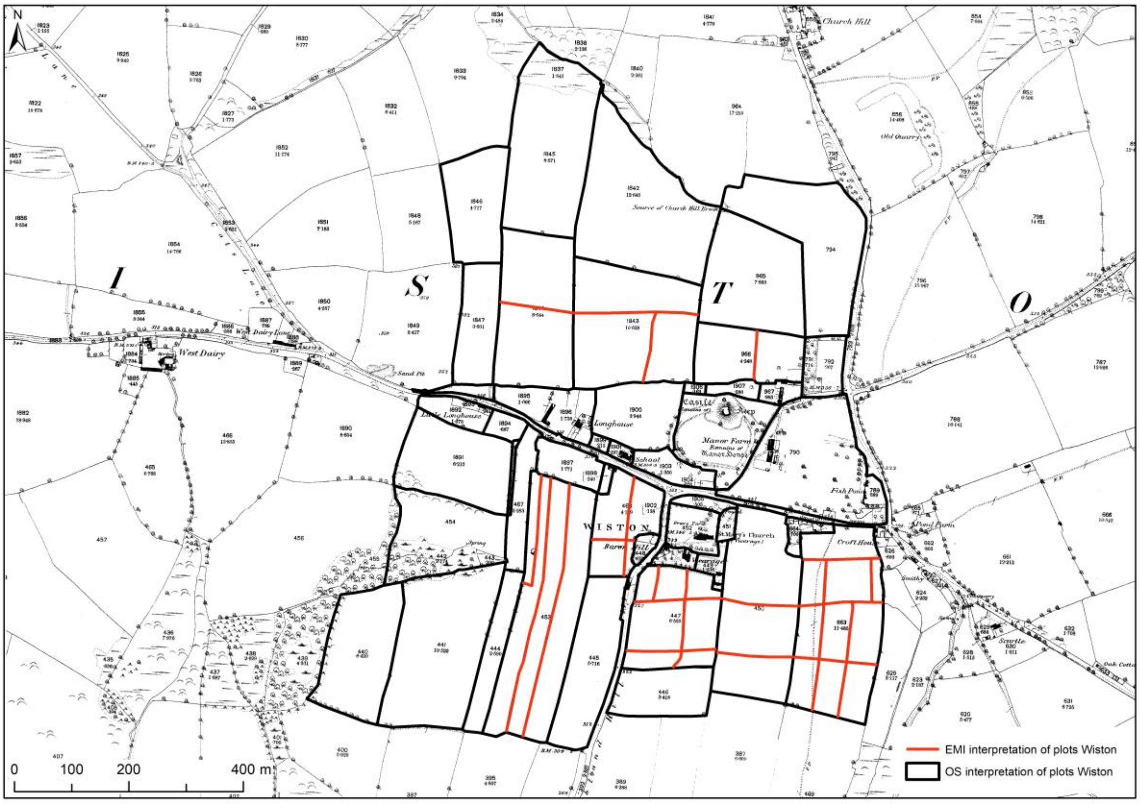

Figure 92: Interpretation of the former field-boundaries in Wiston, based on the large-scale EMI survey and the first edition Ordnance Survey map.

8.5.2 Development of Whitson

Based on the EMI survey and LiDAR, a renewed phasing for Whitson can be proposed following Rippon's 1996 model. As in Rippon's model, the first phase of reclamation would have been located along the edge of the funnel shaped common. The first back lane would have run along slight elevations in the landscape, which provides an explanation for Rippon's (1996, 86) observation that it does not run parallel to the edge of the common or Monksditch. Furthermore, this reclamation would have extended further south of Half Acre Lane than Rippon (1996) proposed. In consecutive phases, the narrow plots of lands would have extended further east, for which at least five phases can be recognised (Figure 93). Although the overall lateral boundaries show a phased extension, minimal deviations from the these lateral axes might suggests that plots were extended individually rather than strictly systematically. Considering that the reclamation would have extended further south as well, this places the village closer to Whitson Church. However, there remains a distance of circa 200 meters between them, which does not permit further clarification of why this church is so far from the village and whether it was originally indeed Whitson Church.

Based on these findings, an interpretative model of the field-boundaries in Whitson was mapped in GIS as well in order to allow further morphological and metrical analysis of the settlement lay-out (Figures 93 and 94).

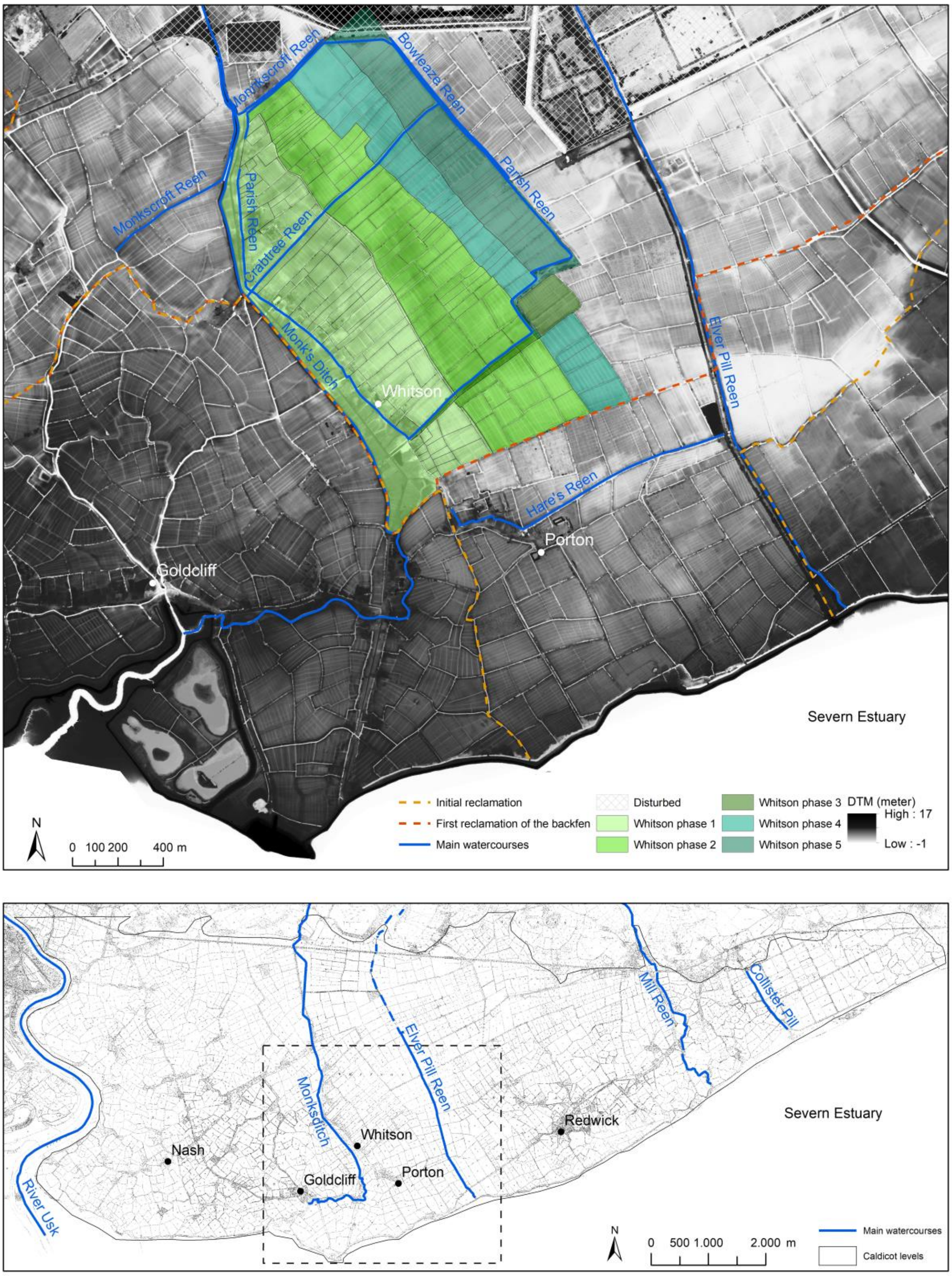

Figure 93: Renewed interpretation of Rippon's 1996 model for the development of Whitson (DTM visualised using Histogram Equalize stretch).

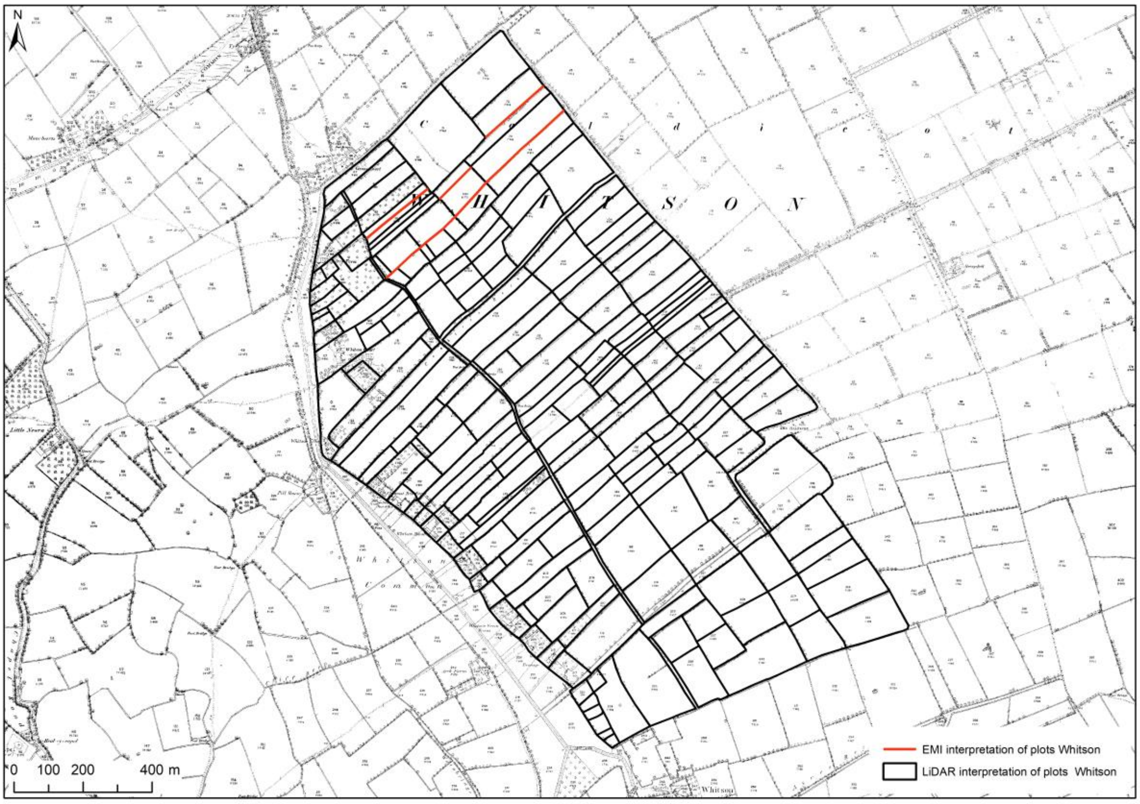

Figure 94: Interpretation of the former field-boundaries in Whitson, based on the large-scale EMI survey and LiDAR data.

8.5.3 Some thoughts on indications of ridge and furrow in Whitson

As described by Courtney (1983, 293-294) and Rippon (1996, 52), few clear examples of sigmoidal or S-shaped ‘ridge and furrow’ seem to be found on the Gwent Levels. It is, however, unclear to what extent this scarcity was a historical reality or has been caused by relatively recent destructions of this system. Although most of the mapped features on both the EMI and LiDAR data are most likely related to other ridging systems (cf. supra), a slight elongated S-shape can be recognised in the former and modern-day field-boundaries to the north east of Whitson Manor (Figure 95).

Elongated S-shaped ‘ridge and furrow’ is most commonly associated with medieval open fields, resulting from the particular procedure needed to turn the plough at the end of every furrow (Eyre 1955, 85; Hall 2014, 150; Taylor 1975, 78-79). Courtney (1983, 294) however did not consider it to be invariably indicative of a medieval nor of an open field related origin. He considers it mainly as the result of using a mouldboard plough and ploughing in clockwise direction. Furthermore, Eyre (1955, 80) states that ridge and furrow continued to be created well into the nineteenth century, even on lands that were not under ‘ridge and furrow’ during the medieval period.

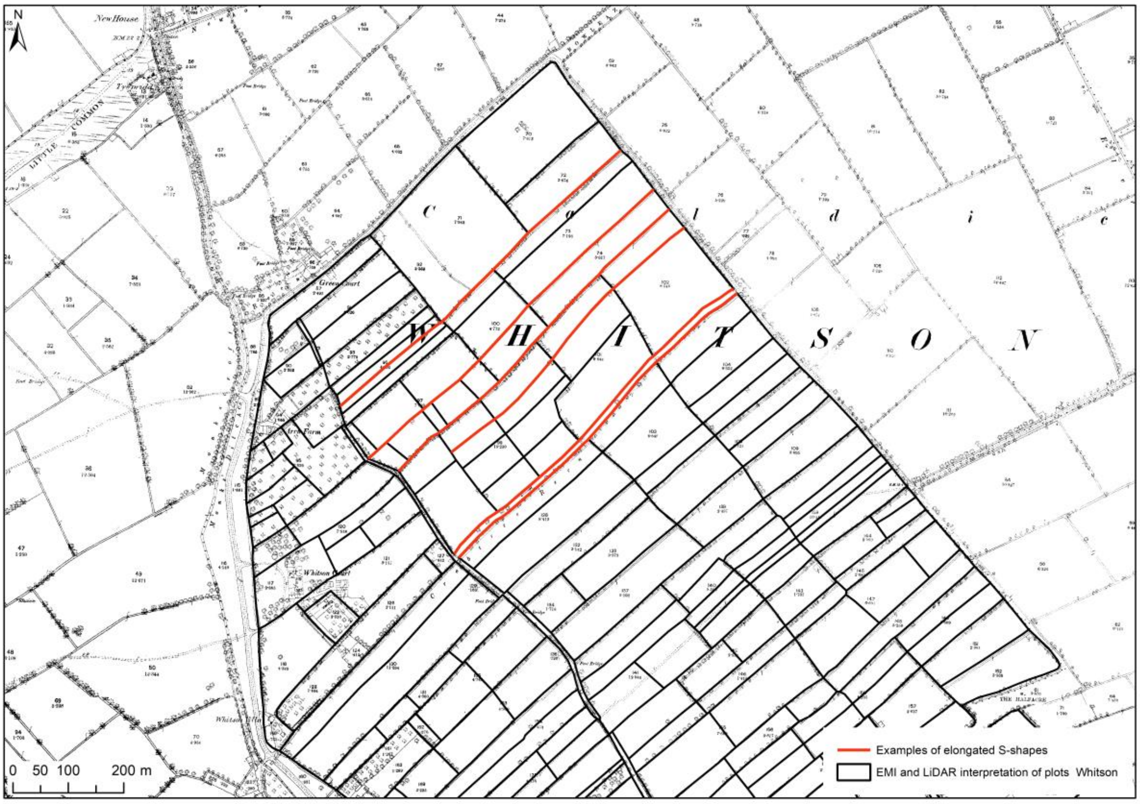

Figure 95: Examples of possible elongated S-shapes to the north of Whitson.

During fieldwork for his PhD research, Courtney (1983, 293) noticed that most of the attested examples of ridge and furrow in Gwent were characterised by straight, rather than sigmoidal S-shaped ridges. Furthermore, these tended to fit perfectly within the modern field-systems, which let him to interpret them as being of post-medieval origin. The latter is also applicable to the ridges in Whitson. Moreover, the sinuosity index indicates that there is little diversion from the direct connection between start and endpoint. This index, developed in the field of hydrology, is a measure of straightness of a linear element (Mueller 1968), and is expressed as the ratio between the length of a line and the shortest distance from start to end point of that line. A straight line therefore has a sinuosity of one and the straighter a line is, the closer its sinuosity value will approach one.

This sinuosity index has been calculated for the individual plots and for the few longitudinal axes that are built up of consecutive field-boundaries stretching the whole length of the settlement. In both cases, the sinuosity values closely approach one, with average values of 1.000 for the plots and 1.002 for the longitudinal axes. This indicates that there is little deviation from a straight line. Rather than representing sigmoidal 'ridge and furrow', the elongated S-shape may therefore be the result from the phased development of Whitson. By extending the narrow plots in different phases, slight deviations from the initial orientation occurred. These resulted in a sigmoidal-like shape over longer distance (up to 1 kilometre in the case of Whitson), while the individual plots are characterised by relatively straight field-boundaries.

8.6 Conclusion

Through the application of large-scale frequency-domain multi-receiver EMI and LiDAR data at the settlements of Wiston (Pembrokeshire) and Whitson (Monmouthshire), this study contributes to the morphological analysis of planned rural settlements with a supposed Flemish origin in Wales. The identification and mapping of former field-boundaries allowed a partial confirmation and further development of already existing morphological hypotheses for both settlements. Several distinct features of a Norman town morphology can be ascribed to Wiston, despite its status as a failed borough. The motte and bailey castle dominates the site, while the main east-west road through the village would have been used as a main axis for the settlement lay-out. The identification of burgage plots within the modern-day village core was, however, not possible. Despite the absence of a castle site and borough status in Whitson, morphological similarity can be attested. Plots of land are thereby oriented perpendicular to the main road. This study allowed identification of a further southward extension of the settlement, adding to the existing development model. The presence of a large funnel-shaped common (which has been identified by Rippon (1996, 47) as one of several drove ways on the Levels) in contrast to the small open space along the main east-west road in Wiston (which had been identified as a market street/place by Murphy (1995, 98)), suggests a different socio-economic origin than Wiston. While the latter is understood to have been a dedicated borough with market rights (Murphy 1995, 75), Whitson would have been a planned rural settlement aimed at extending the reclaimed backfens on the alluvial levels. This is supported by the fact that no clear indications for markets held at Whitson are available. Despite these differences, the basic system of a row settlement can be attested in both settlements. This offers the potential for further comparative analysis with other 'Flemish' settlements in Wales and similar settlements in the County of Flanders, which will be considered in the next chapter.

Chapter 9 Morphological and metrical analysis of row settlements in South Wales and the County of Flanders

9.1 Introduction to the approach

Based on the research by Roberts (1987, 199-200) and Kissock (1990; 1997), it is suggested that the occurrence of planned row settlements in the south of Wales can be related to a Flemish presence in the region. Given the assumed translocation of the settlement system, similarities in metrical and morphological characteristics may be expected. In order to test this hypothesis, the metrical and morphological characteristics of planned row settlements in the south of Wales and the County of Flanders are analysed and compared. It must be stressed that both aspects are studied using metrics, which are quantitative variables to describe the spatial structure. The distinction between metrical and morphological characteristics is hereby used to differ between the measurements used for widths and lengths of the plots, and the shape of the plots respectively. Given the overall rectangular shape of the plots, the selected metrics are based on length and width measurements, as is also the case for the many existing comparative classifications of field systems in (historical-)geographical research (Antrop & Van Eetvelde 2017, 236-238, figure 9.20; Baker & Butlin 1973; Lebeau 1996; Lienau 1986, 92-106; Roberts & Glasscock 1983; Uhlig & Lienau 1972).

9.1.1 Wales

The Welsh county of Pembrokeshire forms the main study area for this analysis. In addition, however, the village of Whitson (Monmouthshire) has been included in the dataset following research by Rippon (1996, 84-87). The first edition of the Ordnance Survey maps (1853-190) of Pembrokeshire was used to map the distribution of rural row settlements in the county (Crown Copyright and Landmark Information Group Limited 2020). Towns with a distinctive Norman planned layout (Lilley 1995; 2017; Lilley et al. 2007), such as Haverfordwest, have not been included because of their urban character. This resulted in the identification of five sites with a distinctive row settlement morphology: Angle, Letterston (referring to the personal name Lettard), Reynalton (referring to Reginald), Templeton and Wiston (referring to Wizo) (Figure 96). All but Angle and Templeton have place names with a possible link to Flemish *locatores* (Charles 1992; Kissock 1997; Roberts 1987, 199-200; Toorians 1990, 110 and 114). The latter is understood to be referring to the Knights Templar and, based on a 1282 reference, it may have been planted as a borough rather than a purely rural settlement(George Owen of Henllys 1994). Place name research by Toorians (1990, 110 and 114) and Roberts (1987, 199-200), however, indicates a wider occurrence of assumed 'Flemish' place names (Figure 96). Four of these can be considered as nucleated settlements with no distinctively planned lay-out: Clarbeston (Clarenbald), Jameston, Jeffreyston (Galfrid) and Waterston (Walter).

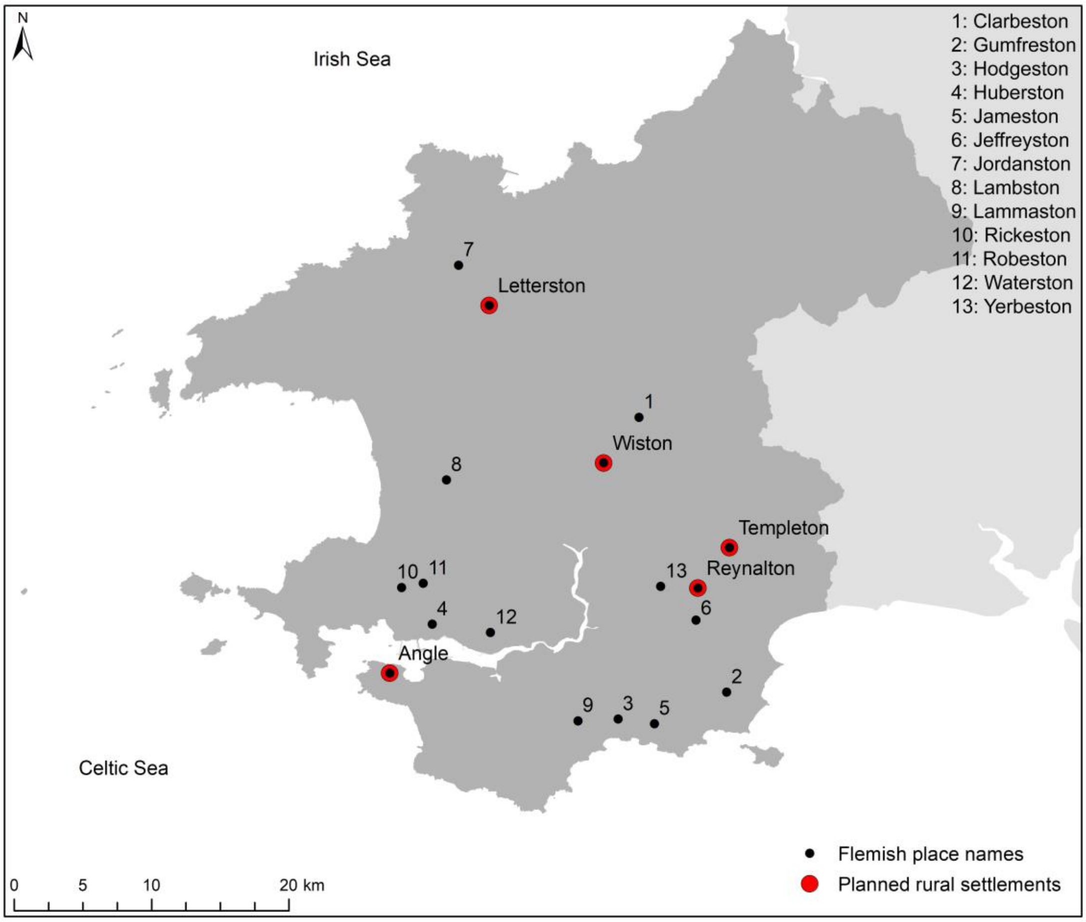

Figure 96: Planned rural settlements on the first edition Ordnance Survey map, and Flemish place names in Pembrokeshire following Toorians (1990) and Roberts (1987).

Nine other place names relate to farms or churches without clear nucleated habitation on the OS map: Gumfreston (Gunfrid), Hodgeston, Huberston (Hubert), Jordanston (Jordan), Lambston (Lambert), Lammaston (Lambert), Rickeston (Ricard), Robeston (Robert) and Yerbeston.

Based on this mapping, the villages of Angle, Letterston, Reynalton, Templeton, Wiston and Whitson were selected for further analysis. For each village, based on the OS (1853-1904) and Tithe (second half of the nineteenth century) maps, an interpretation of the historic perpendicular plots of land related to the settlement were mapped (Crown Copyright and Landmark Information Group Limited 2020; Llyfrgell Genedlaethol Cymru/The National Library of Wales 2017). For Angle, one additional historical map of 1825 was also available ("Map of Angle and Bangeston demesne in the manors of Angle and Hall" 1825). The data of the geophysical surveys in Wiston and Whitson (see previous chapter), as well as an 1831 Commissioner of Sewers map and recent LiDAR data for Whitson, were incorporated for the respective villages (Morris 1830; Natural Resources Wales 2017).

This mapping resulted in a polygon dataset (Figures 97 to 102), for which three measurements of patch characteristics were calculated using GIS. First, an approximation of the average width was considered as $(2 \times A)/P$ (Whuber 2013). A hereby refers to the area of the polygon, while P represents the perimeter. Although all plots in this dataset can be characterised as long and narrow, they differ from an elongated rectangle. Therefore it is important to note that this metric is not the exact average width but an approximation to allow comparison. A second metric is the Corrected Perimeter-Area (CPA), which considers the shape of a polygon. This measurement is based on a corrected ratio of the perimeter (P) and area (A) of the polygon and is calculated as $(0.282 \times P)/\sqrt{A}$ (Farina 1998, 145). The CPA varies between 1 (= a circle) and infinity (= an infinitely long and narrow polygon). For largely quadrangle plot shapes, as is the case for the selected case studies, this value can be expected to be relatively low. However, it needs to be considered that this will vary in relation to the length of the plots. Square plots will have a lower CPA value in comparison to long rectangular plots. Similar considerations need to be made for the final metric, the Fractal Dimension D, which is a measurement for the complexity of a polygon shape and is calculated as $(2 \times \log P)/\log A$ (Paszto et al. 2011, 199). D can lie between 1 and 2, where a fractal dimension approaching 1 corresponds with a simple shape, while a fractal dimension approaching 2 indicates a highly complex and convoluted shape (Farina 1998, 145). Additionally, polylines were drawn in GIS, representing the width of the plots. Three lines were drawn, representing the outer and middle widths, for each individual plot (Figures 97 to 102).

Figure 97: Plots and widths in Angle.

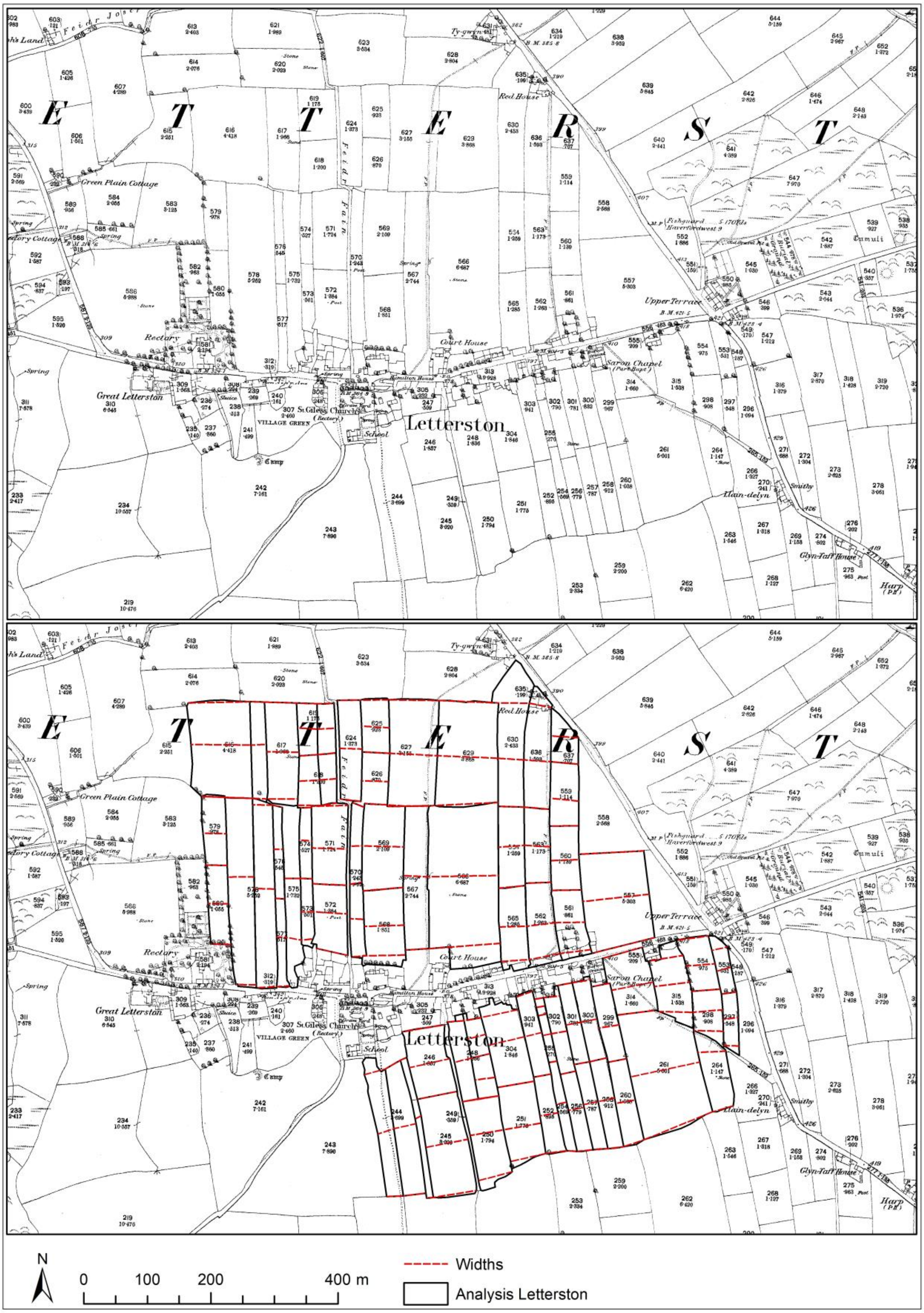

Figure 98: Plots and widths in Letterston.

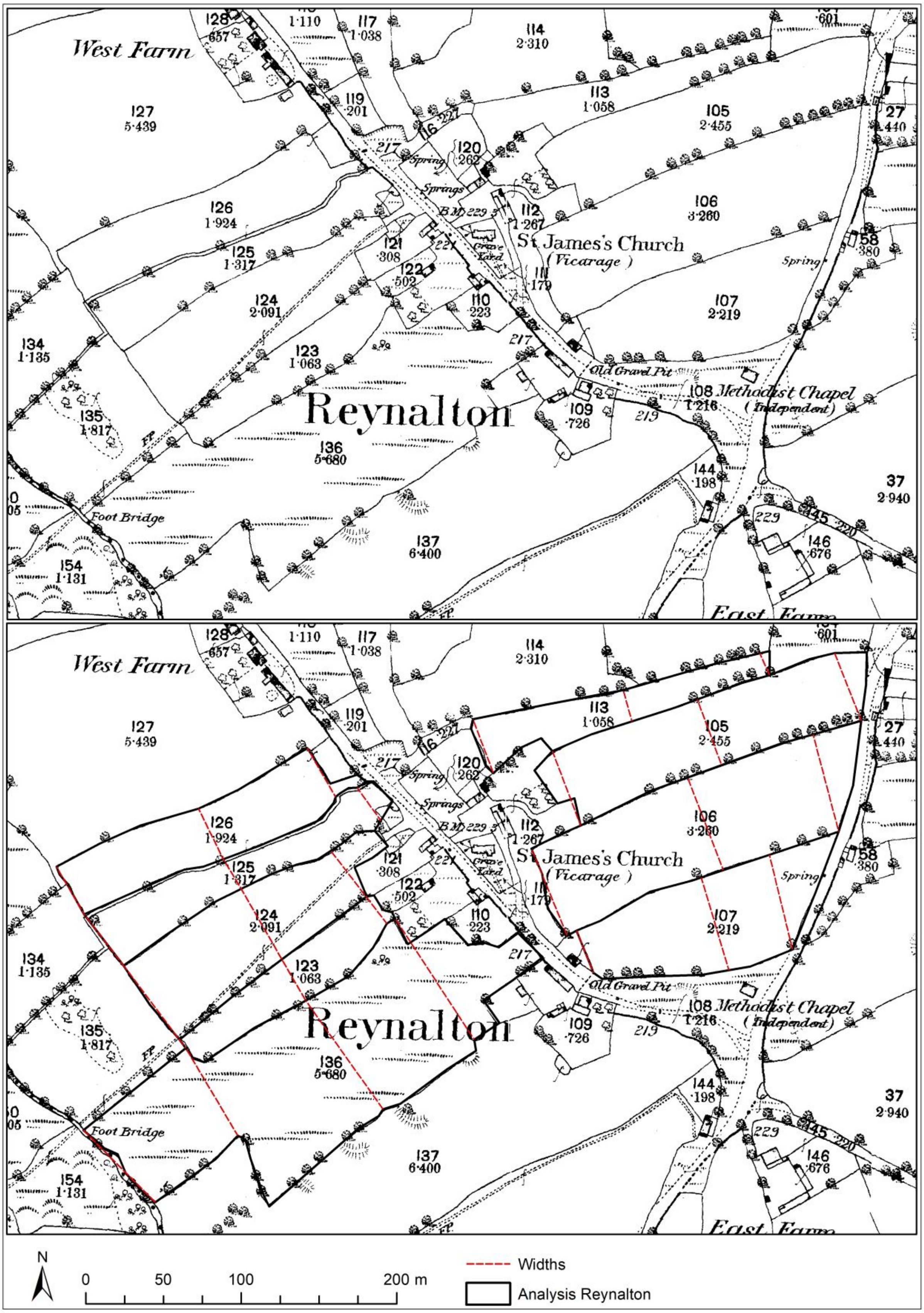

Figure 99: Plots and widths in Reynalton.

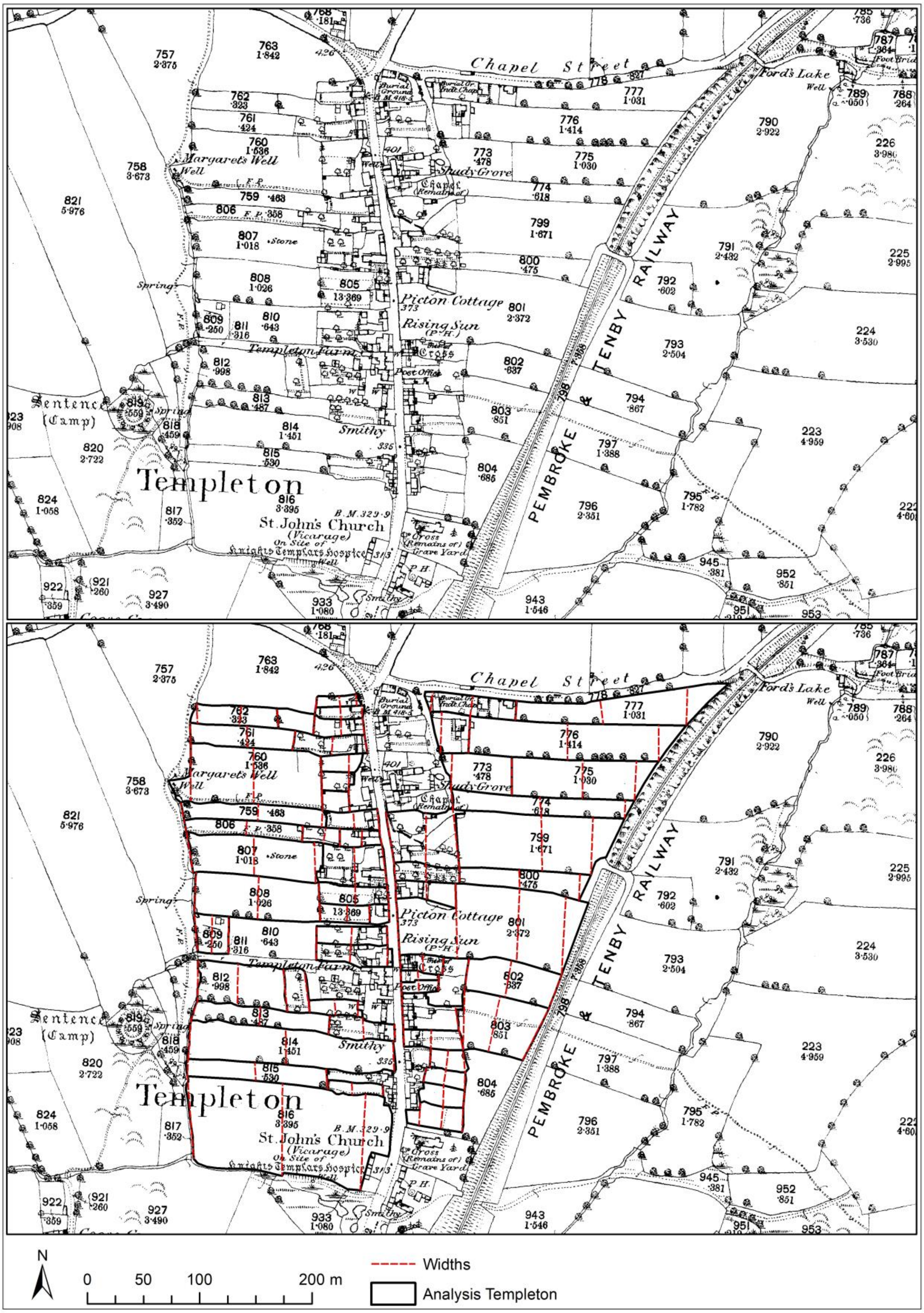

Figure 100: Plots and widths in Templeton.

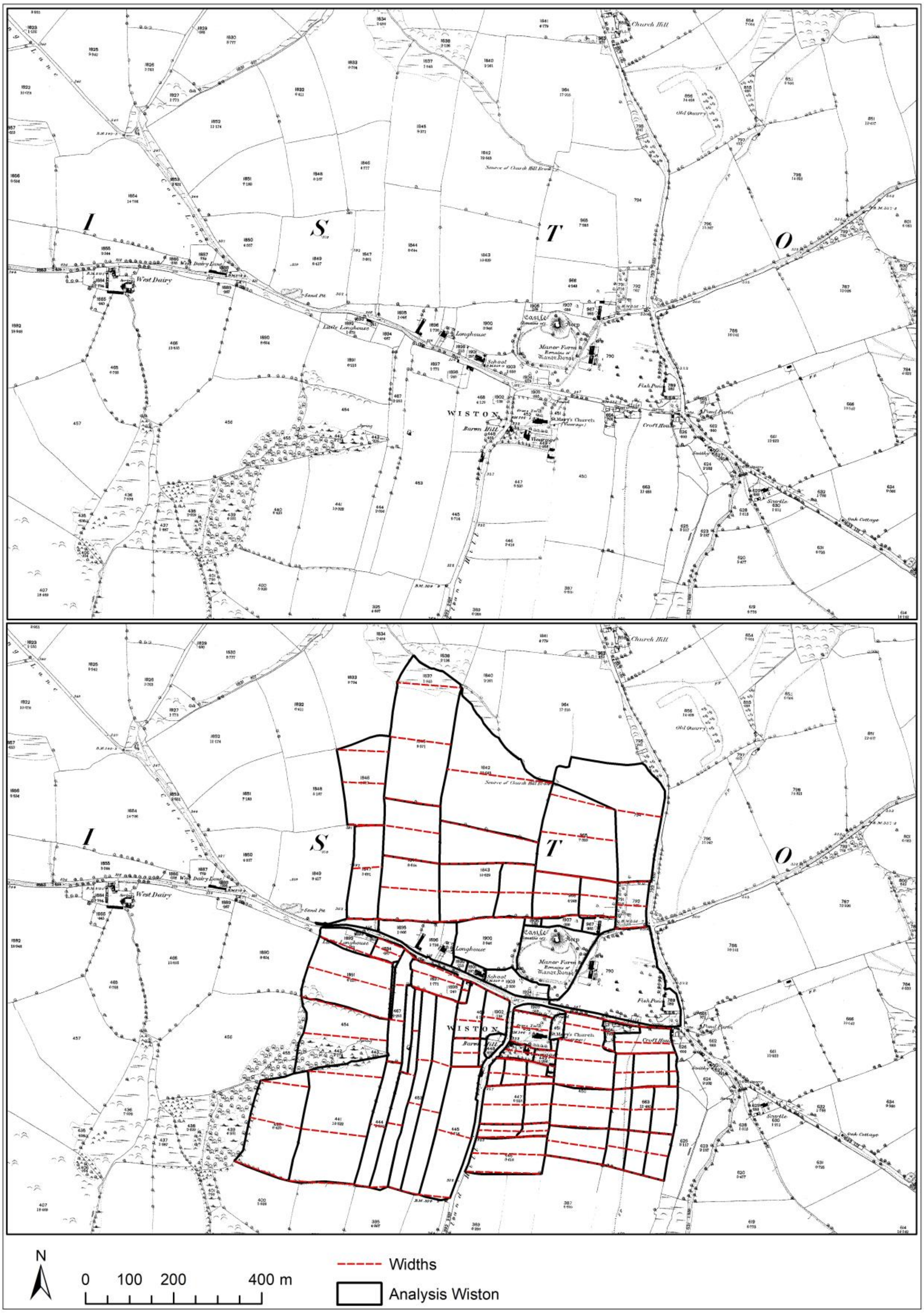

Figure 101: Plots and widths in Wiston.

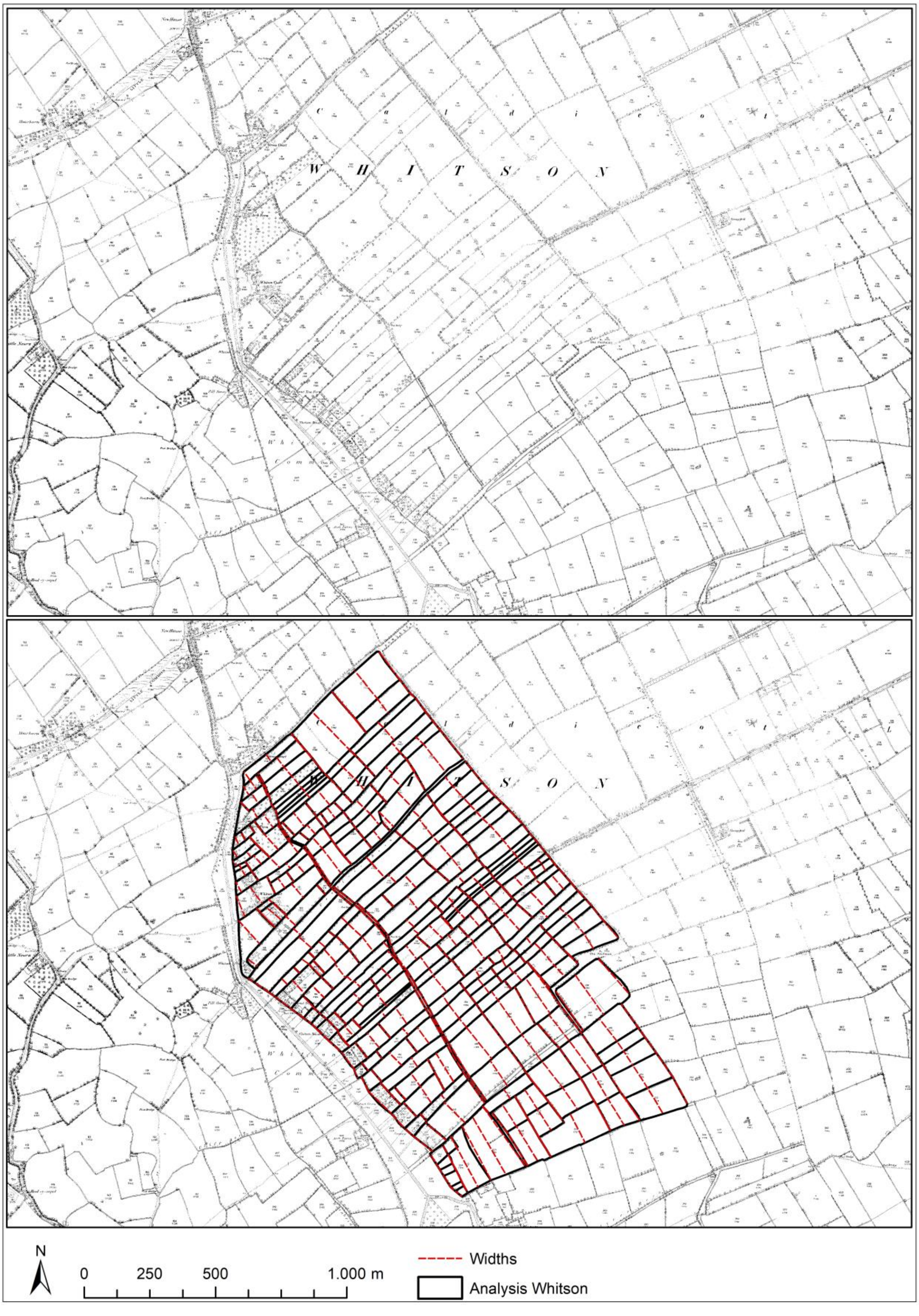

Figure 102: Plots and widths in Whitson.

9.1.2 County of Flanders

For the analysis of the settlements in the medieval County of Flanders, the dataset of row settlements within the county was used (Chapter 5). The further selection from this dataset was based on the shape of the settlement plots and the first mention of the settlements. In a first selection, only settlements with a first mention before the fourteenth century were selected, thereby excluding those settlements with an undated first mention and those of which its first mention was dated after the period of Great Reclamations (Verhulst 1995). A further selection was based on the presence of a strictly planned morphology or long plots of land, similar to the Welsh settlements, as indicated on the historical maps used in chapter 5. Given historic geometrical distortions on the Carte de Cabinet by Count de Ferraris (Vervust 2016) and the limited presentation of plots of land surrounding the settlements on the Cartes d'Etat-major, a further selection of sites needed to be made. This was based on the Parcellaire Express (PCI) dataset of the French *Institut National de l'Information Géographique et Forestière* (IGN) and the *Primitief Kadaster Popp* map for Flanders. The remaining settlements with long narrow plots on these two historical maps were finally selected. This resulted in a dataset of 27 settlements (Figure 103). To this, the data of the geophysical survey at Nieuw-Roeselare were added. As for the settlements in Wales, this mapping resulted in a polygon dataset, for which the same three metrics of patch characteristics were calculated in GIS: an approximation of the average width, the CPA and the Fractal dimension. Additionally, three polylines for each plot were drawn as well in order to calculate the outer and middle widths.

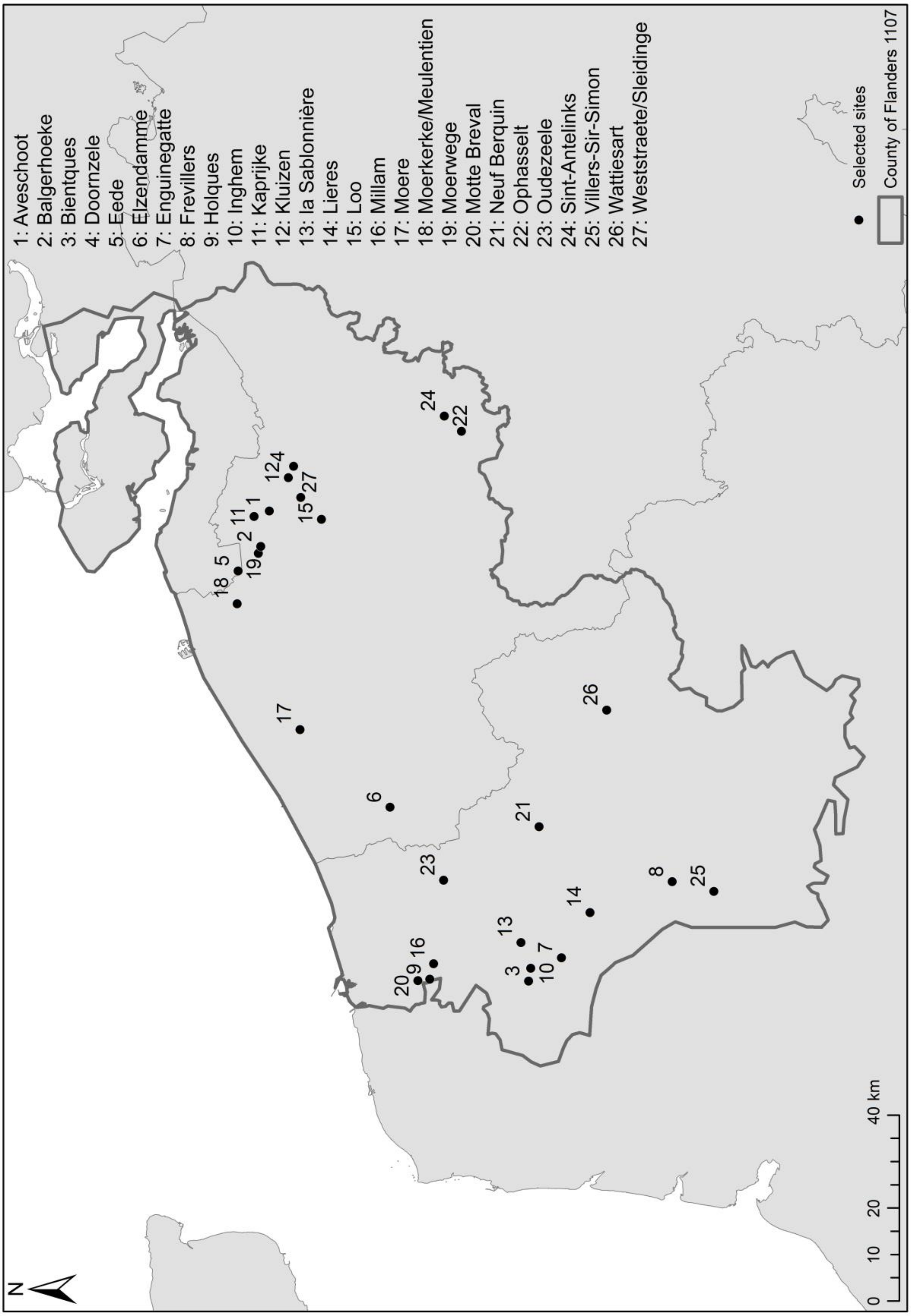

Figure 103: Selected row settlements in the County of Flanders.

9.2 Statistical analysis of metrics and morphology

The aim of this analysis is to statistically determine whether the metrics and morphologies of the selected settlements can indeed be considered as similar. An analysis of variance (ANOVA) is therefore applied using SPSS. This allows the comparison of continuous variables between more than 2 groups (Deschepper et al. s.d., 191; Freund et al. 2010, 702). The null hypothesis for ANOVA is that the studied attributes are the same for all settlements within and between the County of Flanders and southern Wales.

9.2.1 Comparison of widths in 'Flemish' settlements in South Wales

First, the polylines representing the widths of the plots were analysed. The descriptive statistics (Table 11) already indicated differences between the Welsh case studies. The mean length for Templeton (24,6 m) is considerably lower than those in the rest of the settlements. Moreover, the mean length in Wiston (82,6 m) is almost twice the mean length for Angle (43,4m) and Letterston (41,4 m). The same differences can be noticed for the minimum and maximum length and thus for the range as well. While the difference between the narrowest and widest measurement in Reynalton (77,9 m) and Templeton (81,2 m) are relatively small, those in Wiston (226,9 m) and Whitson (275,9 m) are much higher. The Standard Deviation (Std. Deviation) can be considered as an indication for the spread of the measurements within each village. The larger this value, the more spread out the widths are. This is also shown in a boxplot, which visualises the distribution of the measurements for each settlement (Figure 104). It can be noticed that Angle and Letterston are highly similar regarding the lowest 75% of their values. The difference in range between these two case studies is caused by the higher width values. The same is true for Reynalton and Whitson, the latter of which has far more wider plots. Templeton and Wiston, however, do not show clear similarities with the other settlements.

Descriptive statistics									
Metric	**Settlement**	**n**	**Mean**	**Median**	**Variance**	**Std. Deviation**	**Minimum**	**Maximum**	**Range**
Width (m)	*Angle*	284	43,4	34,6	766,8	27,7	8,4	167,8	159,5
	Letterston	183	41,4	35,2	508,2	22,5	10,6	116,4	105,7
	Reynalton	24	51,2	51,3	441,4	21,0	15,4	93,3	77,9
	Templeton	149	24,6	17,6	237,9	15,4	4,8	86,0	81,2
	Whitson	511	61,4	49,4	1539,4	39,2	8,1	284,0	275,9
	Wiston	150	82,6	69,6	2318,8	48,2	15,8	242,7	226,9

Table 11: Descriptive statistics for the mapped widths at the Welsh case studies.

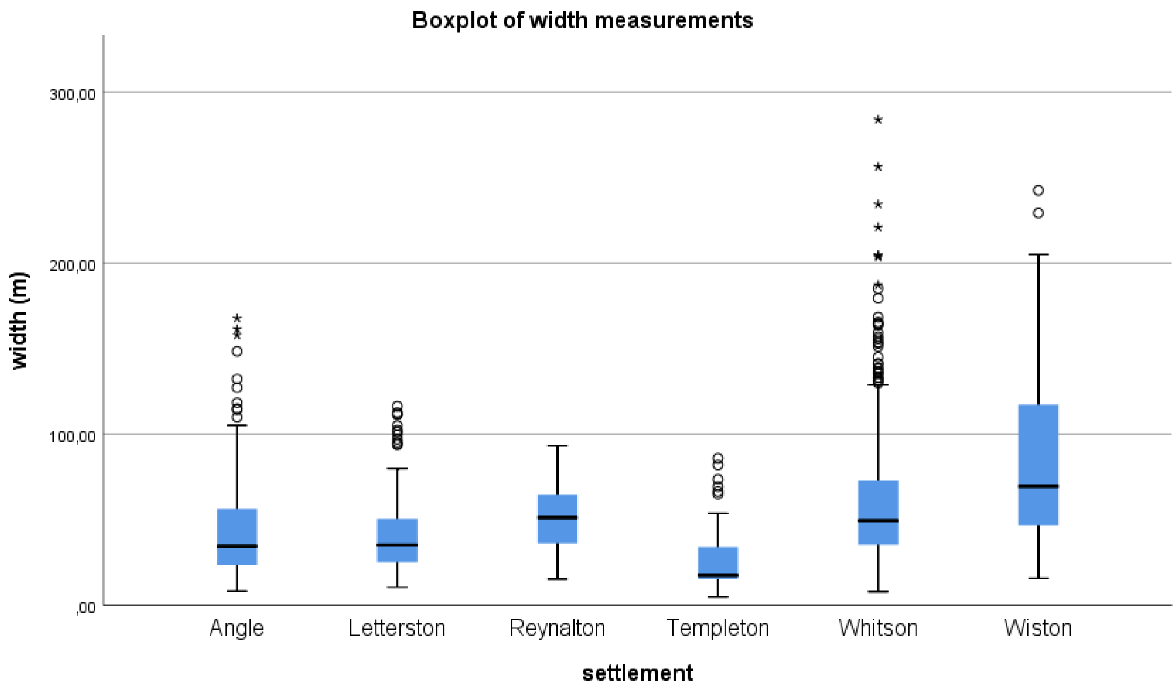

Figure 104: Boxplot of width measurements at the Welsh case studies.

To further analyse these descriptive statistics, the plot widths for each village have been grouped in intervals of 3 meters (roughly corresponding to 10 feet). On a scale from 0m to 285m, the percentages of measurements corresponding to the respective intervals were plotted in a histogram (Appendix 1). This allows to visualise the distribution of the measurements. Wiston is highly variable and does not show clear peaks for certain intervals. Whitson, on the other hand, shows two major peaks. One corresponds to widths between 30m and 39m, with an extension towards 48m. The other interval lies between 63m and 72m. For Angle, peaks can be found for the intervals 21m to 30m and 54m to 60m. A similar situation can be found at Letterston, where the interval 24m to 33m gets the highest representation, together with 42m and 45m. Templeton, however, has one large peak for the interval 15m to 18m, which corresponds with 34% of the measurements. Although two peaks can be attested in the dataset for Reynalton, it should be considered that only 24 measurements were made at this site, which is far less than at the other selected settlements. Overall, the intervals 15m to 18 m, 30m to 33m and 33m to 36m are most represented in the dataset with each 6% of the measurements (Figure 105).

Based on these histograms it can be expected that the observations for each settlements are not normally (Gaussian) distributed. This is confirmed by a test of normality (Table 12) and a test of homogeneity of variances (Table 13). Moreover, the width measurements have no equal variance. Therefore, a non-parametric one-way ANOVA (Kruskal-Wallis test) should be used in SPSS (Deschepper et al. s.d., 196-197; Freund et al. 2010, 702-703). The output is shown in Table 14. The p-value (Asymp. Sig.) is lower than 0,05 and therefore significant, indicating a significant difference in the variance of width between the selected Welsh settlements.

Tests of Normality							
Metric	Settlement	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Width (m)	*Angle*	0,132	282	0,000	0,863	282	0,000
	Letterston	0,122	182	0,000	0,878	182	0,000
	Reynalton	0,129	149	0,200*	0,961	25	0,439
	Templeton	0,253	149	0,000	0,805	149	0,000
	Whitson	0,139	504	0,000	0,829	504	0,000
	Wiston	0,133	150	0,000	0,926	150	0,000
a. Lilliefors Significance Correction							

Table 12: Output for the test of normality. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that only the observation at Reynalton are characterised by a Gaussian distribution (p-value (Sig.) of 0,200 and 0,439 are higher than 0,05 and therefore not significantly different from the Gaussian distribution).

Test of Homogeneity of Variances					
Metric		Levene Statistic	df1	df2	Sig.
Width (m)	Based on Mean	31,214	5	1286	0,000
	Based on Median	22,514	5	1286	0,000
	Based on Median and with adjusted df	22,514	5	1005,668	0,000
	Based on trimmed mean	28,324	5	1286	0,000

Table 13: Output for the test of homogeneity of variances. All p-values (Sig.) are lower then 0,05 and therefore significant.

Test Statistics[a,b]	
	Width (m)
Kruskal-Wallis H	305,635
df	5
Asymp. Sig.	0,000
a. Kruskal Wallis Test	
b. Grouping Variable: site_nr	

Table 14: Output for the Kruskal-Wallis test.

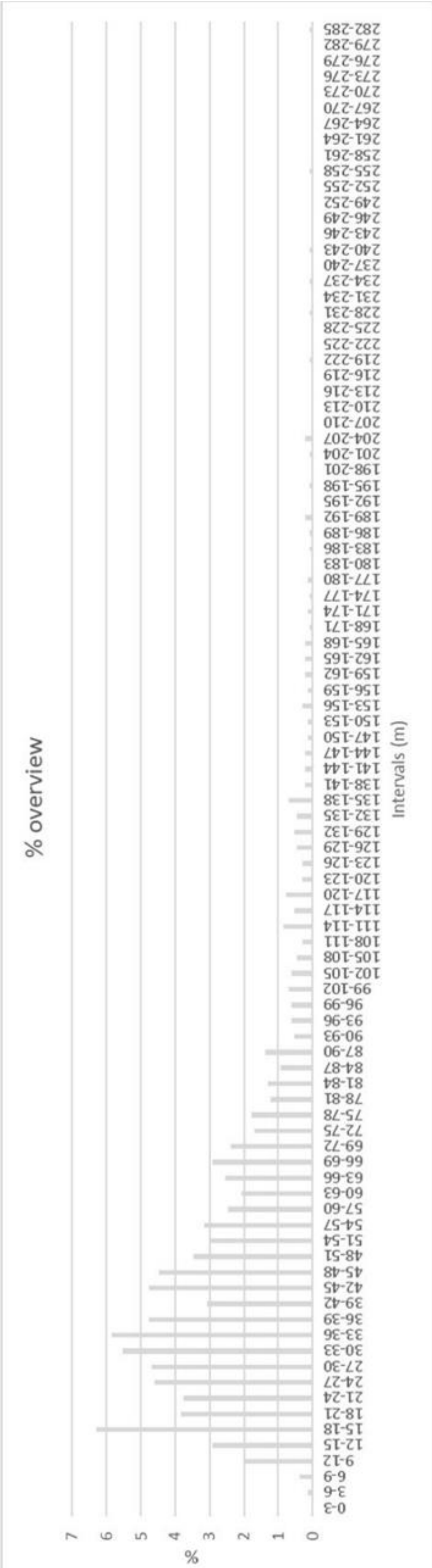

Figure 105: Histogram of width measurements for Welsh settlements.

In order to get further insights in these specific differences, a post-hoc analysis based on pairwise comparison of the settlements is applied (Table 15). This allows to compare each settlement with the other case studies in order to determine which settlements are significantly different from each other.

Pairwise Comparisons of settlements					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
Templeton-Letterston	275,173	41,222	6,675	0,000	0,000
Templeton-Angle	286,766	37,789	7,589	0,000	0,000
Templeton-Reynalton	445,700	80,640	5,527	0,000	0,000
Templeton-Whitson	488,895	34,793	14,052	0,000	0,000
Templeton-Wiston	644,860	43,156	14,943	0,000	0,000
Letterston-Angle	11,593	35,476	0,327	0,744	1,000
Letterston-Reynalton	170,527	79,583	2,143	0,032	0,482
Letterston-Whitson	213,722	32,266	6,624	0,000	0,000
Letterston-Wiston	369,687	41,146	8,985	0,000	0,000
Angle-Reynalton	158,934	77,860	2,041	0,041	0,618
Angle-Whitson	202,129	27,747	7,285	0,000	0,000
Angle-Wiston	358,094	37,706	9,497	0,000	0,000
Reynalton-Whitson	-43,194	76,451	-0,565	0,572	1,000
Reynalton-Wiston	-199,160	80,602	-2,471	0,013	0,202
Whitson-Wiston	-155,966	34,703	-4,494	0,000	0,000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

Table 15: Output pairwise comparisons of selected Welsh settlements.

Based on the corrected p-values (Adj. Sig.) for this post-hoc analysis, similarity in the variance of widths can be found between Letterston-Angle, Letterston-Reynalton, Angle-Reynalton, Reynalton-Whitson and Reynalton-Wiston. The p-values for these pairs are higher than 0,05 and therefore not significantly different.

Based on these findings, it can be stated that there is a variation in the widths within and between the different selected Welsh row settlements. Although statistically significant similarities in the variance of widths could be attested between several villages, no overall measurement could be attested to occur systematically in all settlements. Similarities in variance of widths and the distribution can however be found in Angle and Letterston, where the width of the plots are generally smaller than in Whitson. Wiston shows a wide variance, while in contrast in Templeton the measurement 15m-18m is most common and thus smaller than the other settlements.

9.2.2 Comparison of morphological metrics for 'Flemish' settlements in South Wales

A similar statistical approach was followed in order to compare the different morphological metrics for the mapped plots. The descriptive statistics regarding the average width, evidently, follow the trend that was visible in the above section on the measured widths (Table 16). The average CPA values lie between 1,34 and 1,55. They are larger than 1, since the measured plots are not circular in shape. Their relatively low value, however, indicates the basic shapes of the plots being close to quadrangle. The maximum values, on the other hand, indicate more complex shapes as well. The average Fractal D values lie between 1,36 and 1,44. This indicates that the plot shapes are more complex than basic quadrangles. The differences between the individual villages are limited though.

Descriptive statistics								
Metric	**Settlement**	**Mean**	**Median**	**Variance**	**Std. Deviation**	**Minimum**	**Maximum**	**Range**
Average width (m)	*Angle*	30,0341	26,1246	281,2610	16,77084	8,43	107,70	99,27
	Letterston	29,3222	27,5939	174,1080	13,19498	9,31	73,78	64,47
	Reynalton	34,9557	37,2976	143,618	11,98405	19,49	54,98	35,49
	Templeton	16,6652	13,5145	80,4020	8,96671	6,20	52,77	46,57
	Whitson	37,4968	33,0322	282,7290	16,81456	10,77	106,00	95,23
	Wiston	40,8453	34,5785	514,587	22,68451	5,5	96,39	90,89
CPA	*Angle*	1,4990	1,3450	0,1750	0,41860	1,09	3,22	2,13
	Letterston	1,4233	1,3222	0,0720	0,26756	1,14	2,81	1,68
	Reynalton	1,5492	1,5403	0,043	0,20617	1,29	1,91	0,62
	Templeton	1,3692	1,3270	0,0390	0,19646	1,10	1,96	0,87
	Whitson	1,3750	1,2661	0,0830	0,28882	1,11	2,73	1,62
	Wiston	1,3441	1,2068	0,113	0,33678	1,12	2,85	1,73
Fractal D	*Angle*	1,3937	1,3874	0,0050	0,06950	1,27	1,63	0,36
	Letterston	1,3857	1,3811	0,0030	0,05824	1,28	1,60	0,31
	Reynalton	1,3786	1,3623	0,002	0,4553	1,33	1,46	0,13
	Templeton	1,4442	1,4556	0,0030	0,05623	1,31	1,59	0,28
	Whitson	1,3586	1,3564	0,0030	0,05387	1,26	1,56	0,31
	Wiston	1,3562	1,341	0,005	0,07254	1,27	1,7	0,43

Table 16: Descriptive statistics of the metrics for the mapped plots at the Welsh case studies.

A test of normality and a test of homogeneity of variances (Tables 17 and 18) indicate that the measurements for each village are not normally (Gaussian) distributed nor characterised by an equal variance. Again, a non-parametric one-way ANOVA (Kruskal-Wallis test) should be applied. The output of the Kruskal-Wallis test is shown in Table 19. The p-value (Asymp. Sig.) for each metric is lower than 0,05 and therefore significant, indicating a significant differences in the variance of the metrics between the selected Welsh settlements.

Tests of Normality							
Metric	**Settlement**	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Average width (m)	*Angle*	0,107	122	0,002	0,855	122	0,000
	Letterston	0,115	73	0,019	0,898	73	0,000
	Reynalton	0,154	9,000	,200*	0,952	9,000	0,717
	Templeton	0,257	58	0,000	0,798	58	0,000
	Whitson	0,111	216	0,000	0,920	216	0,000
	Wiston	0,134	64	0,006	0,926	64	0,001
CPA	*Angle*	0,187	122	0,000	0,761	122	0,000
	Letterston	0,161	73	0,000	0,805	73	0,000
	Reynalton	0,193	9,000	,200*	0,934	9,000	0,517
	Templeton	0,154	58	0,001	0,892	58	0,000
	Whitson	0,178	216	0,000	0,785	216	0,000
	Wiston	0,285	64	0,000	0,629	64	0,000
Fractal D	*Angle*	0,086	122	0,026	0,942	122	0,000
	Letterston	0,067	73	,200*	0,962	73	0,028
	Reynalton	0,196	9	,200*	0,91	9	0,319
	Templeton	0,162	58	0,001	0,958	58	0,044
	Whitson	0,077	216	0,003	0,939	216	0,000
	Wiston	0,164	64	0,000	0,849	64	0,000
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

Table 17: Output for the tests of normality. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that only the observations at Reynalton are characterised by a Gaussian distribution.

Test of Homogeneity of Variances					
Metric		Levene Statistic	df1	df2	Sig.
Average width (m)	Based on Mean	8,528	5	536	0,000
	Based on Median	6,794	5	536	0,000
	Based on Median and with adjusted df	6,794	5	471,842	0,000
	Based on trimmed mean	8,112	5	536	0,000
CPA	Based on Mean	4,592	5	536	0,000
	Based on Median	2,431	5	536	0,034
	Based on Median and with adjusted df	2,431	5	428,952	0,034
	Based on trimmed mean	3,337	5	536	0,006
Fractal D	Based on Mean	2,670	5	536	0,021
	Based on Median	2,271	5	536	0,046
	Based on Median and with adjusted df	2,271	5	486,622	0,046
	Based on trimmed mean	2,343	5	536	0,040

Table 18: Output for the test of homogeneity of variances. All p-values (Sig.) are lower than 0,05 and therefore significant.

Test Statistics[a,b]			
	Average width (m)	CPA	Fractal D
Kruskal-Wallis H	107,925	29,813	95,095
df	5	5	5
Asymp. Sig.	0,000	0,000	0,000
a. Kruskal Wallis Test			
b. Grouping Variable: site_nr			

Table 19: Output for the Kruskal-Wallis test.

In order to get more insights in these differences, post-hoc analyses are applied in SPSS, following a procedure of pairwise comparison of the different settlements (Tables 20, 21 and 22). Based on the corrected p-values (Adj. Sig.) for these tests, no significant difference in the variance of average width can be found for 6 out of 15 comparisons. This is higher for CPA (10 out of 15) and Fractal D (7 out of 15). Despite an overall significant difference for the three metrics, these individual comparisons indicate stronger similarities between the settlements regarding the CPA and Fractal D than for the widths and average widths. There thus would be more similarities between the individual case studies regarding morphology than based on metrics/measurements.

Pairwise Comparisons of settlements					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
templeto-angle	146,712	24,978	5,874	0,000	0,000
templeto-letterst	147,530	27,547	5,356	0,000	0,000
templeto-Reynalto	218,199	56,106	3,889	0,000	0,002
templeto-whitson	-224,269	23,160	-9,683	0,000	0,000
templeto-wiston	-227,951	28,391	-8,029	0,000	0,000
angle-letterst	-0,818	23,173	-0,035	0,972	1,000
angle-Reynalto	71,487	54,093	1,322	0,186	1,000
angle-whitson	-77,557	17,736	-4,373	0,000	0,000
angle-wiston	-81,239	24,171	-3,361	0,001	0,012
letterst-Reynalto	70,670	55,326	1,277	0,201	1,000
letterst-whitson	-76,739	21,202	-3,619	0,000	0,004
letterst-wiston	-80,421	26,817	-2,999	0,003	0,041
Reynalto-whitson	-6,069	53,279	-0,114	0,909	1,000
Reynalto-wiston	-9,752	55,752	-0,175	0,861	1,000
whitson-wiston	-3,682	22,288	-0,165	0,869	1,000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

Table 20: Output pairwise comparisons of average width for the selected Welsh settlements.

Pairwise Comparisons of settlements					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
wiston-whitson	38,049	22,288	1,707	0,088	1,000
wiston-templeto	69,842	28,391	2,460	0,014	0,208
wiston-letterst	93,096	26,817	3,471	0,001	0,008
wiston-angle	97,011	24,171	4,014	0,000	0,001
wiston-Reynalto	186,498	55,752	3,345	0,001	0,012
whitson-templeto	31,793	23,160	1,373	0,170	1,000
whitson-letterst	55,046	21,202	2,596	0,009	0,141
whitson-angle	58,962	17,736	3,324	0,001	0,013
whitson-Reynalto	148,449	53,279	2,786	0,005	0,080
templeto-letterst	23,254	27,547	0,844	0,399	1,000
templeto-angle	27,169	24,978	1,088	0,277	1,000
templeto-Reynalto	116,656	56,106	2,079	0,038	0,564
letterst-angle	3,915	23,173	0,169	0,866	1,000
letterst-Reynalto	93,403	55,326	1,688	0,091	1,000
angle-Reynalto	89,487	54,093	1,654	0,098	1,000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

Table 21: Output pairwise comparisons of CPA for the selected Welsh settlements.

Pairwise Comparisons of settlements					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
wiston-whitson	17,246	22,288	0,774	0,439	1,000
wiston-Reynalto	79,239	55,752	1,421	0,155	1,000
wiston-letterst	89,605	26,817	3,341	0,001	0,013
wiston-angle	98,666	24,171	4,082	0,000	0,001
wiston-templeto	219,556	28,391	7,733	0,000	0,000
whitson-Reynalto	61,993	53,279	1,164	0,245	1,000
whitson-letterst	72,359	21,202	3,413	0,001	0,010
whitson-angle	81,420	17,736	4,591	0,000	0,000
whitson-templeto	202,310	23,160	8,735	0,000	0,000
Reynalto-letterst	-10,366	55,326	-0,187	0,851	1,000
Reynalto-angle	-19,427	54,093	-0,359	0,719	1,000
Reynalto-templeto	-140,317	56,106	-2,501	0,012	0,186
letterst-angle	9,061	23,173	0,391	0,696	1,000
letterst-templeto	-129,951	27,547	-4,717	0,000	0,000
angle-templeto	-120,890	24,978	-4,840	0,000	0,000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

Table 22: Output pairwise comparisons of Fractal D for the selected Welsh settlements.

9.2.3 Comparison of widths for row settlements in the County of Flanders

Following the comparison of widths in the 'Flemish' settlements in South Wales, the same statistical approach was applied for the selected row settlements in the County of Flanders. The descriptive statistics for the polylines representing the widths of the plots (Table 23) indicate differences between the settlements. The mean widths, for example, vary between 17,7m (Inghem) and 64m (Millam). Together with Kluizen (19,6m), Inghem has a relatively low mean value for the calculated widths, more than three times smaller than in Motte Breval (60,8m) , Neuf Berquin (62,9m) and Millam (64m). The same differences can be noticed for the minimum and maximum lengths and for the range. The narrowest measurement made is at Bientques (2,5 m), while at Motte Breval the widest measurement is 212,9m. When the range is considered, two settlements have a difference between the narrowest and widest measurement lower than 20m: Wattiesart (17,3m) and Nieuw-Roeselare (18,8m). The majority of the range lies between 50m and 100m though. Eight settlements have ranges above 100m, of which Motte Breval has the largest difference (188,5m). The Standard Deviation (Std. Deviation), which is an indication for the spread of the measurements within each settlement, is a further representation of these differences between the settlements. For Motte Breval and Neuf Berquin this value is relatively high, 37 and 36,8 respectively, indicating a large spread of the widths. In contrast, the low values for Nieuw-Roeselare (5,5) and Wattiesart (5,6) indicate a small difference between the measurements. The large differences in Standard Deviation are also visualised in a boxplot (Figure 106). It can be noticed that most settlements have their lowest 75% of measurements below 50m. This is not the case for Elzendamme, Holques, Millam, Motte Breval, Neuf Berquin and Weststraete/Sleidinge. There is, however, little similarity to be found between the settlements.

To further analyse these descriptive statistics, the plot widths for each village have been grouped in intervals of 3 meters (roughly corresponding to 10 feet). On a scale from 0m to 215m, the percentages of measurements corresponding to the respective intervals were plotted in a histogram (Appendix 2). This allows to visualise the distribution of the measurements. Most settlements have their majority of widths beneath 80m, although some have a limited number of larger plots as well. Most peaks in the values can be found between 15m and 30m (Figure 107), but most settlements are characterised by more than 2 peaks and a wide variation in widths.

Descriptive statistics									
Metric	**Settlement**	**n**	**Mean**	**Median**	**Variance**	**Std. Deviation**	**Minimum**	**Maximum**	**Range**
width (m)	*Aveschoot*	229	41,5	37,5	522,7	22,9	8,8	149,7	140,9
	Balgerhoeke	108	29,8	27,0	157,0	12,5	7,5	61,9	54,5
	Bientques	323	26,4	23,0	163,0	12,8	2,5	80,7	78,2
	Doornzele	287	37,1	36,0	213,5	14,6	11,9	95,3	83,3
	Eede	184	35,0	30,5	266,0	16,3	13,0	100,4	87,4
	Elzendamme	141	48,5	39,5	592,0	24,3	14,0	106,4	92,4
	Enguinegatte	167	26,7	22,6	274,6	16,6	5,1	133,4	128,4
	Frevillers	310	21,3	19,9	101,4	10,1	3,1	72,8	69,7
	Holques	213	48,4	40,0	631,3	25,1	12,3	130,3	118,0
	Inghem	105	17,7	16,3	70,3	8,4	4,6	57,6	53,0
	Kaprijke	217	34,0	29,7	270,6	16,4	11,4	112,4	100,9
	Kluizen	151	19,5	15,4	230,0	15,2	3,7	80,8	77,2
	la Sablonniere	141	21,6	17,4	200,6	14,2	5,6	91,2	85,6
	Lieres	74	20,8	17,5	155,8	12,5	8,8	65,4	56,6
	Loo	98	31,2	27,1	177,4	13,3	16,9	65,1	48,2
	Millam	36	64,0	65,4	876,6	29,6	11,5	151,2	139,6
	Moere	70	27,5	28,8	92,3	9,6	13,0	61,4	48,4
	Moerkerke/Meulentien	32	28,2	25,4	82,1	9,1	19,2	54,0	34,7
	Moerwege	188	34,6	30,9	266,3	16,3	5,3	88,3	83,0
	Motte Breval	33	60,8	55,6	1372,4	37,0	24,5	212,9	188,5
	Neuf Berquin	86	62,9	53,7	1355,3	36,8	15,9	188,6	172,7
	Nieuw-Roeselare	12	29,5	31,1	30,5	5,5	17,9	36,7	18,8
	Ophasselt	115	23,2	20,2	215,3	14,7	3,7	76,6	72,9
	Oudezeele	33	33,4	29,0	279,9	16,7	11,9	81,9	69,9
	Sint-Antelinks	248	25,8	22,8	336,9	18,4	4,6	142,9	138,3
	Villers-Sir-Simon	113	26,6	24,0	119,6	10,9	9,3	62,5	53,3
	Wattiesart	35	23,9	25,2	30,8	5,6	14,5	31,8	17,3
	Weststraete/Sleidinge	237	42,7	44,1	245,4	15,7	9,9	87,3	77,4

Table 23: Descriptive statistics for the mapped widths at the case studies in the County of Flanders.

As for the settlements in Wales, it can be expected that the observations for each settlements are not normally (Gaussian) distributed and have no equal variance. This is confirmed by a test of normality (Table 24) and a test of homogeneity of variances (Table 25). Therefore, a non-parametric one-way ANOVA (Kruskal-Wallis test) should be used (Deschepper et al. s.d., 196-197; Freund et al. 2010, 702-703). The output is shown in Table 26. The p-value (Asymp. Sig.) is lower than 0,05 and therefore significant, indicating a significant difference in the variance of width between the selected settlements within the County of Flanders.

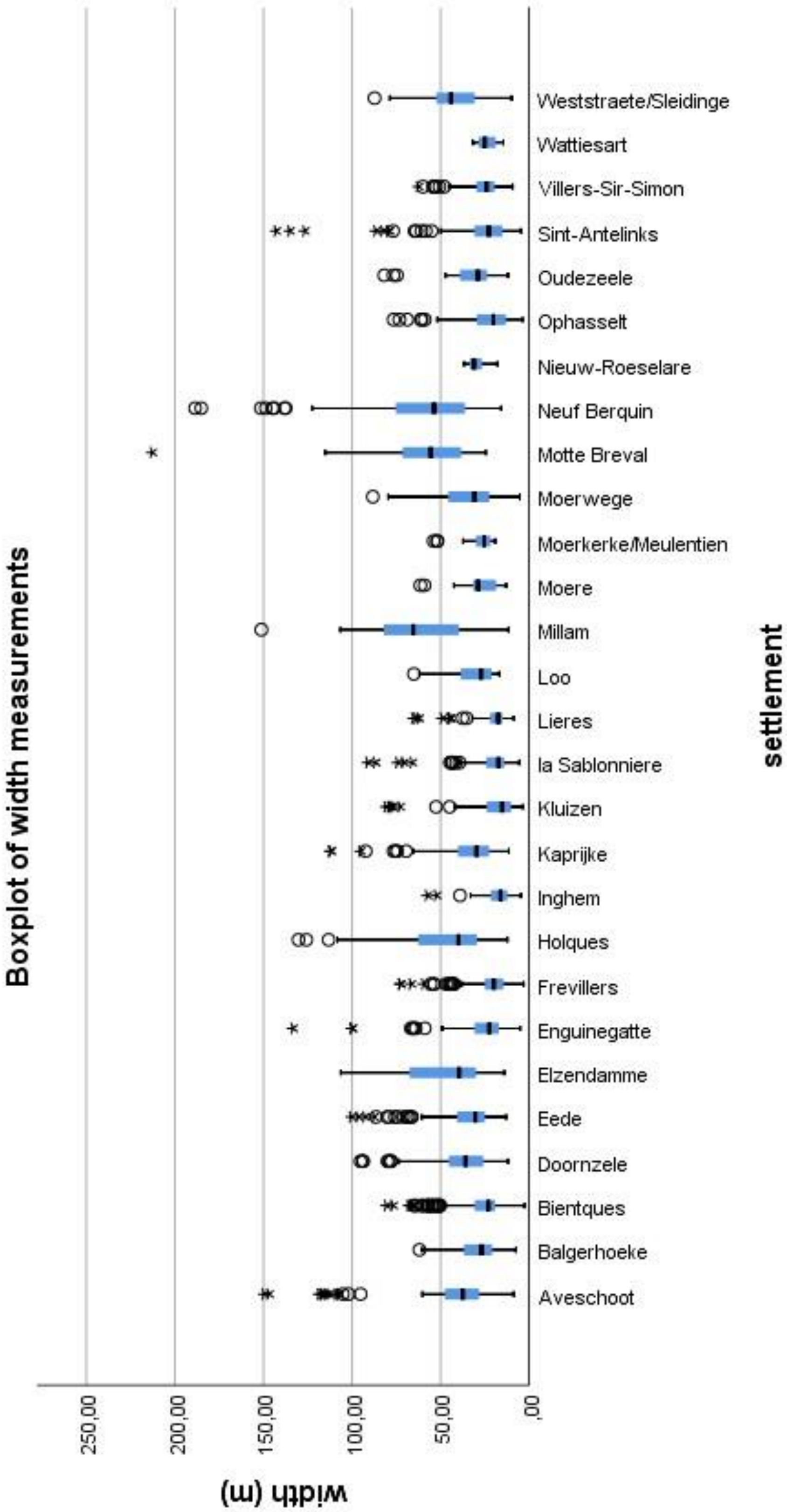

Figure 106: Boxplot of width measurements at the Flemish case studies.

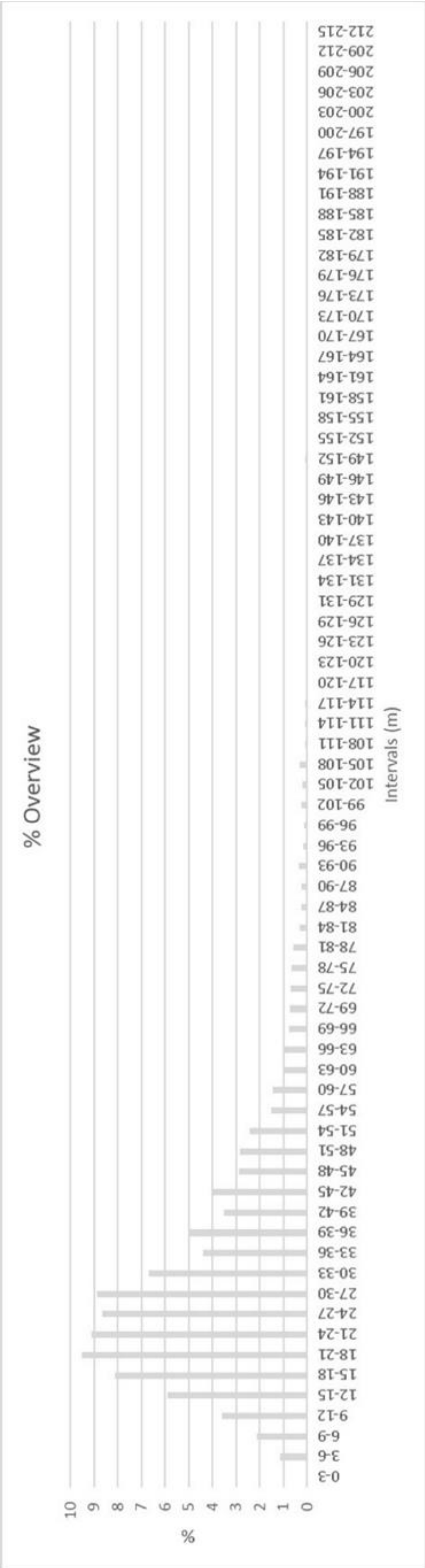

Figure 107: Histogram of width measurements for selected settlements in the County of Flanders.

Tests of Normality							
Metric	**Settlement**	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Width (m)	*Aveschoot*	0,199	229	0,000	0,762	229	0,000
	Balgerhoeke	0,115	108	0,001	0,944	108	0,000
	Bientques	0,147	321	0,000	0,895	321	0,000
	Doornzele	0,074	287	0,001	0,936	287	0,000
	Eede	0,151	184	0,000	0,838	184	0,000
	Elzendamme	0,159	141	0,000	0,918	141	0,000
	Enguinegatte	0,179	166	0,000	0,739	166	0,000
	Frevillers	0,132	296	0,000	0,853	296	0,000
	Holques	0,138	213	0,000	0,898	213	0,000
	Inghem	0,104	105	0,007	0,872	105	0,000
	Kaprijke	0,168	218	0,000	0,846	218	0,000
	Kluizen	0,178	151	0,000	0,745	151	0,000
	la Sablonniere	0,189	141	0,000	0,755	141	0,000
	Lieres	0,228	73	0,000	0,735	73	0,000
	Loo	0,172	100	0,000	0,850	100	0,000
	Millam	0,086	37	,200*	0,968	37	0,350
	Moere	0,120	70	0,014	0,913	70	0,000
	Moerkerke/Meulentien	0,205	32	0,001	0,767	32	0,000
	Moerwege	0,096	188	0,000	0,960	188	0,000
	Motte Breval	0,232	33	0,000	0,769	33	0,000
	Neuf Berquin	0,169	86	0,000	0,842	86	0,000
	Nieuw-Roeselare	0,191	12	,200*	0,930	12	0,378
	Ophasselt	0,102	115	0,005	0,891	115	0,000
	Oudezeele	0,243	33	0,000	0,808	33	0,000
	Sint-Antelinks	0,148	249	0,000	0,727	249	0,000
	Villers-Sir-Simon	0,148	113	0,000	0,907	113	0,000
	Wattiesart	0,148	35	0,051	0,912	35	0,008
	Weststraete/Sleidinge	0,062	237	0,027	0,984	237	0,011

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 24: Output for the test of normality. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that only the observation at Millam and Nieuw-Roeselare are characterised by a Gaussian distribution (p-value (Sig.) of 0,200/0,200 and 0,350/0,378 are higher than 0,05 and therefore not significantly different from the Gaussian distribution).

Test of Homogeneity of Variances					
Metric		Levene Statistic	df1	df2	Sig.
Width (m)	Based on Mean	21,904	27	3.945	0,000
	Based on Median	15,972	27	3.945	0,000
	Based on Median and with adjusted df	15,972	27	2.277,356	0,000
	Based on trimmed mean	19,520	27	3.945	0,000

Table 25: Output for the test of homogeneity of variances. All p-values (Sig.) are lower then 0,05 and therefore significant.

Test Statistics[a,b]	
	Width (m)
Kruskal-Wallis H	1.267,406
df	27
Asymp. Sig.	0,000
a. Kruskal Wallis Test	
b. Grouping Variable: site_nr	

Table 26: Output for the Kruskal-Wallis test.

In order to get further insights in these specific differences, a post-hoc analysis is applied. This is based on a pairwise comparison of the settlements (Tables 27 to 29). Based on the corrected p-values (Adj. Sig.) for this post-hoc analysis, there is a wide variation in settlements that are significantly different and those that are not. There is, however, no clear pattern to be detected.

Based on these findings, it can be stated that there is a large variation in the widths within and between the settlement in the County of Flanders that were selected. Although statistically significant similarities in the variance of widths could be attested between several villages, no overall measurement could be attested to occur systematically in all settlements.

9.2.4 Comparison of morphological metrics for row settlements in the County of Flanders

In order to test whether there is a morphological similarity between the selected settlements in the County of Flanders, the same statistical approach was followed as for the settlements in Wales. The descriptive statistics regarding the average width follow those for the measured widths in the section above (Table 27). The average width values lie between 11,79m (Kluizen) and 34,22m (Holques). The ranges are, however, very different between the individual settlements. Whereas for Nieuw-Roeselare this is only

2,13m, this range at Neuf-Berquin is 117,94m. This is larger than the maximum range of 99,27m in Wales. The average CPA values lie between 1,28 and 1,72 (Table 28). Given that they are relatively close to one indicates their overall basic shape. This maximum is, however, slightly higher than the 1,55 for the Welsh case studies. The average Fractal D values, however, lie between 1,37 and 1,51, which is also higher than for the Welsh case studies and indicates rather more complex shapes than only basic quadrangles. Only limited difference can be noticed between the individual settlements regarding the minimum values, while a wide variety in maximum Fractal D values can be attested.

Descriptive statistics								
Metric	**Settlement**	**Mean**	**Median**	**Variance**	**Std. Deviation**	**Minimum**	**Maximum**	**Range**
Average width (m)	*Aveschoot*	22,5835	23,1063	85,420	9,24231	5,39	45,70	40,32
	Balgerhoeke	21,4930	19,9405	73,270	8,55977	7,12	39,62	32,51
	Bientques	18,2614	17,2666	48,453	6,96084	2,80	38,09	35,29
	Doornzele	22,4051	19,9227	80,030	8,94597	6,73	59,32	52,59
	Eede	26,2997	25,1320	58,605	7,65542	14,73	51,51	36,78
	Elsendamme	30,6026	30,7060	119,397	10,92691	7,53	57,61	50,08
	Enguinegatte	16,3953	13,9527	63,080	7,94227	5,48	48,57	43,09
	Frevillers	14,0334	12,2808	65,552	8,09641	2,30	63,12	60,83
	Holques	34,2155	31,1238	213,209	14,60167	12,64	76,17	63,54
	Inghem	12,0939	10,2513	52,143	7,22099	2,48	47,87	45,38
	Kaprijke	22,9150	23,0333	82,281	9,07089	2,54	47,13	44,59
	Kluizen	11,7865	10,2888	47,949	6,92449	3,73	37,84	34,10
	la Sablonniere	17,4503	14,5310	91,182	9,54893	5,26	52,00	46,74
	Lieres	12,6314	10,9823	48,173	6,94069	4,90	38,24	33,34
	Loo	21,0400	17,1665	57,423	7,57777	11,36	40,64	29,28
	Millam	22,8965	14,7397	345,835	18,59663	2,96	88,75	85,79
	Moere	20,6880	21,2140	44,063	6,63797	10,22	42,67	32,46
	Moerkerke/Meulentien	21,1084	18,2487	57,535	7,58519	14,71	41,22	26,50
	Moerwege	23,2025	23,4128	90,785	9,52814	5,68	50,81	45,13
	Motte Breval	36,9850	35,7155	437,401	20,91414	11,00	76,69	65,68
	Neuf Berquin	29,1349	23,3275	477,048	21,84143	2,74	120,68	117,94
	Nieuw-Roeselare	21,1890	21,2685	1,084	1,04108	20,05	22,17	2,13
	Ophasselt	14,4961	13,7232	46,401	6,81182	3,60	31,98	28,38
	Oudezeele	22,2234	21,4295	32,935	5,73890	15,05	35,83	20,78
	Sint-Antelinks	15,6216	14,1311	49,946	7,06726	4,33	45,02	40,69
	Villers-Sir-Simon	15,2213	13,1969	91,671	9,57448	2,56	47,39	44,83
	Wattiesart	16,4201	13,0097	110,764	10,52444	2,34	58,42	56,08
	Weststraete/Sleidinge	28,2555	29,9914	113,865	10,67076	7,06	51,66	44,60

Table 27: Descriptive statistics of the average width for the mapped plots at the case studies in the County of Flanders.

Descriptive statistics								
Metric	**Settlement**	**Mean**	**Median**	**Variance**	**Std. Deviation**	**Minimum**	**Maximum**	**Range**
CPA	*Aveschoot*	1,3129	1,2448	0,047	0,21773	1,13	2,46	1,33
	Balgerhoeke	1,6087	1,4528	0,198	0,44506	1,14	2,84	1,70
	Bientques	1,4447	1,4210	0,086	0,29333	1,11	3,68	2,57
	Doornzele	1,3156	1,2722	0,028	0,16801	1,13	1,88	0,75
	Eede	1,5742	1,4593	0,141	0,37610	1,08	2,43	1,35
	Elsendamme	1,4562	1,3153	0,173	0,41613	1,13	3,33	2,20
	Enguinegatte	1,4440	1,4102	0,064	0,25388	1,13	2,28	1,15
	Frevillers	1,3899	1,2990	0,075	0,27466	1,13	3,07	1,94
	Holques	1,4460	1,3905	0,077	0,27827	1,13	2,40	1,28
	Inghem	1,4141	1,3518	0,073	0,27075	1,13	2,50	1,38
	Kaprijke	1,7178	1,5944	0,269	0,51898	1,13	3,87	2,74
	Kluizen	1,3847	1,3043	0,071	0,26598	1,08	2,52	1,44
	la Sablonniere	1,4981	1,4311	0,075	0,27431	1,15	2,44	1,29
	Lieres	1,3937	1,3163	0,056	0,23628	1,12	1,89	0,76
	Loo	1,3640	1,3040	0,037	0,19108	1,13	1,90	0,78
	Millam	1,3699	1,2748	0,058	0,24021	1,13	2,47	1,34
	Moere	1,4592	1,3915	0,066	0,25771	1,13	2,12	0,99
	Moerkerke/Meulentien	1,4452	1,3491	0,064	0,25290	1,20	1,89	0,69
	Moerwege	1,3615	1,2712	0,042	0,20458	1,13	1,86	0,73
	Motte Breval	1,4280	1,4314	0,066	0,25620	1,15	2,11	0,96
	Neuf Berquin	1,6379	1,4159	0,497	0,70480	1,12	6,34	5,22
	Nieuw-Roeselare	1,2792	1,2837	0,000	0,02068	1,25	1,30	0,04
	Ophasselt	1,3769	1,2825	0,087	0,29490	1,14	2,53	1,39
	Oudezeele	1,4337	1,4654	0,044	0,20935	1,16	1,70	0,54
	Sint-Antelinks	1,3849	1,2491	0,102	0,31912	1,12	2,54	1,42
	Villers-Sir-Simon	1,3456	1,2656	0,045	0,21258	1,09	2,02	0,93
	Wattiesart	1,3683	1,2427	0,099	0,31444	1,12	2,58	1,46
	Weststraete/Sleidinge	1,3673	1,3006	0,051	0,22523	1,13	2,28	1,16

Table 28: Descriptive statistics of the CPA metric for the mapped plots at the case studies in the County of Flanders.

Descriptive statistics								
Metric	**Settlement**	**Mean**	**Median**	**Variance**	**Std. Deviation**	**Minimum**	**Maximum**	**Range**
Fractal D	*Aveschoot*	1,4029	1,3855	0,004	0,06259	1,31	1,62	0,31
	Balgerhoeke	1,4297	1,4272	0,003	0,05832	1,34	1,64	0,31
	Bientques	1,4386	1,4317	0,006	0,07598	1,33	1,88	0,56
	Doornzele	1,3988	1,3968	0,002	0,04324	1,32	1,57	0,25
	Eede	1,4002	1,3955	0,002	0,04897	1,30	1,50	0,20
	Elsendamme	1,3800	1,3772	0,004	0,06407	1,29	1,65	0,36
	Enguinegatte	1,4533	1,4516	0,003	0,05572	1,32	1,61	0,30
	Frevillers	1,4833	1,4600	0,012	0,10941	1,30	1,91	0,62
	Holques	1,3734	1,3738	0,002	0,04990	1,28	1,52	0,24
	Inghem	1,5060	1,4894	0,011	0,10432	1,34	1,88	0,54
	Kaprijke	1,4372	1,4271	0,006	0,07736	1,33	1,85	0,53
	Kluizen	1,5021	1,4910	0,009	0,09232	1,31	1,72	0,41
	la Sablonniere	1,4532	1,4492	0,006	0,07525	1,30	1,69	0,39
	Lieres	1,4881	1,4792	0,004	0,06324	1,34	1,61	0,27
	Loo	1,4082	1,4189	0,002	0,04246	1,33	1,48	0,16
	Millam	1,4362	1,4291	0,009	0,92430	1,29	1,78	0,49
	Moere	1,4178	1,4101	0,002	0,04471	1,33	1,50	0,17
	Moerkerke/Meulentien	1,4133	1,4200	0,001	0,02351	1,35	1,44	0,09
	Moerwege	1,4042	1,3996	0,003	0,05909	1,32	1,64	0,31
	Motte Breval	1,3743	1,3787	0,003	0,05496	1,29	1,51	0,22
	Neuf Berquin	1,4225	1,4013	0,010	0,97990	1,26	1,91	0,65
	Nieuw-Roeselare	1,3906	1,3908	0,000	0,00741	1,38	1,40	0,02
	Ophasselt	1,4651	1,4413	0,009	0,09527	1,35	1,79	0,44
	Oudezeele	1,4047	1,4169	0,001	0,02882	1,36	1,44	0,09
	Sint-Antelinks	1,4485	1,4345	0,005	0,07271	1,32	1,74	0,42
	Villers-Sir-Simon	1,4757	1,4472	0,013	0,11190	1,32	1,87	0,55
	Wattiesart	1,4623	1,4560	0,011	0,10473	1,29	1,92	0,63
	Weststraete/Sleidinge	1,3850	1,3609	0,004	0,06096	1,31	1,60	0,28

Table 29: Descriptive statistics of the Fractal D metric for the mapped plots at the case studies in the County of Flanders.

Following the same approach as in the section above, a test of normality and a test of homogeneity of variances (Tables 30 to 33) indicate that the measurements for each settlement are not normally (Gaussian) distributed nor characterised by an equal variance. Again, a non-parametric one-way ANOVA (Kruskal-Wallis test) should be applied. The output of the Kruskal-Wallis test is shown in Table 34. The p-value (Asymp. Sig.) for each metric is lower than 0,05 and therefore significant, indicating a significant difference in the variance of the metrics between the selected settlements in the County of Flanders.

Tests of Normality							
Metric	Site	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Average width (m)	*Aveschoot*	0,049	114	,200*	0,985	114	0,251
	Balgerhoeke	0,087	47	,200*	0,961	47	0,121
	Bientques	0,086	123	0,028	0,978	123	0,041
	Doornzele	0,117	165	0,000	0,924	165	0,000
	Eede	0,128	71	0,006	0,922	71	0,000
	Elsendamme	0,079	54	,200*	0,984	54	0,681
	Enguinegatte	0,114	78	0,013	0,932	78	0,000
	Frevillers	0,124	173	0,000	0,861	173	0,000
	Holques	0,102	94	0,018	0,944	94	0,001
	Inghem	0,144	67	0,002	0,840	67	0,000
	Kaprijke	0,055	143	,200*	0,993	143	0,708
	Kluizen	0,155	53	0,003	0,836	53	0,000
	la Sablonniere	0,178	62	0,000	0,824	62	0,000
	Lieres	0,144	30	0,113	0,830	30	0,000
	Loo	0,210	38	0,000	0,887	38	0,001
	Millam	0,221	50	0,000	0,819	50	0,000
	Moere	0,140	29	0,154	0,909	29	0,016
	Moerkerke/Meulentien	0,212	12	0,144	0,797	12	0,009
	Moerwege	0,060	67	,200*	0,981	67	0,396
	Motte Breval	0,119	23	,200*	0,910	23	0,041
	Neuf Berquin	0,151	134	0,000	0,837	134	0,000
	Nieuw-Roeselare	0,271	4		0,881	4	0,345
	Ophasselt	0,110	42	,200*	0,952	42	0,074
	Oudezeele	0,186	10	,200*	0,887	10	0,157
	Sint-Antelinks	0,111	102	0,004	0,875	102	0,000
	Villers-Sir-Simon	0,137	106	0,000	0,901	106	0,000
	Wattiesart	0,189	67	0,000	0,888	67	0,000
	Weststraete/Sleidinge	0,112	107	0,002	0,970	107	0,017

Table 30: Output for the tests of normality of the average width metric.

Tests of Normality							
Metric	**Site**	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
CPA	*Aveschoot*	0,198	114	0,000	0,767	114	0,000
	Balgerhoeke	0,148	47	0,012	0,874	47	0,000
	Bientques	0,128	123	0,000	0,733	123	0,000
	Doornzele	0,133	165	0,000	0,890	165	0,000
	Eede	0,130	71	0,005	0,911	71	0,000
	Elsendamme	0,214	54	0,000	0,740	54	0,000
	Enguinegatte	0,143	78	0,000	0,825	78	0,000
	Frevillers	0,189	173	0,000	0,775	173	0,000
	Holques	0,125	94	0,001	0,874	94	0,000
	Inghem	0,146	67	0,001	0,839	67	0,000
	Kaprijke	0,128	143	0,000	0,878	143	0,000
	Kluizen	0,177	53	0,000	0,803	53	0,000
	la Sablonniere	0,134	62	0,007	0,886	62	0,000
	Lieres	0,153	30	0,069	0,894	30	0,006
	Loo	0,184	38	0,002	0,915	38	0,007
	Millam	0,282	50	0,000	0,494	50	0,000
	Moere	0,146	29	0,118	0,928	29	0,049
	Moerkerke/Meulentien	0,213	12	0,141	0,841	12	0,029
	Moerwege	0,178	67	0,000	0,894	67	0,000
	Motte Breval	0,170	23	0,083	0,896	23	0,021
	Neuf Berquin	0,271	134	0,000	0,538	134	0,000
	Nieuw-Roeselare	0,286	4		0,871	4	0,300
	Ophasselt	0,213	42	0,000	0,696	42	0,000
	Oudezeele	0,192	10	,200*	0,892	10	0,180
	Sint-Antelinks	0,204	102	0,000	0,736	102	0,000
	Villers-Sir-Simon	0,167	106	0,000	0,755	106	0,000
	Wattiesart	0,262	67	0,000	0,622	67	0,000
	Weststraete/Sleidinge	0,171	107	0,000	0,858	107	0,000

Table 31: Output for the tests of normality of the CPA metric.

Tests of Normality							
Metric	Site	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Fractal D	*Aveschoot*	0,141	114	0,000	0,869	114	0,000
	Balgerhoeke	0,101	47	,200*	0,926	47	0,006
	Bientques	0,178	123	0,000	0,756	123	0,000
	Doornzele	0,056	165	,200*	0,969	165	0,001
	Eede	0,065	71	,200*	0,983	71	0,463
	Elsendamme	0,154	54	0,003	0,859	54	0,000
	Enguinegatte	0,321	78	0,000	0,461	78	0,000
	Frevillers	0,253	173	0,000	0,709	173	0,000
	Holques	0,066	94	,200*	0,968	94	0,020
	Inghem	0,204	67	0,000	0,814	67	0,000
	Kaprijke	0,138	143	0,000	0,823	143	0,000
	Kluizen	0,080	53	,200*	0,986	53	0,808
	la Sablonniere	0,089	62	,200*	0,976	62	0,276
	Lieres	0,118	30	,200*	0,965	30	0,419
	Loo	0,151	38	0,029	0,961	38	0,207
	Millam	0,288	50	0,000	0,489	50	0,000
	Moere	0,147	29	0,111	0,949	29	0,172
	Moerkerke/Meulentien	0,239	12	0,056	0,781	12	0,006
	Moerwege	0,092	67	,200*	0,884	67	0,000
	Motte Breval	0,087	23	,200*	0,965	23	0,573
	Neuf Berquin	0,171	134	0,000	0,779	134	0,000
	Nieuw-Roeselare	0,247	4		0,903	4	0,445
	Ophasselt	0,175	42	0,002	0,864	42	0,000
	Oudezeele	0,234	10	0,129	0,914	10	0,309
	Sint-Antelinks	0,109	102	0,004	0,908	102	0,000
	Villers-Sir-Simon	0,200	106	0,000	0,794	106	0,000
	Wattiesart	0,322	67	0,000	0,476	67	0,000
	Weststraete/Sleidinge	0,178	107	0,000	0,836	107	0,000

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 32: Output for the tests of normality of the Fractal D metric.

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Average width (m)	Based on Mean	14,434	27	2.037	0,000
	Based on Median	10,206	27	2.037	0,000
	Based on Median and with adjusted df	10,206	27	847,711	0,000
	Based on trimmed mean	12,640	27	2.037	0,000
CPA	Based on Mean	9,559	27	2.037	0,000
	Based on Median	5,798	27	2.037	0,000
	Based on Median and with adjusted df	5,798	27	490,359	0,000
	Based on trimmed mean	6,937	27	2.037	0,000
Fractal D	Based on Mean	7,302	27	2.037	0,000
	Based on Median	4,476	27	2.037	0,000
	Based on Median and with adjusted df	4,476	27	519,689	0,000
	Based on trimmed mean	5,030	27	2.037	0,000

Table 33: Output for the test of homogeneity of variances. All p-values (Sig.) are lower than 0,05 and therefore significant.

Test Statistics[a,b]			
	Average width (m)	CPA	fractal_D
Kruskal-Wallis H	603,736	174,975	490,405
df	27	27	27
Asymp. Sig.	0,000	0,000	0,000
a. Kruskal Wallis Test			
b. Grouping Variable: site_nr			

Table 34: Output for the Kruskal-Wallis test.

In order to get more insight in these differences, post-hoc analyses are applied, based on pairwise comparison of the settlements (Tables 35, 36 and 37 in digital attachment). Based on the corrected p-values(Adj. Sig.) for these tests, the individual comparisons indicate stronger similarities between the settlements regarding the CPA and Fractal D than for the widths and average widths. No significant difference in the variance of average width can be found for 245 out of 378 comparisons. This is higher for CPA (341 out of 378) and Fractal D (259 out of 378). Despite an overall significant difference for the three metrics, these individual comparisons indicate stronger similarities between the settlements, especially regarding the CPA and Fractal D. Morphologically there would thus be more similarities than metrically between the individual case studies.

9.3 Discussion

The ANOVA tests for the mapped widths and three morphological metrics in both Wales and the County of Flanders indicate significant overall differences between the selected settlements, thereby rejecting the null hypothesis of randomness. Regarding the width measurements, there is a wide variation between and within the individual settlements. The range for the Welsh settlements lies between 4,8m and 284m. In Flanders, in contrast, the range is smaller and lies between 2,5m and 188,6m. The interval 24m-39m is most common in Wales (27% of the measurements), with an additional peak for 15m-18m. In the County of Flanders, however, 15m-30m is most common (45% of the measurements). It can therefore be concluded that the width of the measured plots are smaller in the County of Flanders than in Wales.

Given the wide variation in measurements, supported by the large standard deviations and significant p-value for the Kruskal-Wallis tests, it was not possible to determine an underlying module of recurrent measurement(s). This was also indicated by Rippon (1996, 86) in his research on Whitson (Monmouthshire). Furthermore, it should be noted that a wide variation in units of measurements were used in the medieval and later periods, both geographically and over time (De Schryver 1968; Grierson 1972; Hesse 2000; Jones 1979; Vandewalle 1984; Zupko 1977, 16-70). Another important consideration to make, is the fact that the field systems would have evolved over time. Due to technical and methodological limitations, the measurements made in this study were based on the oldest topographical maps from the late-nineteenth to early-twentieth century, and therefore not necessarily refer to the exact same medieval boundaries. Only for Whitson, Wiston and Nieuw-Roeselare, archaeological data was incorporated in the dataset. However, this resulted in a similar order of magnitude for the variation in measurements in these three settlements.

The same variance can be found for the CPA and Fractal D metrics. The ranges for the Welsh settlements respectively lies between 1,09-3,22 and 1,27-1,7. Those for Flanders are higher, respectively between 1,08-6,34 and 1,26-1,92. This suggest more complex shaped plots in Flanders. The ANOVA tests for these metrics pointed at significant overall differences within the study areas. Based on the pairwise comparison of the settlements in both regions, however, multiple significant similarities can be found between individual settlements. For both Wales and Flanders, a larger similarity in plot morphologies than metrics can therefore be suggested.

A final consideration that should be made relates to the fact that differences in settlement location were not incorporated in the set-up of this analysis. The differences in physical landscape and socio-economic and political evolution between the coastal areas and Inland Flanders, for example, may have influenced the settlement systems and metrics that would have been used. However, given the low number of row settlements that were mapped and dated in the coastal areas (Chapter 5), no such diversification has been incorporated in this specific study. Moreover, based on the pairwise comparison that were executed, no clear regional similarities could be identified.

9.4 Conclusion

By examining the measured width, average width, Corrected Perimeter Area ratio and Fractal Dimension of plots of land around several Welsh and Flemish case studies, this study presents the first in-depth comparative analysis of the metrics and morphologies of 'Flemish' row settlements in South Wales and the County of Flanders. Taking into consideration the methodological difficulties in mapping the medieval field systems in both regions, this research indicated a wide variation in measurements present in the different individual settlements. Therefore, no overall unified system could be attested. In contrast, statistical analysis of the CPA and Fractal D metrics suggested significant similarities between individual settlements. Rather than clear metrical similarities, the selected case studies therefore show stronger morphological parallels within and between the two regions. Considering these observations, the expected similarities related to an assumed translocation of the row settlement system from the County of Flanders to southern wales are limited and mainly consider the overall plot shape.

Part 4: Interpreting Little Flanders beyond Wales

Chapter 10 Discussion: Towards an understanding of Little Flanders beyond Wales

The landscape archaeological study of the high medieval rural settlement landscapes of the County of Flanders and South Wales aimed at the creation of a comparative framework for a further understanding of the origin, distribution and socio-economic context of planted row settlements in both regions. The multiproxy integration of historical maps, aerial photographs, existing archaeological data, LiDAR and 112 ha of extensive EMI survey thereby allowed to analyse different row settlements in their archaeological and historical context and at different scales. This chapter discusses the general results for these case studies in relation to the theoretical framework and *status quaestionis* as considered in Part 1 of this dissertation. This way, the individual case studies are integrated, compared and confronted to form an interpretative framework on the reciprocity of settlements in the County of Flanders and Wales. First, the application of landscape archaeological and historical geographical methods is assessed. Second, the distribution, character and origin of the row settlements in the County of Flanders are reviewed. Third, the translocation of this settlement type to the south of Wales and its role in the expression of identity are reflected upon. Finally, the character of the Flemish migration to Wales is discussed.

10.1 Integrated landscape archaeological approach

Although the research question, aims and objectives of this dissertation (Chapter 4) are not purely methodological, reconsidering and reviewing the applied methods may offer important and valuable insights for further research.

10.1.1 Complementarity of landscape archaeological techniques

Throughout this research, different complementary forms of archaeological prospection techniques and desktop research were applied in order to map, characterize and date individual sites such as Nieuw-Roeselare, Dudzele-Kruisabelestraat, Wiston and Whitson. The application and relevance of specific techniques was highly dependent on the local site and landscape contexts, availability of data and cooperation of farmers and/or landowners (Table 35).

Given its applicability on both unploughed grasslands and regularly ploughed croplands, the main aspect of fieldwork were large-scale geophysical survey using Electromagnetic Induction. This offered a reliable and time efficient survey technique to assess large areas at all selected case studies. 112ha were surveyed in 21 days offering valuable data regarding the settlement structure and landscape context. In Wiston and Whitson former field boundaries were thereby detected, helping to reconstruct the original settlement structures (Chapter 8). For the site of Dudzele-Kruisabelestraat, EMI offered a broader perspective on the topographical location and surrounding landscape of an excavated high medieval rural settlement site. Finally, at Nieuw-Roeselare, the lost settlement was located and mapped in detail. When possible, additional desktop research and fieldwork was applied to allow further characterisation and dating of the sites.

Ploughed croplands are theoretically well suited for fieldwalking surveys, as has also been presented by Trachet et al. (2017) for the former Zwin harbours and by de Ruijsscher (2019a) for the lost settlement of Coxyde. In the context of this research, fieldwalking was only possible at the site of Nieuw-Roeselare, where it offered an important contribution to the identification and localisation of the settlement centre. The choice to pick up diagnostic RHB fragments for red and grey ware in contrast to all fragments of well-datable stoneware and other imports at Nieuw-Roeselare was based on the work of Trachet et al. (2017) and their conclusion of it being the most time and cost efficient approach. Despite the fact that only a relatively low number of fragments were indeed collected in comparison to Coxyde and the Zwin harbour sites, this methodology allowed to identify the spatial and chronological distribution of habitation at Nieuw-Roeselare. As considered in the discussion of Chapter 7, this relatively low number of finds can be related to different local conditions, which have been identified by an augering campaign. Going back and collecting all find material would, however, offer important methodological and substantive contributions for further research.

The meadowlands in Wales, in contrasts, offered a valuable potential for archaeological information through remaining microtopography. Especially on the meadowland in Whitson and on the Green in Wiston small differences in elevation were preserved. The limited availability of LiDAR data for Wales, however, only resulted in considerable

Nieuw-Roeselare				
	MORPHOLOGY	SOC-ECO	LANDSCAPE	DATE
FIELDWALING		x		x
HISTORICAL SOURCES		x		x
CARTOGRAPHY	x		x	x
EMI	x		x	
AERIAL PHOTORGRAPHY	x		x	
LiDAR	x		x	
ARCHAEOLOGICAL DATA	x	x		x
AUGERING	x		x	x
Dudzele-Kruisabelestraat				
	MORPHOLOGY	SOC-ECO	LANDSCAPE	DATE
FIELDWALING				
HISTORICAL SOURCES				
CARTOGRAPHY			x	
EMI	x		x	
AERIAL PHOTORGRAPHY	x		x	
LiDAR			x	
ARCHAEOLOGICAL DATA	x	x		x
AUGERING				
Whitson				
	MORPHOLOGY	SOC-ECO	LANDSCAPE	DATE
FIELDWALING				
HISTORICAL SOURCES				
CARTOGRAPHY	x		x	
EMI	x		x	
AERIAL PHOTORGRAPHY				
LiDAR	x		x	
ARCHAEOLOGICAL DATA				
AUGERING				
Wiston				
	MORPHOLOGY	SOC-ECO	LANDSCAPE	DATE
FIELDWALING				
HISTORICAL SOURCES		x		
CARTOGRAPHY	x		x	
EMI	x		x	
AERIAL PHOTORGRAPHY				
LiDAR	x		x	
ARCHAEOLOGICAL DATA	x	x		x
AUGERING				

Table 35: Illustration of the complementarity of applied methodologies at the sites of Nieuw-Roeselare, Dudzele-Kruisabelestraat, Whitson and Wiston (after De Clercq et al. 2019, 90).

contributions for Whitson. For the regularly ploughed Flemish croplands, LiDAR did not allow to identify micro-topography, yet offered insights in the topographical landscape contexts of the case studies and inventoried archaeological sites.

Desktop research through the use of historical maps was applied at all sites, while the use of oblique aerial photography only offered results for the case studies in Flanders. In contrast to the limited availability of this imagery for the Welsh villages of Wiston and Whitson in the collections of the RCAHMW, the collection of Ghent University and dedicated flight campaigns on the site of Nieuw-Roeselare yielded more data.

Overall, the great strength of the applied cross-disciplinary methodology was the integrated application of multi-proxy data and its flexible complementarity related to the availability of data and applicability to local site and landscape contexts, as has also been accentuated by De Clercq et al. (2019, 90-91).

10.1.2 Considerations regarding scales of approach

Within and between the chapters of this dissertation three different scales have been applied, resulting in different approaches. These correspond to the three scales of the 'three scale settlement analysis' as developed by Antrop and Van Eetvelde (2017, 216): site, territory and geographical situation. The metrical and morphological analysis of Flemish and Welsh settlements (Chapter 9), and the identification of grouped settlements in the growing archaeological dataset on rural settlement sites (Chapter 6) can be ascribed to the level of the individual site. The geophysical surveys, fieldwalking, augering and analysis of archaeological excavation data together with aerial photography, LiDAR and historic maps for the selected case studies, on the other hand, bridged the gap between the site level and that of the surrounding territory. The integration of both levels offered both site specific data and insight in the landscape context of the case studies. Equally so did the environmental data for inventoried archaeological sites, and the analysis of their relative topographic position (Chapter 6).

Most influential to the chosen approach was the focus on the County of Flanders as the third or regional geographical level. First, this influenced the choice of historic maps for the identification and mapping of the row settlements in the County of Flanders (Chapter 5). Given the focus on the geographical distribution of these row settlements, it was not possible to identify the medieval settlement morphology of all 720 mapped row settlements in detail. As discussed in Chapter 5, the eighteenth- and nineteenth-century morphologies originating before the large-scale and intensified landscape changes were considered instead. As indicated by Termote (2014) in-depth research at the site level would have been required to identify original settlement morphologies, something that may be considered in future research. Second, when mapping the geographical distribution and analysing metrical characteristics of row settlements, no distinctions have been made based on differences in the physical landscape or socio-economic and political contexts. Although coastal and inland landscapes, for example, would have had different formation processes, Chapter 5 confirms the observations by Schlesinger (2008) that row settlements can be found in both contexts. Nevertheless, a clustered distribution was attested, which has been identified to be related to regional differences in socio-political organisation and evolutions since the early medieval period. Furthermore, the metrical and morphological analysis of settlements within the County of Flanders and Wales, did not allow to highlight similarities based on geographical locations (e.g. coastal areas versus inland regions). Rather than regional consistencies in size and measurements, the local landscape and socio-economic contexts would have been most influential, as is also suggested by older historical research on units of measure (De Schryver 1968; Vandewalle 1984). Finally, the observation that settlement systems were translocated between different landscapes (Roberts 1996b, 95-97; Schlesinger 2008) influenced the approach to consider the Welsh case studies as one dataset, despite topographical and landscape differences between Wiston and Whitson for example. The focus thereby was on studying to what extent the row settlement morphology was applied in a different context than the one from which the *locatores* would have originated.

10.2 Row settlements in the County of Flanders

10.2.1 Interpretation of the geographical distribution

For the County of Flanders, the high medieval landscape reclamations are generally accepted to have strongly influenced the settlement landscapes (Antrop 1997, 109; Antrop & Van Eetvelde 2017, 145; Thoen & Soens 2015, 226; Verhulst 1966a, 76-88; 1966b, 99-109). Based on the research by Verhulst (1953, 349-351; 1991a; 1991b; 1995, 130-133; 1998a, 12), topographical axes of exploitation were highly important for the structuring of the landscape, while planted row settlements are regarded as the major settlement morphology related to these intensified landscape reclamations in the county. Past research especially focused on the settlements of Kluizen and Woesten from a historical-geographical perspective (Verhulst 1991a; 1991b), but a limited number of other historically attested cases have been suggested by Thoen (1990), among others. Yet, this doctoral research on the geographical and chronological dispersal of row settlements in the County of Flanders, as described in chapter 5, strongly supports the suggestion by Dussart (1957), Lefèvre (1964b) and Van De Velde et al. (2012) that the row settlement morphology is more widespread throughout the county. Moreover, the inventoried archaeological data on high medieval rural settlements (Chapter 6) strongly suggests an even wider occurrence that is not depicted on historical maps. However, rather than being confined to predefined regions, the mapped distribution pattern is more complex and suggests different phases of creation with different contexts or origins for these settlements.

Overall, a shift in geographical location of these row settlements from the fertile loam/loess soils in the southern parts of the county towards the less fertile northern sandy soils is attested, confirming suggestions and conclusions from previous research that the establishment of row settlements is strongly related to landscape reclamations. Based on dates of first mention for these settlements, the strongest shift towards the north of the county appears to have mainly taken place from the thirteenth century onwards, which corresponds with the final phase of intensified landscape reclamations as defined by Verhulst (1995, 134-136). In this period, lands were sold or given in concession to lay and urban elites who planted new settlements, such as Nieuw-Roeselare (Chapter 7) to organise the reclamations (Verhulst 1958, 213; 1966a, 79-80; 1966b, 99-116; 1995, 134-139). Although loam/loess soils were most important during the previous phases of the 'Great Reclamation Period', statistical analysis indicates that new row settlements were founded both on the newly reclaimed (sandy) as well as on the already reclaimed (loamy) lands (Figure 108).

The largest number of row settlements on the sandy soils are only mentioned for the first time after the period of high medieval intensification, with mentions especially dating to the fourteenth to seventeenth centuries. It should be noted, however, that the number of first mentions would increase in time related to the further development of administration over the course of the high medieval period. Yet, as suggested by Szabó et al. (2017, 95), this offers an indication of the process and scale of development. Furthermore, the more fine-grained chronological distribution allows to add more nuance. Two phases can thus be identified. Although the large cluster between the cities of Bruges and Ghent mainly consists of row settlements with a thirteenth-century and later first mention, older settlements can be found around these cities as well (Figure 108). The large cluster clearly corresponds to the high, late and post medieval reclamation of the sandy soils and the early industrialisation of the rural areas in the context of the cloth making industry. In this northern cluster, several row settlements are characterised by very long and wide open streets that are interpreted to have been important for the processing of cloth (Verhoeve & Verbruggen 2006). In addition, an earlier dynamic around the major cities, in contrast to the lands between them, can be identified as early as the tenth to eleventh centuries for Ghent, and the twelfth century for Bruges. This indicates that, predating the systematic intensification of landscape reclamations on the sandy soils, the town-countryside interaction would already have influenced the presence of row settlements around the towns and cities. Ghent transformed into a riverine trade settlement from the tenth century onwards, while Bruges became one of the most important hubs in the international trade networks from the twelfth century onwards (Dumolyn, Declercq, et al. 2018; Dumolyn, Ryckaert, Meijns, et al. 2018; Verhulst 1999). As is suggested by historical research, rural regions would have benefited from interactions and integration with growing urban centres and their markets (Clark 2009, 44-45; Curtis 2013, 246-250; Grantham 1997; Masschaele 1997; Soens et al. 2012), while higher rural production is understood to have contributed to the steady growth of the urban centres (Thoen 1993a, 260-263; 2001). In other words, the first quantitative and spatial expansion of the row settlement, a type of settlement which is now understood to be strongly related to rural exploitation, is linked to increasing urbanisation and intensifying town-countryside relations. This certainly was the case for the County of Flanders and northern Italy, the two most urbanised regions of Europe during the high medieval period (Curtis & Campopiano 2014; Dumolyn, Declercq, et al. 2018; Thoen 1993a; 2001). One of these grouped settlements would have been Sijsele-Stakendijke (Chapter 6), for which a first pottery assessment indicates a twelfth-century occupation (De Gryse et al. 2012; Deconynck et al. 2019). Based on the settlement's morphology, characterised by individual plots that are structured along a road/trackway, there are strong indications of it being a planted row settlement. However, in contrast to the examples that have been studied historically (e.g. Kluizen), written confirmation of this suggested plantation context is currently lacking.

Besides the large cluster and hotspot between Bruges and Ghent, so-called cold spots also occur, in which a significant low number of row settlements has been mapped. The largest of such cold spots can be found along the river Yser to the East of Saint-Omer and to the West of Veurne. This relative low number of mapped row settlements may be related to both differences in the use and exploitation methods of the landscape as well as to historical power structures and land ownership. Together with the coastal area and the Yser estuary this region roughly corresponds to the former *pagus Iseritius*, part of the original heartland of the County of Flanders. Here, the counts were able to acquire large demesnes already before the tenth century (Tys 2001/2002; 2004, 33-34; 2010; 2013). Elsewhere in the county, the acquisition of royal manors, lay abbacies and the Wilderness rule allowed the counts to take jurisdiction over large areas of wastelands and abandoned abbey demesnes during the tenth and eleventh centuries (Deschepper 2016, 23; Tys 2004, 34; Verhulst 1958, 57; Voet 1942). Yet, the scale of these newly acquired lands is understood to have been smaller because most of the land was already owned by other local lords and institutions (Koch 1951, 10-12; 1981, 371-382; Tys 2004, 34; Voet 1942, 31). Historical-geographical research has shown how already from the tenth century onwards a so-called *pastoral specialisation* was installed in the coastal areas, in which extensive sheep holdings would have aimed at production for market purposes in relation to the growing urban centres such as Bruges, Ghent and Ypres. These holdings were organised from large central farms, which would have been granted to ecclesiastical institutions and a limited number of lay tenants (Tys 2004, 53; 2013, 217-220; Verhulst 1966a, 27; Verhulst 1998b). Thoen (1999, 75-77; 2001; 2004) considers this to be a political strategy to limit the influence of local lords, which furthermore formed the basis for the predominance of large commercial holdings in the coastal area during the late and post medieval periods.

Elsewhere, socio-economic and political contexts may equally explain why a relative limited number of row settlements has been identified. For the Scheldt and Dender region, research by Verhulst and Thoen has indicated a major cluster of *Kouter* place names. These refer to (micro) open field agriculture in which the croplands of a settlement are grouped into complexes called *kouters*, often having origins in the Early Middle Ages. The settlements in this agriculture system existed of groups of farms at the edge of these *kouters* (Thoen 1993b, 71-92; 2010; Verhulst 1995, 121), resulting in a different morphology of grouped settlements. When comparing the geographical distribution of the mapped row settlements with the occurrence of *Kouter* place names, as mapped by Verhulst (1995, 121), it becomes clear that both highest densities do not correspond (Figure 109). In other words, the main region of *Kouter* place names is characterised by a relative low number of row settlements.

In contrast, the Lys region has been characterized by Thoen (1990) as being dominated by dispersed settlements. Apart from some smaller *Kouter* complexes, individual farms can be found scattered across a more closed landscape. These larger farms would have been part of ecclesiastical demesnes and, similarly to those in the coastal area, would have acted as centres for the exploitation of the landscape (Thoen 1990, 25; Verhulst 1953). From the end of the high medieval period onwards, investments of urban elites and wealthy local farmers would have resulted in a further increase of large enclosed farms or moated sites as well (Thoen 1990, 21 and 30-31; Thoen & Soens 2015, 224). Thoen (1988; 1990, 27) refers in this context to the principle of *buitenpoorterij* in which rural inhabitants could escape from the lordly jurisdiction by becoming sort of an external citizen and follow urban jurisdiction and benefits instead.

The difference between the Lys region and the area between the rivers Scheldt and Dender thus can be explained by their differing socio-economic and political context, which gave rise to a different landscape and settlement system. Thoen (1990, 26-27) states that the counts of Flanders were able to limit the power of local lords in the region of the river Lys. This was less the case between Scheldt and Dender since this region was incorporated in the county at a later stage. To date, it still is a matter of debate whether it were these local lords who were able to move people into grouped settlements and imposed the system of (micro) open field agriculture on the communities rather than a bottom-up process of people collaborating on their own behalf (Curtis 2013; Thoen 1990). Generally, a conscious need to collectively organise resources within communities in order to cope with decreasing capital as individual holdings were decreasing in size supports the bottom-up interpretation (Curtis 2013, 234; Thoen 1990, 28-29; 1993b, 71-92). In the theoretical concept of Riddersporre (1999, 173) this would be described as live together/work together. In contrast, researchers such as Saunders (1990) state that the ever growing urge for luxury goods and large revenues by the elite forced this system upon the rural population. Yet again, the context for the County of Flanders may be more nuanced, as Thoen (1990, 28-29) states that the diminishing power of the local lords would have implied that they were not able to impose a change in agricultural approach upon the rural communities, while the need for capital would have been rather limited, thanks to the close relation between the countryside and the growing urban markets.

10.2.2 Socio-economic and political triggers for the occurrence of row settlements in the county

The geographical and chronological distribution of row settlements in the County of Flanders clearly indicates a regional and temporal variance that was closely related to different ways of exploitation, various socio-economic contexts and contrasting political power structures which lead to different types of grouped and dispersed settlements. Saunders (1990, 183) describes this variation as the embodiment of social relations in the spatial structures. Although the occurrence of grouped settlements, among which row settlements, has been widely studied and is considered to be a complex process of social, economic and political factors, an in-depth understanding of the origin of the wide array in morphologies and the causes for a geographical distribution between grouped and dispersed settlements is still a subject of debate (Chapelot & Fossier 1980; Kissock 1990; Renes 1981; Rippon 2008; Roberts 1977; 1982a; 1982b; 1987; 2008; Roberts & Wrathmell 2000; Van De Velde et al. 2012; Verspay et al. 2018). In his synthesising paper, Curtis (2013) describes up to four main explanatory models for the occurrence of grouped settlements in medieval Western Europe: Power, Coercion, and Lordship ; Communalism and Territorial Formalization ; Field Systems and Resource Management ; Urbanization and Market Integration. Yet, he thereby stresses that there is no single model to sufficiently explain each individual case and that geographical and temporal variation may be found.

The distribution of row settlements across Europe shows that the origins of these settlements are diverse and unclear. Although some examples such as in Vitry-en-Artois (Louis 2004, 494-496), Vorbasse (Hvass 1986), Kirchheim (Christlein 1981) and Gasselte (Waterbolk 1991; Waterbolk & Harsema 1979) date back to the early medieval period (Hamerow 2002, 55-80), most European research indicates a high medieval origin related to increasing landscape reclamations. Traditionally, a strong influence of local lords and urban elites has been considered to have been influential in the occurrence of row settlements. Regarding this interpretation, Hamerow (2002, 87) points out that a high degree of uniformity and regularity in settlement lay-out in some settlements hints at lordly influence. Saunders (1990, 190) states that the establishment of rigorously planned row settlements represents "the expression of the power and domination of the feudal lord over the peasantry". According to this model, the driving force was always the material interests of the local lords. While tenement strips were the basis of fiscal assessment, as has also been suggested for Denmark and Sweden by Roberts (1996b, 112), the spatial planning would have been part of the means by which the lords maintained their dominant social position (Saunders 1990, 190-192). Furthermore, the location of settlements along roads would have allowed the lords to supervise the rural communities daily lives and control the access to the settlements (Saunders 1990, 193). This may be nuanced since Verhulst (1953) considered roads as prime axes of exploitation and communication. Moreover, as demonstrated by several examples in the archaeological dataset of high medieval rural settlements as studied in chapter 6, roads would have had a structuring impact on the landscape and surrounding settlements. This certainly was the case for the relative position of farm holdings at the site of Sijsele-Stakendijke (De Gryse et al. 2012; Deconynck et al. 2019).

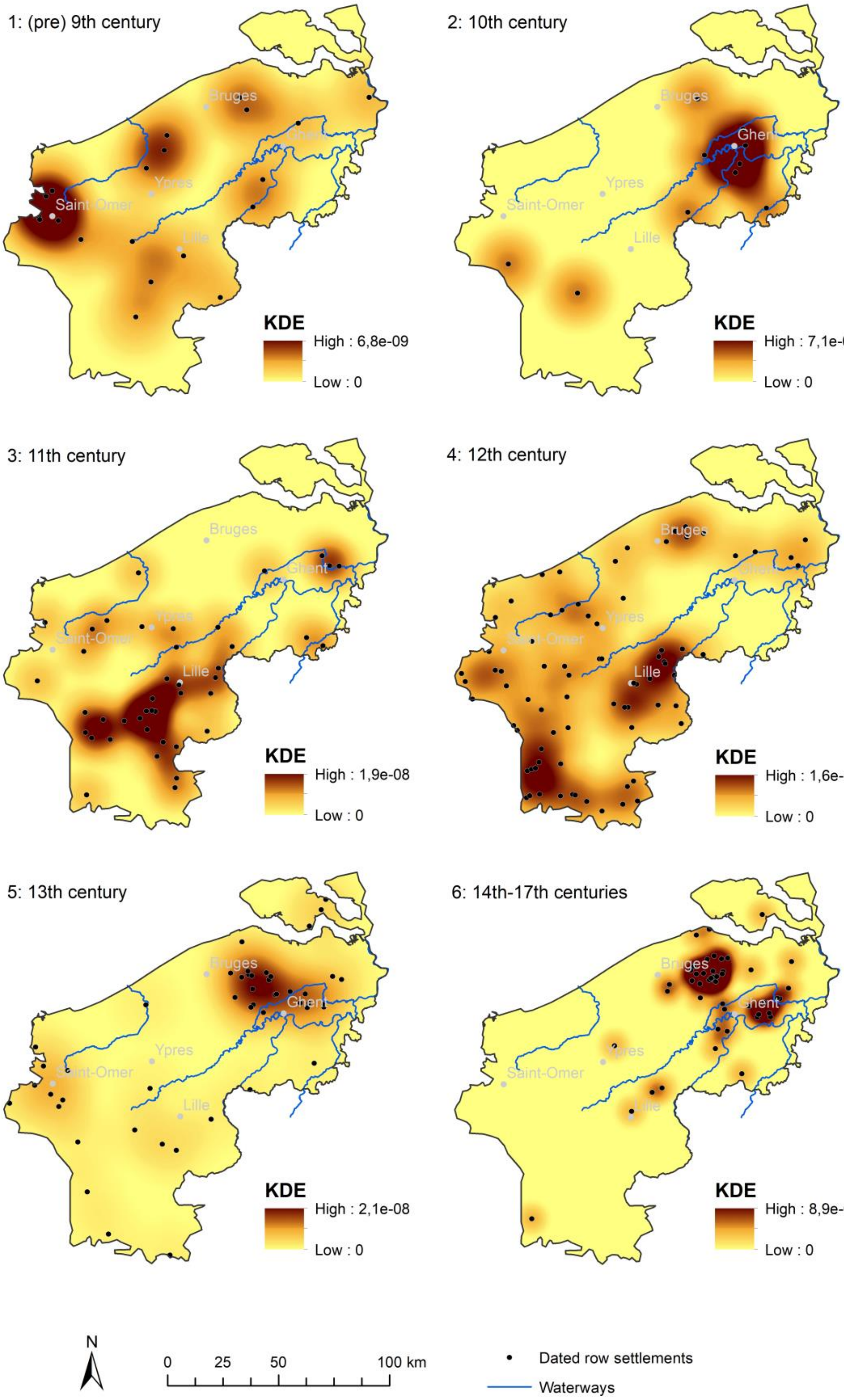

Figure 108: KDE for mapped and dated row settlements in the County of Flanders according to century of first mention (Visualised using 2.5 Standard Deviations stretch). 1: (pre) 9th century (n=20); 2: 10th century (n=10); 3: 11th century (n=42); 4: 12th century (n=76); 5: 13th century (n=48); 6: 14th-17th centuries (n=47).

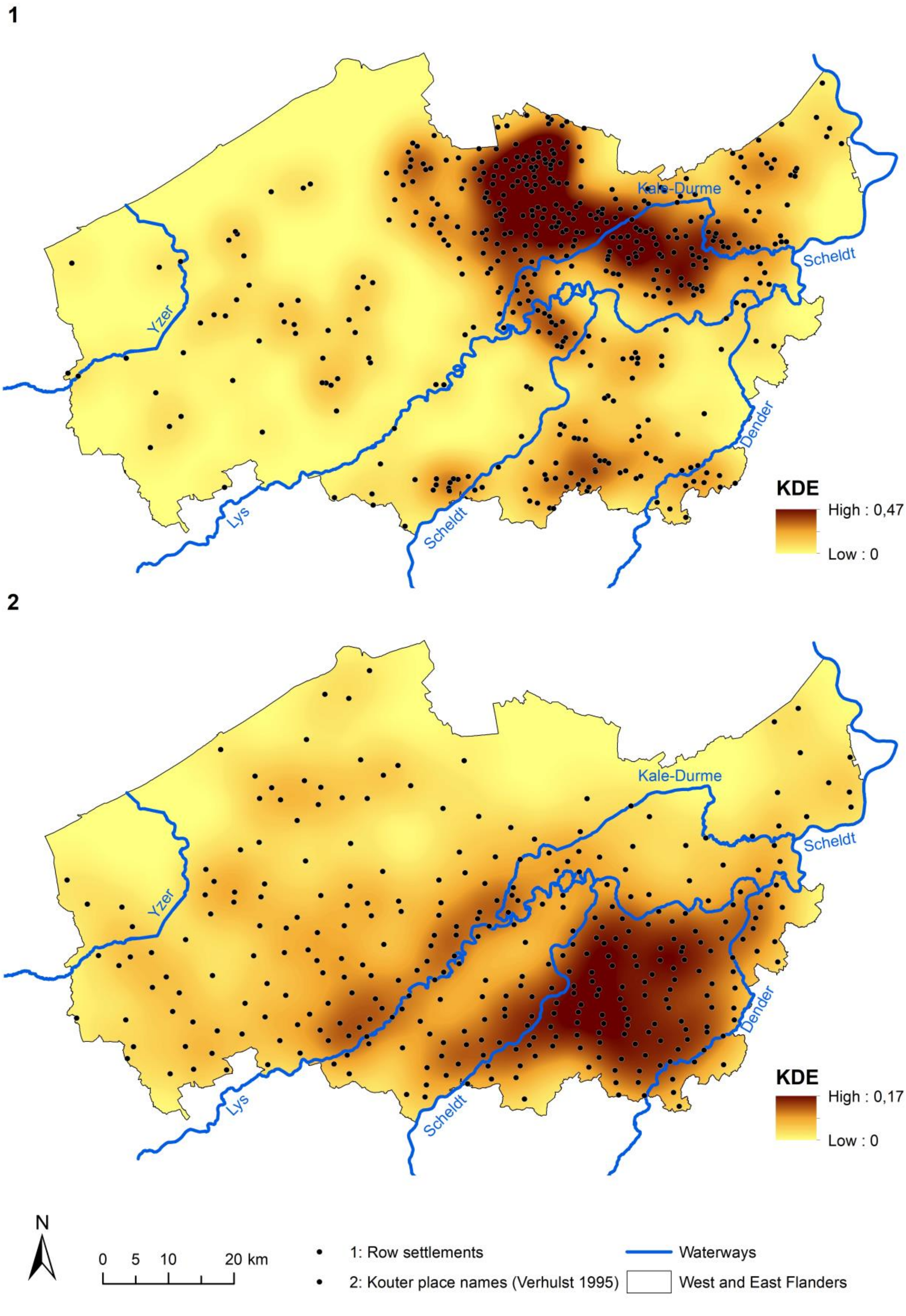

Figure 109: Kernel Density Estimation for mapped row settlements (1: upper map) in comparison to *Kouter* place names (2: lower map) as mapped by Verhulst (1995, 121) (Visualised using 2.5 Standard Deviations stretch).

In contrast to these top-down interpretations, one could argue that the organised layout of these newly planted settlements was the most logical and natural thing to do. Long and equal partitions of land were thereby perpendicularly orientated along an axis of exploitation. This can also be found in newly reclaimed settlements in Central and Eastern Europe and in the medieval kingdom of Jerusalem (Ellenblum 1998, 89-90; Schlesinger 2008). It should be stressed though that not all row settlement morphologies show indications of *ab nihilo* plantation. Furthermore, for those that are known to have been planted, there are exceptions on the strictly planned morphology. Woesten, for example, rather exists of individual farms closely located along a road, without perpendicular plots (Verhulst 1991b).

Göransson's (1979) research on the metrics and legal framework of row settlements in Scandinavia suggests that the legal principles for this planned morphology would have originated in Danish laws during the thirteenth century and appeared in Sweden at the end of the thirteenth century. The primary motives would have been the equality principle, rather than fiscal purposes guided by institutions or lords. In Germany, Poland and the Czech Republic, the presence of row settlements has traditionally been linked to the colonisation of the regions to the east of the river Elbe by settlers from the Low Countries during the high medieval period. Research by van der Linden (1955; 1982; 2000) on the Dutch reclamations in north eastern Germany has indicated that exactly the same legal framework and settlement system was used as for the reclamations on the Holland-Utrecht plain. However, he ascribes a more important role to *locatores* in Germany than in the reclamations of the fenlands in the modern-day Netherlands, which already started in the eleventh and twelfth centuries. These *locatores* or land agents were involved as intermediaries who contracted with the political, ecclesiastical or other elites to plant new settlements and attract colonists to reclaim the landscape (Rippon 2008, 241-243; Roberts 1996b, 112; van der Linden 1982). Similarly to Göransson's (1979) observations for Scandinavia, equality would have been incorporated in the legal principals of the Östsiedlung (Bünz 2008, 102-103).

Regarding the County of Flanders, it thereby should be questioned to what extent there really was a power struggle between the peasantry and the local lords or institutional elites. In the context of an elite urge for luxury goods and revenues, labour duties and payments in kind were changed into fixed rents (Thoen & Soens 2015, 224). Because of economic growth, these would quickly devaluate, allowing for the rural population to invest into reclaiming new land for additional profit. From the twelfth century onwards, local lords and the counts of Flanders developed a policy of stimulating population growth and attracting new settlers in order to gain influence and wealth but also to keep their overall revenues stable (Thoen 1990, 24; 1999, 76). Aiming at attracting as many people as possible, privileges and low rents were offered to settlers (Thoen 1990, 24; 1999, 76;

Thoen & Soens 2015, 224). Verhulst (1991a) describes this for example for the comital settlement plantation of Kluizen. Indeed, when considering the distribution of row settlements within the county (Figure 108), the number of mapped and dated settlements increases from the twelfth century onwards and shows a relatively higher density in the south of the county. The same principles continued to be used during what Verhulst (1966a, 79-80; 1966b, 99-119; 1995, 134-139) considers to be the final phase of the 'Great Reclamation Period'. For new reclamations, mainly in the northern part of the county, lands were sold or given in concession to lay and urban elites who also planted new settlements and recruited settlers.

This would indicate that lords did large efforts to attract people for their new reclamations and that the rural population of these new settlements enjoyed a certain form of freedom. Curtis (2013, 234-235) refers to secure property rights and village governments that were capable of maintaining the commons over long periods through conflict resolution in the Campine region. There, the Duke of Brabant and local lords similarly planted new settlements to increase their mutual influence (De Keyzer 2013; Leenders 2011a; 2011b; Vangheluwe & Spek 2008). Also on the Holland-Utrecht plain, research by van der Linden (1955; 1982), Erlen (1992) and van Cruyningen (2013) indicates that the rural population in the newly planted reclamation settlements obtained freedom from serfdom and secure property rights. Some settlers also received the jurisdiction for further reclamations. Equally important was the *buitenpoorterij* in which rural populations were able to follow the jurisdiction and privileges of urban centres (Thoen 1988; 1990, 27).

This discussion shows that explaining the morphology and socio-economic structure of row settlements must always be firmly rooted in local conditions. Sometimes a strong lordly presence and initiative is determining (top down), while in other spatial or chronological contexts the peasantry had a dominant influence or was able to obtain special rights and freedoms. The high medieval landscape reclamations that were induced by the elite would equally have resulted in positive social change for the rural population. Lyon (1957, 47) describes it as the twelfth and thirteenth centuries having "contributed to the emancipation of the common man". As indicated by the landscape archaeological research on the lost settlement of Nieuw-Roeselare (Chapter 7), a clear social differentiation can still be found within the settlement's lay-out. The core of the settlement is made up of individual plots with a perpendicular orientation along a road. This corresponds to the planted settlement from the end of the high medieval period, ascribed to Gosuwin de Roeselare who was a citizen of Ghent. Around this settlement centre, up to four enclosed farms have been attested through EMI, one of which is characterised by a considerable ditch. Excavations by Van Doorselaer and Verhaeghe (1974) revealed three brick buildings with remnants of glazed tiles floor paving and tiled roofs. The largest construction was reinforced with buttresses, which indicates a substantial construction with a possible upper floor. Together with the considerable enclosing ditch, it can be considered that this dwelling would have been of higher status than the nearby settlement and possibly related to more elite inhabitants.

10.2.3 A much more diverse rural settlement landscape

It should be stressed that the high medieval reclamation settlement landscape was much more diverse than just row settlements. First of all, other types of grouped settlements should be considered as well. As already presented in the discussion on the *Kouter* place names, this specific agricultural system often resulted in a more nucleated form of grouped settlements. Furthermore, unpublished doctoral research by Van de Velde on the *Meetjesland*, a region to the north of East Flanders, indicates a wide array of grouped settlement morphologies in a relatively small area (Van De Velde et al. 2012). Verhoeve and Verbruggen (2006, 10), for example, indicate how several grouped settlements in the *Meetjesland* were granted urban rights, which resulted in the creation of marketplaces and squares as loci of settlement. Lastly, as indicated by the syntheses of archaeological research on high medieval rural settlements in the northern parts of the county (Chapter 6), individual farms make up the main body of settlements in archaeological contexts. A considerable increase in archaeological data over the last decades has allowed to study their relative topographic position in a wider landscape context. Statistically significant relations between soil texture and drainage could be attested and an overall preference for dry to moderate dry sandy and sandy loam soils was identified. Because of general difficulties regarding detailed dating of high medieval settlement structures, no temporal attributes were included in the analysis. Therefore, and in contrast to the mapped row settlements, a chronological analysis could not be executed. Nevertheless, a clear majority of the high medieval rural settlement sites is located to the north of these northern parts of the county. This corresponds to the idea that these are related to landscape reclamations. Based on the archaeological dataset, ditched enclosures are an integral part of these farmsteads. Although this would already have started in the early medieval period, regularity and structured lay-out maximised in the high medieval period (Blair 2018, 372; Donat 1980; Hamerow 2012, 67-88; Huijbers 2012). Besides purely functional considerations, the creation of these enclosing features can also be interpreted as a social practice, embedded in the habitus of the rural communities, expressing (group) identity and status (De Clercq 2009, 259-260; Huijbers 2012). The majority of these enclosed farmsteads were limited in scale, suggesting that it mainly were small family holdings. In Thoen's (Thoen 1999, 76-77; 2001, 111-112; 2004, 53-58) concept of 'commercial peasant economy' the main goal of production was for the family to survive with a limited additional production for market purposes. Given the decreasing size of many family holdings due to inheritance, larger holdings, although limited in number, were highly important since they provided for the necessary additional labour for small farmers and offered support by lending equipment such as horses, mills and ploughs. Without these, most small holdings were not large enough for subsistence (Lambrecht 2003, 240; Thoen 1999, 76-77; Thoen & Soens 2015, 226). As indicated by Verhulst (1953; 1958) and Thoen (1990, 25) many of these larger holdings would have been part of ecclesiastical demesnes as centres of exploitation. Others were property of wealthy local farmers or urban elites (Thoen 1990, 21 and 30-31; Thoen & Soens 2015, 224), as may have been the case at Nieuw-Roeselare. The occurrence of so-called proto-villages of the 'semi-nucleated mode' in the County of Flanders, such as Sijsele-Stakendijke, and although much more limited than in the archaeological records of northern France and England (Blair 2018; Hamerow 2012; Peytremann 2003), can also be related to the limited and decreasing size of individual holdings and the communities adapting to changing socio-economic conditions. With the intensified landscape reclamations and increasing settlement stability, a certain change to the social system occurred in which a new building concept emerged. This was not related to buildings *stricto sensu*, but to the way in which the rural communities lived together and organised the settlement landscape. Although the grouping of dwellings with their individual plots may fit Riddersporre's (1999) concept of Live together / work apart, it may still have allowed rural communities to cooperate (work together). In contrast to the *Kouter* system, this not necessarily would have involved the arable lands. De Keyzer (2013), for example, indicates how grouped settlements were able to organise the exploitation of the commons over long periods of time.

Rather than considering strict regions characterized by certain settlement types, the rural landscapes of the County of Flanders would thus have existed of a symbiotic system in which different types and sizes of rural settlements existed next to one another, and all played their part in the exploitation of the landscape and the interaction with urban centres.

10.3 Translocation of row settlements as an expression of identity

Based on the logic of common practice or habitus model as described by Bourdieu (1977), practices and material culture are shaped by past conditions and are embedded in cultural tradition. Equally, the production and adaptation of material culture is thereby intrinsically connected to social actions and interactions. Following Robertson and Richards (2003), as described in the theoretical framework (Chapter 1), the settlement landscape is considered as material culture, which can provide indications for assessing migration and which Mitchell (1994) considers to be a dynamic process forming identities. Burmeister's (2000) application of the habitus concept in archaeological migration research has highlighted a distinction between the internal and external cultural domain. Material culture used in this private sphere is more likely to refer to the origin and traditions of the migrant population, expressed in their day to day domestic practices. Hence, migration and cultural identity are most likely to be recognised archaeologically through material culture from the internal domain. Material culture used in the external domain, in contrast, is more prone to interaction and influence of the immigration area. It is therefore considered to represent an individual's social status or identity as member of a (social) group (Burmeister 2000; Tys 2012a). Especially in the context of difficult interactions, such as armed conflicts with the native population as historical chronicles describe for the Flemish migration to Wales, the expression of different forms of identity may become more relevant (Burmeister 2000, 546). Roberts (1996b, 95-96) follows this theoretical framework in the context of settlement translocation, for which he states that "If a settlement is indeed planned, then the people who created it had in their mind's eye an image, a concept, of what a settlement should be. This is exciting, for not only are these images derived from roots deep within cultures and lifestyles, they can travel as a package in the mind, be elaborated or simplified, duplicated exactly or adapted to changed or local circumstances, and are testimonials to the fertile imagination of human beings." Well-studied medieval examples of these translocations of settlement concepts are highly limited and are often based on studies of legal history, as is the case for the Östsiedlung settlements in relation to the Cope reclamations in the Netherlands (Bünz 2008; Luck 2010; van der Linden 1955; 1982; 2000). The application of exactly the same legal principles in both regions resulted in the occurrence of morphologically similar planted row settlements.

Such translocation has also been suggested for the planted row settlements in Pembrokeshire and Whitson in Monmouthshire, where Kissock (1990; 1997), Roberts (1987) and Rippon (1996) suggested a high medieval Flemish influence. Indeed, this settlement morphology is related to place names that are understood to refer to Flemish personal names (Coplestone-Crow forthcoming; Roberts 1987; Toorians 1990). Two exceptions are Templeton and Angle, for which no direct Flemish link has been attested. There are, however, several considerations to be made. First of all, it should be stressed that not all suggested Flemish place names can be linked to planted row settlement morphologies. Several refer to individual farm holdings or other morphologies of grouped settlements (Chapter 9). Furthermore, the ascription of a Flemish origin not necessarily strictly refers to the County of Flanders, but might consider the Low Countries in general (Chapter 3). As indicated by Geary (1983, 18), the ascription of an individual's ethnicity in historical written sources was highly subjective and related to a person's social status/function rather than cultural background in the context of medieval migrations. Moreover, as considered in chapter 3, the geographical and political awareness of the ascriber would have been of influence as well. Yet, for England at least, tenants-in-chief are mentioned in Domesday Book by names referring to places in the southern parts of the County of Flanders and Artois (Keats-Rohan 2001, 141; Oksanen 2012, 178-197; Verberckmoes 1988). No such specific place name references are available in the south of Wales, where the appellation of *flandrensis* is mainly used. This southern region of the County of Flanders, however, corresponds to the area with the majority of older row settlements as mapped in chapter 5.

Based on the comparative metrical and morphological analyses of Flemish and Welsh case studies, no statistically significant similarities could be identified in the use of metrical units of the overall settlements and individual plots. This is not surprising, however, as within both study areas little to no similarities could be identified either, clearly indicating a wide variety in measurements being used within and between individual settlements. This has also been attested by Schlesinger (2008, 249) for the planted settlements of Flemmingen and Küren in Germany. In contrast to the assumed strict regularity of these Östsiedlung settlements, he attested a lack of systematic measurements in individual plot sizes. Furthermore, he concluded that the inland settlements are located individually in the landscape, while the so-called *Marschhufen* villages are situated in much larger complexes because of their relation to water management, much like it is the case for the Cope reclamations on the Holland-Utrecht plain (Bünz 2008; Luck 2010; van der Linden 1955; 1982; 2000). The morphological idea thus has been translocated to the inland areas where water management was less important. The study of morphological attributes for Flemish and Welsh planned row settlements allowed to confirm that the plots in both study regions are similar in shape (long plots perpendicular to a road or stream), indicating that the overall morphologies are similar, but that no metrical analogy is present. The strict equality and regularity in plot sizes within these settlements has disappeared. Furthermore, for both the County of Flanders and the south of Wales it can also be observed that planted row settlements are located individually in the landscape, rather than in large complexes, thereby suggesting geographical differences in the application of an overall similar settlement system.

The lack of metrical similarity not necessarily means that there is no link between the planted row settlements in the south of Wales and the Flemish migration, though. As stated by Kissock (1997), this settlement morphology is strongly related to the Anglo-

Norman urge for influence in the region. Historical sources clearly indicate Flemish migration being part of this. Furthermore, place name evidence suggests a strong connection between Flemish immigration and the occurrence of the row settlement morphology in southern Wales. This is strengthened when considering that this settlement type is rare in southern Wales in contrast to northern England (Creighton & Rippon 2017; Roberts 1988; 1996a). As for the County of Flanders, however, it can be argued that the application of the row settlement morphology in southern Wales is the most logical when planting new settlements.

Based on this research, in combination with historical sources, it can be stated that settlement morphology in the context of high medieval Flemish migration mainly was an expression of social identity (social status and/or membership of a group), rather than an intentional/conscious expression of cultural identity. Indeed, the morphology is strongly linked to the reclamation of the landscape and the plantation of new settlements in the County of Flanders. However, this is not the only morphology in the County of Flanders, nor in the south of Wales. Moreover, it is not unique for the County of Flanders and can therefore not solely be ascribed to inhabitants of the county. Moreover, medieval examples such as in Germany indicate that there is rather a strong link with the legal systems that were used (Luck 2010), rather than with cultural traditions. Although a legal system that is being translocated can be considered as being part of the *habitus* of a community.

Similarly, research on urban town morphology indicates that several new Norman towns in the British Isles were deliberately planted following translocated Norman legal systems (Beresford 1967; Blair 2000, 258-270; Lilley 1995; 2000; 2017; Lilley et al. 2007), which allowed to regulate and control social and spatial practices within the towns (Lilley 2000, 520). One of these legal systems is known as the Law of Breteuil and allowed Norman lords to establish new urban communities who, much like the planted grouped settlements in the County of Flanders, received legal and economic privileges. Haverfordwest in Pembrokeshire is understood to have been planted following this legal system (Lilley 2000, 521). The town's lay-out also illustrates the capacity of the urban laws to exclude, "for not only did they provide colonizing lords with a means of keeping watch and maintaining a presence, but they also enabled them to engender social divisions within their enfranchised towns" (Lilley 2000, 523). In fact, the urban laws favoured specific groups which resulted in the cultural construction of the others as outsiders (Sibley 1992, 112-113). In Haverfordwest, the Welsh suburb of Prendergast was located across the river and opposite the Norman town surrounding the castle, resulting in what Lilley (2000, 525) considers to be the spatial articulation of social divisions and marginal social position (Figure 110).

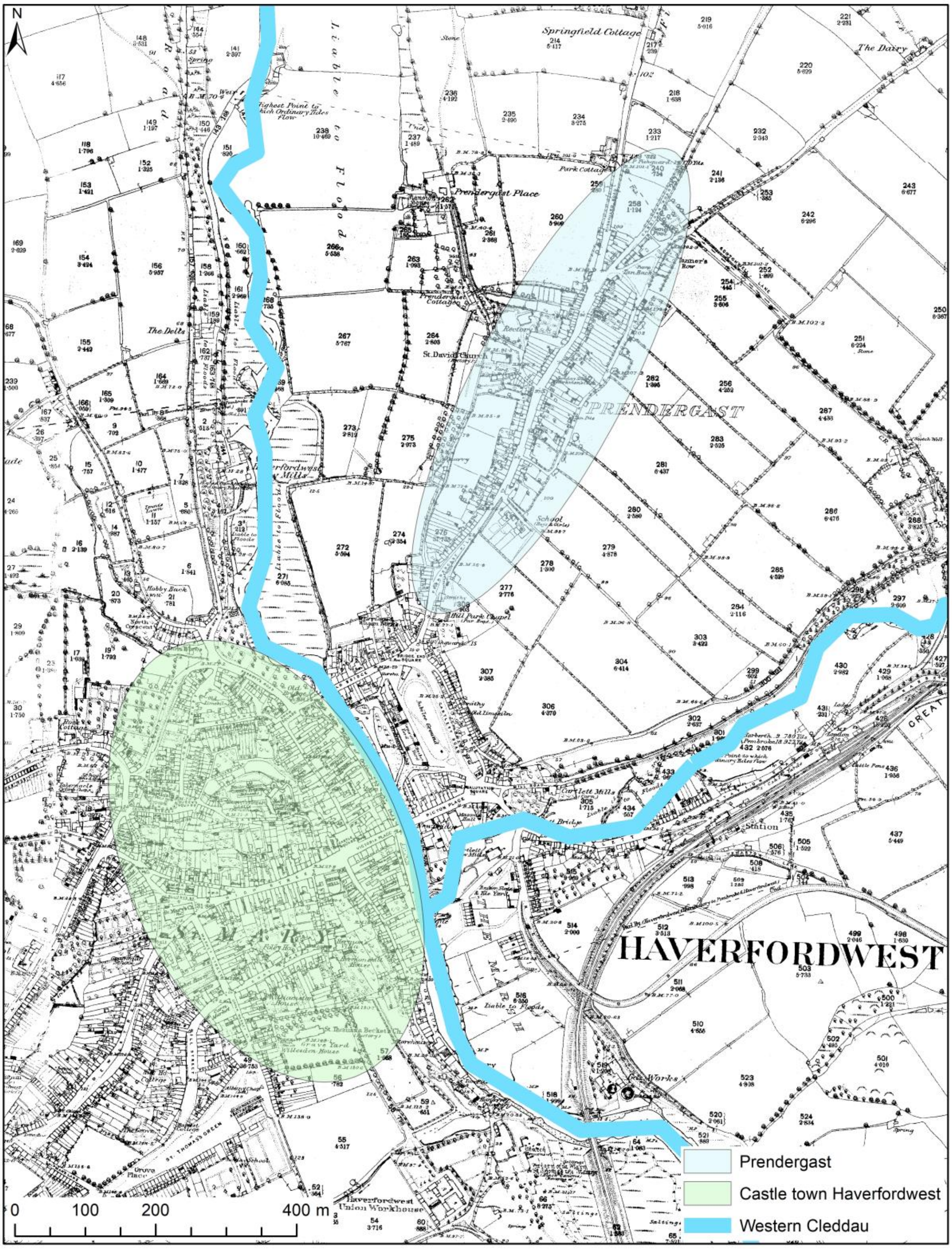

Figure 110: Rudimentary indication of the spatial relation between the Norman castle town of Haverfordwest and its suburb of Prendergast on the First Edition OS-map (1853-1904) after Lilley (2000, 525).

This process of exclusion and incorporation (Barth 1969, 10), which aimed at social differentiation and expression of belonging to a certain social group/community in contrast to 'the other', might equally have influenced the rural settlements in the south of Wales. Although no written records of the legal system are available, in applying a certain settlement morphology that was universally used in the context of planting new settlements, the Flemish *locatores* expressed their membership to a social group related to the Anglo-Norman elites, in contrast to the native Welsh population and their settlements. It would have concerned a logical/natural system as part of their *habitus* which was applied to the local Welsh landscape within the already existing system of other dispersed and nucleated settlements for which Kissock (1997) suggested a complex and varied origin. Similarly to what Richter (1972, 68-69) indicates for the use of different languages in Pembrokeshire, settlement morphology would principally have been a matter of social status/membership to a social elite rather than cultural identity.

This corresponds to Burmeister's (2000) concept of the external cultural domain, in which material culture is more prone to interaction and influence of the immigration area. Indeed, Flemish place names in Pembrokeshire are not uniquely linked to row settlements and show integration in a much wider and diverse rural settlement system, for which Kissock (1997) has suggested a pre-Norman conquest origin. This would indicate that immigrating Flemings also adapted to the existing settlement landscape, besides planting new settlements *ab nihilo*. It therefore does not mean that a Flemish place name stricto sensu indicates a planted row settlement. Moreover, the wide array in measurements being used indicates that local context did have an influence. However, the identified row settlements show a strong relation with Flemish place names and have similar morphological characteristics to row settlements in the County of Flanders, based on morphological analyses (Chapter 9). This at least suggests a reference to the traditions and day to day practices in settlement morphology, as Burmeister (2000) relates to the internal domain of a migrant population, and in a certain way it can be linked to their cultural identity as well. In other words, the variation in settlement types represented by the different Flemish place names can be considered as an expression of the external sphere, while the use of a morphological template for row settlements refers to the internal sphere in Burmeister's (2000) model.

Furthermore, while the application of socially differentiating legal systems in urban contexts can clearly be considered as an active process of expressing social status and identity, this is far less clear for the rural settlements. The unwitting character of the *habitus* is important in this context, for it is in fact the existing socio-cultural structure that has been shaped by past conditions of the individual (Bourdieu 1977, 72-73 and 81-82; De Clercq 2009, 29; Maton 2008, 51). In other words, settlement landscapes, among other forms of material culture, are shaped by an individual's socio-cultural background and are part of that individual's identity and traditions. The Flemish application of row settlement morphologies in the south of Wales can therefore be considered as a passive/unwitting expression of the *habitus* of the *locatores* within the context or as part of Anglo-Norman claims on the region. By applying the row settlement morphology in the context of newly planted settlements, *locatores* would have passively/unwittingly used their socio-cultural background to express their membership to a social elite. Due to a lack of historical sources, however, it is unclear to what extent this would have been an intentional strategy.

Post-medieval examples of migration and settlement translocation to Northern America and Australia, for example, show that expressing group identity (both collective identity as well as membership to a specific group) and 'national' cultural identity is also an active process. In these cases, settlements were laid out in such a way as to deliberately replicate or relate to examples from the region of origin. Similarly to medieval cases, the planned row settlement morphology was used as well. French settlement along the Detroit river, Mississippi river (e.g. downstream from Baton Rouge), and Green bay are all characterised by long plots perpendicular on the waterbodies. Harris (1994, 63) states that the "French landscape could not be transplanted overseas, but elements of French landscapes, like other elements of French culture, could be". Individual plots were thereby laid out following well-known principles in Normandy, the region of origin for many of the earliest immigrants to Canada (Harris 1994, 70). This is in sharp contrast to the later American grid systems that were used from a perspective of easy selling and cheap surveying (Lewis 1994, 97-98). For German settlements too, examples are available of settlement translocation to Transcaucasia and Australia (Roberts 1996b, 159; Tiggesbäumker 1983; Young 1985). Young (1985, 54, note 12) states that based on social status more land could be claimed within the row settlement. This obviously led to different sizes of plots within a strict regular settlement morphology. Whether this might have been the case for the medieval settlements in the County of Flanders and the south of Wales is unclear because of the lack of historical written sources on the matter. The difference with these medieval cases, however, is the explicit aim and claim to create a new, second or improved version of the region of origin as a memory of the home landscape. Research on the seventeenth-century colony of New Sweden along the Delaware river in Northern America, for example, illustrates how strict regulations and practical instructions aimed at creating "a mirror of Sweden". Naum (2018, 87-88) describes how traditional ways of house building, subsistence and spatial planning were used to create a recognizable and emotionally comfortable environment that mimicked the region of origin. This way, cultural incentives would have been more strongly present. Again, this might equally have been the case for the medieval settlement translocations, but historical sources supporting this are absent.

Furthermore, it should be noted that the influences not necessarily would have worked in one single direction. As stated by Williamson (2012, 66) "changes in material culture do not so much represent the movement of people, but of fashions, beliefs and life styles. Nor, of course, were such contacts necessarily in a single direction or of short duration". The exchange of ideas and goods through trade, religion and political relationships would have equally been of importance as actual migration. Regarding the Flemish settlement in the south of Wales, the follow-up of the internal migration of Flemings within Britain by external migration directly from the continent thereby indicates close contacts and collaboration between the new region of settlement and the County of Flanders.

Finally, it needs to be considered that the row settlement morphology was not unique to the County of Flanders but rather to the context of newly planted rural settlements in the context of landscape reclamations. Although, as discussed above for the County of Flanders, a variation in top-down and/or bottom-up influences and processes related to differences in social-agrosystems might have been involved, this settlement morphology can be considered to be a natural/logical and efficient way of spatial planning for new settlements. This does not, however, exclude its possible incorporation in the *habitus* of *locatores*, as both the logic behind it and its socio-cultural context would have been part of the same mental template of the Flemish *locatores*.

10.4 Identifying the character of Flemish migration to Wales

To assess the scale of the Flemish migration to Britain and eventually to the south of Wales is not straightforward and can only be considered based on indirect indications, due to the lack of historical sources highlighting orders of magnitude let alone exact numbers. As presented in Chapter 1, decades of archaeological research on migration have allowed to consider it as a multi-layered process, for which many types and circumstances can be distinguished (Anthony 1990; 1997; Burmeister 2000; Fernández-Götz 2014; Prien 2005). Flemish migration to Britain would have been prompted by a combination of socio-economic opportunism, ecological and environmental push factors and demographic pressure (Koebner 1942; Oksanen 2012; Rowlands 1980; Thoen & Soens 2015; Toorians 1990; 1996). Based on (contemporary) chronicles such as the *Gesta Regum Anglorum* of William of Malmesbury (Mynors et al. 1998, 727) and the *Brut Y Tywysogyon* (Jones 1952, 27-28), storm surges are considered to have acted as push-factor for considerable numbers of Flemings to seek refuge in England, from where they were send to southern Wales by King Henry I. This corresponds to the (mass) movement of larger populations and/or family groups for whom migration was a way of securing subsistence. As stated by Burmeister (2000) and Anthony (1990), it is thereby important to consider that this does not necessarily implicate mass migration of whole societies or distinct social groups. Migrations of large groups would have rather consisted of specific segments of the population. Davies (1990, 11) supports this observation of a larger movement of people by stating that a considerable population would have been necessary to inhabit the new Flemish colony in Pembrokeshire, thereby assuming that the Welsh would indeed have been expelled from the region. A considerable Flemish presence would also correspond with other and later mentions of Flemish communities of craftsmen and traders across the British Isles (Oksanen 2012).

The only concrete indications for Flemish migration, however, refer to the other end of the migratory scale spectrum and rather suggest a movement of elite individuals. Historical sources, such as Domesday Book, mention elite individuals who acted as tenants-in-chief, authority figures and *locatores* in England, Scotland and Wales (Barrow 1973; 1980; Duncan 1975; Oksanen 2012, 183-184; Ritchie 1954; Sharpe 2011, 8-9; Toorians 1990; 1996; Verberckmoes 1988, 726). Based on research by Keats-Rohan (2001) on Artesian Flemings around Northampton, this migratory process clearly correspond to what Anthony (1990, 902-904) considers to be leapfrogging or chain migration. Scouts send information back to the region of origin before other groups migrate along well-defined routes towards specific destinations. The same would be the case for the direct migration from Flanders to Wales, following initial movement of Flemings from northern England to the region, as indicated by the *Brut Y Tywysogyon* (Jones 1952, 27-28). These observations rather indicate a migration of social elites with their military and social retinues representing specific segments of a population. Oksanen (2012, 197-200) thereby states that career opportunities, inheritance patterns and opportunities to acquire new property and wealth would have been the major factors influencing this elite driven migration. Moreover, as suggested by Toorians (1990), similarities in place names between Upper Clydesdale (Scotland) and Pembrokeshire (Wales) strongly suggest the activities of *locatores* such a *Wizo Flandrensis*, who would have been made responsible for the creation of new settlements and the recruiting of settlers.

As indicated by this dissertation, these *locatores* indeed had their influences on the rural settlement landscape of southern Wales. However, the limited number of planned row settlements and Flemish place names in the region suggest that this influence would have remained limited in comparison to later English changes to the landscape. Although Austin (2005) contradicts a strong and extensive English presence and influence on the landscapes of southern Pembrokeshire, Rippon (2008, 227-249) offers clear indications for the landscape to be largely English, characterised by large numbers of '-ton' place names, the distribution of Norman manorial tenure, English style open fields and Anglo-Norman churches. The distribution of these features clearly indicates a dichotomy between the south and north of Pembrokeshire, respectively corresponding to the so-called ‘Englishry’ and ‘Welshry’. Although the Flemish *locatores* had their mark on the settlement landscape, these settlements would have been incorporated within the wider Anglo-Norman character of the southern Pembrokeshire landscape. When considering this as a reverse argument, it may indicate the limited scale of Flemish presence in the region. Rather than reclaiming the whole landscape of the Pembrokeshire cantrefi, these indications suggest that the Flemings would have acted as the scouts for later Anglo-Norman/English leap frogging migration and interventions on the landscape.

Chapter 11 Conclusions and future lines of research

Building on centuries of popular interest and decades of academic research, this dissertation stands as an additional piece of the puzzle to offer new insights into the character and development of high medieval planted row settlements in both the County of Flanders and the south of Wales. Furthermore, it offers a building block in the interdisciplinary study on a highly dynamic period in which the landscape was shaped in such way as is still visible to date. By combining and integrating a multi-proxy dataset including landscape archaeological, historical, geographical, geophysical and remote sensing data and methodologies, this dissertation's main achievement has been to describe a comparative framework regarding the origin, distribution and socio-economic and archaeological context of row settlements in the County of Flanders. Furthermore, considering settlement landscapes as material culture, this approach has offered new understanding of settlement translocation in the context of high medieval migration and has demonstrated the added value of a cross-disciplinary approach. This final chapter offers an integration of the different aspects before considering future lines of research.

11.1 Landscape archaeological mapping of row settlements

Through the integrated application of large-scale frequency-domain multi-receiver EMI, archaeological prospection techniques and LiDAR, among other remote sensing data, this research has contributed to the mapping and morphological analysis of planned row settlements in both the County of Flanders and southern Wales. At the site of Nieuw-Roeselare, the cross-disciplinary application of archaeological, historical and geographical methodologies and data has allowed to reconstruct the former settlement's topography.

Furthermore the site could be identified as a planted row settlement, related to the thirteenth-century exploitations in the north of the county. Within the settlement lay-out, different social zones can be located, comprising the small tenement plots in the centre of the settlement and the larger moated sites near its edges. This offers important archaeological insights at both the site level and the medieval settlement research within the county of Flanders and beyond.

The same geophysical methodology, in combination with LiDAR data, at the settlements of Wiston (Pembrokeshire) and Whitson (Monmouthshire) has contributed to the morphological analysis of row settlements with a supposed Flemish origin in southern Wales. The identification and mapping of former field-boundaries allowed a partial confirmation and further development of already existing morphological hypotheses for both settlements. Several distinct features of a Norman town morphology can be ascribed to Wiston, while a further southward extension of the settlement at Whitson was identified in addition to Rippon's (1996) model. Furthermore, different socio-economic origins have been described for both settlements. While Wiston is understood to have been a dedicated borough with market rights (Murphy 1995, 75), Whitson would have been a planned rural settlement aimed at reclaiming the alluvial levels along the Severn Estuary. Despite their differences, the integrated landscape archaeological approach at these three settlements has shown how the basic system of a row settlement could be attested in all cases.

11.2 Row settlements and the high medieval settlement landscape in the County of Flanders

Intensified landscape reclamations during the high medieval period have been considered as major influences on the distribution of row settlements in the County of Flanders. The use of eighteenth- to nineteenth-century maps in combination with place name registers and toponymical dictionaries, and the application of archaeological excavation data on rural settlements allows to add nuance to the original zoned concepts of Dussart (1957) and Lefèvre (1964b), by indicating that the row settlement morphology was more widespread throughout the county. Furthermore, it reinforces existing interpretations regarding the distribution being related to landscape reclamations. However, based on the first mention of the mapped row settlements, important chronological and geographical nuances can be made. Generally, an increase of this settlement type is attested during the high medieval period, continuing into the late- and post-medieval period. Moreover, strong geographical relations with loam and sandy soils can be described, pointing at a shift from the southern loamy soils to the northern sandy soils within the county. The strongest shift has taken place from the thirteenth century onwards, clearly indicating that post-medieval socio-economical processes influenced the continued use of this morphology, besides high medieval landscape reclamations. Earlier dynamics are identified in the south of the county and around large urban centres such as Ghent (from the tenth and eleventh century onwards) and Bruges (from the twelfth century), linked to intensifying town-countryside relations and interactions. One of these settlements would have been Sijsele-Stakendijke, which has been studied through archaeological excavations (De Gryse et al. 2012; Deconynck et al. 2019). Originally, this site was interpreted as an Einzelhof, but thanks to adjacent excavations, its character as a planted row settlement along a trackway became evident. This example, among others, has presented how the incorporation of archaeological data on high medieval rural settlements has added an additional point of view regarding row settlements that had not been depicted on historical maps. Despite the fact that archaeological research in currently inhabited hamlets and villages is difficult, both legally and technically (De Groote et al. 2018), a limited number of larger excavations or adjacent projects allow to identify grouped settlements in archaeological context. Based on their morphology it is suggested that they were planted. However, due to a lack of historical sources this cannot be confirmed from a historical perspective. Furthermore, considerations should be made about the difficulties related to exact dating of settlement structures in the Flemish dataset and its limits in determining contemporaneity within the excavated settlements.

Other areas are characterised by a lower amount or even absence of row settlements. Considering historical research, this can be related to differences in socio-economic contexts, variations in political power structures and different ways of exploitation, which led to differences in systems of grouped and/or dispersed settlements. Although row settlements thus must have played an important role in the reclamations of the landscape in certain regions, other settlement types were equally present in the same regions or more important in others. The majority of archaeologically attested high medieval rural settlements, for example, comprises individual farmsteads. Besides contributing to an archaeological understanding of planted row settlements in the County of Flanders, the archaeological study of high medieval rural settlements aimed at identifying the topographical and morphological characteristics of high medieval rural settlements in the archaeological record. For the dataset of 186 inventoried sites, significant relations between settlements location and the sandy-loamy and sandy soils within the study area are identified, which corresponds to the observations regarding the overall distribution of mapped row settlements above. Generally, an increase in rectilinear enclosure can be attested for the rural settlements in the dataset, suggesting a increasingly structured approach to the lay-out of the settlement and the intensified landscape reclamations, as has also been suggested by Hamerow (2002).

11.3 Comparative analysis of row settlement in the County of Flanders and southern Wales

Through a metrical and morphological analysis of Flemish and Welsh planned row settlements, this research presents the first in-depth comparative study between the two study regions. A wide variation in measurements could be attested both within and between the settlements. Therefore, no overall unified system could be identified. Yet, based on morphological attributes, significant similarities in the shape of plots were to be found. Therefore, rather than metrical similarities, stronger morphological parallels are described between the row settlements in the study areas, pointing at the translocation of its morphological principles.

Although this morphology can be considered as a natural or logical way of planting new settlements, this research considers the application of the row settlement morphology by Flemish *locatores* in southern Wales as an expression of their identity. Following Bourdieu's (1977) logic of common practice, settlement morphology is considered as material culture that is incorporated in the *habitus*. Unwittingly it is shaped by past and current socio-economic conditions of the locatores, thereby forming a passive/unwitting reference to their cultural identity. However, this settlement morphology is strongly related to landscape reclamations and not unique to the County of Flanders, nor is it the only settlement type related to Flemish place names in southern Wales. It can therefore not purely be considered as 'Flemish'. Moreover, in contrast to post-medieval migrations to northern America and Australia, historical sources describing a clear cultural incentive for the application of this settlement morphology are lacking. Therefore, similarly to medieval town planning in the region, the row settlement morphology is considered as an expression of the social status and identity of the *locatores* as part of a social elite within the context of the Norman conquest. In other words, by passively/unwittingly applying their socio-cultural background as part of their *habitus*, Flemish *locatores* mainly expressed their social identity in contrast to the Welsh.

11.4 Character of the Flemish migration to Wales

Based on the observations described above, the plantation of row settlements related to Flemish place names can be linked to the migration of social elites, such as *Wizo Flandrensis*, who acted as *locatores*. Considering the whole Flemish migration to the south of Wales, however, it is difficult to determine the size of the migratory population. Based on the contemporary chronicles, a considerable Flemish population would have been present in northern England and was sent to the south of Wales by King Henry I (see Chapter 3). Historical sources, however, mainly refer to elite individuals who acted as tenants-in-chief, authority figures and *locatores* in England, Scotland and Wales (Oksanen 2012, 183-184; Sharpe 2011, 8-9; Toorians 1990; 1996), rather suggesting migration of an elite with their military and social retinues. Davies (1990, 11), in contrast, states that a considerable population movement would have been needed to populate the new settlements in the Flemish colony in Pembrokeshire. This would also correspond with other mentions of Flemish communities of craftsmen and traders across the British Isles (see Chapter 3). However, based on the landscape archaeological research on the planned row settlements in the region, no clear indications are available for a large population movement with influences on the landscape, which can be considered as largely English based on Rippon's (2008, 227-249) research.

11.5 Future perspectives

Considering the various arrays of row settlements and geographical scales approached in this dissertation, additional research initiatives could follow different perspectives. At the site level, additional invasive research on specific features would offer the necessary archaeological insights to further support the interpretations that have been made. While augering at Nieuw-Roeselare has made the first effort in understanding its geomorphological evolution, clear stratigraphic insight is needed to explain and confirm why a relative low amount of surface finds were picked up in comparison to several of the Zwin harbours to the east and in relation to a century of habitation at the site. At the sites of Wiston and Whitson, absolute dating of features that were identified through EMI and LiDAR would contribute to a further chronological understanding of the settlement morphology and evolution. Especially for Whitson, where regular maintenance of the grip system would have resulted in the change of ditch features, small scale invasive fieldwork would allow to assess its impact of the metrics being used. Considering the archaeological data on high medieval rural settlements, this dissertation has demonstrated the potential of the available and growing dataset for the study of the rural settlement landscape and grouped settlement in particular. However, two aspects should be considered for future research. Qualitative absolute dating of settlement structures in combination with in-depth analysis of material culture is of vital importance to bring the research at both the domestic and settlement scale forward. Despite the relatively large dataset, ^{14}C and dendrochronological data were only available for a highly limited number of sites and features, not allowing to determine contemporaneity. Yet, a well-established chronological framework, based on a wide range of various dating methods, is pivotal when making the difference between dispersed and grouped settlements. Furthermore, analysis of the overall settlement morphology has indicated a growing importance of rectilinear enclosures, which at some sites were connected to features that structured the surrounding landscape. It was not possible to determine the full extent of these enclosure for the majority of the sites though, due to the limited excavated area. In the given context of archaeological research in Flanders this is unlikely to change, but ideally it should be considered that these enclosures are an inherent aspect of rural settlements, besides buildings and wells, and should therefore be incorporated when determining the excavation area. Furthermore, as demonstrated by the site of Sijsele-Stakendijke (De Gryse et al. 2012; Deconynck et al. 2019), considering a larger excavation area (whenever possible of course) may offer a completely different view on an excavated settlement. Alternatively, an integration of other methodologies such as the rich datasets of aerial photographs in combination with geophysical survey, as presented for the site of Dudzele-Kruisabelestraat, offers a non-invasive approach to identify enclosure systems in their surrounding landscape. Although efforts are being made, it is necessary to structurally incorporate this cross-disciplinary approach in archaeological fieldwork and research in order to bring the understanding on the character of rural settlements further.

As demonstrated by the EMI-survey at Dudzele-Kruisabelestraat, in-depth research of the settlement territory allows to clearly understand its position in the surrounding landscape and relation to its in- and outfields. At a wider landscape level, this has been done by assessing the topographical location of the individual sites and building structures. However, with improving intra-site horizontal chronology, new opportunities would come to add time-depth to this analysis and determine chronological change and evolution in site location. Furthermore, the mapping of geographical and chronological distribution of other types of grouped rural settlements at the landscape level, would allow to further determine and nuance socio-economic differences and influences in the rural settlement landscape. As demonstrated by this dissertation, the cross-disciplinary approach thereby offers the best way forward when archaeological research in currently inhabited hamlets and villages remains difficult. Continuing and expanding this effort at both site and landscape level will certainly prove to be promising.

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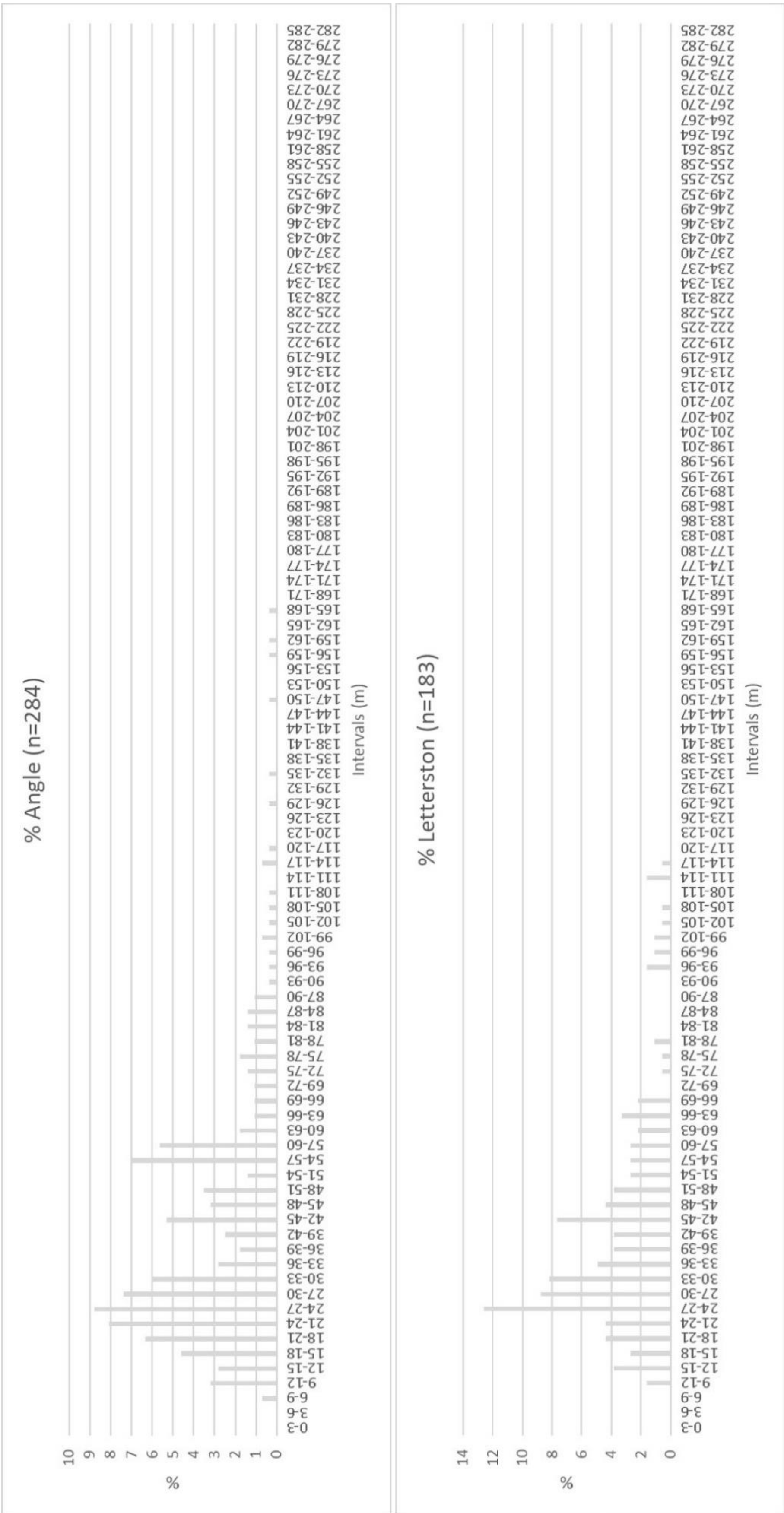
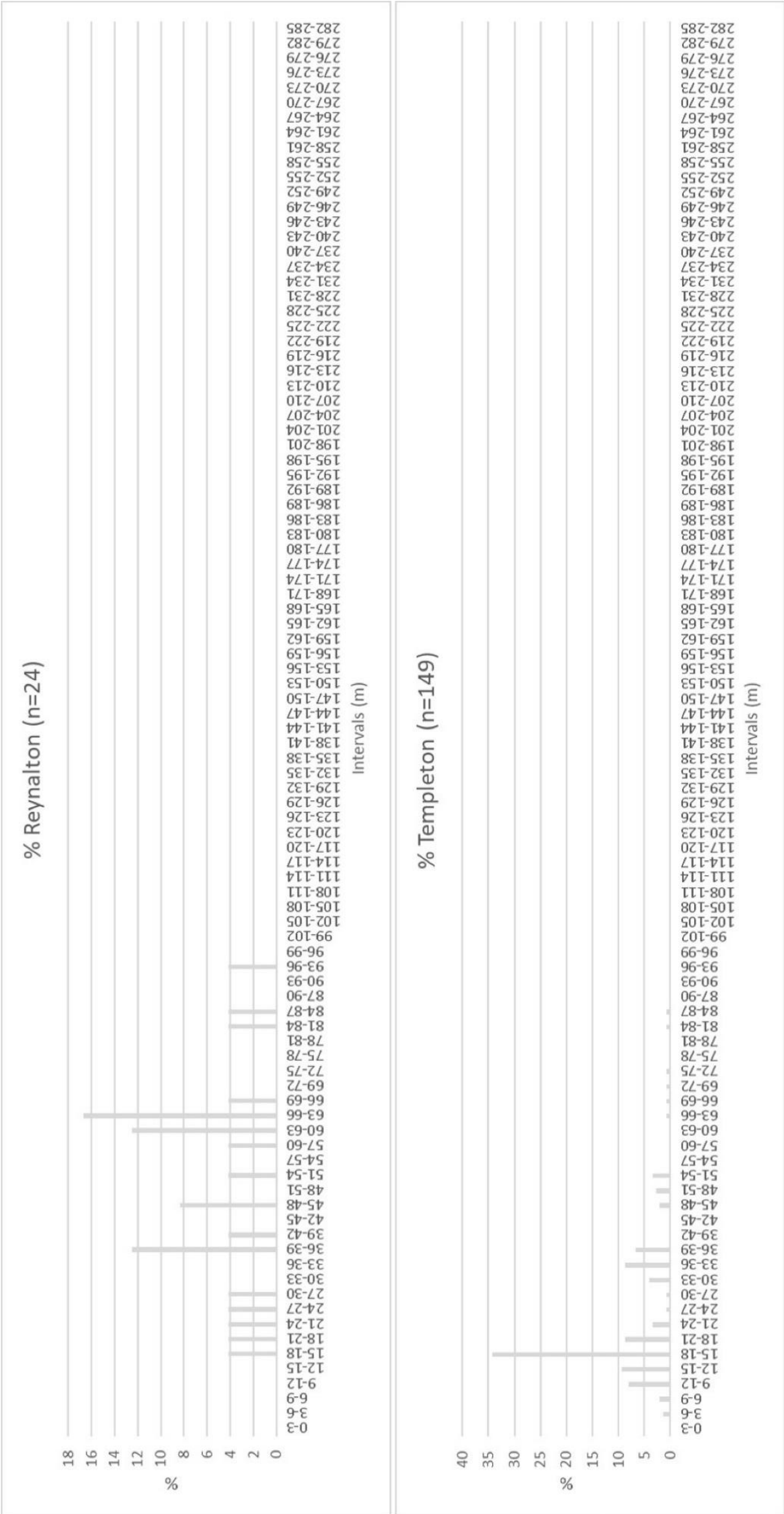
Appendices

Appendix 1: Histograms of width measurements for the Welsh case studies.
Appendix 2: Histograms of width measurements for the Flemish case studies.

Appendix 1



Histogram of width measurements in Angle and Letterston.



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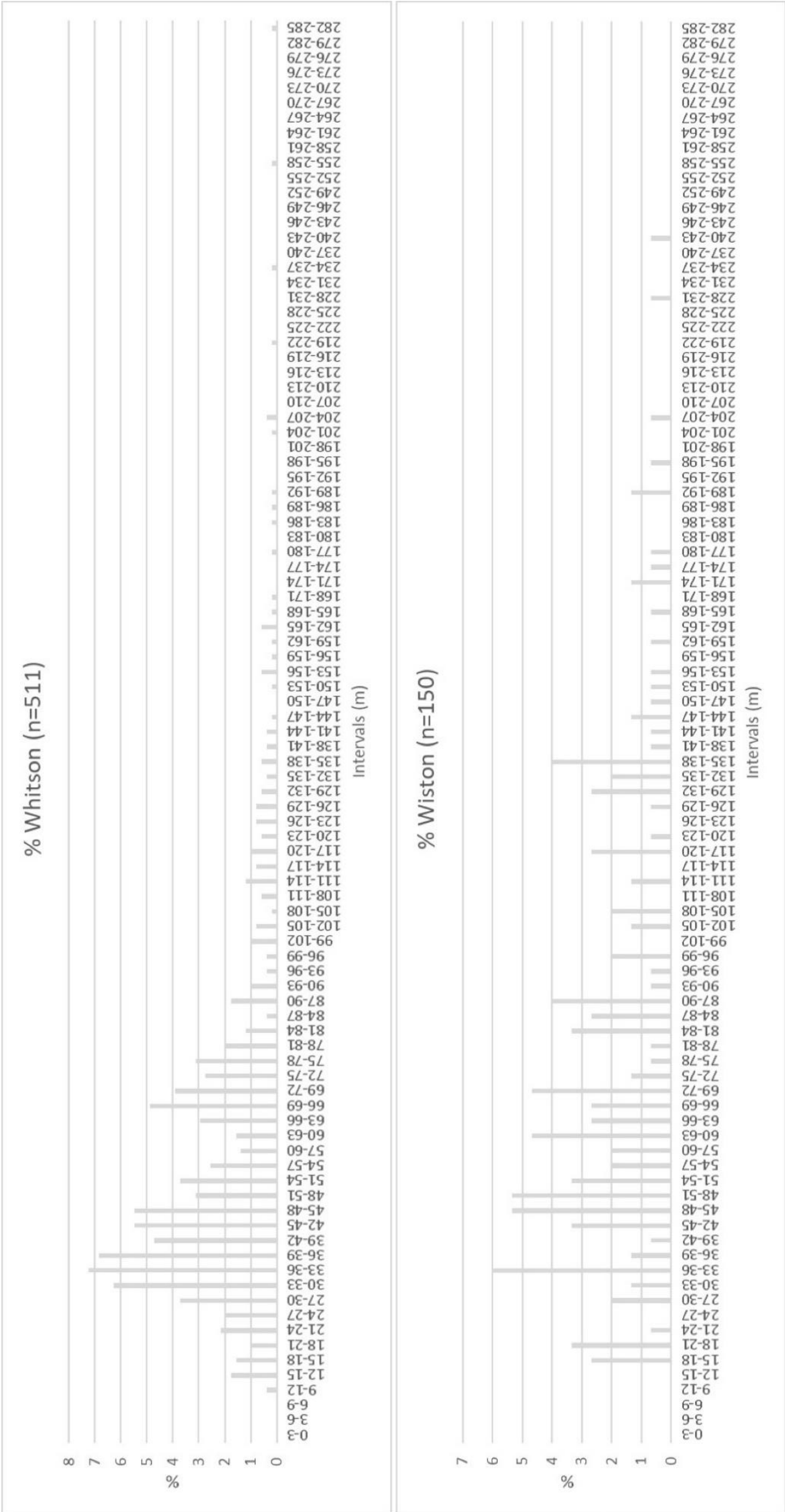
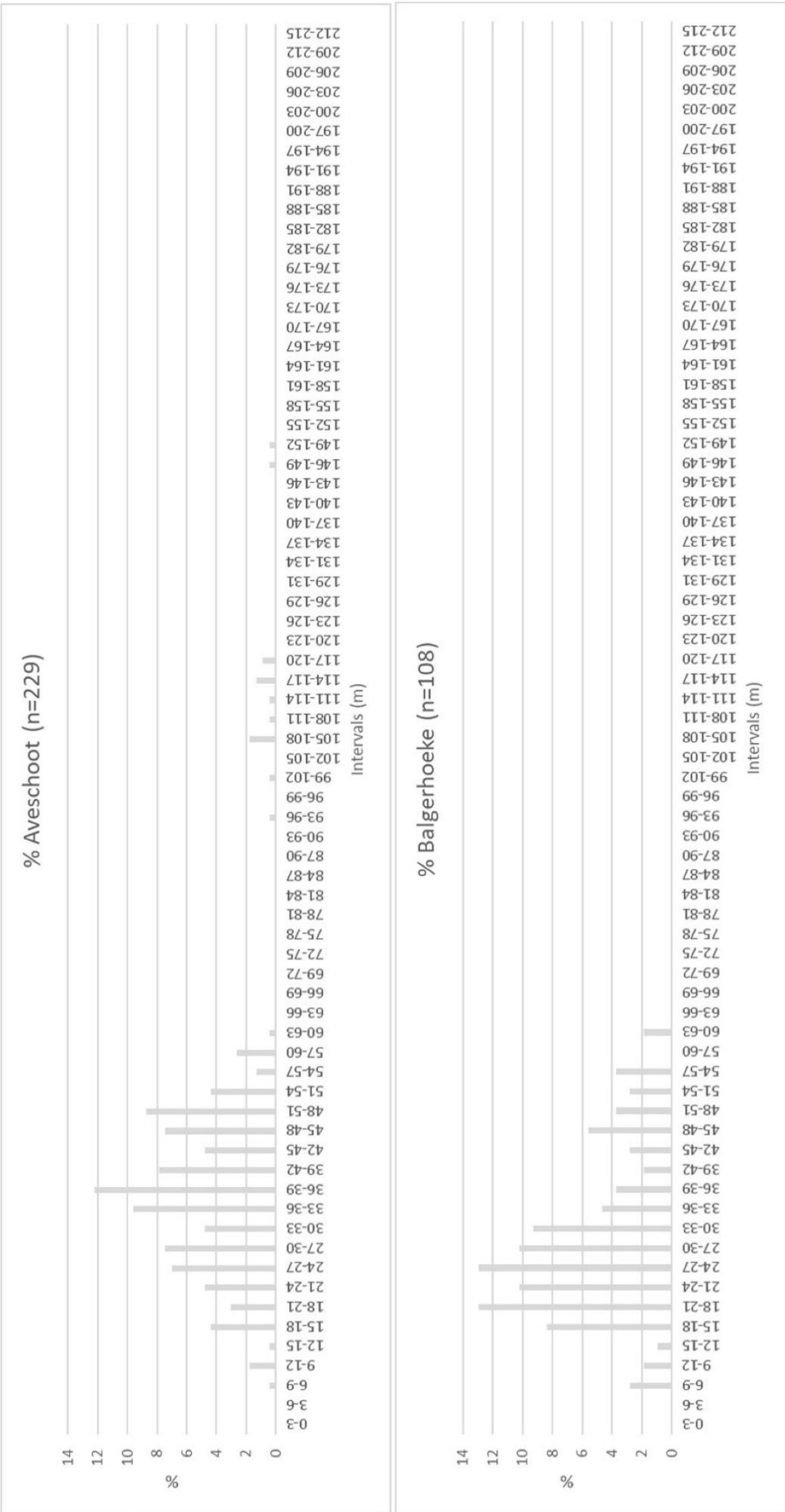
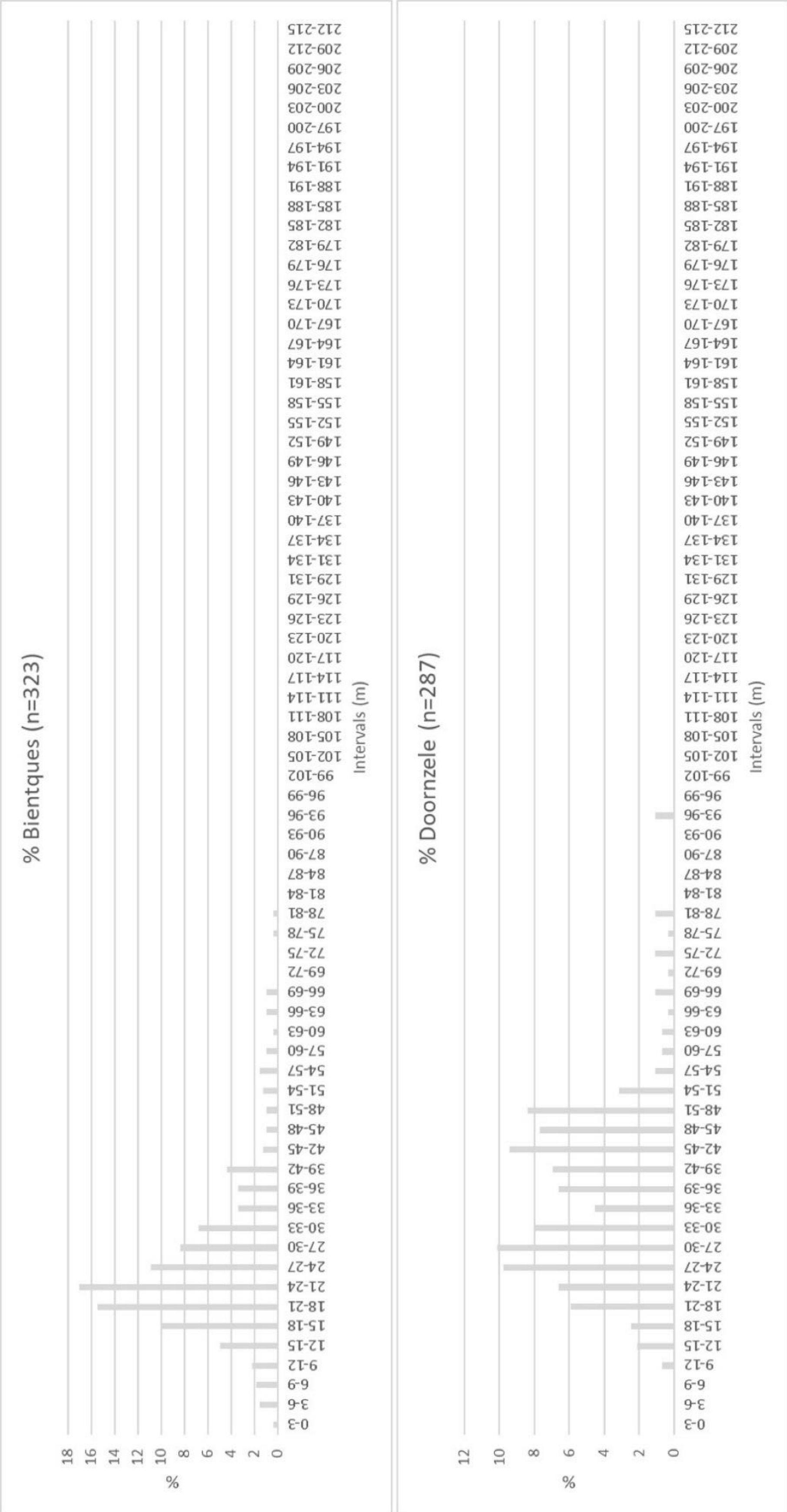


Histogram of width measurements in Whitson and Wiston.

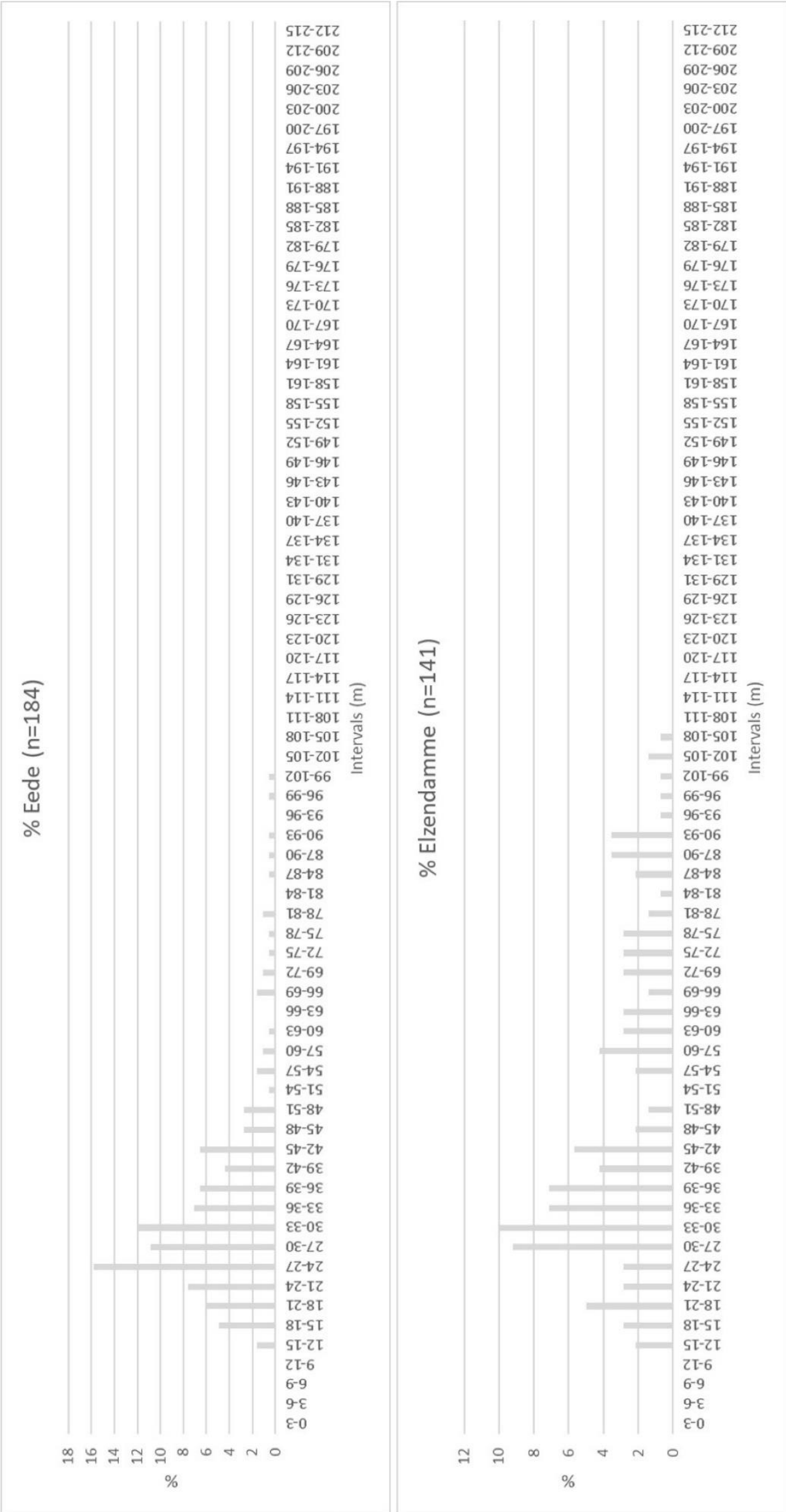
Appendix 2



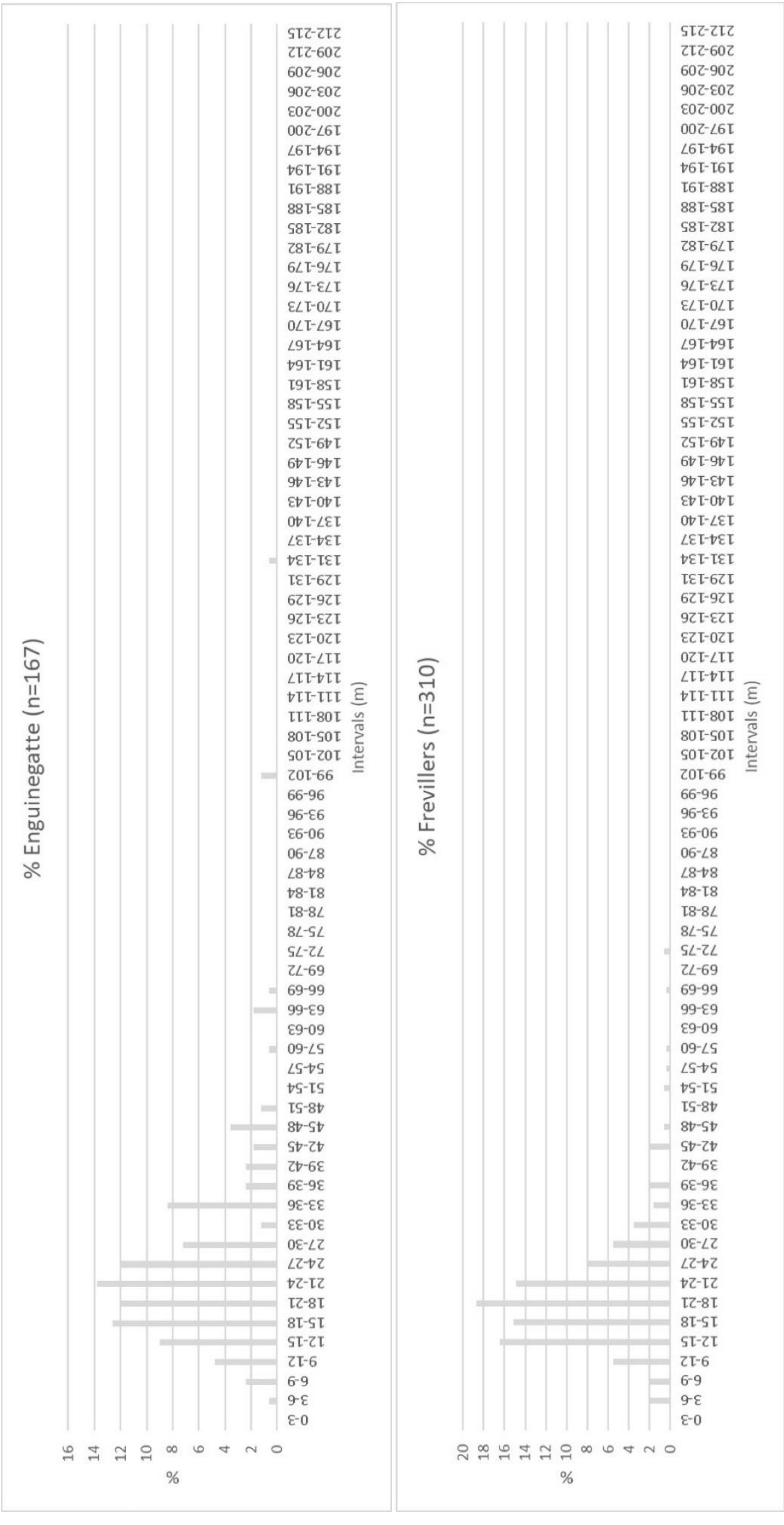
Histogram of width measurements in Aveschoot and Balgerhoeke.



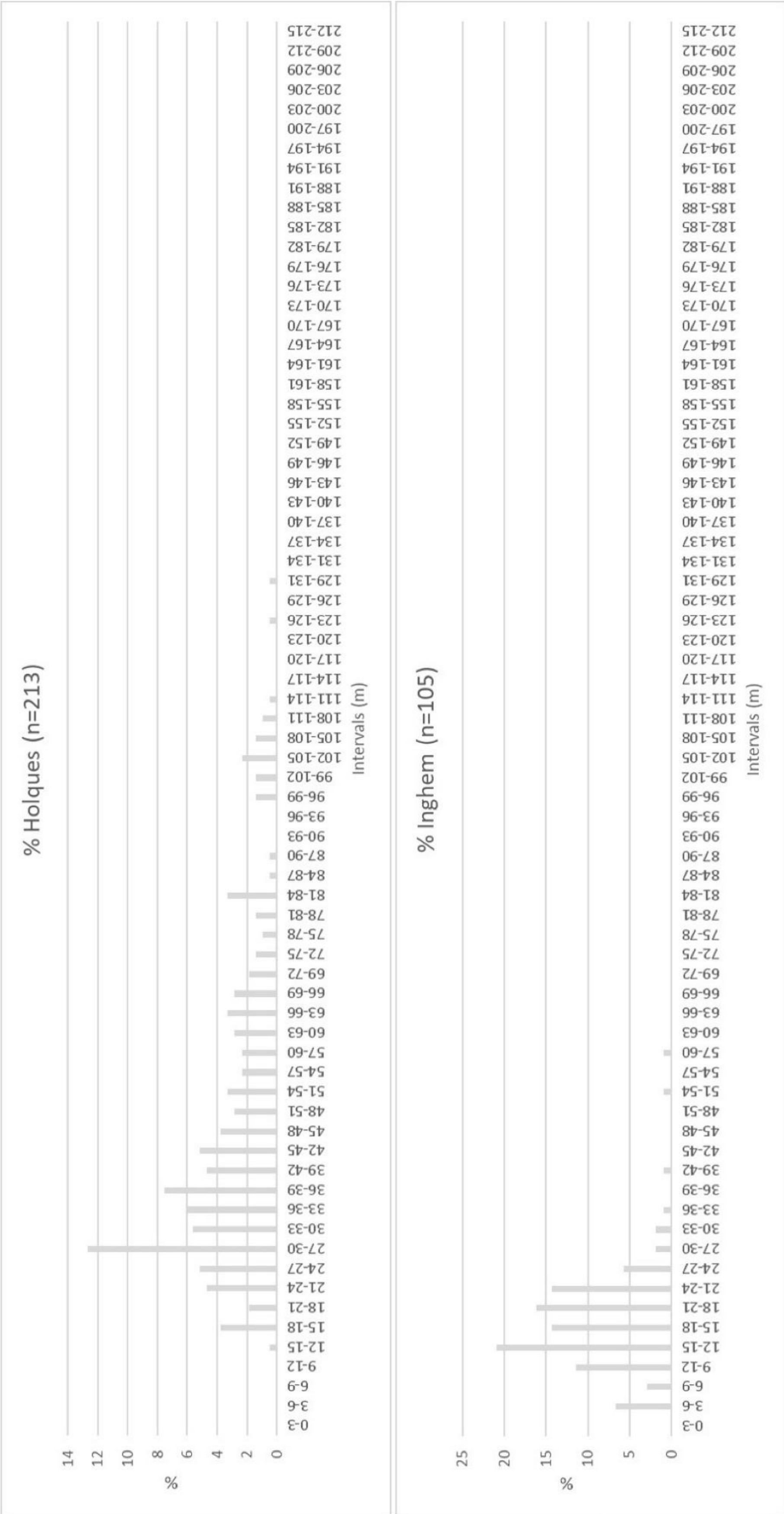
Histogram of width measurements in Bientques and Doornzele.



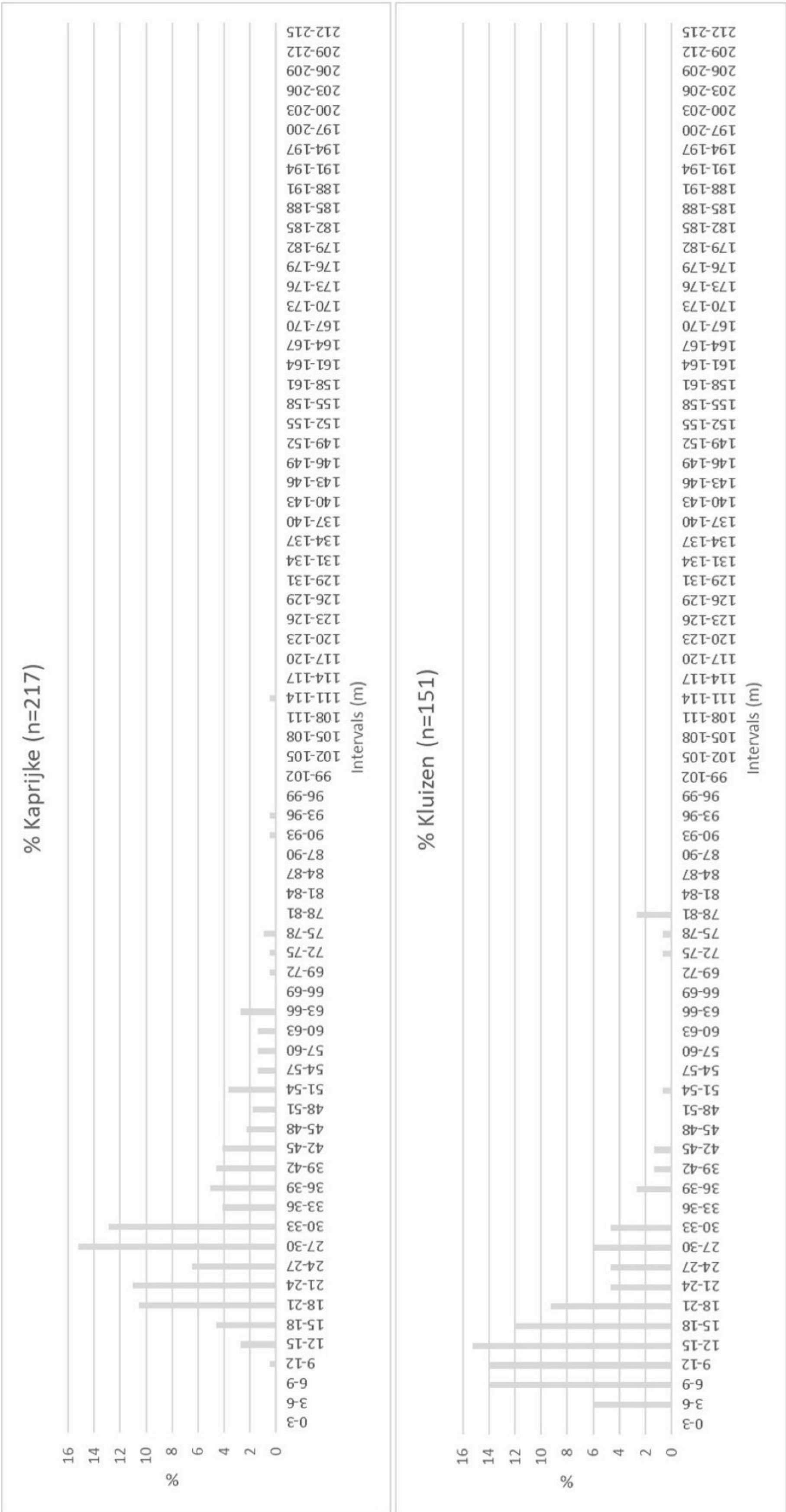
Histogram of width measurements in Eede and Elzendamme.



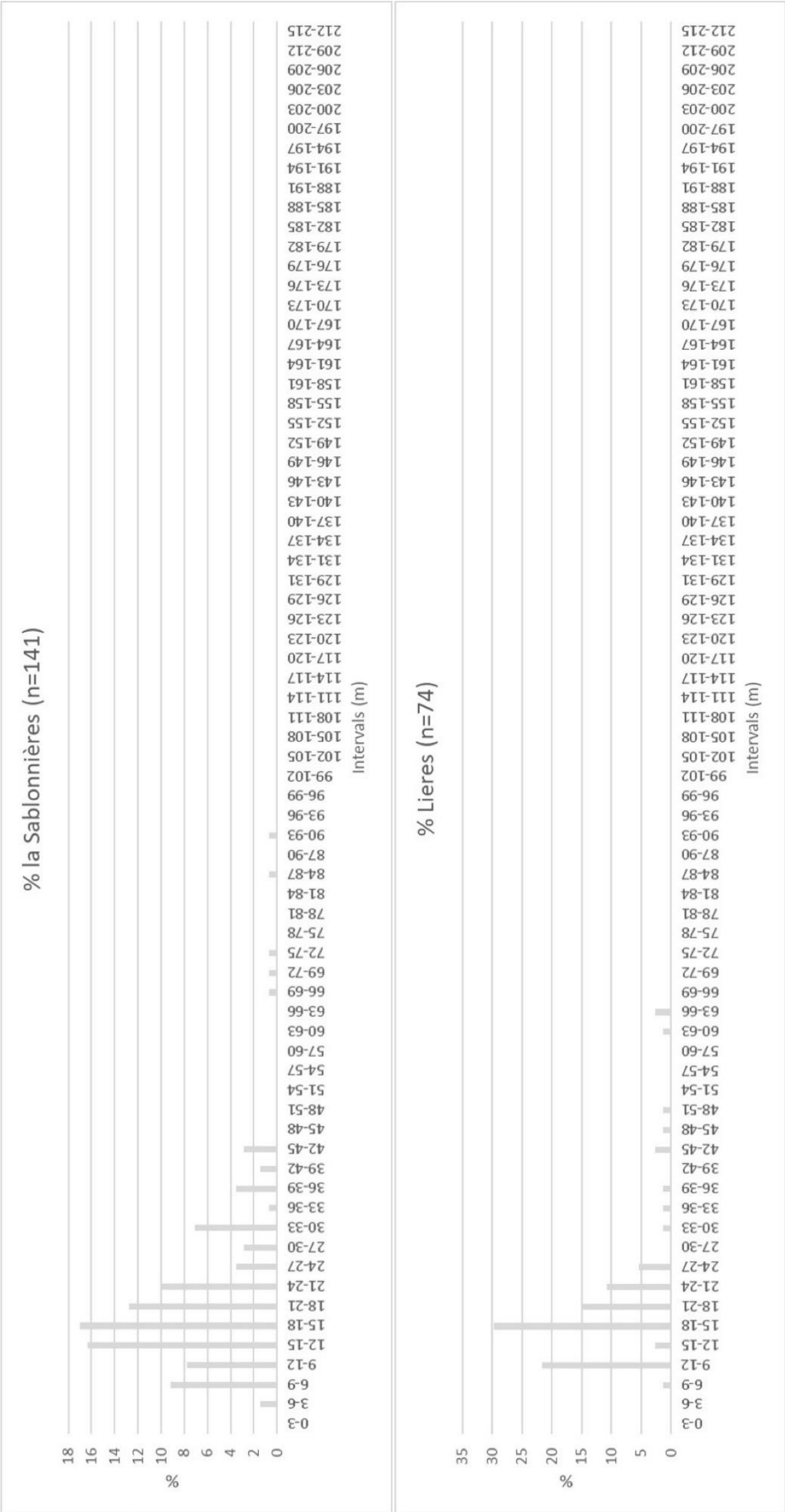
Histogram of width measurements in Enguinegatte and Frevillers.



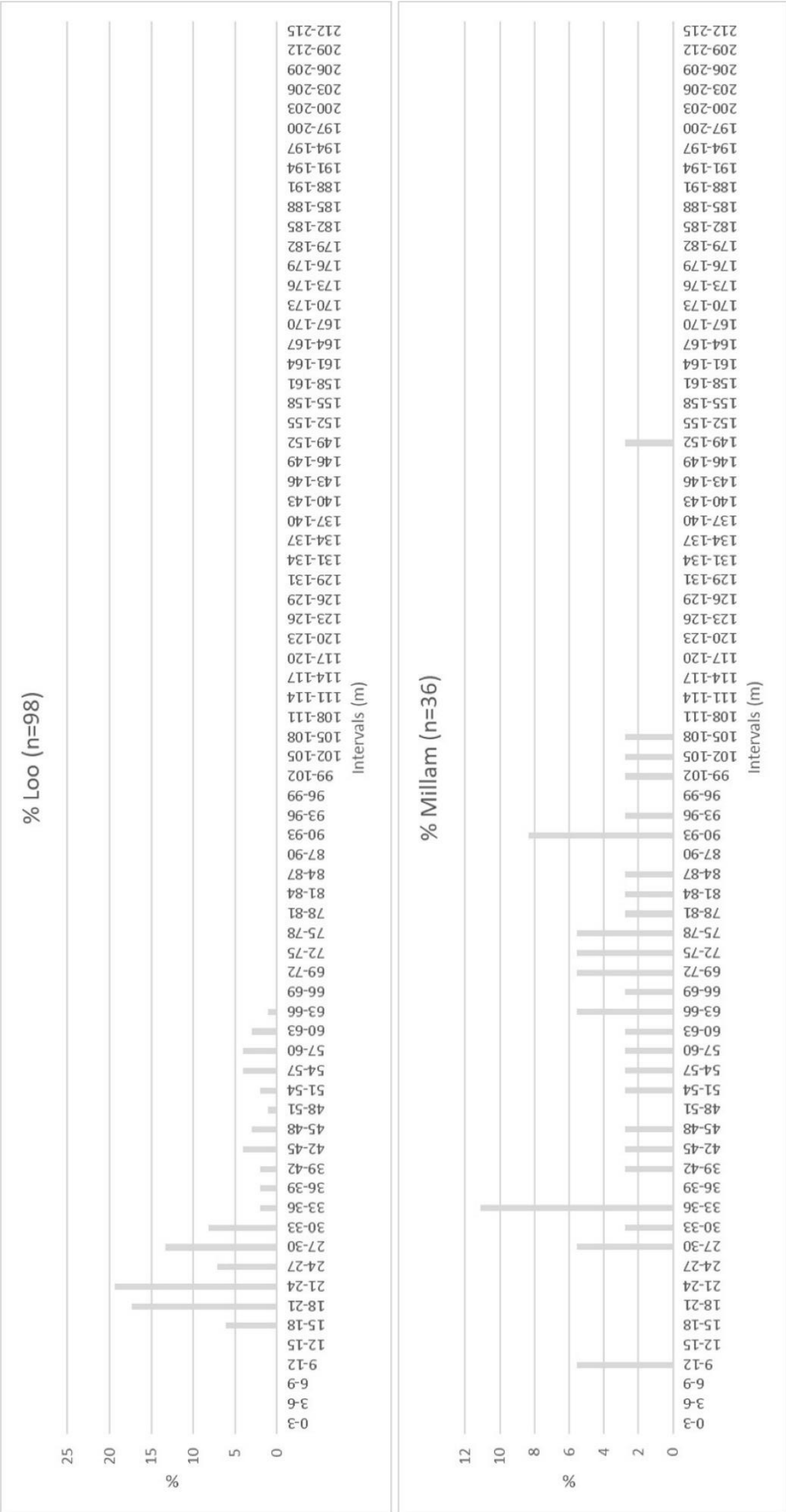
Histogram of width measurements in Holques and Inghem.



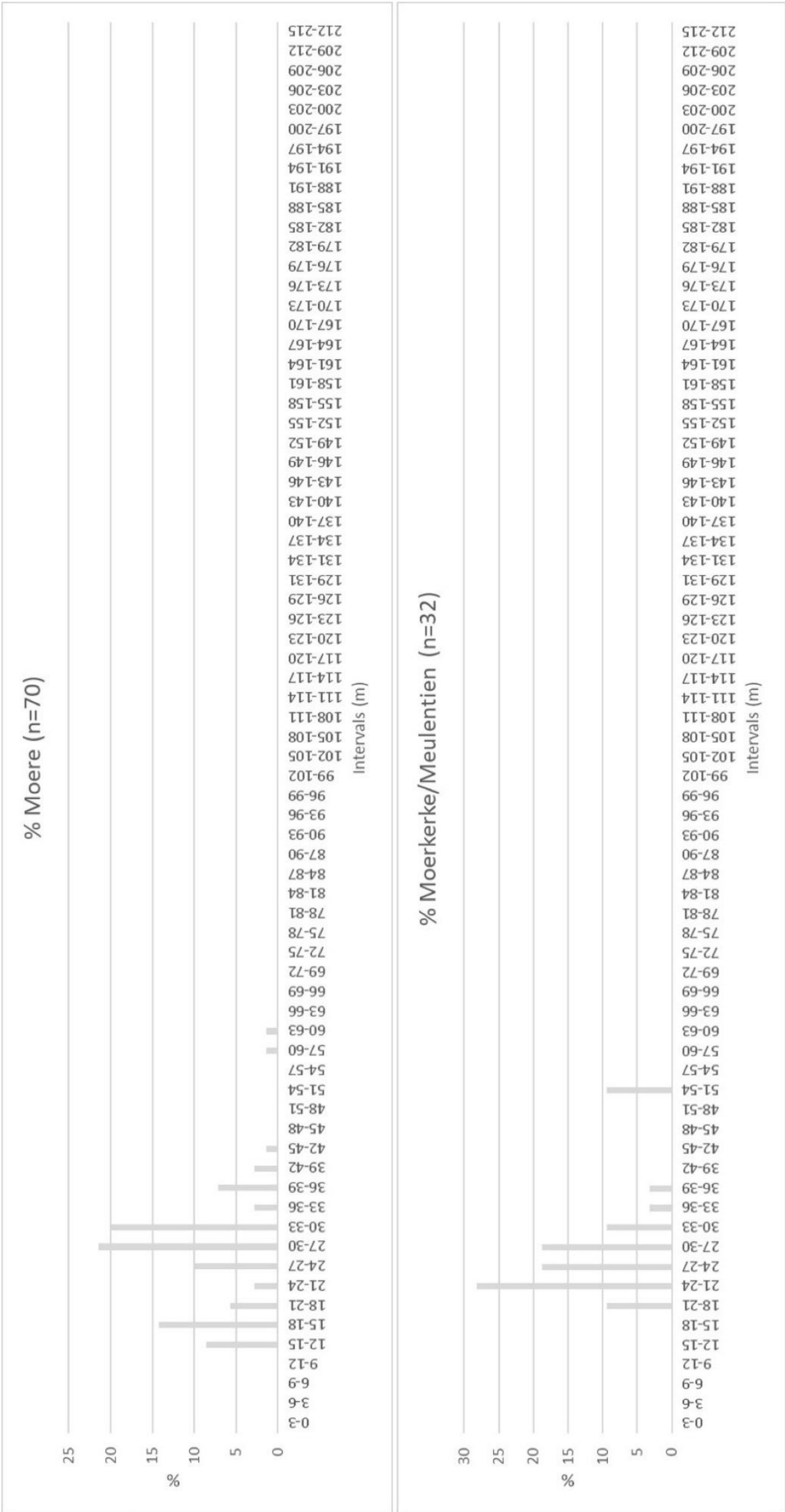
Histogram of width measurements in Kaprijke and Kluizen.



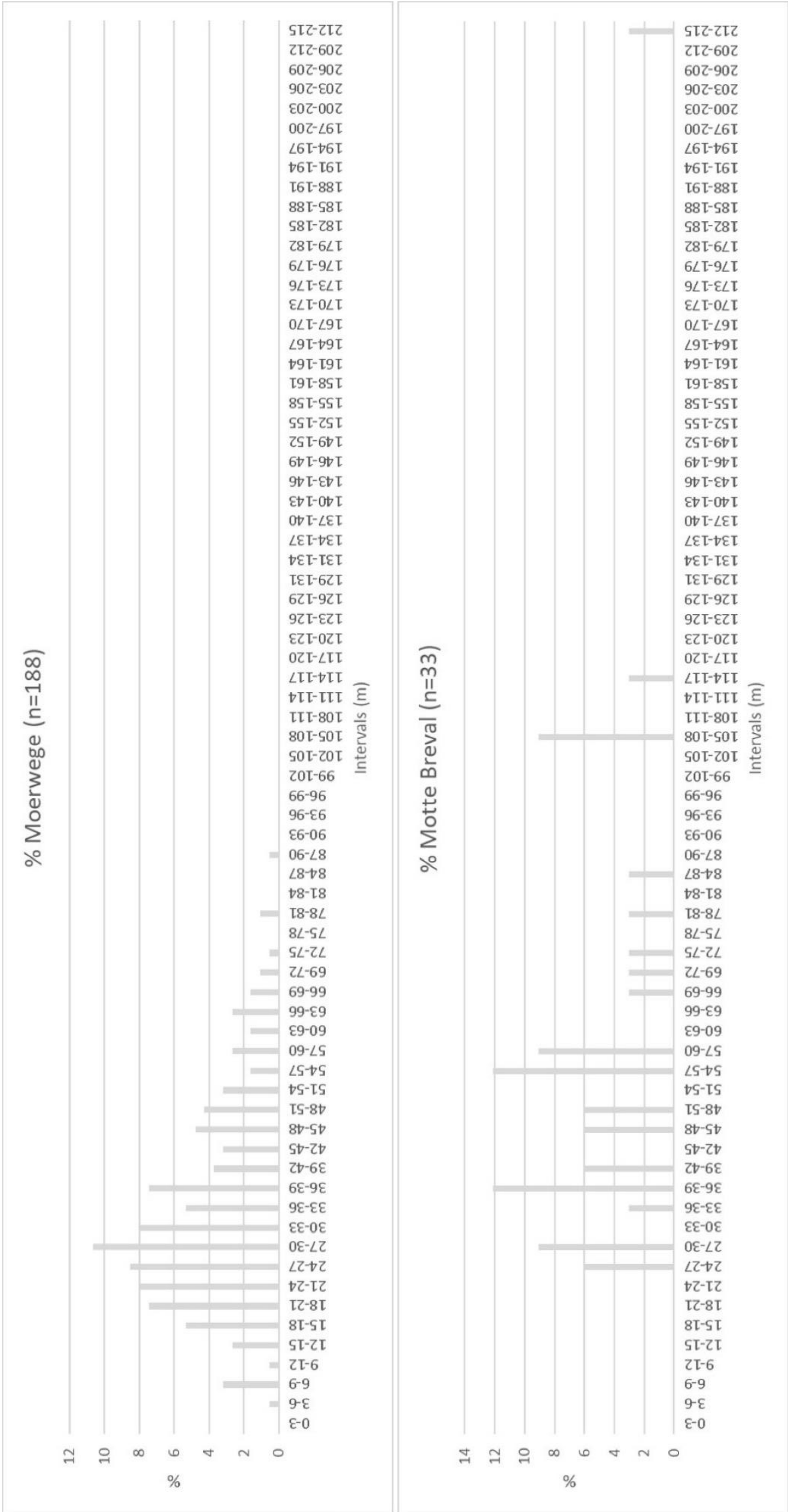
Histogram of width measurements in la Sablonnières and Lieres.



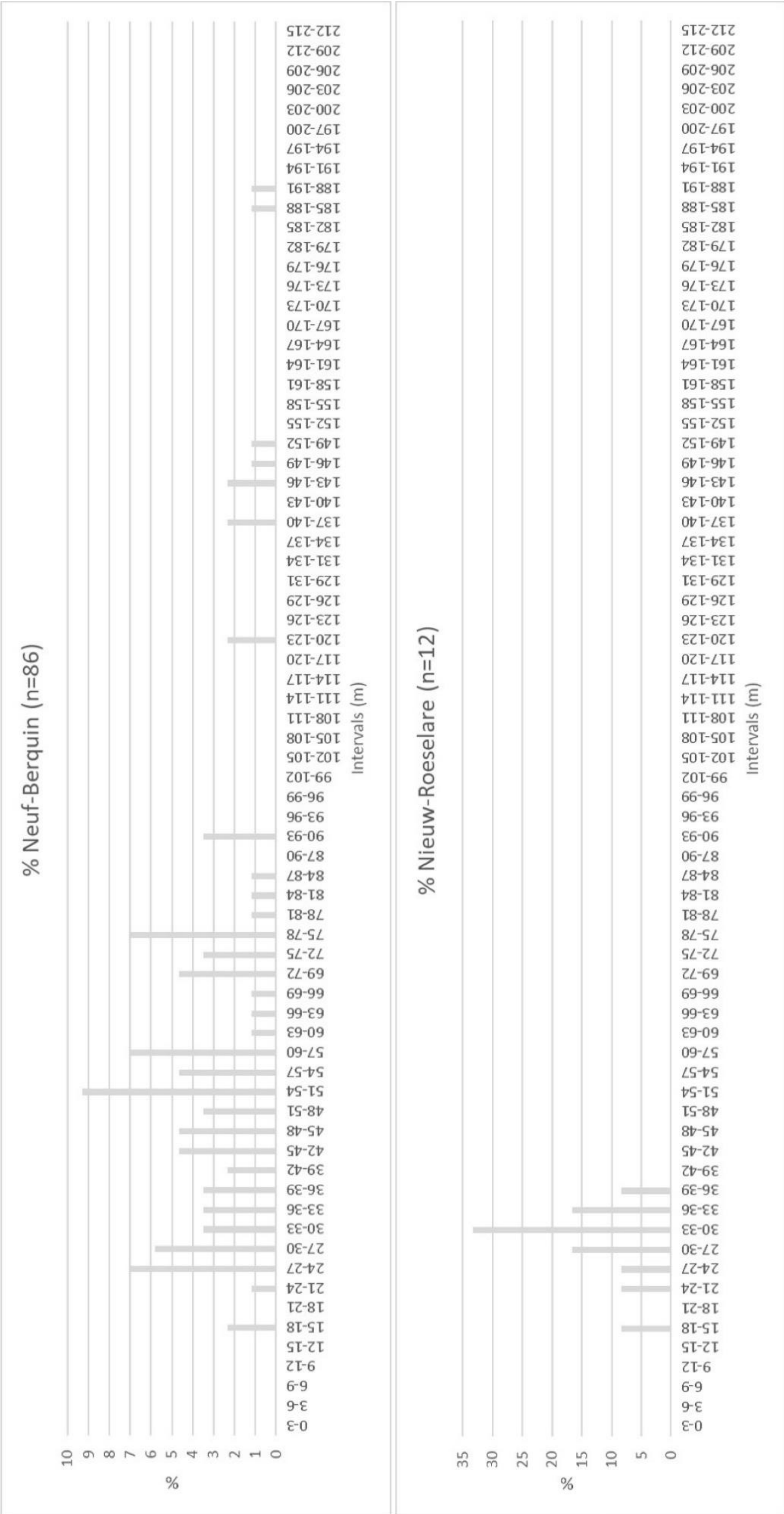
Histogram of width measurements in Loo and Millam.



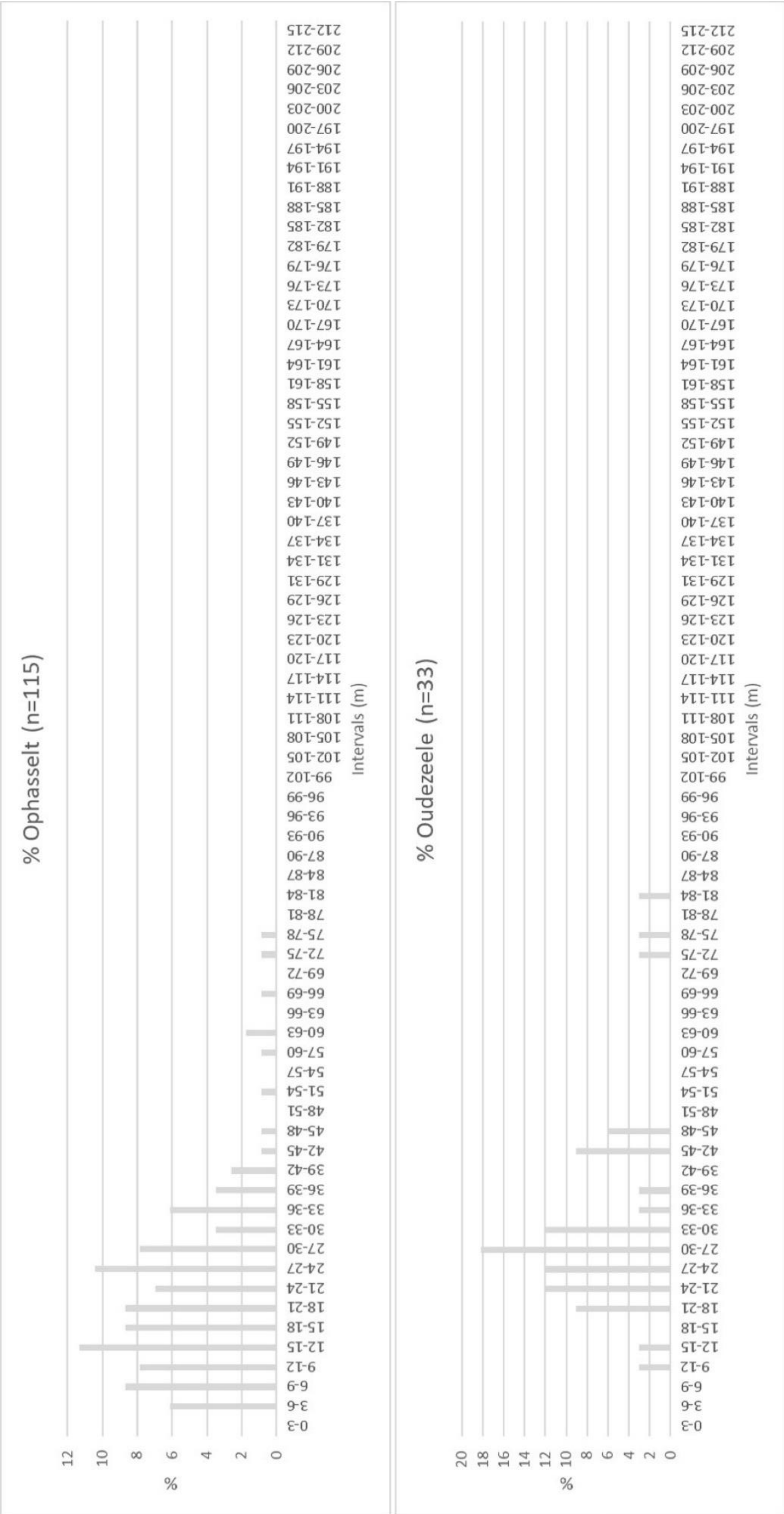
Histogram of width measurements in Moere and Moerkerke/Meulentien.



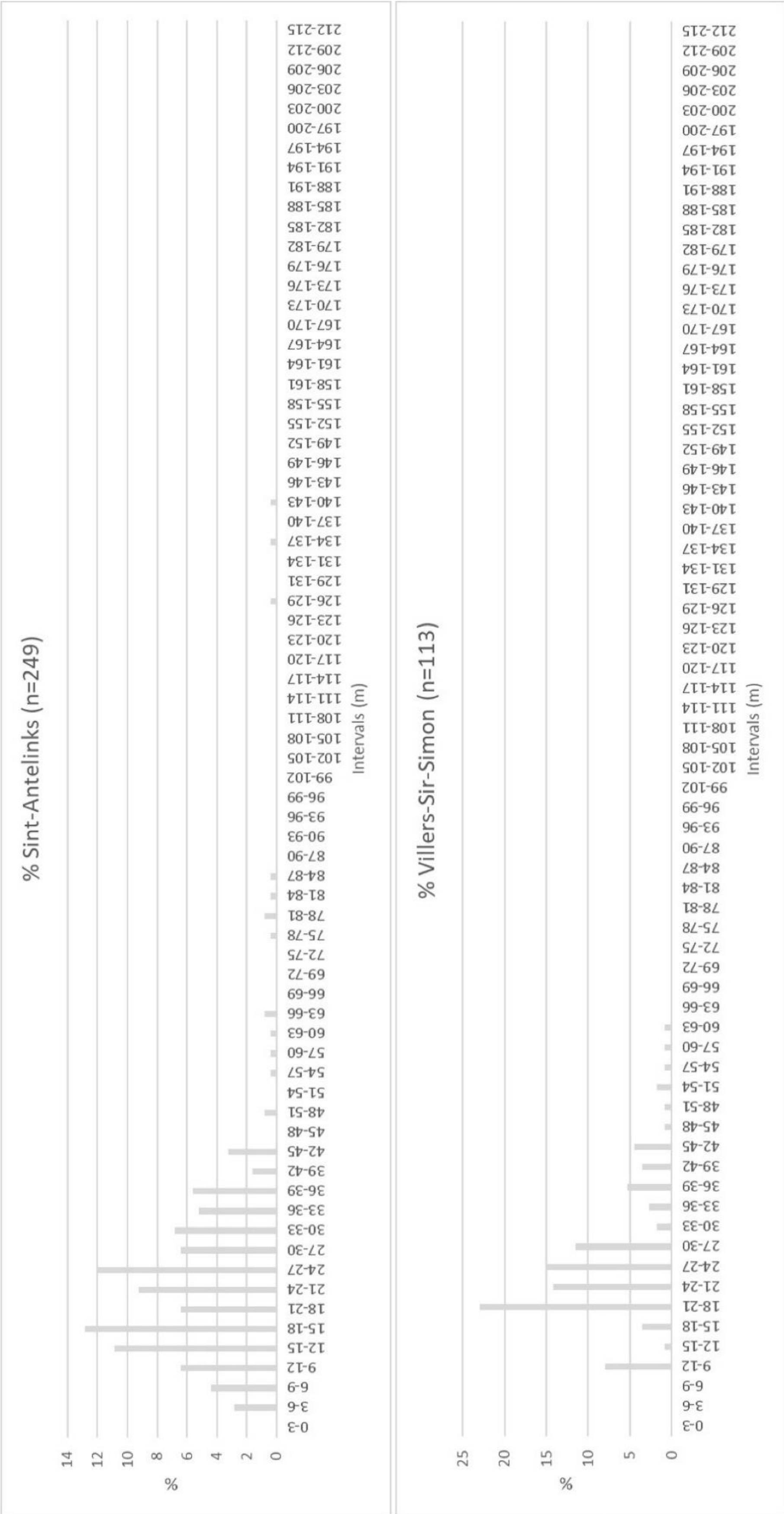
Histogram of width measurements in Moerwege and Motte Breval.



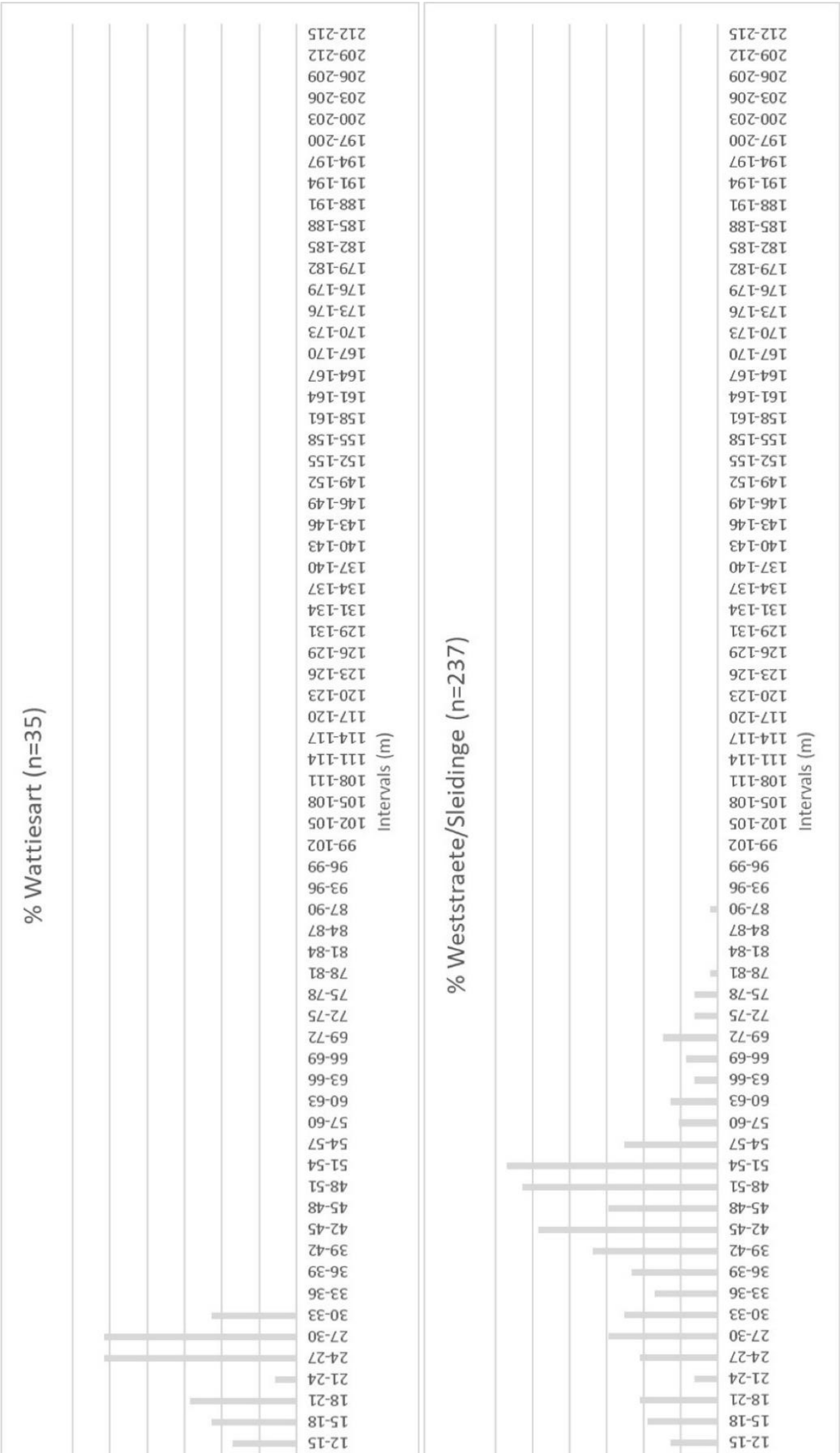
Histogram of width measurements in Neuf-Berquin and Nieuw-Roeselare.



Histogram of width measurements in Ophasselt and Oudezeele.



Histogram of width measurements in Sint-Antelinks and Villers-Sir-Simon.



Histogram of width measurements in Wattiesart and Weststraete/Sleidinge.

English summary

This dissertation makes a contribution to the research on rural settlement landscapes in the County of Flanders and the south of Wales. During the high medieval period (tenth to mid-thirteenth centuries), the human impact on the landscape intensified and expanded to previously less reclaimed areas. For the County of Flanders, axes of exploitation and the *ab nihilo* plantation of new farms and row settlements as centres for the landscape reclamations, have been considered as important structuring aspects. Only few of such row settlements have been studied, but historical research indicates that inhabitants received legal, social, and economic privileges. Furthermore, people described as 'Flemings' are known to have migrated across Europe to plant new settlements and reclaim landscapes outside the County of Flanders. The most elaborately described Flemish settlement in contemporary chronicles was located in southern Wales, in the *cantrefs* of Rhos and Dungleddy (both part of modern-day Pembrokeshire). Popular belief claims that these Flemings paved the way for later English settlement, that would have resulted in a distinctively different character of the region described as 'Little England beyond Wales', something that is strongly nuanced by researchers to date. The only indications for this Flemish presence are place names referring to personal names of *locatores*, who are believed to have planted settlements with strikingly similar morphologies as the planted row settlements in the County of Flanders. Despite the suggestion of a Flemish origin for this settlement morphology in southern Wales, in-depth comparative research and incorporation of Flemish data is lacking. Moreover, due to the highly built-up character of modern-day Flanders, archaeological data for grouped rural settlements, many of which are still inhabited to date, is limited and does not allow further analysis.

The aim of this dissertation is to illustrate the potential of a cross-disciplinary landscape archaeological approach in offering new insights into the character and development of high medieval planted row settlements in the County of Flanders and the assumed translocation of this specific settlement system to southern Wales. It is argued that, as for

other forms of material culture, landscapes are conditioned by socio-cultural context and are part of an individual’s habitus. Similarities and changes in settlement systems and morphologies may thus reflect how ideas about spatial planning were transferred or adjusted in order to cope with changing physical and social conditions of new regions.

This dissertation’s objectives are twofold. First, a comparative framework on the row settlements in the County of Flanders is created. This considers the primal identification of the geographical and chronological distribution of row settlements in the county based on historical maps, the integration of the expanding archaeological dataset on rural settlements and fieldwork on the lost settlement of Nieuw-Roeselare in the north of the county. Second, former settlement morphologies in southern Wales are identified and mapped in order to allow comparative research on the metrical and morphological characteristics of row settlements in both regions. The aim is not to prove migration happened, but to analyse to what extent traditions in spatial planning were translocated and to understand these transformation processes in relation to the cultural and/or social context of the immigrants.

This research shows that regional and chronological variation in the occurrence of row settlements in the County of Flanders in relation to other types of rural settlement and the growing urban centres is to be found, depending on differences in socio-economic context, environmental aspects, (historic) ways of exploitation, political power-structures and land ownership. Yet, based on the mapping of row settlements and archaeological data, row settlement can be linked to the exploitation of previously less reclaimed lands. Furthermore, a wide array in metrical characteristics can be found both within and between the County of Flanders and southern Wales, therefore not allowing to identify one overall unified system. Significant morphological similarities, however, suggest that an overall idea of the settlement concept was widely used and linked to the practices and habits of *locatores*. However, this settlement morphology is related to the activities of *locatores* in reclaiming the landscape and not unique to the County of Flanders. It can therefore not purely be considered as ‘Flemish’. Moreover, clear cultural incentives for the use of this settlement morphology are absent. The translocation of this system to Wales can therefore mainly be considered as an expression of the *locatores* their social status as part of the Anglo-Norman elite in contrast to the Welsh as ‘the other’. Since settlement landscapes form part of their habitus, however, it is stated that its application can also be considered as an unwittingly expression of their cultural identity in the context of *ab nihilo* plantations.

Overall this research has made clear that the cross-disciplinary landscape archaeological approach to study rural settlement landscapes is highly effective and should be elaborated and promoted in further archaeological research in both Flanders and Wales.

Nederlandstalige samenvatting

Dit doctoraat vormt een bijdrage aan het onderzoek naar rurale nederzettingslandschappen in het Graafschap Vlaanderen en het zuiden van Wales. Tijdens de volle middeleeuwen (tiende tot midden-dertiende eeuw) intensifieerde de menselijke impact of het landschap en breide deze uit naar voorheen minder ontgonnen gebieden. Ontginningsassen en het *ab nihilo* stichten van nieuwe boerderijen en rijnederzettingen als centra voor de ontginningen van het landschap werden als belangrijke structurerende aspecten beschouwd binnen het Graafschap Vlaanderen. Slechts enkele van deze rijnederzettingen werden onderzocht, maar historisch onderzoek geeft aan dat de inwoners wettelijke, sociale en economische privileges ontvingen. Daarnaast migreerden mensen, die omschreven werden als 'Vlamingen', binnen Europa om nieuwe nederzettingen te stichten en landschappen te ontginnen buiten het Graafschap Vlaanderen. De meest uitgebreid beschreven Vlaamse nederzettingen in contemporaine kronieken bevonden zich in het zuiden van Wales, in de *cantrefi* Rhos en Dungleddy (beiden onderdeel van het huidige Pembrokeshire). Volgens de overlevering zouden deze Vlamingen het pad geëffend hebben voor latere Engelse nederzettingen, die zorgden voor een geheel eigen karakter van de regio omschreven als 'Klein Engeland in Wales'. Dit wordt tegenwoordig echter sterk genuanceerd. De enige indicaties voor een Vlaamse aanwezigheid zijn toponiemen die verwijzen naar persoonsnamen van *locatores*. Er wordt verondersteld dat deze *locatores* nederzettingen stichtten met sterke vormelijke overeenkomsten met gestichte rijnederzettingen in het Graafschap Vlaanderen. Ondanks suggesties van een Vlaamse oorsprong voor dit nederzettingstype in het zuiden van Wales, ontbreekt vergelijkend onderzoek alsook de incorporatie van Vlaamse data. Bovendien zorgt het sterk urbane karkater van het hedendaagse Vlaamse nederzettingslandschap voor een gebrek aan archeologische data met betrekking tot gegroepeerde nederzettingen, waarvan velen nog steeds bewoond worden.

Het doel van dit doctoraat is om aan te tonen dat een cross-disciplinaire landschapsarcheologische aanpak het potentieel heeft om nieuwe inzichten te verkrijgen omtrent het karakter en de ontwikkeling van gestichte rijnederzettingen tijdens de volle middeleeuwen in het Graafschap Vlaanderen, alsook omtrent de verplaatsing van dit specifiek nederzettingssysteem naar het zuiden van Wales. Daarbij wordt gesteld dat, net zoals andere vormen van materiële cultuur, landschappen mede gevormd worden door hun socio-culturele context en deel uitmaken van de *habitus* van een individu. Gelijkenissen en veranderingen in nederzettingssystemen en morfologieën kunnen daardoor dus verwijzen naar de manier waarop ideeën omtrent ruimtelijke planning werden verplaatst of aangepast om veranderingen in fysieke en sociale omstandigheden in nieuwe gebieden het hoofd te bieden.

De doelstellingen zijn tweeledig. Eerst wordt een comparatief kader opgesteld voor de rijnederzettingen in het Graafschap Vlaanderen. Dit omvat de primaire identificatie van de geografische en chronologische spreiding van rijnederzettingen in het graafschap op basis van historisch kaartmateriaal, de integratie van de groeiende archeologische dataset aan rurale nederzettingen en veldwerk op de verdwenen nederzetting Nieuw-Roeselare in het noorden van het graafschap. Ten tweede worden voormalige nederzettingsmorfologiëen in het zuiden van Wales geïdentificeerd en gekarteerd. Op die manier kan vergelijkend onderzoek naar de metrische en morfologische eigenschappen van rijnederzettingen in beide regio's uitgevoerd worden. Het doel daarbij is niet om te bewijzen dat er daadwerkelijk migratie plaatsvond, maar om na te gaan in welke mate tradities in ruimtelijke planning zich verplaatsten, alsook te begrijpen welke processen plaatsvonden in relatie tot de culturele en/of sociale context van de immigranten.

Dit onderzoek toont aan dat regionale en chronologische variaties in het voorkomen van rijnederzettingen binnen het Graafschap Vlaanderen in relatie staan tot andere types rurale nederzettingen en de groeiende urbane centra en bovendien afhankelijk zijn van verschillen in socio-economische context, omgevingsfactoren, (historische) manieren van exploitatie, politieke machtsverhoudingen en eigendomsstructuren. Op basis van de kartering van rijnederzettingen en de archeologische data kunnen rijnederzettingen echter gelinkt worden aan de exploitatie van voorheen minder ontgonnen gebieden. Voorts wordt een brede waaier aan afmetingen aangetroffen, zowel binnen als tussen het Graafschap Vlaanderen en het zuiden van Wales. Hierdoor kan niet één algemeen systeem worden geïdentificeerd. Significante vormelijke gelijkenissen suggereren echter dat een algemeen idee omtrent het nederzettingsconcept voorkwam en gelinkt kan worden aan de activiteiten en gewoonten van de *locatores*. Deze nederzettingsvorm is echter sterk gelinkt aan de ontginningsactiviteiten van die *locatores* en is niet uniek voor het Graafschap Vlaanderen. Daarom kan het niet als 'Vlaams' worden beschouwd. Bovendien ontbreken ook expliciete culturele drijfveren voor het gebruik van dit type nederzetting. De verplaatsing van dit systeem naar Wales kan daarom hoofdzakelijk als de uitdrukking van de sociale status van de *locatores* worden beschouwd als leden van een Anglo-

Normandische elite tegenover de Welshe bevolking die beschouwd wordt als ‘de andere’. Aangezien nederzettingslandschappen echter onderdeel vormen van de *habitus*, kan gesteld worden dat de toepassingen ervan daarnaast ook een onbewuste uitdrukking is van een culturele identiteit in de context van *ab nihilo* stichtingen.

In het algemeen maakt dit onderzoek duidelijk dat de cross-disciplinaire landschapsarcheologische aanpak om rurale nederzettingen te bestuderen zeer effectief is en verder dient uitgebreid te worden in toekomstig archeologisch onderzoek, zowel in Vlaanderen als in Wales.