The Spatial Construct of Social Relations: Social Transformation in Early *Kaushi*, Taiwan

Mu-Chun Wu

Hertford College

Thesis submitted for the degree of D.Phil. in Archaeology

University of Oxford

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Abstract

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This research attempts to extend the application of spatial analysis to the investigation of human agency in social relations. Marcos Llobera's research framework on modelling daily experience and social space showcases great potentials of utilizing Geographic Information Systems (GIS) to explore the perception and behaviour of individual agents. By expanding Llobera's work and incorporating Tim Ingold's wayfaring theory to explore the human agency in the context of social relations, this research proposes a new analytical method to investigate social relations through the accumulation of intimate interactions. Exemplified with detailed analysis on two settlements of *Kaushi* people in Taiwan, the proposed analytical method demonstrates great strength and yields fruitful insights into their social structure and transformation. In addition, this method is particularly instrumental in unravelling specific relations between individuals, as well as between social groups. The application of this method on *Kaushi* settlements yielded fruitful insights of their social structure and transformation. On the other hand, the side products of this approach can be further employed to investigate the visual structure and movement intensity of a site, as well as to experiment alternative 'what if' scenarios relating to visibility, movement, and interaction. In sum, this research augments the potential of spatial analysis to explore human agency in a social context and lays out a further platform for the investigation of social relations at a settlement scale.

Declaration and Word Count

The candidate hereby declares that the work presented in this thesis is entirely his own and that appropriate credit has been given where explicit reference has been made to the work of others.

Word count: 80,487 words

Preface

This research is aimed at extending the application of spatial analysis to explore human agency in social relations. Following the introduction of Pierre Bourdieu's theory of practice and habitus (Bourdieu 1977), there has been a growing interest amongst archaeologists in the relation between space and human behaviour. Researchers have come to realise that there are three inseparable aspects of human behaviour: the spatial dimension, the temporal dimension and the process. Space is no longer just a stage of the social play, but is also an active force that limits and constrains human behaviour and interaction. The growing interest in agency and interaction amongst archaeologists highlights the importance of the appropriation of social institutions through constant daily practices that shape and reshape social relations.

Following Marcos Llobera's work on modelling daily experience and social space (Llobera 1996, 2000, 2003, 2005, 2007b), this research focuses on exploring agency in social contexts through modelling in Geographic Information Systems (GIS). Llobera's research framework on spatial and visual structures showcased a great potential of GIS techniques to explore human agency, perception and behaviour in a wide range of spatial environments. His work established the theoretical grounds for modelling agency in GIS and provided archaeologists with the tools to explore and investigate agency within archaeological contexts. This research applies the tools developed by Llobera to explore the human agency in social interaction and relations.

Another methodology used to investigate agency and social relations, is the 'wayfaring theory' put forth by Tim Ingold (2011). Ingold argued that movement is

the starting point for understanding and forming knowledge of the world. Furthermore, he proposed a new way of thinking about social relations on the basis of meshworks rather than networks. The concept of meshwork implies that social relations are built on individual movement and intimate interactions along the routes one walks every day. Therefore, Ingold's theory of 'wayfaring' has strengthened the connection between space and daily perception. This theoretical framework encourages researchers to investigate social interaction from the bottom up i.e. from the level of behaviour of individuals. With the tools provided by Llobera, I was able to translate these concepts into the quantitative language of GIS and further investigate social interaction and relations.

In order to explore this marriage between agency modelling and social interaction, I will choose the case study of two *Kaushi* settlements as the main subject. The *Kaushi* is part of the *Paiwan* ethnic group, one of many indigenous groups in Taiwan of whom some ethnographic accounts are known. Nevertheless, due to the sedentary nature of the *Paiwan* settlements and cultural practices (more discussion to follow), any exploratory ethnographic and archaeological research will benefit greatly from the integration of at least some elements of modelling and the wayfaring framework. That said, the wayfaring model can also be tailored for investigating specifically the social relations of *Paiwan* settlements. In sum, this thesis aims to explore human agency in the context of social relations through the application of GIS techniques combined with the analysis of archaeological material and ethnographic literature.

This thesis consists of seven chapters. Chapter 1 provides an introduction and background of both the method and the theoretical framework used in this research. It discusses the nature of this study and its position within archaeological research. Chapter 1 provides the literature review of spatial analysis and social

theory in archaeology and beyond. It gives an overview of the state of the art in the research of space and society, and discusses the rise of research concerned with human interaction and agency in archaeology. In this discussion the significance of the introduction of Ingold's wayfaring theory is highlighted. Furthermore, this chapter sketches out the research frame on which this thesis is based, including the discourse between allocated and delegated social power (Mehrer 2000). In sum, this chapter describes and discusses the methodological underpinnings of the thesis and showcases how this specific perspective provides the tool for investigating social transformations. Finally, the research goals are specified at the end of this chapter. Part of this chapter has already been published in the course of my PhD candidature (Wu and Lock 2012).

Chapter 2 provides a brief introduction to the *Paiwan* culture and some of its characteristics. It discusses what makes the research on the *Paiwan* culture a particularly good case study for investigating the spatial construction of social relations. Particularly focussing on the sedentary nature of the *Paiwan* people, this chapter outlines how the social and kinship structure, and the practice of 'house society' benefit the research in both the modelling of wayfaring and the investigation on social transformation.

Chapter 3 presents in detail the methodology of this research. It addresses the issue of how human interaction and dynamic social transformation can be tackled using computational tools. This chapter presents a concise overview of the theoretical framework in computer-based agent modelling and the definition and description of the types of analysis employed throughout the thesis. In particular, the majority of this chapter is focussed on the development of the wayfaring model in order to explore its potential in investigating interaction-based social relation. It

highlights the strength of computational simulation and describes the process flow of later analyses.

Chapter 4 focuses on the characteristics of the sites under study and an introduction to the spatial structure and 'habitus' of the past *Paiwan* people. This introduction identifies spatial divisions at the sites and the differences in their use of space. Furthermore, it also demonstrates the bottom-up spatial approach to investigating social structure through the application of the wayfaring model. This chapter discusses in detail both the spatial and social aspects of the *Paiwan* settlements and their inhabitants in order to gain a comprehensive understanding of the two sites. These spatial structure and social relations provide the starting point and reference for later discussions on power dominance and social transformations.

Chapter 5 re-introduces the top-down methods of social structure and identity analysis informed by the previous results of the purely spatial analysis performed in Chapter 4. In this chapter I also scrutinise the composition of different neighbourhoods and the relations amongst them. It showcases how the combined use of space syntax and wayfaring model can provide new insights into social composition and specific social relations of past societies. In addition, this chapter demonstrates other potential aspects of the wayfaring model that could inspire better understanding of the past human mind and alternative 'what if' scenarios. In sum, this chapter provides a more detailed view on the individual choices and social relations amongst the inhabitants of the two sites in comparison to Chapter 4.

Chapter 6 is the discussion and interpretation of the social transformation of *Kaushi* people. In this chapter I discuss power dominance and highlight the

difference of allocated and delegated social power. First, I identify different occupational phases at each site and establish the context in which social phenomena occurred. These social phenomena are then compared with each other to provide the interpretation of social transformation over time. The confrontation of allocated power and delegated power is explored through this comparative study. The discussion includes the examination and interpretation of changes in social power in the early *Kaushi* history. It also demonstrates the strengths and challenges of adapting the wayfaring model.

The final chapter, Chapter 7, presents an evaluation of the wayfaring model, as well as summarises the results of the study on the social transformation of early *Kaushi*. It discusses the role of the wayfaring model in providing insights into the agency in social relations as showcased in this research. On the other hand, it also highlights the contrast between allocated and delegated social power in the two settlements and how it triggers dynamic social transformations in early *Kaushi* history. Lastly, this chapter provides an overview of the limitations and potential of the wayfaring model as well as possible future research directions.

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Chapter 1

The Role of Space in Social Research

1.1 Settlement Archaeology and Society

1.1.1 Settlement Archaeology

'Settlement pattern' as a focused methodological concept of archaeological research was brought to the forefront by the *Virú Valley Project* conducted by Gordon Willey in 1946. He regarded an archaeological settlement pattern as evidence of the relation between human groups and the natural environment, and contended that the way human groups adapt themselves to nearby natural resources can be revealed by studying these patterns. Although Willey had a strong ecological anthropological background, he also observed that many other factors of a social and cultural nature were reflected in the archaeological record and therefore, he refused to treat these as merely being a reflection of general patterns of ecological adaptation (Trigger 1996: 376). In consequence, with respect to other social and cultural factors, Willey used the settlement pattern to approach the function and structure of specific past societies.

Following Willey's research, Kwang-Chih Chang stated that this approach had overlooked the importance of the 'whole community' and the 'entire settlement', and was confined by concepts such as types, styles, and attributes of 'artefacts'. He argued that archaeological types range in multiple scales from the single attributes of artefacts to entire cultural traditions and, therefore, using the unitary social group to describe and characterise a prehistoric people can also be

considered to be an alternative to a range of various scales (Chang 1968: 2). On this premise, Chang proposed a pattern investigation of three categories: households, communities, and the aggregate of communities (Chang 1958). By examining a settlement using these three scales, archaeologists are able to start to understand the social structure, and furthermore, social organisation, in the local and wider region. This particular methodological framework proposed by Chang is focused on the acquisition and interpretation of archaeological data, by way of defining, characterising, and relating prehistoric social groups so that social 'structure' is its main goal, and reconstruction, or 'articulation' in Chang's terms, is the means to achieving that goal. Although the 'structure' inevitably falls short of the ideal of past reality, 'articulation' can be conceived and pursued as a scientific process, and can be improved upon constantly (Chang 1968: 2). The significance of using settlement patterns to reconstruct prehistory is seen to be the result of various 'organisations' or 'institutions' which are reflected in those patterns.

1.1.1.1 The Settlement Pattern Approach and the Debate over Space

However, during the early development of settlement pattern studies, many researchers questioned the logistics of this approach. For instance, Irving Rouse argues that there are four logical steps in reconstructing prehistory: the recovery, classification, reconstruction and interpretation of the remains (Rouse 1968). He argues that it is impossible to define a meaningful prehistoric settlement without the help of a defined cultural complex and furthermore, suggests that cultural complexes are defined by the clustering and association of material remains and artefacts. Once such complexes are recognised, it is then possible to correlate spatial features into patterns which represent former social institutions. To Rouse, a settlement is merely the temporal locale where a particular community carried out its various activity components, but is not a component in itself. The value of a

settlement pattern investigation is only significant in the fourth procedural step of interpretation when the previous three steps have already been established.

In the continuing debate of settlement pattern as an ‘approach’, Willey concluded that the investigation of a settlement pattern did not, and could not, in itself comprise a self-contained approach to prehistory (Willey 1968: 208). He agreed with Rouse that the concept of an archaeological settlement is not on a primary level of investigation; rather, it is important on the secondary level of investigation, that of interpretation. However, Willey also raised the problematic issue of the difference between cultural and social by questioning that, if archaeologists treat settlement patterns as a cultural trait, why cannot settlement serve as a device in the definition of a cultural complex or cultural phase (Willey 1968: 213)? That is, when settlement patterns are classified into types (such as building structures, spatial arrangements, and modes of dwelling), they should be able to suggest cultural distinctions just like other material traits.

The main reason for the settlement approach paradox lies in the obscure relation between the cultural and the social. Rouse argues that temporal prehistory is composed of different cultures across the landscape, whereas Chang breaks down the temporal landscape into separate regional social community areas. The former sees prehistoric people as being bound by culture, which is reflected in artefacts, and the latter sees them as being bound by social structures, which are reflected in regional distribution patterns. Willey also noted this different perspective and stated that his difference with Chang was not ‘over the inevitability of a close relation between archaeological field methods and cultural-historical interpretation, but over what I (Willey) believe to be the necessity of taking certain basic methodological steps prior to the settlement pattern-prehistoric society interpretation step’ (Willey 1968: 211).

However, Willey did not specify the kind of information which needs to be established in order to be considered appropriate for a ‘second level’ of investigation, i.e. interpretation. Following his statement that the cultural-historical aspect is not a factor of his disagreement with Chang, the logical sense would be to examine the attributes of artefacts regardless of their cultural category, and reconstruct their structural order and relation. In this case, there still remains the question of why the settlement pattern, referring to its house structure, building material, distribution pattern, location selection, etc., cannot be seen to be a type of ‘artefact’ like other material remains to ‘approach’ prehistory. To answer this question, a further examination of space and society is needed.

1.1.1.2 Space and Social Structure

Some geographers, and this is by no means restricted to geographers, assume that there is a spatial cause behind every spatial pattern that characterises the spatial structure and, henceforth, can explain its demise (Massey 1985: 11). The argument about whether ‘purely spatial processes’ exist, is similar, but not necessarily the same as, the ‘settlement pattern approach’ of the 1970s. It was formerly argued that only social processes were operating over space and, therefore, the spatial was only the result of social constructs. However, as Andrew Sayer pointed out later, although it is common to separate space and substance, and speak as if they are independently existing objects, it is actually the deceptive structure of the human language which separates the three inseparable aspects of human behaviour: the spatial, temporal and process (Sayer 1985: 52). Edward Soja also suggested that spatial structures and relations are the ‘material form’ of social structure and relations (Soja 1985: 94) so that only the structural ‘idea’ of human behaviour and interaction exists together with the ‘physical appearance’ of this idea. The ‘idea’ is in the mind but the ‘physical

appearance' is in the combined body of space, time and artefact. The realisation that social life is materially constituted in its spatiality is the keystone of the later interpretation of spatiality. Furthermore, the spatial is not only a result of social construct, but it also limits and constrains human social interaction. The one-way relation of 'social structure' equals 'spatial distribution' ignores the crucial impact of spatially organised opportunities and limitations of social interaction. Derek Gregory has argued that social relations are not merely expressed within a spatial structure, they are, in fact, also constituted through that very same structure (Gregory 1978: 120). As a result, the analysis of the spatial structure itself is not secondary to the analysis of the social structure but the relation between the two is actually a recursive one, one cannot be theorised without considering the other. Therefore, spatial order should be understood as both the outcome and the medium of social action and relation with the spatial structuring of social life defining how social actions and relations are materially constituted and made concrete.

Despite Willey's objection towards the settlement pattern as an approach in itself, later archaeologists accepted it as a possible perspective (Hodder 2004; Patterson 2004; Renfrew 1984; Trigger 1968, 2004). In his book, *Approaches to Social Archaeology*, Collin Renfrew stated that, by adopting a spatial approach, and breaking down the landscape into discrete social units each of which occupies a definite territory, archaeologists can start to investigate social relations (Renfrew 1984: 10). He acknowledges the limitations of this approach in that it only uses one of a number of possible pieces of information, i.e. space, but nevertheless argues that, although rather simplisticly, it is possible to begin to investigate questions of dominance and power from these data alone. This spatial perspective is not aimed to resolve all the broad cultural issues, but to answer questions of a

social-relational nature. The beginnings of social archaeology once again highlight the difference between a cultural and a social perspective of prehistory although this is not to deny the significance of material culture studies. Material remains are still at the very heart of identifying social status, network flow, identity, subsistence, etc., and any distinction merely implies different interests in prehistory, some focusing on activity context, and others on human relations. The relation between the two is complimentary rather than contradictory.

1.1.1.3 Spatial Pattern and Space Syntax

In applying Renfrew's social perspective the issue is how to extract a meaningful pattern from space itself and how a spatial pattern provides significant meaning. According to Renfrew the landscape is broken down into territories that represent individual social units and the spatial patterning and relations of these territories can then be utilised to investigate their social relations. Along with Chang and Trigger's discussion on society and settlement pattern (Chang 1972; Trigger 1968), Renfrew also pointed out some simple correlations between the settlement pattern and the social structure it hosts. In addition, he later went on to discuss how individual spatially identified social units can be related to each other through network trades and information exchange (Renfrew 1984: 80). Renfrew's analysis was based on using Thiessen-Polygons to break the landscape down into individual territories and discuss the political dominance through Central Place theory. He then demonstrated how this approach can highlight spatial meaning through several case studies. In the study of architectural space, there is a very similar approach to revealing spatial meaning, that of Space Syntax.

Proposed by Bill Hillier and Julienne Hanson (1984), space syntax theory provides archaeologists with a wider view of spatial relations by arguing that space

is not just a neutral background, but a fundamental component of human activity. Furthermore, it is proposed that, by breaking space down into individual units, these can be analysed with formal methods, a premise in alignment with Renfrew's earlier proposal. The spatial units approach has been adopted since then by many scholars and later evolved into methods such as 'access graphing', 'axial mapping', and 'convex mapping' which have impacted on different aspects of spatial studies (Batty 2004; Foster 1989; Hillier and Hanson 1984; Turner et al. 2004). In terms of settlement pattern analysis, space syntax has been widely applied by archaeologists to investigate household relations, road networks, spatial movements and spatial patterns in general.

Amongst all the space syntax analytical methods, access analysis concentrates on the differentiation and integration of space enabling the investigation of the interconnection of certain spatial components and highlights the location of high-level integration. With the use of reconstructed road networks, the basic network connection can then produce an access graph diagram for further analysis. This includes investigation of household spatial relations, integrations and separations; it can help to identify distinctive areas and divisions which may indicate the presence of individual settlement segments. Furthermore, the division results can be examined either individually or in their entirety in order to highlight the characteristics and relations between the segments. Applying an access analysis aids the possibility of identifying separate social groupings in the settlement and provides insights into their social structure.

Following Hillier and Hanson, space syntax and access analysis have been broadly applied to studying settlements in archaeology. For example, Mark Grahame has used an access analysis as a framework to investigate the spatial structure of Roman houses in Pompeii showing that the central courtyard, which

provides the main access route leading to closed rooms, served as a main defense mechanism for inhabitants against outsiders (Grahame 2000). Looking at historic Zuni architecture, Thomas Ferguson has demonstrated how convex mapping could provide information instrumental in understanding the spatial layout and division of social activities (Ferguson 1996).

However, in addition to the quantitative technique and pattern-identifying mechanism space syntax can offer, it can also serve as a 'tool to think with'. Marion Cutting (2003: 3) has categorised the analytical process into four stages: the identification of convex spaces, the insertion of the links joining those spaces, the representation of the linked spaces visually through a justified access graph, and the calculation of the numerical relation (usually expressed in terms of integration values) between those spaces. The first two steps in this process are usually the most difficult to define in terms of analysing settlement layout. Since a single convex space is defined as an identified space within a layout plan, it is likely to be a somewhat controversial process as unlike architectural buildings where space syntax originated, archaeologists are usually faced with settlement plans involving open spaces. It is difficult, if not impossible, to recreate a spatial division if it is not apparent in the archaeological record, not to mention the problem of different individual perceptions of spatial divisions. However, the process of forming a definition stimulates the redefinition of space itself and its function, and forces rethinking the relation between human behaviour and spatial structure. It is this function as a 'tool to think with' that can be of most use to prehistorians.

Despite the problem of spatial definition, there are some other limitations and shortages regarding the original access analysis and convex mapping; the most apparent issue is that both are 'adjusted graphs'. This results in the

misplacement of spatial location and connection along with the loss of many other spatial attributes, such as location, size, distance, function, etc. Many researchers have managed to work around this issue by devising special maps. For example, in his Bolton Castle planning diagram, Patrick Faulkner (1963) assigned alphabetic symbols to each space in order to represent different spatial functions and in addition, the layout of the diagram is in accordance with horizontal spatial accessibility and vertical floor difference. In his planning diagram of Edlingham Castle, Graham Fairclough (1992) further assigned different kinds of lines to represent different means of accessibility, and different convex shapes to represent their functions or locations. To a certain extent, these later graphs do assist in clarifying the articulation of that particular space. However, these can only be meaningful to those who are familiar with these symbolic representations and such presentation can, in fact, be more difficult to understand than the original site plan. Nonetheless, space syntax is not mainly about how visual graphs can represent reality in detail. Although the alternative perception offered does provide unique insights into understanding space, it is more concerned with statistical analysis and pattern-identification and using these to understand social structure and relations. Therefore, there are many ways in which an access graph or a convex map can be improved, either by adding functional symbols, separating floor heights or assigning distance gaps. These extra attributes assist in looking at specific correlations and distributions although the major issue is still the lack of human representation.

Space syntax analysis has always involved the de-population of space when defining a single meaningful space; it is difficult to know how the furnishings and human activities originally took place, since they have disappeared from the archaeological record. This aspect of Hillier and Hanson's work has received most

criticism because it treats space as a totally independent discourse in itself (Franz and Wiener; Turner and Penn 2001). The behaviour and decision-making of human activity are removed from the construct, leaving only the spatial distribution behind, an assumption which has a major impact on the social interpretation and the use of recognised structures. That is, how can archaeologists link back the spatial pattern to human activity and its social implication?

Originally space syntax emphsised the examination of 'control over space' (Hillier and Hanson 1984), a perspective of purely spatial relation that leaves very little room to take the function and use of the space into account. Hillier and Hanson were most concerned with the movement, encounter and direction of access between outsiders and inhabitants. The idea of inhabitants and outsiders was aimed to emphasise access and control over the space in which they dwell rather than also including the symbolic or practical function of space. As Fairclough rightly put it, 'the reason for access, and the frequency and nature of movements and encounters, tend not to be considered in detail and other methods are required to contextualise and explain' (Fairclough 1992: 350). Space syntax provides a way of identifying spatial distinctions and layout patterns, of categorising spatial divisions and possible structural order. However, in terms of social relations and human interaction, there is no direct link between the pattern and social structure. Space syntax is a single perspective on space, a useful analytical tool, and also a 'tool to think with', but it is not a 'theory of space'.

1.1.2 Moving Towards an Archaeology of Community

Spatial structures and relations are, then, the material form of social structure and relations and the identification of a settlement pattern should reflect its social structure and the various institutions of social interaction (Willey 1968).

The issue is therefore, how do researchers repopulate the de-humanised spatial pattern?

Since a settlement pattern is defined as a study of social relations on the basis of archaeological evidence, the identification of the social group is crucial. This research refers to the 'scale' of the social group rather than the 'cultural background' of the people. As Chang (1958) rightly pointed out, cultures can fluctuate, whereas social groups are clear-cut. The first step in studying a settlement pattern is to delimit local social groups rather than identifying archaeological regions and areas by time-spacing material traits since cultural traits are meaningless if they are not described in their social context. Material and cultural traits are supplementary tools useful to interpret discovered social relations and contexts. In order to identify basic social groupings, both Chang and Trigger have drawn attention to the concept of 'community' and considered it universally manifest in the archaeological settlement record.

1.1.2.1 The Archaeology of Community

'Community' to both Chang and Trigger means 'a group of people sharing the same interests in the land in which they dwell'. Since this group of people lived side-by-side with each other, they would naturally form a distinctive single society regardless of their political, cultural and religious backgrounds. In general, therefore, a community corresponds to a single settlement and can be identified as an archaeological component. The composition and social implications of this group are usually investigated from three different perspectives: individual structures, the settlement, and the relation between settlements (Chang 1958; Trigger 1967). Although different terms are used, such as 'house', 'community' or 'aggregate', the underlying principle remains the same and highlights a settlement

pattern focus as being an analysis of individual ‘house structures’, a ‘community’ consisting of multiple houses, and a wider ‘region’ involving multiple communities. In order to reveal the social relations implied in these spatial patterns and structures, Trigger pointed out that the layout of communities is strongly influenced by family and kinship organisation in non-industrialised societies, and there is a high degree of correlation between community plans and village social life (Trigger 1968: 62).

Based on this the correspondence between specific community patterns and certain social forms, such as bands, chiefdom and states has been attempted. Chang (1958) categorised communities into ‘Siberian’ types and ‘Eskimo’ types based on present groups, kinship lineage system and social composition, in order to identify and correlate their settlement layout pattern. Trigger and Renfrew have both discussed the possible social implications by scrutinising particular spatial structures (Renfrew 1984; Trigger 1968). However, they have acknowledged that a direct link between certain spatial structures and specific social institutions does not exist suggesting that mere spatial patterning and structure is not enough to understand intimate human interaction and social relations. One major common issue amongst archaeological definitions of social institutions, like the community, is that they often end up as a method for recognition rather than informing analytical theory. This is mainly due to the fact that defined social institutions are, by nature, constrained by the limits of the material record. The emphasis on recognition over analysis allows concepts like ‘community’ to remain unproblematic, because the object studied arises directly from the data (Yaeger and Canuto 2000: 5). Since material remains are regarded primarily as being products or by-products of human behaviour in social and cultural contexts, they are, by their nature, something more than just systematic patterning data.

Settlement archaeology should characterise itself as the archaeology of humans in settlements more than the archaeology of the settlement in its physical sense. In addition, Yaegor and Canuto have pointed out that pattern identification approaches frequently ignore issues of social creation, manipulation, and meaning which have become increasingly important as archaeologists inject concepts of agency, practice, structuration, and interaction into models of the past (Yaeger and Canuto 2000: 5). One of the shortcomings of structuralist and post-structuralist approaches is that the role of social agents is often overlooked. The growing interest in agency and interaction highlights the appropriation of social institutions through constant daily practices which shape and reshape social relations. Consequently, there is a growing interest in the utilisation of the form and function of a settlement pattern to 'reflect' social institutions so that community is conceived as a dynamic socially-constituted institution which relies on human agency for its creation and continuing existence. The social interest has shifted from the archaeology of 'settlement patterns' toward the archaeology of 'communities'.

Traditionally archaeologists have defined community as a residential unit such as a 'site' or a 'settlement' although anthropologist George Murdock's (1949) definition of community as 'the maximal group of persons who normally reside together in face-to-face association' is now widely accepted. It is not hard to see from this that the human community is essentially produced by two things: (1) shared residence or space, and (2) human interaction based on face-to-face association. George Homans has argued that community is a necessity due to the material interdependency of people requiring human interaction which, consciously or unconsciously, produces group sentiments and identity (Isbell 2000).

In localised regions, like a small settlement, community identity is formed by its members' daily routines such as subsistence reproduction from the nearby

environment and understanding survival within the place in which they dwell. Their common pragmatic concerns produce a shared behavioural reaction to adapt themselves to the physical and social world, similar to Bourdieu's 'habitus' (1977). This structures their perception and guides their 'practices' in the world, and eventually consolidates a sense of 'being in common', which leads to the existence of a community and mental identity. It is the perspective of this practice theory that has stressed 'human interaction' most strongly and positioned agency at the centre of creating and recreating society. Instead of seeing community as a place where social interaction and reproduction take place, the agent-orientated approach views social institutions as being socially constituted.

1.1.2.2 Issues for the Conceptual 'Community'

However, this perspective of 'community' presents additional issues for archaeological analysis. To begin with, community is a social rather than an archaeological concept and thus seems unable to be excavated or identified, even though the inhabitants of an area can be inferred to be a community. This issue is not hard to overcome and appropriate spatial patterning has been widely discussed (see below). The most problematic issue, however, is that this interactive perspective on community unveils the potential of non-spatially-based social network groups. Space and place are still important since communities emerge through interaction in specific locations. However, community is based on co-presence rather than co-residence (Yaeger and Canuto 2000: 6) and therefore cannot be reduced solely to a spatial unit. For this approach the core of the community is an idea of membership and identity which is not necessarily rooted in a fixed location or space. Furthermore, now that the concept does not exclude other types of social groupings the issue of multiple identities, such as those based on ethnicity, gender, lineage, or faction becomes important.

Isbell has proposed that the archaeology of ‘community’ faces a crossroads (Isbell 2000: 263). On one hand is the ‘natural community’, a real and bounded entity based on a spatial pattern, and on the other the ‘imagined community’, constructed through discourses and process. The advantage of adopting an ‘imagined community’ is that it populates the past with agents who act as interested individuals to examine social fractions. Furthermore, it promotes an interest in contingent change within an individual ‘culture’ rather than the universal cultural evolution based on a comparison of settlement patterns. Based on this, Isbell suggests that archaeologists should abandon the ‘natural community’ concept and adopt the ‘imagined community’ (Isbell 2000: 263); however, this research partially disagrees with such a concept.

This shift of community concept from a spatial base to an ideological base begs the question of the distinction between 'community' and 'society'. The term ‘community’ is gradually becoming a collective concept including 'kinship', 'economic unit', 'ethnicity', 'wealth division', etc.; that is, it has become an alternative term for the previously established term 'society'. However, as Oliver Harris has correctly pointed out, whilst society is seen as something big and impersonal, communities are the face-to-face connections emerging through human interaction (Harris 2014: 77). The concept of the 'imagined community' has stimulated a further investigation of the obscure concept of 'social' and 'societal', with its emphasis on the significance of a different 'identity'. More importantly an individual agent’s interaction within a community cannot be overlooked so that the community serves as a crucible where multiple and potentially incompatible or antagonistic identities -- such as factions, lineages, genders, and ethnicities -- interact, competing with, or complementing, one another (Yaeger and Canuto 2000: 7). As Isbell correctly suggested (Isbell 2000: 249), it benefits archaeologists

to investigate further the dominance of power and the internal social transformation.

Nonetheless, research on community is aimed at investigating human interaction and social relations and the first step is to identify the units of analysis. Since the focus is social in nature, these units should be a type of social group, or should be relevant to their notion of its social identity. As Renfrew stated (1984: 39), a social group cannot be analysed if one cannot recognise it, for it is the recognition of the group that governs group behaviour and provides archaeologists with the path to investigate social relations. Such being the case, the social group ought to be identified, if possible in the archaeological record although it is quite difficult, if not impossible, to identify a number of social groups and identities which fall into the category of the 'imagined community'. This accordingly greatly increases the analytical challenge.

Furthermore, this research would argue that Isbell's rejection of the 'natural community' is an error reflecting those of the 1960s and 1970s because this still provides an alternative spatial perspective which is significant in itself. The natural community should be regarded as a 'neighbourhood identity' and retain a position in the 'imagined community'. The logic is the same as for the previous social and cultural argument and although this does not answer all the questions, it still serves as a meaningful approach amongst many others. Despite the fact that social identities, such as kinship and ethnicity etc., are hard to distinguish amongst archaeological evidences, space and 'neighbourhood identity' present themselves as more fixed and stable factors of human relations.

Gamble's (1999) and Whittle's (2003) studies have both clearly demonstrated that the natural community ('local networks' in Gamble's terms) still

offers significant insights into their composition, in particular, how different scales of interaction within and between communities might be structured. This highlights that communities can involve very different kinds of interaction, from the emotional bonds that link people who share the same house to the relations that characterise less commonly encountered people, such as those living in the same settlement. This multi-scalar approach is also showcased in Yaeger's (2000) work, which argues that multiple, mutually independent, communities cross-cut each other and can be nested within one another .

Isbell's hard distinction between imagined and natural communities has also received criticism from Bernard Knapp, who suggests that a combination of the two (natural and imagined communities) better enables us to understand communities as the outcome of practices on-the-ground (Knapp 2003: 567). This is manifested in his study of a miner's community within a wider changing landscape (Knapp 2003), where the multi-scalar approach to community is particularly useful when the imagined community is combined with actual regional 'social relations'. Oliver Harris further concludes that perhaps the most useful approaches are those that link both the natural and imagined communities together, exploring both face-to-face interactions and the senses in which these communities are understood as dynamic, transformative and emergent through practice (Harris 2014: 79).

The multi-scalar approach highlights the crucial nature of community whereby any person belongs to several communities at any one time. In this case, a person is not restricted to a single community, and a specific community may consist of people from different community backgrounds. As a result, some scholars (Haynes 1999; Lave and Wenger 1991) treat communities as sites of practices and argued that communities emerge by people taking part in groups of

dedicated particular forms of practice suited to these communities (Harris 2014: 80). Therefore, both people and communities emerge through these practices, shaping each other (Wenger 1998). In his study of communities, Harris (2014) argues that by allowing agency and practice to take centre stage, they offer a historically situated, contextual approach. Communities are not separated from the history of places, even if they are not determined by residential relationships (Harris 2014: 80).

Harris (2014: 86) further points out a major issue in the study of communities: an anthropocentric approach. He criticises that the current approach to community sees it as the outcome of human relations and as an entirely human construct. Such being the case, animals, places, things and people are separated from the investigation. He argues that agency does not reside with humans alone, nor can it be devolved into things. Rather, it emerges from the connection between people and things, and things are indispensable constitutions of the social fabric (Harris 2014: 88). In other words, communities do not impose themselves on particular places; rather, they emerge through them. Community emerges through the relations amongst humans, animals, places, and material things altogether. It is also on this note that Harris later pushes on with the concept of ‘assemblages’ in the research on communities.

Assemblages are diverse elements of vibrant materials of all sorts and they are compositions that act (Harris 2014: 90). This concept makes room for all manners of humans and non-humans in communities. Crucially, the assemblage is in a state of becoming; that is, it is in process instead of being static (Harris 2014: 90). In this case, the community emerges from all its parts but is not reducible to them. Therefore, the linkages within an assemblage are thus not between two prefixed entities, but along the connections that constitute them. This nature of

assemblage bears a clear resemblance to Tim Ingold's concept of 'meshwork' (further discussion below) and empowers community to endure time and transcend different locations. As a result, Harris defines community as 'a particular set of assemblages that operate at a range of specific scales and that always involves human beings' (Harris 2014: 91).

This research agrees with Harris's definition of community and further explores the role of space within this 'assemblage'. Since investigating assemblages is vital in understanding communities, the issue still lies with how to unveil a given space and its relation to agency and other materials.

1.2 Limitations and Potentials of the Spatial Approach

The current spatial analysis approach to site plans has its limitations. The fundamental flaw of site plan is that it is a de-populated space, which leads to the problematic lack of intimate human interaction. In this case, we are usually forced to take an alternative approach to the examination of the spatial pattern.

1.2.1 Space as an Actor in Different Social Themes

Collin Renfrew has identified five major themes in social archaeology at a larger regional scale (Renfrew 1984): 1.) society and space; 2.) network and flow; 3.) authority; 4.) the dynamic of continuous growth; and 5.) discontinuity and long-term change. In most of these five themes of social archaeology, the spatial approach plays an important role.

With regard to the first theme, 'society and space', Renfrew broke the landscape down, using the Thiessen-Polygon method to identify repeating and independent social units. Through the investigation of the spatial pattern, he

sought to identify the nature of the specific society to understand their social composure and structure. Secondly, by scrutinising material remains, Renfrew went on to examine how space plays an important part in the trade of goods and the information of exchange. Furthermore, he applied Central Place theory, which is spatial in nature, to discuss territorial dominance and authority as the third theme. Even though he later picked up the issue of how spatial patterns can provide the information of structural changes in long-term transformation, Renfrew did not mention the role of space in dynamic growth in the fourth theme.

This research suggests that the reason the spatial approach is unable to answer questions such as dynamic growth is due to the fixed and de-populated nature of site layouts. Every site layout is usually seen as a single space-time temporal entity because it is difficult to date and distinguish its periodic development within a short time span. Therefore, one layout usually provides one corresponding spatial thinking towards social structure in a specific period. In the discussion of social growth and transformation, a series of site layouts can provide the results of pattern change but do not inform us of the reason why it changed. As a result, while Renfrew's discussion of space has been involved in four of the five themes (1, 2, 3 and 5), not much has been focused on how space plays a significant part in the dynamic of continuous growth. It would seem that spatial approach has reached its limit in the investigation of the dynamic of social interaction and society growth. Nevertheless, is the spatial approach really unable to provide messages for researchers to explore internal social growth and transformation?

1.2.2 Multi Scalar Community

In Harris's (2014) discussion on community, he also highlights the close relation between communities and power dominance (Harris 2014: 84). As mentioned earlier, communities may range in scale from the local to the regional (Gamble 1999). The concept of imagined community further exposes the nature of multiple various communities (Isbell 2000; Wenger 1998; Yaeger 2000). This co-existence of multiple communities lead to the discussion of community interaction and political dynamics (Canuto 2004; Mehrer 2000; Thomas 2002). This conflicts of interest is not just limited between different communities but is also present in landscape studies (Bender 1993; Bender and Winer 2001; Goodman and McCool 1999). The concept of a 'contested landscape' highlights precisely this political conflict between different governing groups and communities (Bender and Winer 2001; Goodman and McCool 1999). However, there will be no conflict if there is a hierarchical structure within the region. The governing authorities will have the power to make any decision without objection. Therefore, where does the power of small local communities come from?

Drawing on Foucault, Julian Thomas provides a coherent view of power as something not just exercised by chiefs but also enacted by constant practices of people through their interactions with each other (Harris 2014: 85). He applies this concept on both multi-scalar and imagined communities, and suggests that different kinds of authority emerge through practices rather than from the predefined hierarchy (Thomas 1996: 178). Thomas's concept of emerging social power is paralleled with the term 'heterarchy', which captures the way power is structured through multiple different fields of action rather than being strictly hierarchical, or associated solely with social structure (Harris 2014: 85).

Mark Mehrer's (2000) work has also shown that the dominance of social power is epistemologically different between top-down and bottom-up perspectives. The source of social power is divided into what is allocated (heterarchical) and what is delegated (hierarchical): whereas local elites gain delegated social dominance from a superior authority, people also receive allocated social power and resources from common neighbours. The negotiation and conflict between the local and regional act as a social phenomenon. Therefore, researchers can identify these social phenomenon and examine whether the settlement spatial integrity changes or not from the society as a whole. The bottom-up approach to community interaction can highlight this structural difference and allow for the possibility of a contingent change within the social group. With the focus on the contrast amongst individuals in the community, local and regional scales can be a fruitful approach to the understanding of social transformation.

However, with regard to the social relations within a site, we usually rely on the ideological social structure derived from spatial patterns and material artefacts. These social relations are a top-down social status superimposed upon human individuals. Needless to say, these relations do not always work. One might make friends with a random stranger and have a better relation with him than with some of his distant cousins or working colleagues. Therefore, what we need is an alternative bottom-up approach to build up a social relation based on intimate interaction. In a sociological term, not only do we need to look at the delegated social status from the top-down perspective in the whole community, but we also need to examine the bottom-up allocated status from the local perspective. This does not mean to downgrade or deny the significance of social structure or

identity; rather, it attempts to provide an alternative view and supplementary information.

Nonetheless, due to the fact that site layouts are de-populated, it is difficult to discuss human interaction within the site. In terms of synchronic social structure and power dominance, it only informs a top-down delegated power, not a bottom-up allocated power. Again, what is crucial and missing in the spatial layout is the intimate human interaction that informs the bottom-up allocated power since it already provides insight to the former.

1.2.3 Modelling Agency

1.2.3.1 Dwelling and Learning at a Micro Scale

The issue of agency has become important when discussing how individuals perceive and react to a wider construct, such as that of cultural and social entity. Anthropology and sociology have shown how individuals influence and interpret the world in which they dwell. The ‘practice’ and ‘habitus’ theory proposed by Pierre Bourdieu (1977) has been influential in the switch from the exploration of collective consciousness to the investigation of perception and behaviour of a ‘native’ view. Archaeology has followed, Christopher Tilley (1994) and phenomenology, who, for example, have helped the move away from typology, structuralism and technology to concentration on the agency of perception, senses and individual behaviour.

Such approaches have become widespread in the field of landscape archaeology with an increasing interest in scrutinising how human senses perceive the surrounding environment, how they make sense of the information they perceive and, in turn, how they behave and react to this information. This kind of

agency-based modelling often relies on software applications, like Geographic Information Systems (GIS), and other spatial analysis tools to model visibility, sound-scape and their relations with the immediate surroundings on the basis of spatial statistics and attributes (Conolly and Lake 2006; Fitzjohn 2007; Lake 2007; Llobera 2003, 2007b; Lock 2000; Lock and Stancic 1995; Wheatley and Gillings 2000, 2002). Furthermore, researchers are also starting to model how the perception of surroundings affects human behaviour, such as moving across a landscape (Batty and Jiang 1999; Castle and Crooks 2006; Llobera 2000, 2005; Turner and Penn 2007). The works of Llobera (1996, 2000, 2003, 2005, 2007b) have immensely contributed to establish the methodological ground for GIS-based movement and visibility. He has also provided a well-argued theoretical framework based on the social theory of inhabiting a landscape (further discussion below). These various kinds of modelling studies have demonstrated and highlighted the importance of agency in the interpretation of wider socio-cultural constructs.

The main objective of this research is to explore and apply agency modelling to a socio-relational context. Most existing modelling of agency using spatial technologies has centred on the senses and perception of the world and on modelling individual movement across a given environment. The challenge, therefore, is how to model an individual's relations with a collective society from a social perspective. To address this, this research starts, with the help of Bourdieu's 'practice' and 'habitus' theory, to investigate how daily practices, such as movement around domestic space, the discarding of refuse and the construction of an oven, all have their social weight. People gain their identity, social status and form relations with each other by behaving and performing in a certain way; it is through one's 'action' that one receives social recognition. The first step in recognising one's social identity is to identify its bodily practice and

behavior, which are complicated because, although these practices can be observed through ethnography, they are lost in the archaeological record. Despite traces of practices left in the assemblage of material culture, we cannot be definitely sure how they related to specific situations. Therefore, this research takes a similar but alternative view of modelling agency in a social context.

In his recent book *Being Alive* Ingold proposes a new way of thinking on social relations (Ingold 2011) by introducing the idea that people perceive the world and form knowledge by embodying themselves in a 'meshwork' of reality. He argues that, in real life, people perceive not from a fixed point, but along a continuous itinerary of movement (Ingold 2011: 46) so that perception is a function of movement and what we perceive must depend on the way we move. Henceforth, locomotion, not cognition, must be the starting point for the study of perception and it is through locomotion that everything surrounding us is woven into life, and so are lives woven into everything surrounding us. As opposed to traditional 'network theory', according to which everything is connected through points and nodes, he proposes a spider-web-like 'meshwork theory' which advocates that the world is understood through movement and encountering.

Ingold proposes that a meshwork is everything happening around us and is the very reality in which we dwell so that rather than viewing things happening around us as different entities in a linked network relation with each other, we see it as everything being interwoven or 'meshed' together, and the way to understand this mesh is to walk it through and experience it, or in his words, to experience 'wayfaring'. He argues that to perceive the environment is 'not to look back on the things to be found in it, or to discern their congealed shapes and layouts, but to join with them in the material flows and movements contributing to their – and our – ongoing formation' (Ingold 2011: 88). As to what we experience in life, things do

not so much exist as occur, lying at a confluence of actions and responses; they are identified not by their intrinsic attributes or their definition nametags, but by the memories they conjure up. This concept is also parallel to Harris' discussion on community and assemblages. Human behaviour is not the result of agency which is distributed through the network, but rather emerges from the interplay of forces which are conducted along the lines of the meshwork (Ingold 2011: 92). The world should not be classified into nametags or entity-networks. It is meshworked and the way to understand the world around us is to walk through it, acting and reacting to upcoming encounters and forming a memory of understanding and knowledge about what has happened.

The similarity between Bourdieu and Ingold lies in the essence of 'practicing' or 'acting' any upcoming event and it is this behaviour that provides individuals with the way to perceive and understand the world. However, the same behavioural process does yield different implications. For Bourdieu, the process of practice is to define and redefine one's self-identity, which is a fixed entity within the cosmological order. In contrast, the process of wayfaring is to understand one's relative relations with the rest of the world. For Ingold, there is no fixed entity since identity is a fluid concept, forever changing.

1.2.3.2 Repopulating Space

In order to model the agency Ingold and Bourdieu are discussing, this research adapts the theoretical framework provided by Llobera. Llobera argues that human behaviour is a result of the combination between 'structures' and 'affordance' (Llobera 1996: 614). The 'structures' are constituted by Bourdieu's habitus and surrounding resources. It is the daily routines being practiced in everyday life. And through these daily routines, people 'acquire specific

dispositions and sensibilities that lead them to orientate themselves in relation to their environment and to attend to its features in the particular ways they do' (Llobera 2005: 176).

In other words, habitus is the 'form' of behaviour for people to reposition themselves in the wider context, that of culture. From an archaeological perspective, the material remains are the only remainders of the forms of human behaviour. In terms of settlement pattern analysis, the spatial pattern of households is the remains of living practice. People position themselves in the wider culture by choosing the 'right' location, 'appropriate' adornments, or 'suitable' sizes. These spatial attributes are the habitus past people applied to express and reposition themselves in the wider context. Only through the examination and comparison of these spatial attributes can spatial research attend to the interplay of recognised systems, establish order and ranking, or recognise social hierarchies (Llobera 1996: 613).

On the other hand, Gibson (1986: 129) uses the term 'affordance' to designate the properties of the real environment perceived by the agent in the context of practical action (Ingold 1992: 46). This affordance, however, is not simply what the environment consists of. It is what the agent thinks the environment provides. Affordance is not the physical world itself, but the physical world perceived from the agent's perspective. It only exists in the relation between the agent and the outer world. Similar to that of Gibson's affordance, Ingold also argues that knowledge and stories are formed through the perception of individuals walking their way through the world. It is through wayfaring that everything is woven into life, and lives woven into everything surrounding us.

From this perspective, Llobera argues that researchers are then able to investigate human agency, and the behaviour context beyond, through the application of GIS (Llobera 1996). Through agency modelling, such as movement models and visibility analysis, it is possible to understand how perceptions are constructed out of the interaction between the body and the environment. However, Llobera also asserts that the employment of GIS to model agency perspective is the usage of a heuristic tool to 'explore' processes, concepts and notions defined within a larger landscape framework as it is perceived from an individual's perspective (Llobera 1996: 622).

In terms of modelling, this research takes up Llobera's position and explores social relations with the use of agency modelling in GIS. This exploratory research investigates the spatial affordance of social relations by way of agency modelling. Through the modelling of social interaction, this research also attempts to investigate how the spatial constraints may influence the social relations and structures from the ground up.

Based on Llobera's theoretical framework, this research proposes three different levels in terms of the relation between spatiality and social relations: (1) the ideational governing structure that produces the spatial layout; (2) the spatial layout that reproduces and maintains the very same structure in which it is made; and (3) the social relation which is constrained by the spatial layout. The first two levels are relatively straightforward, for they are essentially the same as the early 'settlement pattern' approach. However, as previously stated, the ordered structure revealed is merely the stratigraphy of status and does not illustrate the kind of social relation and human interaction which actually took place. Therefore, the third level introduces individual agents into the space in order to model and investigate human behaviour.

As previously stated, this research aims to understand the spatial implications of social relations through agency modelling. The first two of the three levels of relation outlined above between spatiality and social relations can be better understood with the help of Bourdieu's practice theory, since they are concerned with social structure and the maintenance of the structural order. The third level, the actual social relation which is constrained by the spatial layout, is more appropriately addressed by applying Ingold's wayfaring theory. However, Llobera also noticed further potentials of this research framework.

In Renfrew's discussion on dynamic growth, the role of space has received little attention. Judging from the perspective of space, the spatial layout of a given environment usually provides a certain way of spatial thinking for the understanding of that given time. However, the concept of affordance provides an additional path to understanding social relation and structure. Based on the theoretical framework discussed above, researchers are facilitated to investigate the social relations and interactions from a spatial perspective. Llobera has recognised this potential and argued that 'it is possible to explore how mechanisms of social reproduction and transformation play a role in an individual's environment. Ultimately, affordance may be associated with the organisation of power and domination, as power relations are acted and re-enacted within structures' (Llobera 1996: 614).

Again, to borrow from Mehrer's viewpoint, dynamic social transformation can be understood through the dialogue between the allocated power and the delegated power (Mehrer 2000). The delegated power is the social authority that is derived from the existing social structure. This power is acquired through the fixed social status within the existing hierarchy. On the other hand, the allocated power is obtained through the intimate local social interaction. It is a fluid entity, which is

continuously changing in accordance with the change of social interaction. In this case, the structure can be taken as the delegated power, and the affordance the allocated power. Now that researchers have more analytical facilities to investigate both, it is then also possible to explore the dynamic social transformation from a spatial perspective.

1.3 Research Purpose and Aims

The purpose of this research is to extend the application of spatial analysis to explore human agency in social relations. This research argues that there are three levels of relation between space and social relations. The first two of the three levels of relation outlined earlier between spatiality and social relations are better understood from Bourdieu's practice theory, since they are concerned with social structure and the maintenance of the structural order. It is the investigation of the social structure and society as a whole. The third level, the actual social relation, which is constrained by the spatial layout, is more appropriately addressed by applying Ingold's wayfaring theory. This provides the route to examine the intimate human interaction in different communities. By adapting the discourse between delegated and allocated social power, this research utilises these three levels to discuss the potential of social transformation by way of agency modelling.

In order to achieve this purpose, the first aim is to investigate the basic social structure of the society under study, that is the social structure of the *Kaushi* people. This research adapts a space syntax approach and breaks down the

settlement space into individual entities. These spatial entities are analysed with mathematical methods to highlight the structure of local communities and spatial organisation. The results of this space syntax approach are also accompanied by ethnographic studies of the *Paiwan* culture so as to understand their social compositions and structure of the local community and the larger settlement. In consequence, all the results provide evidence for the existence of the delegated power from the social hierarchy.

On the other hand, the second aim of this research is to investigate the intimate social interaction that forms various kinds of communities within the settlement. This research utilises the wayfaring theory to re-populate site layouts and investigates the affordance of human interaction and social relations. This research approach not only solves the issue of de-population but also provides an alternative structure of the allocated power from the bottom-up. Since this is a relatively new approach, the discussion on the wayfaring result is laid not only on its interpretation, but also on its potentials, implications, as well as limitations and shortfalls.

Last, but not the least, the final aim of this research is to investigate the potential of social transformation based on the previous two aims. The previous two aims provide the results of the delegated power and the allocated power. These two different social dominances are subject to continuous negotiation and scrutiny. The process of this power dominance and conflict can be seen as the challenging social phenomenon against the existing social hierarchy that triggers social transformation. It is the examination on what kind of reaction the society provides that makes possible the study of the growth of the settlement. This discourse between delegated and allocated social power provides a further route to the understanding of the dynamic social transformation of *Kaushi* settlements.

Chapter 2

Research Subject and Data

2.1 The *Paiwan* Ethnic Group and the *Kaushi* People

In the attempt to investigate human agency and social interaction by way of wayfaring theory, this research utilises the materials of two settlements in Taiwan. Taiwan is an island nation located off the southeast coast of China. The two settlements under study in this research are both located in the southern tip of Taiwan in *Pingtung* County (Figure 2.1). Both settlements are abandoned by the indigenous *Kaushi* people who belong to the *Paiwan* ethnic group. This section provides the fundamental information regarding the social and cultural composition of the *Paiwan* ethnic group, as well as the description of the main data consulted in this research.



Figure 2. 1 Location of the two settlements in this research and the current *Kaushi* village.

2.1.1 *Paiwan* and its Social Composition

Ethnographic studies during the Japanese occupation period (1895-1945) documented detailed information of the indigenous people in Taiwan (Chiang 2003a, 2003b, 2003c; Chou 2011; Tan 2003). Amongst various indigenous groups,

the *Paiwan* ethnic group is the southern-most indigenous people. Traditionally speaking, the majority of the *Paiwan* people inhabit the mountain areas of *Pingtung* County. Some of them also extend their habitats into parts of the mountain areas in both *Kaohsiung* and *Taitung* County (Chiang 2003a; Chou 2011) (Figure 2.2). Amongst this spread, the *Paiwan* ethnic group is commonly categorised into the North, Central, South and East *Paiwan* people according to their settlement locations. These categories are not only spatial but also cultural. Ethnographic studies have pointed out slight differences amongst these four groups of *Paiwan* people (Chiang 2003a, 2003b; Chijilwa 1988; Tan 2003; Wei 1960). This highlights the diversity within the *Paiwan* culture. However, due to job opportunities and increasing connection with Han Chinese in the coastal plains in recent decades, the *Paiwan* people, like any other indigenous people in Taiwan, are experiencing settlement decline and becoming more dispersed around the island.



Figure 2. 2 Paiwan territory and the current *Kaushi* village.

The *Paiwan* settlement is well known for its 'slate-stone house' characteristic (Figure 2.3). Constructed with slate stones piled one on top of another, the dry stone-walling technique of slate-stone houses is one of the most famous characteristics of *Paiwan* settlements. These settlements are usually located on mild mountain slopes and comprise numerous terraces. The sizes of these *Paiwan* settlements vary greatly, from several households to several

hundreds of households. Ethnographic research has documented the number of households in each village during the Japanese Occupation period (Chiang 2003a; Chou 2011; Tan 2003). This information was collected as a reference mainly for taxing convenience for the Japanese government. These accounts, along with other ethnographic studies (Chiang 2003a; Curimudjuq et al. 2003; Tung 2001), have recorded a total of 9923 households with the population of 47429 at an average of 4.77 people per household. In this case, the population of a single village can vary from 25 people to more than 1000 people. These numbers provide a glimpse of the population in the old settlements.



Figure 2. 3 A traditional *Paiwan* village (Taken from Fu 2012: 90). This is a photograph of the village *Chala'abus* (*Tjalja'avus*) taken by Shien-Min Jen in 1957.

According to ethnography, the settlements are usually in locations that are easy to defend, with good access to both water and solar radiation, and close to agricultural and hunting grounds (Chiang 2003b: 212). Chen's recent study (2008: 230) has summarized the characteristics of *Paiwan* settlements as follows: '1) they are located in the mild-sloped area in the mountain woodlands; 2) they are characterized by slate-stone house structures (floor, walls, roof, poles, and even interior structures) arranged in parallel lines, with numerous slope terraces usually set against the slope and facing the valley; 3) they possess an L-shaped cross-section for the foundation of structures, which are formed by cutting the terrace and building the rear and side walls against the excavated portion; and 4) the size of the house and the front yard, the presence or absence of the front platform, attached structures, symbolic pole, and engraved decorative structural items determine the social status and wealth of the inhabitants of the house'.

In his study of Neolithic social groupings, Chang has categorised *Paiwan* settlements as segmented villages (Chang 1958: 305). He also identified some characteristics of the segmented villages as: 1) they contain two or more lineages, each localised in one segment of the community; 2) the segments are small, planned, with houses arranged in a pattern centering on a plaza, a men's house, or other special buildings; and 3) the segments are further arranged into a community, which sometimes has an additional common plaza and some community buildings or a big house (Chang 1958: 305). Chang's observation is based on the close link between land ownership and individual clans. He noticed that since individual clans control their own land, each clan normally resides together, forming individual segments of the settlement (Chang 1958: 300). The segmented nature of settlement is also documented in ethnographic research (Chiang 2003b; Chou 2011; Tan 2003). In addition, Wu's recent research on

Paiwan settlement patterns has showcased that this segmented nature appears not only in contemporary *Paiwan* villages but also in two prehistoric *Paiwan* settlements (Wu 2007, 2010). This highlights the close relation between the settlement pattern of the *Paiwan* and its social composition.

However, Chang's interpretation of *Paiwan* settlements as 'Neolithic' is not accurate. Due to their relation with contemporary indigenous people, *Paiwan* settlements have long been the subject of ethnographic and architectural research but were not studied in an archaeological context until the last two decades. This has resulted in a massive gap between archaeological prehistory and indigenous history (Liu 2002). Excavation at the prehistoric *Chiuhsianlan* site has uncovered ceramic, stone and bone tools carved with the 'hundred-pace snake' pattern, which is an iconic pattern seen in both *Rukai* and *Paiwan* cultures (Lee 2005: 12-21). This suggests a possible link between the indigenous *Paiwan* culture and the *Chiuhsianlan* site and fits the *Paiwan* into the prehistoric timeline. However, the C*hiuhsianlan* site is dated to 2300 B.P. - 1400 B.P. and has been identified as an Iron Age settlement (Lee 2005: 12-15). This dating stands in contrast to Chang's claim that *Paiwan* settlements, amongst which the oldest dating is 600 B.P. (Chen 2008), are Neolithic, i.e., 'Stone Age', settlements. Nonetheless, the relation between *Paiwan* and *Chiuhsianlan* is merely based on simple decoration patterns, which is a concept or idea that transcends social groups. Since there are very few material remains uncovered from *Paiwan* settlements, the understanding of *Paiwan* culture in the prehistoric time frame remains an urgent task for future research.

Although archaeological excavation has yielded very little information on prehistoric *Paiwan*, the ethnographic record still provides a glimpse of the material culture of *Paiwan* during the Japanese occupation period. It is worth noting that

the ethnographic record is the documentation of a period much later than the prehistoric *Paiwan* investigated in this research. It only provides reference to the contemporary *Paiwan* culture, and is not necessarily the same as that in the prehistoric period. According to ethnography, the main subsistence base of *Paiwan* comes from hunting and gathering (Chiang 2003b: 308) with the support of taro and millet cultivation (Chiang 2003b: 307). The main games are deer, boar and wild goat. Besides hunting, they also keep domestic pigs in the settlement. The use of ceramic pots is common and they are famous for their '*Paiwan* snake pots' (Pavavaljung 2002). Wood, bamboo and shell ginger (*Alpinia zerumbet*) are also common materials for making storage vessels (Chiang 2003b: 327). Metal tools such as iron spearheads and daggers are known to be imported through trade with the *Han* Chinese and are not locally made (Chiang 2003b: 331). Traditional carvings on tools are very popular (Chiang 2003b: 329). These may occur on handles, stools, cups, wooden pillars and even stone pillars. However, certain carving decorations, such as anthropomophic or snake-like patterns, on pillars are restricted amongst specific social classes (Chiang 2003b: 330). In addition, since metal tools can only be gained through trade, the possession of the delicately carved tools and metal tools is also a symbol of social status.

The *Paiwan* is a ranked society that is structured by two classes: the nobility and the commoner (Chen 2008: 212; Chiang and Li 1995: 204; Chiu 2001: 55). Crowning amongst the nobilities is the Headman of the settlement. The Headman is the leader of the village and possesses absolute authority (Chou 2011: 551; Tan 2003: 13). Some existing documents record the presence of council meetings amongst nobilities (Jen 1956: 150; Shih 1971: 33; Tan 2003: 22), and even community buildings hosting these events (Jen 1956: 158; Lusausatj 2012: 51; Shih 1971: 33-34), which naturally suggest a delegation of power. However,

the ultimate decision of such councils still lies with the Headman. Along with the authority over the village, the Headman enjoys the right to own prestigious artifacts and has better means of obtaining materials through taxing commoners (Chou 2011: 551; Tan 2003: 13). Therefore, the Headman's residence is usually larger in size since the Headman gains more building materials through quarrying tax (Chou 2011: 552). For this same reason, the Headman's residence also has a sizable front yard and front platform attached to it to give out orders and host gatherings (Chiang 2003b: 230; Curimudjuq et al. 2003: 141). In addition, the iconic 'Headman stone' would usually be erected at the front yard as a symbol of the Headman's superior social status (Chiang 2003b: 230). The status of the Headman is a hereditary title that is passed on through his/her family. In fact, most social statuses in the *Paiwan* culture are hereditary, including the nobility identity (Tan 2003: 19). In this case, the social system of the *Paiwan* is relatively static and lacks fluidity. That said, there are still ways of climbing the ladder, mostly though marriages between social classes (Shih 1971: 89).

Marriage is the most common way of climbing up the social ladder in *Paiwan* culture (Shih 1971). Commoners gain higher status by marrying into a noble 'house'. On the other hand, if a noble member marries into a commoner 'house', his/her social status is also reduced to that of 'commoner' (see discussion on house society below). However, the Headmen of some *Paiwan* villages are not allowed to marry commoners not even in some cases, nobles (Chiang 2003c: 29). Besides this Headman rule, here is no particular restriction to whom one cannot marry. Marriages between different ethnic groups are also allowed (Chiang 2003c: 30). For a female *Paiwanese*, marrying a *Han* Chinese husband is considered a good thing since the *Han* family is usually wealthier. On the contrary, this does not work for *Paiwan* man because marrying a *Han* Chinese bride means more dowry

(Chiang 2003c: 30). Contacts between different *Paiwan* villages are normal. However, the spatial distance separating the four *Paiwan* groups (North, Central, South and East), to a certain extent, limits the contact amongst these four regions. That said, marriages between the different regions of *Paiwan* are not that common. Since social status is hereditary and external contacts are limited to local regions, marriages and kinship relations are the essential keys to altering social status.

According to ethnography, the social hierarchy of the *Paiwan* is dominated by their kinship system (Chiang and Li 1995: 204; Chiu 2001: 55; Chou 2011: 551; Tan 2003: 12-20; Wei 1960: 74). They practice primogeniture in which the eldest child in the family, regardless of male or female, inherits the social status and wealth of the family. In this case, the first born in the family remains the head of the family and his/her siblings are forced to move out of the house once they come of age. Therefore, there is a clear 'head family' and 'sibling family' division whereas the head family retains its social status and the sibling family becomes commoners (Chiu 2001: 58). This practice of primogeniture is the foundation of the *Paiwan* social structure.

On top of this primogeniture nature in their kinship system, the *Paiwan* people have a strong tradition in naming their 'houses'. In fact, researches in the past two decades (Chen 2008; Chiang and Li 1995; Chiu 2001) have pointed out that the *Paiwan* people actually practice the concept of 'house society' (Lévi-Strauss 1987: 151-152). Introduced by Levi-Strauss, the idea takes the physical 'house' as a vessel to inherit social status (Lévi-Strauss 1987). He highlights that in some societies, a house is a '*personne morale*' that inherits both physical and non-physical properties (Lévi-Strauss 1987: 152). Therefore, both physical (the house, the items within, precious artefacts, etc.) and non-physical possessions (social status, fame, titles, etc.) are inherited through the house itself rather than

the people living in it. This sedentary nature of houses greatly benefits the investigation of social transformation in later sections (further discussion below).

In addition to its kinship system, the social structure of the *Paiwan* is also based on its land ownership. In the *Paiwan* culture, the land ownership belongs to the first inhabitant of that landscape (Chiu 2001: 56; Tan 2003: 217). That is, the first family that settled there owns the land of that settlement. In this case, the Headman, being the first inhabitant, owns all the land of the settlement. Therefore, the Headman also enjoys the privilege of collecting all kinds of taxes relating to economic production. The nobility of a settlement, however, is exempt from most taxes since they are originally the Headman's siblings (Shih 1971: 85; Tan 2003: 20). They normally do not possess land but have the right of using the land promised by the Headman (Shih 1971: 85). Furthermore, they sometimes even have the right of taxing commoners that settled on the land the Headman gave them (Tan 2003: 216). On the other hand, the rest of the villagers would have to ask the Headman for land and pay taxes as rent (Tan 2003: 220; Wei 1960: 86). This 'rental contract' forms the divide between nobility and commoners.

The nature of 'house society' and land ownership in *Paiwan* culture has a massive impact on the investigation of social transformation. In the investigation of social transformation, the same social statuses and structures are scrutinised by their time periods. Viewed from a spatial perspective, these social statuses and identities are in the form of material remains that are within or attached to specific households or land. However, land and houses are physical properties that are tradable. As for social status, it depends on whoever its owner is. Nonetheless, people come and go. The social status property of a house is not fixed and, therefore, it is extremely difficult to discuss social transformation of a society based on houses rather than people. This highlights a disadvantage in social

research from a spatial perspective. One way to make it work is to find a strong link between the spatial and the social. In contrast to the general practice of trading mentioned above, both house and land are sedentary in *Paiwan* culture. The land is always owned by the Headman and is rarely traded or exchanged. In this case, land ownership is very sedentary and unlikely to change hands. Similarly, the 'house society' also constitutes the sedentary nature of the 'house'. Since the social status is inherited through the house rather than the people, it allows the 'house' to take centre stage in the investigation of social identity and social structure. Even if the house is traded, which is extremely rare, the later inhabitant inherits all the social status that is attached to the house (Chiang and Li 1995: 173). In this case, the investigation of social status and identity can be focussed on the 'house' rather than on the 'family' living in it. This sedentary nature allows researchers to eliminate uncontrollable variables, such as house exchange in which the replacing families could be of different social status. Furthermore, it enables researchers to take a fully spatial approach where social identity and structure are examined based on the position and characteristics of house structures.

What is crucial is that both land and house are spatially fixed. Therefore, they serve as the platform on which wayfaring analysis can be performed. Since both land and house are sedentary in nature, they enable the researchers to track (and trace) their spatial attributes in individual time periods. Furthermore, they then allow researchers to perform comparative analysis of the spatial attributes of a 'house' in different periods and investigate the transformation of its position in the wider context. This sedentary nature of both house and land makes *Paiwan* settlements a perfect subject to explore the wayfaring theory and social

transformation. Therefore, this research utilises two *Paiwan* settlements, which are claimed by the *Kaushi* people, to explore this potential.

2.1.2 *Kaushi* Amongst *Paiwan*

The *Kaushi* inhabitants are indigenous people that belong to the *Paiwan* ethnic group, and in particular the 'South *Paiwan*'. The current village of *Kaushi* is located in *Mudan* District, *Pingtung* County at the southern tip of Taiwan (Figure 2.1). According to their oral history, the *Kaushi* people have migrated throughout the landscape and established settlements six times before settling at their current village (Chen 2008). Their oral tradition states how their ancestors came to this region and established the first settlement *Saqacengalj* 500 to 600 years ago. It also describes how an unfortunate suicide event occurred, which made the place an 'ill land' and brought forth the abandonment of *Saqacengalj*. After the suicide event, the village merged into another nearby settlement *Aumagan* and started to rebuild their way of life there. Since then, they later moved to *Cacevakan*, *Linivuan*, *Gade* and finally to its current location.

This oral history of *Kaushi* is partly supported by ethnographic studies conducted during the Japanese occupation period from 1895 to 1945. These ethnographic studies documented detailed records of village nobilities and their origin (Chiang 2003a: 107). According to the records, there are other proposals of *Kaushi* people's origin according to different noble lineages. However, the lineage of '*Ljematjaq*', which was once the Headman's house, confirms the historical trace of the current oral history (Chiang 2003a: 107). Whether this particular lineage has survived or what significance it has had on the *Kaushi* people remains unclear. Nonetheless, the ethnographic records do support the credibility of oral history to a certain degree.

The actual dating of *Kaushi*'s abandoned settlements still awaits future analysis. There is no evidence that indicates their earliest settlement *Saqacengalj* was built 500-600 years ago. However, excavation in *Saqacengalj* has unearthed a Chinese potsherd that suggests trading with Han people during the mid-Chin dynasty (Chen 2008: 216). This evidence suggests that *Saqacengalj* can be dated back to 280-300 years ago. In addition, the presence of *Kaushi* was mentioned in a Dutch document 350 years ago (Chen 2008: 216), which indicates that they existed in some form during the Dutch colonial period in Taiwan. Although not as ancient as their oral history suggests, physical evidence has pointed out that Saqacenglj may be the oldest *Paiwan* settlement recorded by scholars (Chen 2008: 237).

2.2 The *Paiwan* Settlement

Amongst the ethnographic studies during the Japanese occupation period, there are also detailed documentations of the *Paiwan* people's architecture and types of settlement (Chiang 2003b; Chijilwa 1937, 1988). Chijilwa's documentation on the slate-stone houses is particularly precious for the understanding of the settlement environment and its village life. These records have later formed the foundation of any indigenous research in Taiwan. Much of the effort since has been focussed on the North *Paiwan* settlements as they were considered the origin of *Paiwan* culture (Chiang and Li 1995; Chien 1995; Hsu 1996; Huang 1982; Kau 2003; Li 1994; Wu 1994).

As mentioned earlier, the division of North, Central, East and South *Paiwan* is based on both spatial and cultural grounds. Ethnographic research has observed slight cultural differences amongst each *Paiwan* group (Chiang 2003a,

2003b; Chijilwa 1988; Tan 2003; Wei 1960). The differences amongst the *Paiwan* were also apparent in their architectural style. According to records on their architecture (Chiang 2003b; Chijilwa 1937, 1988), the slate-stone houses in South *Paiwan* consist of more organic building materials than those in the North *Paiwan*; particularly on the construction of the roof. The differences also extend to the shape of the house and the interior spatial layout. These differences were drawn from the ethnographic observations of contemporary villages during the Japanese occupation period in Taiwan.

However, recent studies on one of South *Paiwan*'s abandoned settlements, *Saqacengalj*, show a very different result (Chen 2008; Tsai 2007). From an architectural point of view, the slate-stone houses in *Saqacengalj* are extremely similar to those of North *Paiwan* (Figure 2.4 and 2.5). Both the interior layout and building material are the same as that seen in North *Paiwan* (Chen 2008; Chijilwa 1988; Tsai 2007). Although Chen has mentioned there are very slight differences in shape (Chen 2008: 230), the slate-stone houses in *Saqacengalj* appear extremely similar to those of North *Paiwan*. As the first settlement of the *Kaushi* people, the evidence in *Saqacengalj* indicates that the differences amongst *Paiwan* may not have existed in the early stages. Or, as Chen pointed out, there is a possibility that the origin of *Paiwan* is from the south rather than from the north (Chen 2008: 237). It is stressed here that, although the migration history is itself interesting, it is not the focus of this research. What is highlighted here is the similarity between the settlement of early *Kaushi* and those settlements in the north. As Chen has correctly pointed out, the time depth under study is way before the time of ethnographic records, and archaeology is best positioned to provide more information on subjects before historical records (Chen 2008).

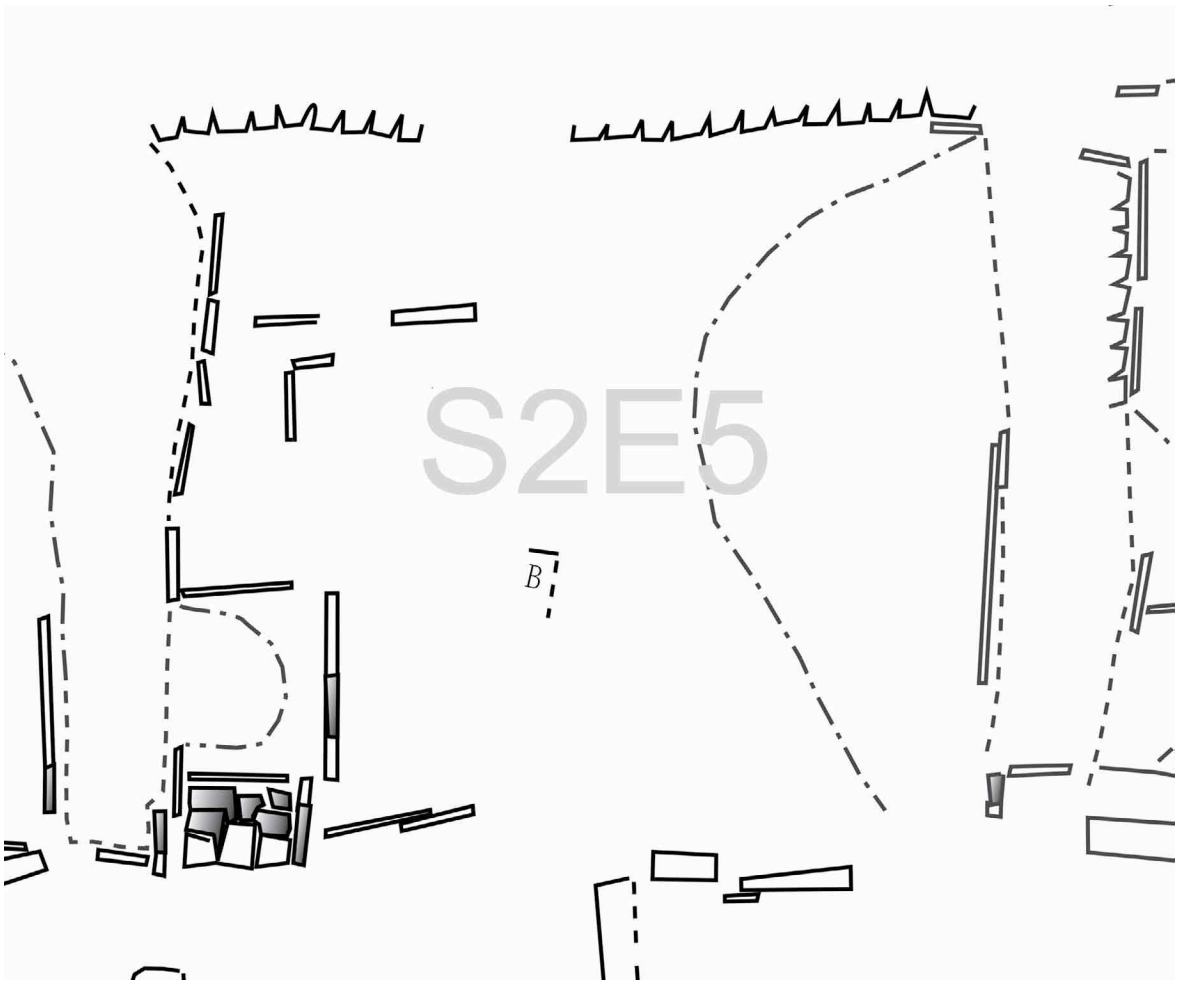

Figure 2. 4 Interior spatial layout of a typical *Kaushi* household (S2E5, *Saqacengalj*).

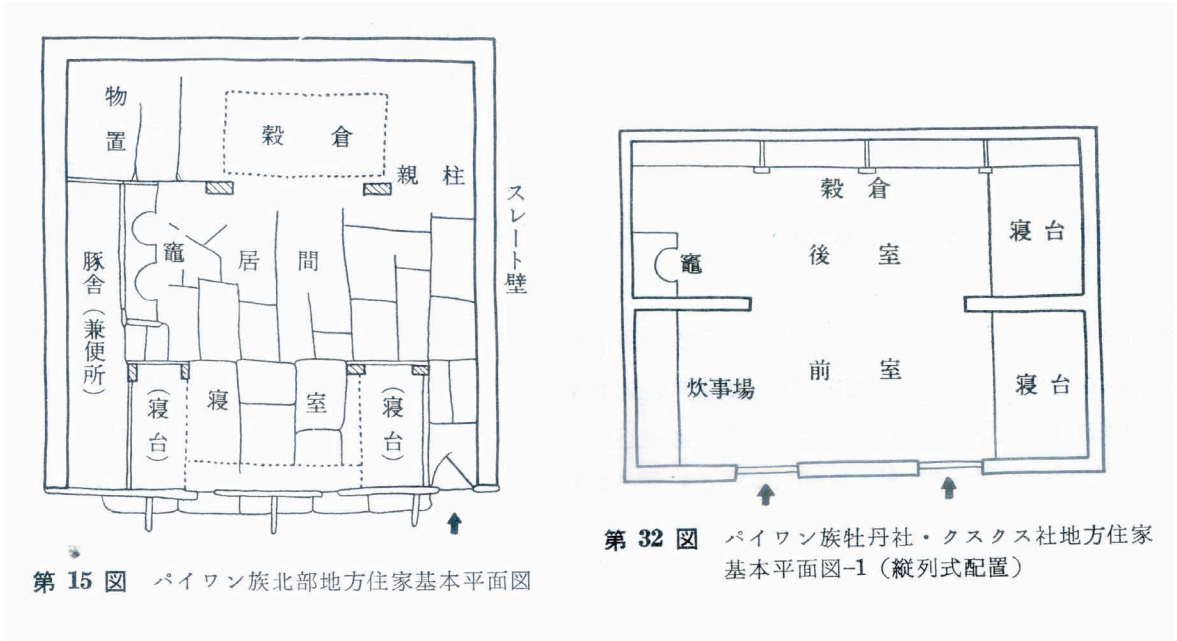

Figure 2. 5 Interior spatial layout documented by Chijilwa(1988: 42 & 46).

Left - North *Paiwan*. Right - South *Paiwan*.

In the wake of this newfound evidence, the archaeological work on South *Paiwan* settlements has intensified in the past decade. Research focused on *Kaushi* people and their abandoned settlements have been fruitful. Topics ranging from formation process, architecture, spatial analysis to cultural issues such as the concept of house, and *Paiwan* cosmology provide very diverse understandings of the abandoned settlements of *Kaushi* (Chen 2008; Ching 2007; Du 2007; Tsai 2007; Wu 2007, 2010). These studies on *Kaushi* have provided ground for this research to elaborate on and are fundamental in understanding the life in a *Paiwan* settlement.

The *Paiwan* settlement is essentially multiple households located on a number of terraces forming a well-clustered community. A typical *Paiwan* household is composed of three areas: the indoor space, the front yard and the front platform (Chen 2008; Chiang 2003b; Chijilwa 1937, 1988; Tsai 2007)(Figure 2.6). The interior spatial layout of *Kaushi* households is extremely similar to that of the North *Paiwan* (Figure 2.4 and 2.5). Both kinds of layout show the same interior design. The indoor space is mainly for private family activities, and is composed of six major areas: 1.) the entry; 2.) the living area; 3.) the bedding area; 4.) the hearth; 5.) the toilet; and 6.) the back area (Figure 2.7). The entry could be located on either side of the house. Therefore, the hearth and toilet would always be on the opposite side in reference to the entry.

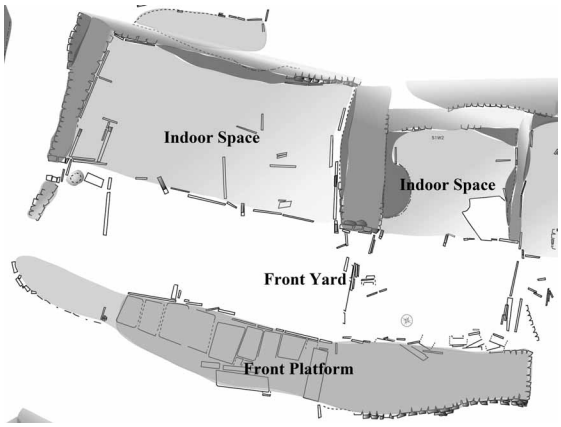

Figure 2. 6 Three main spaces of a *Paiwan* household.

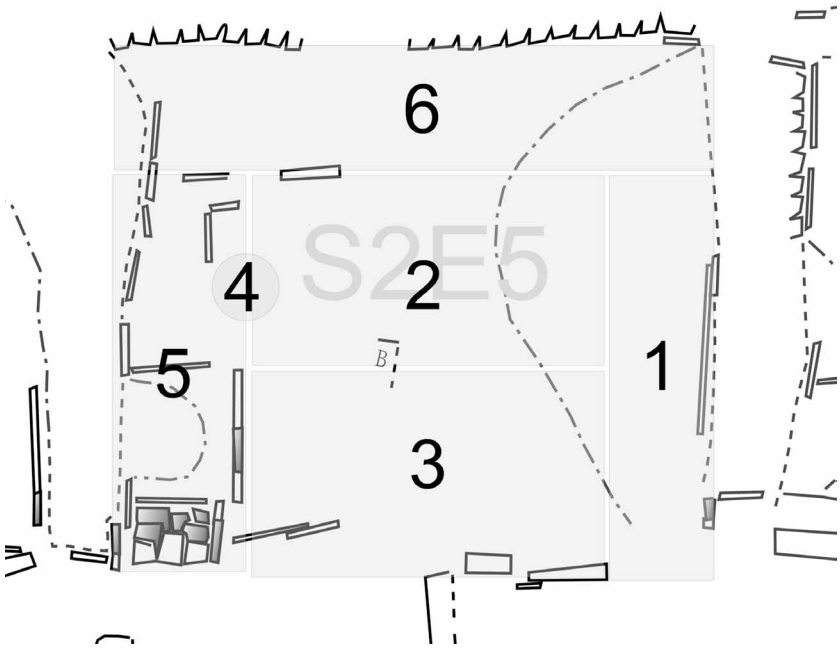

Figure 2. 7 Six major areas of indoor space (S2E5, *Saqacengalj*). 1 – Entry. 2 – Living area. 3 – Bedding area. 4 – Hearth.
5 – Toilet. 6 – Back area.

Whereas the indoor space is private use for family activities, the front yard and front platform are public space mostly for economical production and social activity. In addition to its original function, the front yard also serves as the main road by connecting in series with each other within a single terrace. It is the place where most movement and social interaction occur. Individual terraces are further connected with pathways in both up hill and down hill directions. The use of front yards and terrace connecting pathways bound individual households together forming a cluster of communities (Figure 2.8).



Figure 2. 8 The terrace connecting pathways (Taken from Fu 2012: 21). This photograph is taken by Shien-Min Jen in 1957 at *Chala'abus* (*Tjalja'avus*).

In previous research on *Kaushi* settlements (Wu 2010), Wu developed an analytical approach using space syntax to investigate the network connection of road systems, and to identify the segmented nature of *Paiwan* settlements in the site of *Saqacengalj* (Figure 2.9). With the use of step-depth analysis (see Appendix 1), Wu showcases how individual neighourhoods can be identified within a single settlement. In addition, these neighbourhoods provide the information of how the settlement is spatially, as well as culturally, structured (Wu 2010: 77). In this case, researchers are then able to investigate the spatial composition of a segmented village and the social structure it implies. Wu's study provides the platform on which the social construct of spatial pattern in *Paiwan* settlements can be understood.

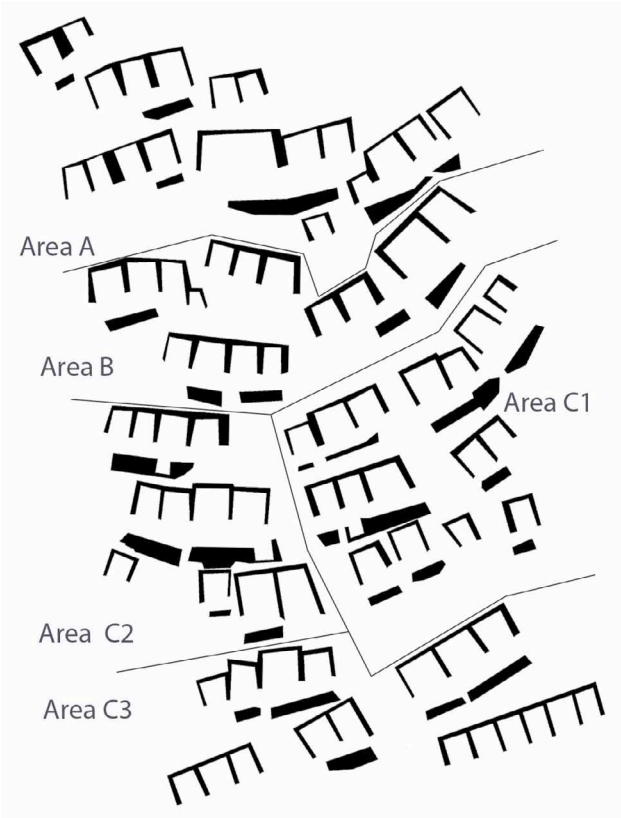

Figure 2. 9 Neighbourhood division in *Saqacengalj* defined by Wu (2010).

This research adapts Wu's approach in identifying the segment divisions amongst *Paiwan* settlements and further explores the intimate social interaction potential through the modelling of wayfaring. Wu's space syntax approach provides the basic information in identifying segment divisions amongst *Paiwan* settlements. The neighbourhood division amongst settlements has a massive influence in later investigations of the wayfaring model. This research will demonstrate how the combined use of space syntax and the wayfaring model can further the understanding of social interaction and relation of a settlement.

2.3 Research Data

In order to explore the concept of wayfaring and social transformation, this research utilises two abandoned settlements as the main subject: *Saqacengalj* and *Aumagan*. The first settlement, *Saqacengalj*, is also the first settlement of *Kaushi*. It has been the most widely studied South *Paiwan* settlement up to now. The second settlement utilised in this research is *Aumagan*. According to oral history and ethnographic studies (Chen 2008; Chiang 2003a: 107), it is the place where the *Kaushi* people moved to after they had abandoned *Saqacengalj*. This direct migration relation between the first settlement and the second settlement provides a better foundation for the investigation of social transformation through time.

There are two major types of data utilised for the wayfaring model and social analysis in this research. Both kinds of data are provided by Prof. Maa-Ling Chen of National Taiwan University. As part of her on-going *Kaushi* Project, these data are fundamental to many recent studies on South *Paiwan* settlements (Chen 2008; Ching 2007; Du 2007; Tsai 2007; Wu 2007, 2010).

The first major data are the spatial layouts of the settlements (Figure 2.10 and 2.11): these were mainly collected through plane-table mapping. The settlement layout outlines the slate-stone house-structures as well as major structural features attached to them. It provides a detailed spatial illustration of the built settlement. The site plans of *Saqacengalj* and *Aumagan* show that there are 80 and 58 households with a total house structure floor area covering 1463.1m^2 and 1552.19m^2 respectively. The settlement *Saqacengalj* is 150m long and 110m wide with an elevation difference of 32m. The settlement *Aumagan* is 130m long and 115m wide with an elevation difference of 36m. Based on the average

population per household (4.77) in the ethnographic data (Chiang 2003a; Curimudjuq et al. 2003; Tung 2001), it is estimated that the two sites hosted populations of 381 and 276, respectively. Other population estimates can be gained with the use of different calculations (Brown 1987; De Roche 1983; Narrol 1962), ranging from 146 (Narrol 1962) to 477 (De Roche 1983) for *Saqacengalj*. Since the ethnographic record is focused on *Paiwan* settlements, the population derived from the estimate of 4.77 people per household is used.

Based on the site layouts, researchers are able to identify and reconstruct the road systems connecting all the households. The road system and household connections are key to the understanding of the spatial pattern in a *Paiwan* settlement. It is fundamental in space syntax analysis and provides the spatial constraints of agent movement. In previous research, Wu (2010) developed a suitable methodology using space syntax to identify the segmented nature of *Saqacengalj*. The present research will apply the same approach to the settlement of *Aumagan* and the spatial layout of the site is, again, key to the analysis.

The second major data in this research are the digital surface model (DSM) of the settlement. As mentioned earlier, *Paiwan* settlements are usually located on mountain slopes. In this case, the topography of the settlement has a major influence on how people move. Since wayfaring is based on movement, the topography would have a significant effect on the wayfaring model. In this case, the DSM is crucial in the modelling of movement and perception in a GIS platform. Therefore, in addition to the settlement layout, the topography of the settlement is also utilised in this research.

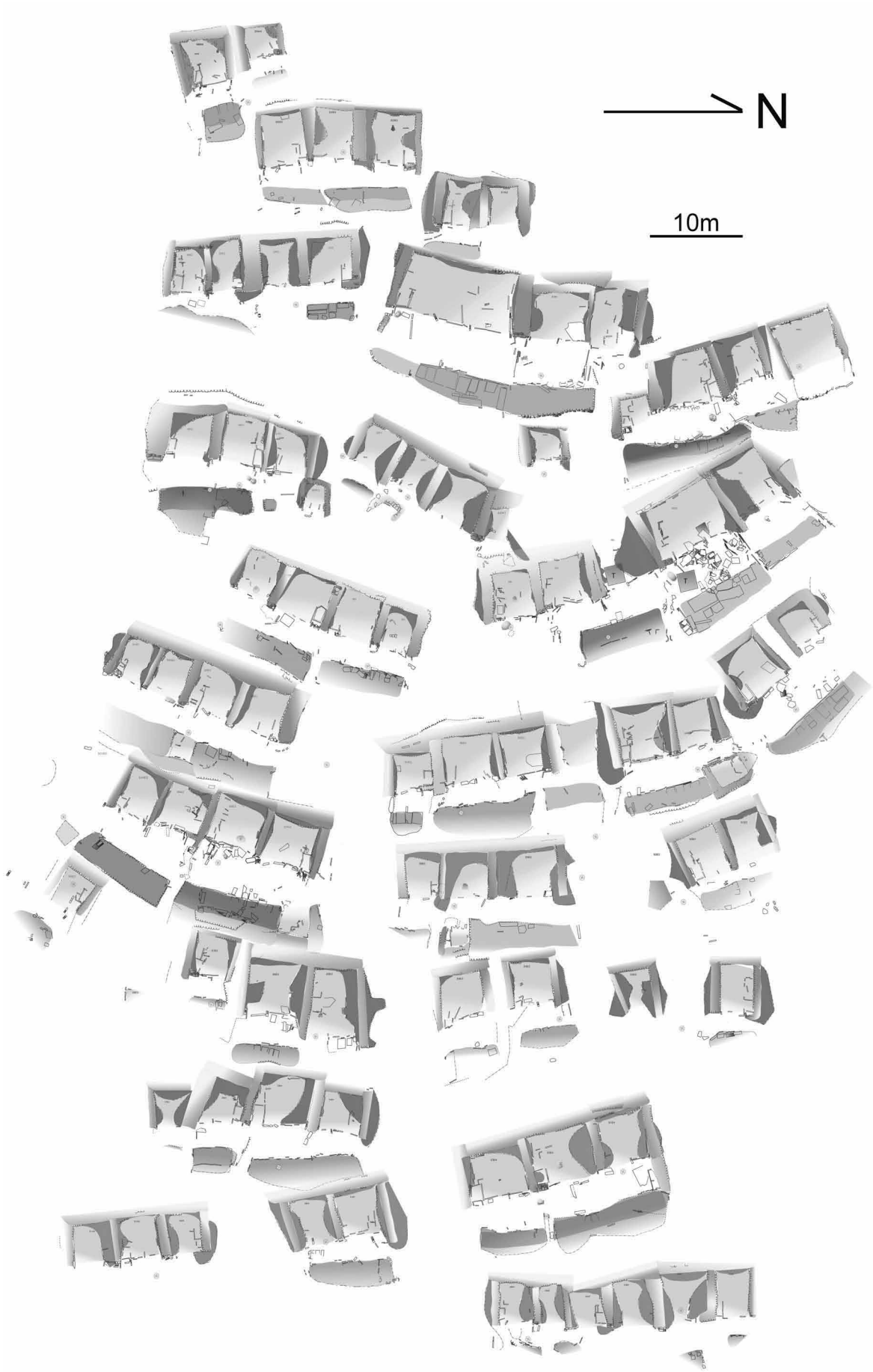

Figure 2. 10 Site plan of *Saqacengalj* (Made by Maa-Ling Chen in 2004).



Figure 2. 11 Site plan of *Aumagan* (Made by Maa-Ling Chen in 2008).

The data collection of the DSM is conducted through terrestrial LiDAR scanning. The initial scanning generates the 'point cloud' that represents the physical environment of the site. The point cloud collected is first modified by removing the vegetation, and then exported to produce the digital terrain model (DTM). This DTM represents the physical topography of the settlement. This topography is the foundation for later analysis on agent movement. The cell size of the DTM is set as 50cm in this research. The application of a 50cm cell size is due to both practical and theoretical reasons. Theoretically, the modelling of wayfaring is focused on the movement and perception of an 'agent'. Therefore, the cell size of the topography is modelled to suit the physical presence of a single person, which is represented in 50cm cell size. Practically, the 50cm cell size is applied to suit the computational efficiency. In the modelling of DTM, large cell size renders a 'smoother' topography whereby distinct features recorded in the point cloud are modified. In this case, even though it may reduce the computational processing time, there is a risk of losing specific feature details of the landform. On the other hand, a small cell size would produce a more detailed topography but increase the processing time drastically. Therefore, the cell size of the DTM is dependent on whether it provides sufficient feature information to suit the objectives of the research, and on a reasonable processing time. In consequence, this research applies a 50cm cell size that suits both practical and theoretical reasons.

However, due to modelling requirements (see Chapter 3), house structures and platforms are later modelled and added on to the DTM to generate the DSM of the sites. The modelling of house-structures is based on Chijilwa's documentation on the slate-stone houses in the North *Paiwan* (Chijilwa 1988: 42). This research does not model the houses in reference to Chijilwa's South *Paiwan* record simply because both settlements clearly share more resemblance to the records of the

North *Paiwan*. The cell size of the DSM is also set as 50cm for the same reason that produced the original DTM. The combination of settlement layout and DSM provides the platform in GIS on which the wayfaring modelling is performed (Figure 2.12-15).

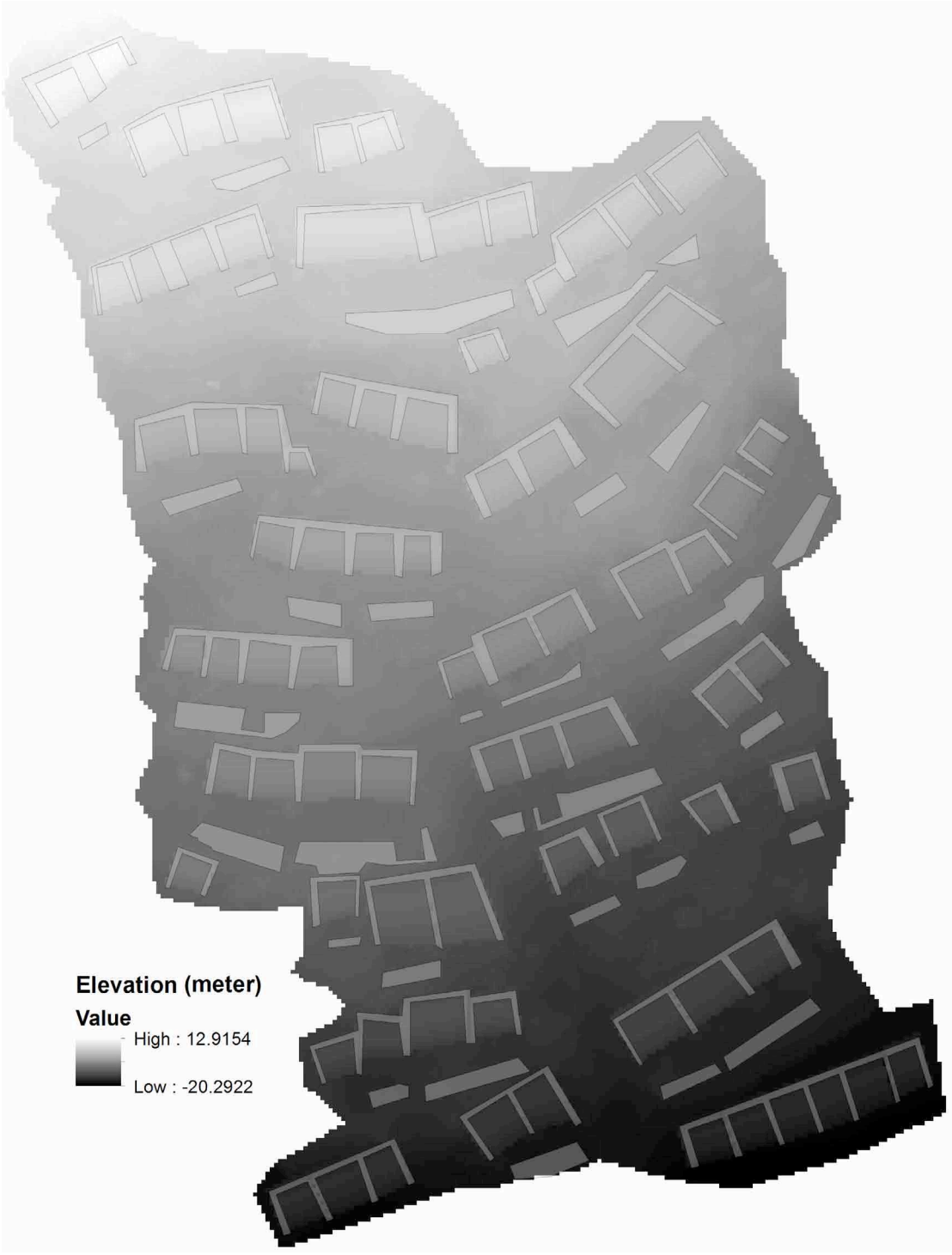

Figure 2. 12 DSM of *Saqacengalj*.
(The elevation is a local height measurement not absolute elevelation)

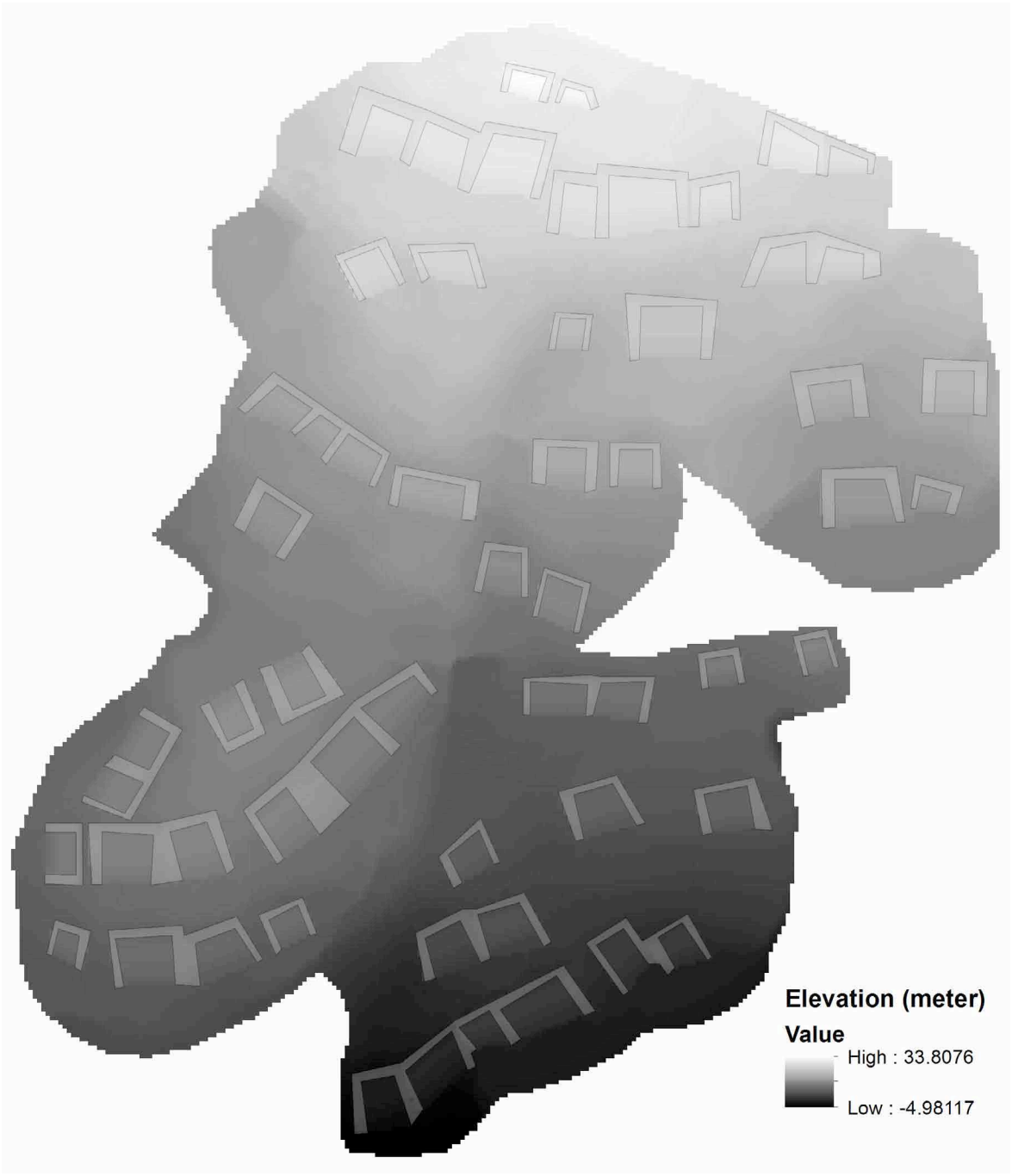

Figure 2. 13 DSM of *Aumagan*.
(The elevation is a local height measurement not absolute elevelation)

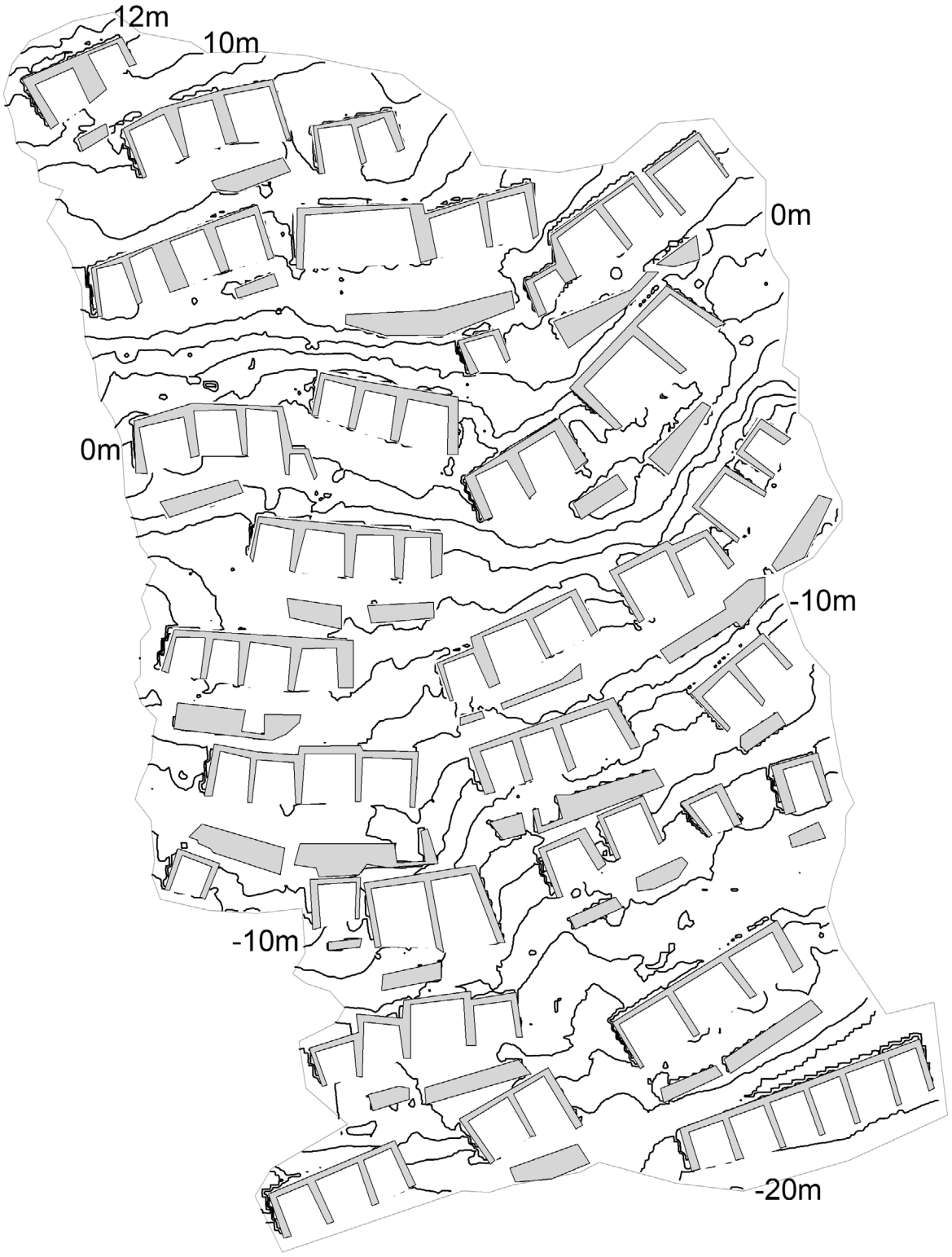

Figure 2. 14 Contour map of *Saqacengalj*.
(The elevation is a local height measurement not absolute elevelation)

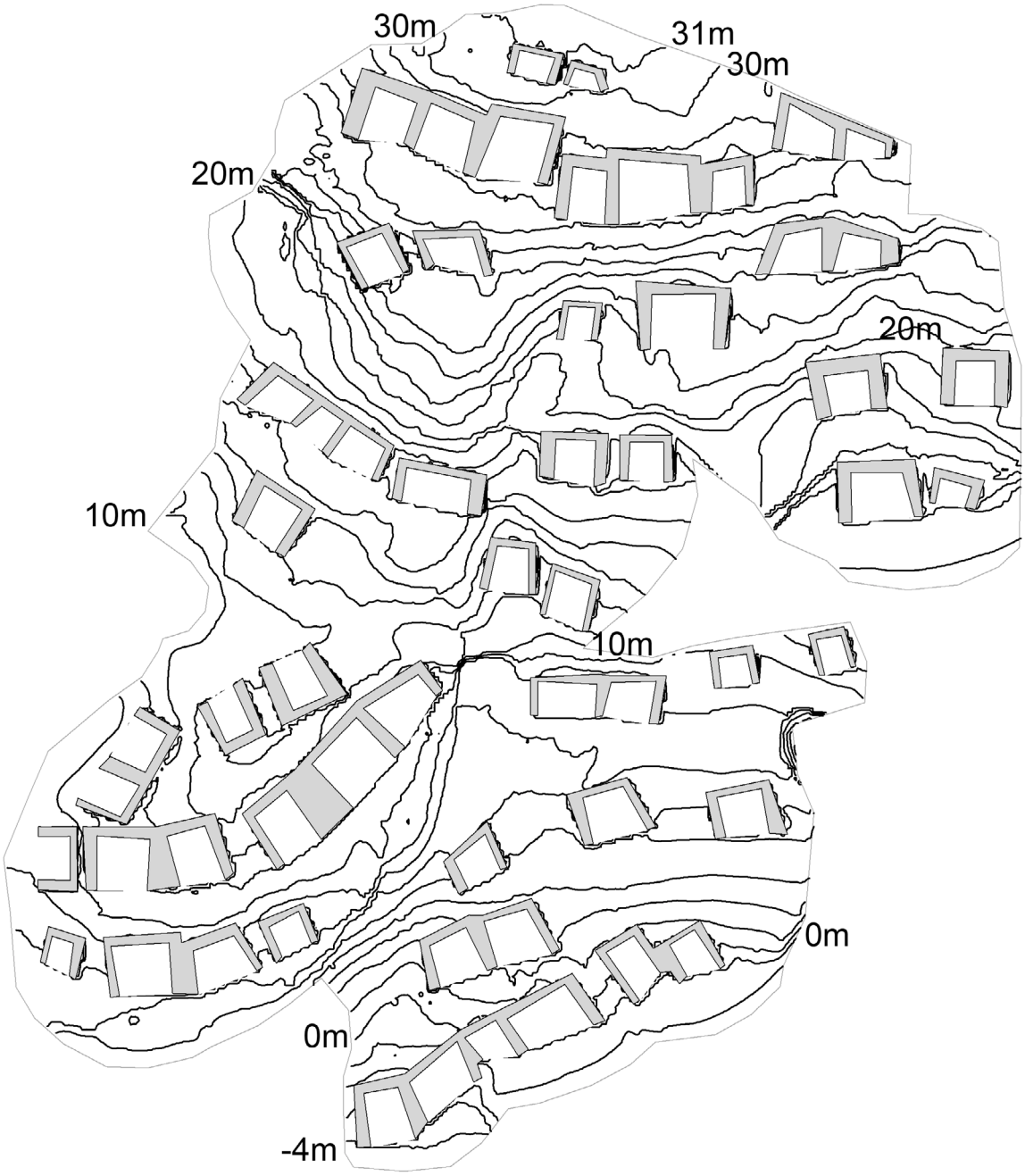

Figure 2. 15 Contour map of *Aumagan*.
(The elevation is a local height measurement not absolute elevelation)

Both the site layout and DSM are in digital form. That said, the data utilised in this research are mostly computational. The two sites under study are both abandoned settlements of the *Kaushi* people (Figure 2.16). Due to this abandoned nature, very few material artefacts were found in the site. Most of the artefacts were reused and taken to their next settlement resulting in the lack of materials in the original site (Chen 2008). In consequence, the material remains are mostly immovable possessions (the house structure), or objects that are difficult to take away with them (large stone features).



Figure 2. 16 Current condition of an abandoned *Paiwan* settlement, *Saqacengalj* (Photo taken by Maa-Ling Chen). View of house structure 00 (Headman's residence) from the front wall inwards.

However, the remaining spatial layout still yields much useful information in the discussion of social identity and relations. This research identifies the following attributes of house structures: 1.) the dimensions, 2.) the identity indication structures, 3.) the location of hearths, 4.) the presence of water containers; and 5.) the presence of cube stone structure. The dimension of house structures has always been a potential indicator of social status (Chang 1958; Hayden and Cannon 1983; Kramer 1979; Trigger 1968: 58). Although many have argued that there are other factors that influence house size (Netting 1982; Wilk 1983), this research accepts that house dimension is a significant indicator of distinct identities (further discussion in Chapter 4). This social status reference to house size is not based on the wealth of the household, but based on classification of size categories that may indicate distinct social status (Trigger 1968: 58). In terms of the identity indication structures, they are a symbol of distinct social statuses, such as Headman or Priest, as already documented in empirical ethnographic records (Chiang 2003b; Chijilwa 1937).

The water containers and cube stones are the large material artefacts left in the sites. Although they are hard to acquire and/or require specific manufacturing techniques (Wu 2010), they may be too heavy to be transported to the new settlement after the abandonment. The presence of water containers in front of a house structure is proposed here as a key indicator of wealth. Although research has attempted to relate house size with the wealth of the household, no direct correlation can be firmly established (Netting 1982; Wilk 1983). Methods such as using population of a household, land owned by a household, or the amount of livestock possessed by a household to measure both labour force and income have been attempted but the correlation is limited to specific regions and cannot be universally applied (Netting 1982; Wilk 1983). The correlation of household

clusters with family wealth suggested by Richard Wilk (1983: 109) may be useful since households in *Paiwan* settlements cluster together and often share side walls. However, this clustering in *Paiwan* is a common recurrence and does not share any correlations with other distinct attributes. Therefore, it is not included in later analysis here. Since the water container is the only artefact considered to be luxurious and precious, it is used as the main indicator for household wealth. The location of hearths is an attribute emerging as something significant during later spatial analysis and correlation (see Chapter 4). Therefore, it is also listed as a significant attribute for understanding house structures. These five attributes are utilised in the discussion of habitus and social identity, and they provide the primary social aspects of this research.

It is acknowledged here that there are other spatial aspects which may be related to social status and identity, such as: the size of front yards, the presence of front platforms, the size of front platforms, the quality of building materials, the quality of building techniques, etc. These attributes may also indicate the wealth and social status of individual households. However, the first two aspects do not show relevant significance during spatial analysis and correlations. On the other hand, the preservation of front platforms in both sites is very poor. Most of the front platforms have collapsed because they are on the very edge of each terrace slope so that it is difficult to estimate their original size. In addition, the quality and technique of individual house structures are still to be studied after future excavation. Given the reasons above, these aspects are not included in this research but they may yield very interesting information in future studies. As a result, this research utilises the five attributes listed earlier as the main indicators for social identity of households. This research will demonstrate how the spatial

approach can still profit the understanding of social relations by the application of the wayfaring model, and the use of these five ‘spatial attributes’.

2.4 Summary

This research utilises two *Paiwan* abandoned settlements of *Kaushi* people to explore the potential of the wayfaring model. The *Paiwan* culture practices the ‘house society’ concept whereas the social status and identity are inherited through the house rather than the person. This characteristic puts the house in the focal point in the discussion of social identity and structure. The sedentary nature of *Paiwan* households enables researchers to take a fully spatial approach where social identity and structure are examined based on the position and characteristics of house structures. Therefore, this sedentary nature makes *Paiwan* settlements the perfect subject to explore the wayfaring theory and social transformation.

On the other hand, recent research focuses of *Kaushi* settlements have yielded very fruitful and diverse understandings of the life in the settlement. These studies provide extensive information and the platform for this research to build on. However, due to the emphasis on the kinship system in *Paiwan* culture, most of the researches focus at the scale of families and households. There is a lack of research that examines the settlement at a larger scale; a scale that investigates the social relation amongst individual households and the whole settlement. In this case, the exploration of wayfaring theory on *Paiwan* settlements not only profits from the sedentary nature of houses, but also fills in the archaeological research gap of *Kaushi*.

Chapter 3

Methodology:

Spatial Structure, Movement and Perception

3.1 Methodological Framework

The main goal of this research is to extend the application of spatial technologies, such as GIS, to explore the human agency in social interaction and relation. By utilising two *Kaushi* settlements in Taiwan, this research applies a newly developed approach to model wayfaring and investigates how intimate human interaction influences social relations and triggers social transformation. The following section explains the research framework on which this research tackles the issue of human agency in social transformation.

This research has previously argued that there are three levels of relation between spatiality and social relations: 1.) the ideational governing structure that produces the settlement spatial layout; 2.) the spatial layout that aims to reproduce and maintain the very structure it was made from; and 3.) the actual social interaction relation which is constrained by the spatial layout. The first two levels can be better understood through the practice and habitus theory put forth by Bourdieu, since they are concerned with social structure and the maintenance of the structural order. On the other hand, the third level, concerning the intimate social interaction, can be more appropriately addressed by applying Ingold's wayfaring theory. Whereas the first two levels are aimed at examining the fixed

structure that produces and is reproduced, the third level is focused on the fluid social experience based on intimate interactions.

This difference between the fixed social structure and the fluid actual social experience is what Mehrer identifies as the ‘delegated’ and ‘allocated’ social power (Mehrer 2000). The delegated power is the social authority that is derived from the existing social structure. In contrast, the allocated power is obtained through the intimate local social interaction. The dialogue between the two could provide the route to investigate the mechanism behind social conflict and transformation. Such being the case, the delegated power can be seen as the existing social structure; and the allocated power can be treated as the potential challenging social phenomenon against the social hierarchy. It is through this discourse between delegated and allocated social power that researchers can start to explore dynamic transformations.

From a spatial perspective, Llobera has pointed out that researchers are already accustomed to study the social structure from spatial information (Llobera 1996). By utilising multiple spatial attributes and phenomenon archaeologists are able to attend to the interplay of recognised systems, establish order and ranking, or recognise social hierarchies (Llobera 1996: 613). In terms of the three levels mentioned above, researchers are accustomed in finding the first level from the second level. By identifying the spatial structures in the site, researchers are able to investigate the behaviour habitus and the social structure behind it. Furthermore, Llobera takes on Gibson’s (1986) affordance concept and argues that it is also possible for researchers to investigate the third level with the use of GIS (Llobera 1996: 614). Through analyses, such as those on movement and visibility, it is possible to model the world perceived from an agent’s point of view and start thinking about individual perception and interaction with the environment.

Once researchers are equipped with both analytical abilities, it is possible to examine the dialogue between the first level and the third level, and explore the mechanism behind social transformation.

This research examines the reason behind social transformation through the investigation of delegated and allocated social dominance. The following section documents how this research first examines the settlement pattern in order to unfold the social structure and habitus at the first two levels. Secondly, this research applies the wayfaring theory to investigate the intimate social interaction at the third level. The combination of the two provides the results to start discussing the discourse between delegated and allocated social power.

3.2 A Neighbourhood Community

The first aim of this research is to identify the basic social structure and its habitus of the *Kaushi* people through the examination of their settlement pattern. This is not restricted to the first level of the ideational structural hierarchy; but extends itself to the form of habitus the structure produces and which is reproduced at the second level. This habitus serves as the existing order of human behaviour. It governs how people act in order to express and re-invent themselves. The habitus is the material form that reflects the existing social structure. It serves as the foundation on which later social phenomena are going to act. Once the structure and habitus are established, it is then possible to perform more in-depth analysis on the dialogue between delegated and allocated social power. Therefore, this research first looks at the settlement pattern in order to identify the social structure and its habitus.

3.2.1 Space Syntax Approach

In terms of settlement pattern, this research applies the same space syntax approach used in a previous study on the *Paiwan* settlement *Saqacengalj* (Wu 2010). The potential and advantages of the space syntax approach has been described in detail in Chapter 1. It allows researchers to break space down into individual units and analyse the spatial structure with formal mathematical methods. This approach benefits the researchers to investigate spatial connectivity and relations, as well as spatial dominance and individual compositions. By breaking space down into individual units, space is transformed into distinct numeric attributes. These numeric attributes indicate specific characters that can be analysed as spatial patterns. With the help of other spatial patterns from the material remains, the combination and correlation highlight the habitus of the past social structure. In his previous study on the settlement of *Saqacengalj*, Wu has used space syntax to establish an analytical procedure to examine the spatial structure of *Paiwan* settlements (for summary of Wu 2010, see Appendix 1). This procedure is focused on understanding the neighbourhood division amongst the settlement.

As Chang (1958) stated in his study of settlement patterns, the *Paiwan* settlement is categorised as a ‘segmented village’. He also further pointed out that these segments are most likely a division of lineages whereby people tend to live amongst their kin (Chang 1958: 300). Wu’s analysis of individual neighbourhoods is designed to investigate this segment characteristic of *Paiwan* settlement. He argued that in order to understand the settlement pattern of *Paiwan*, it is necessary to investigate the neighbourhood composition that comprises the settlement (Wu 2010). In turn, Wu designed an analytical procedure, using space syntax to identify this neighbourhood separation, and the results have been fruitful.

This research carries forwards Wu's analytical procedure and utilises it as a tool to identify the neighbourhood character amongst *Paiwan* settlements. The nature of *Paiwan* settlements has shown that households are built quite close to each other. This is mainly due to land ownership as well as defensive reasons (Wu 2010). As a result, the settlement is tightly clustered and congested. Unless there is obvious topographic separation, it is very difficult to detect area separations and groupings. This clustering character has decreased the usefulness of traditional Thiessen-Polygon or buffering approaches in identifying local groupings. Therefore, Wu has suggested an alternative space syntax approach with the use of step-depth. He argued that since absolute distance is not useful in this instance, the spatial 'depth' between two households could prove beneficial (Wu 2010: 56).

Wu suggested that the number of 'activity areas' in between two households could also act as a spatial distance measure (Wu 2010: 56). Instead of treating distance as equal intervals defined as metres or kilometres, Wu considers individual activity space as equal depth of space. Therefore, the distance between two households can be represented as the number of activity spaces in between them. In order to utilise this concept as measurement to identify spatial separation, he first counts the spatial depth between every household and starts removing depth counts from high to low. Once links above certain steps are removed, clear separation appears in *Saqacengalj* (Wu 2010: 58). In doing so, the procedure can be seen as changing the buffer of each household from high to low. When the buffering distance is high, the whole settlement is merged together into a single polygon. Once the buffering distance is low enough, separation amongst the spatial layout starts to emerge. This step-depth approach proves to be successful in identifying spatial separation amongst the clustered *Paiwan* settlement and is therefore adapted in this research.

3.2.2 The Neighbourhood Identity and Its Significance

Once the neighbourhood separation is established, it is then possible to understand the more detailed spatial characteristics. As mentioned earlier, the material remains are the form of habitus produced by the social structure. The spatial pattern of these material remains informs researchers of their order and place in the wider structural hierarchy. However, the material remains need to be examined and interpreted in their original context. Since *Paiwan* settlements are segmented villages, the spatial structure of segment neighbourhoods is the original context of these material remains. Without the identification of neighbourhoods, the pattern and habitus of the material remains would be out of place. As a result, the identification of neighbourhoods is crucial in investigating the spatial pattern and habitus of the wider ideational social structure.

Since individual neighbourhoods are identified, the spatial structure and composition of the settlement, as well as the neighbourhood itself can be further scrutinised. Different analytical methods of space syntax can be applied to investigate various aspects of the space unit. These aspects include: neighbourhood connectivity, spatial dominance, household accessibility, ease of movement, social composition, etc. Spatial units, in this case neighbourhoods and households, are then transformed into numeric statistics to indicate different kinds of spatial phenomenon. They serve as the spatial attribute that reflects certain habitus in human behaviour. This highlights the strength and potential of a space syntax approach. By breaking space down into individual units, the spatial structure is transformed into numeric values to highlight specific spatial phenomenon, and can be compared with using formal methods. The advantage of taking a space syntax approach does not stop at the identification of neighbourhoods. It is the in-depth analysis -- which provides spatial phenomenon

and human habitus -- that is most crucial in spatial studies. Through the application of space syntax, this research is then able to utilise these spatial phenomena as spatial attributes and further investigate the human habitus and social structure that produced them.

3.2.3 The Habitus of Individual Traits

This research utilises multiple traits derived from the material remains to supplement the space syntax approach. The use of space syntax is without a doubt a useful approach with great potential. However, the numbers do not speak for themselves. In order to extract the meaning from these numbers, it needs to be examined with the use of material remains. Material remains are integral to and create both meanings and social structure (Bourdieu 1977; Lévi-Strauss 1961; Renfrew and Bahn 2004). The spatial layout of the site is undoubtedly a form of material remains. Nonetheless, it is only one of many other forms of remains. The spatial relation of each household is meaningless unless different sorts or specific patterns of households are recognisable in the settlement. Therefore, the identification of different or unusual households is vital in the investigation of settlement patterns.

As mentioned earlier, the nature of the sites has resulted in very few material remains. The sites are abandoned settlements left in the migration process that sprang over centuries. In consequence, people tended to pack up or come back to retrieve their belongings and take them to the new settlement. Therefore, what is left behind are usually immovable or large and heavy items that are difficult to carry around. This has resulted in very few artefacts being unearthed in the excavation process. What remains are mainly the house-structures and the sub-structures attached to them. However, even with just the

household layouts, there is still plenty of information concerning socio-political status to draw on.

In addition to the household layouts, this research has also identified five structural attributes amongst the house-structures that could shed light to socio-political implications: 1.) dimension size of individual house-structure; 2.) identity indication structure; 3.) hearth location in individual house-structure; 4.) water container; and 5.) cube stone structure. These five structural attributes showcase the differences and variations amongst the house-structures, and can provide crucial implications on their socio-political significance. It is the combination of these structural attributes, along with the spatial phenomena provided through space syntax, that highlights the patterns of habitus as well as the social structure behind it.

In this research, the five structural attributes are compared with the spatial location attributes of households to unveil the habitus of social structure. The habitus highlights how individuals of certain socio-political status prefer their house being built, located, and adorned. It governs the material form that reflects the existing social structure and serves as the foundation against which later social phenomena are going to act. In the later section, this habitus is scrutinised through an agent's perspective to investigate the social relations and structure through intimate social interaction. The results of later analyses provide the reference of intimate interaction in the discourse between social dominance. The five structural attributes are examined from both perspectives in order to investigate the contrast or similarity between the delegated and allocated social power. It is through this dialogue between the top-down and bottom-up approach that researchers gain understanding of the dynamic social transformation.

3.3 Walking and Perceiving: Wayfaring and the Meshwork

The second aim of this research is to re-populate the settlement and explore the intimate social interaction amongst people. This aim is designed to investigate the bottom-up allocated social power, as opposed to the previously established delegated social authority. The contrast of the two would later provide insights into and information of dynamic social transformation of *Kaushi*.

The allocated power is an authority that is gained through intimate social interaction from the local perspective. As mentioned in Chapter 1, this local perspective is best explored through the application of Ingold's wayfaring theory. The wayfaring theory is about movement and perception (Ingold 2011) from an individual's view. It is the affordance of the land agents walked upon as well as interacted with. Since affordance only exists in the relation between the agent and the surrounding environment, an agent-based investigation is necessary. It is exactly at this point that, as Llobera suggests, GIS becomes useful. Through agency modelling, such as movement models and visibility analysis, it is possible to understand how perceptions are constructed out of the interaction between the body and the environment. Therefore, this local perspective is examined through the application of Ingold's wayfaring theory. Since this is a relatively new approach, the discussion on the wayfaring analysis is not limited to its interpretation, but extended to its potentials, implications, as well as limitations and shortfalls. This research approach not only solves the issue of de-population but also provides an alternative structure of allocated power from the bottom-up.

The following section focuses on the application of wayfaring and highlights its modelling process as well as some limitations. This research is about exploring the social relation from the bottom-up social interaction. Henceforth, the modelling

focuses on the view of social interaction and relations from a wayfaring meshwork perspective. The following section not only underscores some key theoretical concepts behind wayfaring but also demonstrates how these concepts are modelled in a GIS platform.

3.3.1 Concepts of Wayfaring

3.3.1.1 Definition of Social Relation

According to Ingold, perception is a function of movement (Ingold 2011). He argues that it is through locomotion that one starts to perceive and understand the world. Starting from Ingold's premise, in order to understand the social relation between two people, this research looks at the pathway linking their two houses. The most direct way for two people to have a relation is to visit their counterpart and start interacting. It is also through this interaction that they start to define and understand their relation. However, this visiting process involves the process of traveling between the two households. In this case, the relation between the two is not only restricted to the two households. Their relation is also defined by the things occurring along the path they take.

For example, the surrounding environment along the path one travels to work would affect the person's perception of his work. This is not saying that the relation is everything in between. Their relation is without a doubt about the two ends. However, things in between the two would also influence their relation. Just as Ingold suggested in the ant-spider example, the relation between the spider and its prey is not an arbitrary line, but the complete layout of the spider web (Ingold 2011: 92). Rather than the direct connecting line, it is the meshwork that defines their relation. Therefore, the social relation between two people is defined as the meshwork along the pathway linking their two houses in this research.

3.3.1.2 Defining Meshwork

In order to investigate the relation between two households, the first step is to define what a meshwork is in this research. According to Ingold, 'wayfaring yields an alongly integrated, practical understanding of the lifehood. Such knowledge is neither classified nor networked but meshworked' (Ingold 2011: 154). It is along the pathway that one interacts with and perceives the outer world. 'Places' of knowledge and interaction are along the lines one moves and formed as a knot on the line (Ingold 2011: 148). Furthermore, it is the binding of the lines and the knots that constitutes the meshwork (Ingold 2011: 152)(Figure 3.1). From a social perspective, the meshwork is not an inter-connected social network; rather, it is a texture of social fabric. It is the binding of the world perceived and interacted that constitutes the meshwork.

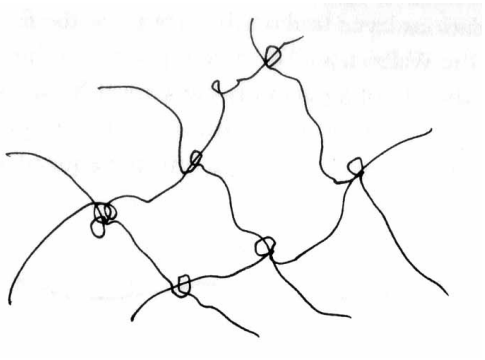

Figure 3. 1 Meshwork defined by Ingold (Taken from Ingold 2011: 152).

In his discussion of meshwork, Ingold uses the conversation between an ant and a spider as an example to highlight the difference between network and meshwork (Ingold 2011: 89-94). As opposed to lines connecting different entities in the network theory, the lines and knots of the web are the conditions of possibility for the spider to interact with the fly (Ingold 2011: 85) from the meshwork's perspective. From this perspective, the meshwork is a fabric of the world perceived, and a fabric of possible interactions. This might make the meshwork appear to be something far-fetched and abstract. However, it can also be seen as a simple process of encounters that occur along the path people take. Whether it is the world perceived or people interacted with, this process is what

Ingold calls ‘the becoming of the world (Ingold 2011: 64)’. It is the process of being astonished by the world in its formation, as if people are consistently ‘encountering’ the world for the first time. Since this is a research of social relation, the encounter is then seen as the encounter of social interactions. As a result, the meshwork is defined as the ‘interaction encounter’ along the predefined social relation pathway.

3.3.1.3 Social Relation and Identity

On this premise, the social relation structure is understood by accumulating all the pathway meshworks of all households. The settlement is a community whose residents interact with each other through face-to-face contact. It is an entity whereby people reside and work together in order to meet their subsistence and social requirements. This togetherness and interaction eventually form a common identity that is the ‘settlement’. That said, this research assumes that everyone in the settlement has a social relation with everyone else. The thought behind this is that, everything being equal from the start, each individual has a relation with everyone else regardless of kinship, social status or personal preference.

As mentioned earlier, this research is about building social relations from the ground up. That is, this research is most interested in the intimate everyday social interaction and how this interaction influences their social relations. It is about how spatial layout would influence our social relations rather than how people would have behaved according to their social status. In order to achieve this goal, there can be only one influential factor: space. As a result, other factors such as social status and personal preferences are discarded at first. The reasons

behind this are to create an equal environment and to highlight the effect of space on social interaction.

However, this approach can also be understood through the common social identity of the ‘settlement’. Since this is the accumulation of all the relations amongst all people, it is then a social relation of the ‘settlement’. It is a social identity that links everyone together in a more arbitrary way. Some would argue that since it is arbitrary, the actual interaction would not have necessary existed. However, the same could be said with other social identities. Take kinship identity as an example: there is no guarantee that one has interacted with a distant relative. Nonetheless, the arbitrary social relation still binds them together in the same system, and their relation is examined under this kinship system regardless of direct contact. That said, the accumulation of all the pathway meshworks is only the result of social relation based on the ‘settlement’ identity. That is, the result is only the social relation seen from the perspective where they are all from the same settlement.

Based on this perspective, more social identities can later be added. The discard of social identity is only the first step. It is designed to highlight the social relation from the perspective of the settlement. However, different social identities can be added on to the existing meshwork once their social link is confirmed. Similar to that of network analysis, there are networks of ceramic trade, networks of metal trade, and other networks of materials, etc. The economic trading system is composed of different networks. And the accumulation of all these material trading networks then forms the final network of the trading system. The wayfaring meshwork is no different. Meshworks of different identities can be accumulated to highlight the overall social relation. That is, there are different social relations based on different identities, such as a meshwork accumulated from linking all

elite households, a meshwork accumulated from linking the same lineage, or a meshwork accumulated from people who live close to each other. These various kinds of meshworks highlight the accumulation of specific people that form different communities. These social relations based on different identities can all be accumulated to highlight the final social relation of the settlement. Eventually, this wayfaring approach is aimed at accommodating different perspectives and presenting a final social relation meshwork composed of various social identity meshworks, reflecting different communities and social relations, and can be scrutinised independently.

In all, the wayfaring theory can be understood through three key components: 1.) the pathway linking different households; 2.) the meshwork along the path that defines their social relation; and 3.) the accumulation of different identity meshworks. In the following section, this research demonstrates how these three key factors can be modelled with the help of Geographic Information Systems (specifically ArcGIS v10).

3.3.2 Modelling Wayfaring

3.3.2.1 The Relation Pathway

Since the pathway connecting one house to the other is the starting point of defining the social relation between these two households, the first thing to be determined is the starting and end point of this pathway. That is, each household requires a point to represent it. In terms of information representation, this point would normally be located in the centre of the house structure. In this case, the point would better represent the location of the house. Furthermore, information of the house can be passed on to the point by simple spatial join function. It not only

increases data precision but also enhances data management as well as ease of analysis.

However, the point representing each household is located in the centre of the front yard in this research. As mentioned earlier, the front yard is the place for social interaction, whereas the indoor area is for family activities. Since this research is about modelling how spatial layout influences social interaction and relations, the location of social space is more suitable than private family space. In other words, there is no point investigating whether or not a 'house' is located in an intense social interaction location. The house itself is enclosed by its walls and roof and is detached from social interaction. It is a place of private family activity rather than social interaction. What needs to be scrutinised is whether the 'social area' of a household is located in an intense social interactive area. This social area is the link between the household and everyone else. In this regard, the social link starts and ends in the front yard areas on either end.

Once all the points of households are defined, the next step is to model the social link between the households. That is, to model the pathway for one person to walk along from one house to the other. The modelling of routes between two points is a very standard practice used in GIS research (Conolly and Lake 2006; Wheatley and Gillings 2002). Least-cost path (LCP) analysis provides the exact tool to model pathways based on the least accumulated cost. However, the way of modelling 'how' people move is very diverse. The cost of movement is not merely restricted to distance. It can also be the time of travel, or a relative value based on slope to represent the energy spent. There are numerous costs that affect movement, not to mention how landmarks could attract/push people closer/further away and alter the route people take (Collischonn and Pilar 2000; Douglas 1994; Lee and Stucky 1998; Lock and Pouncett 2010). The various ways to model how

people move through the landscape is a most interesting and exciting area of research in itself. However, this research is not about how people move, but about how movement influences social interaction and social relations. Therefore, this research adapts the same modelling approach applied in a previous *Paiwan* settlement study (Wu 2010).

In previous *Paiwan* settlement pattern study, the 'hiker's equation' was applied to model LCP between households (Wu 2010: 38). It was argued that in an environment as small as a settlement, surface distance and slope would have made very little difference in an individual's decision (Wu 2010: 37). While a steep slope in the landscape may represent a towering cliff, it might only represent a couple of steps of stairs at a settlement scale. The same could be said in terms of distance; the difference between two routes might be some kilometres in the landscape, but only several metres in a settlement scale. In contrast, social relations and personal preference would have played a more significant part in the decision process at a settlement level. However, since these factors are lost in the material remains, it is very difficult to trace back and model LCP based on these factors (further discussion in Chapter 5). 'Hiker's equation' is a LCP model based on time and energy spent. Some would argue that the difference in time at a settlement level is also not as significant as others. However, since the best way of modelling movement at a settlement scale (social relation and personal preference) is not applicable, the only choice is to look for the next best thing. 'Hiker's equation' utilises a good analytical balance between distance and slope in order to calculate energy and time spent. Since *Paiwan* settlements are located on mid-hills, slope does play a significant role in movement. The balance of distance and slope makes the 'hiker's equation' a reasonably good fit for analysing LCP in *Paiwan* settlements. In addition, by utilising the same approach as previous

studies, it enables this research to compare the results with former conclusions. In this case, the research of *Paiwan* settlement can benefit from a more coherent study approach. Therefore, this research adapts the same approach and utilises the 'hiker's equation' as the friction surface for LCP analysis.

One thing worth noting is that the LCP analysis applied, both in Wu's analysis and in this research, does not involve agents walking out of the settlement and coming back. That is, the LCP analysis applied does not consider the possibility of a more cost-effective route located outside of the settlement. This is mainly due to the fact that the DTM data is focussed on the settlement itself and there is no topographic data of the surrounding area. Therefore, the LCP analysis cannot take into account the place where there is no cost surface. In this case, the LCP analysis suffers from this assumption, similar to 'edge effect', in which the peripheral areas under study do not receive equal consideration simply because they are located on the edge. In consequence, the intensity of movement would favour the central area of the settlement since agents are more likely to cut across the site in order to arrive at the other end.

It is acknowledged as well here that the 'edge effect' to a certain extent influences the results of the LCP analyses. However, since this is research about the spatial construct of social relations, the significance of spatial location and arrangement is the primary subject. Although the areas in a more central location would normally have higher influence on our interaction, that does not mean it must be avoided. The central location of a place is, by its nature, better positioned to affect social relations. It is precisely this kind of spatial significance and the given house arrangement, and how they affect the social relations in the settlement that this research is most interested in. Therefore, this research still performs the LCP analysis as it was applied in Wu's (2010) previous study.

By utilising 'hiker's equation' as friction surface, LCP analysis is performed to define the pathway of social relation amongst all the households (Figure 3.2 and 3.3). Through the accumulation of all the pathways, it also presents the social 'network' of the settlement whereby everyone has a social relation with everyone else. One thing noteworthy is that this is only a social 'network', instead of a social 'meshwork'. The intersection of nodes in this network merely represents that the different routes passed through the spatial location. It is an overlay of location rather than interaction of different individuals. Therefore, it is not the meshwork of social relation. The meshwork is the encounter that comes later in this analytical process.



Figure 3. 2 The Least-Cost Path between two households in *Saqacengalj*. The hollow-shaped polygons are house structures and the filled-in polygons are the front platforms.

Nonetheless, there is a by-product in this network that indicates clues of social interaction. Since the network is defined by people walking along the pathways, the location of the pathway suggests that the individual is present at one time. Through the accumulation of multiple pathways, it is possible to count how many times the same path has been passed through (Figure 3.3 and 3.4). This times-passed rate implies, to a certain extent, the possible rate of social interaction between the local household and the people passing through (Wu and Lock 2012). However, the encountering meshwork in the later section provides a more theoretically correct model designed to fit the wayfaring framework, and an improvement to this times-passed reference rate.

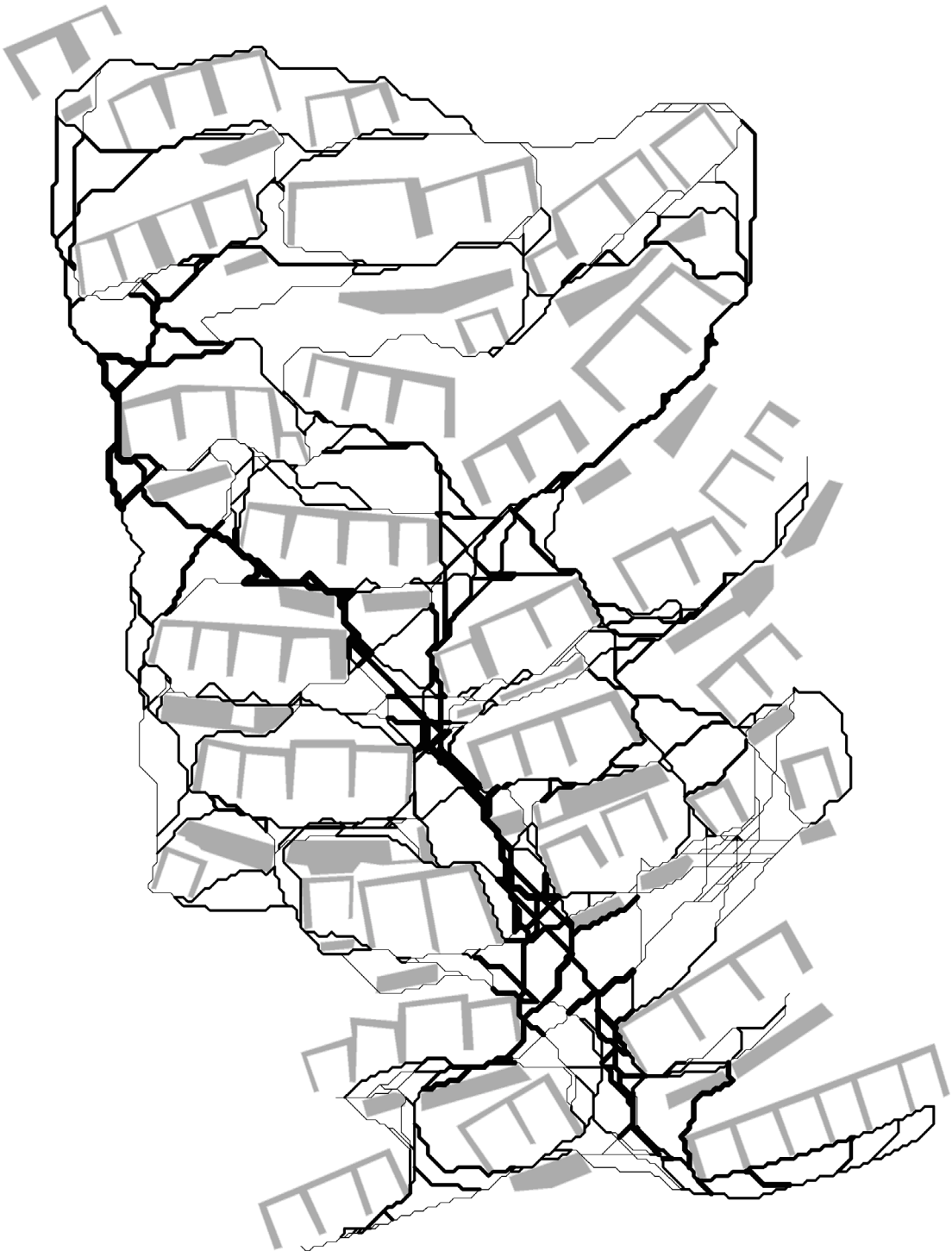

Figure 3. 3 Times-passed rate of all accumulated paths in *Saqacengalj* shown in line thickness. Thick – High. Thin – Low.

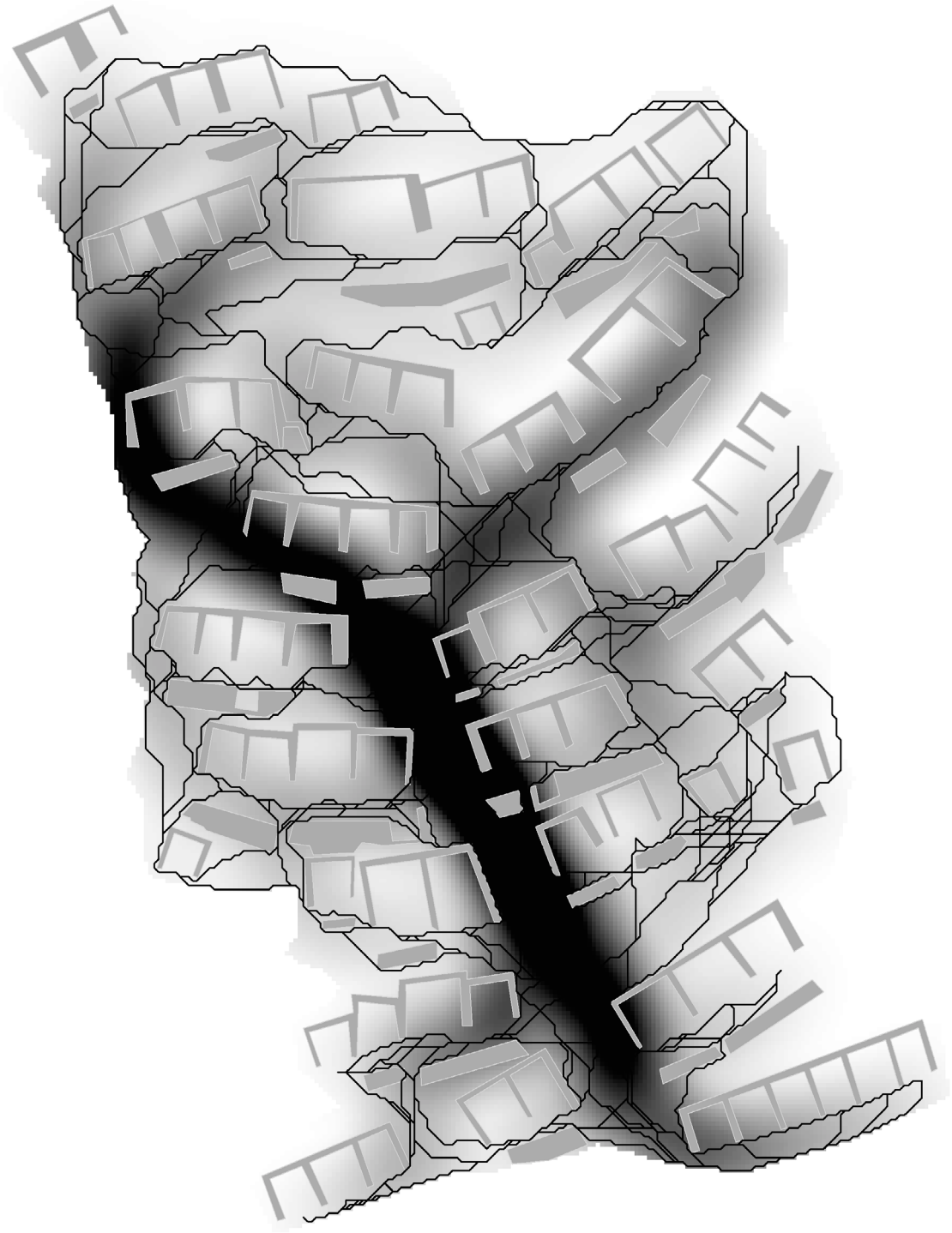

Figure 3. 4 Times-passed rate of all accumulated paths in *Saqacengalj* shown in density. Dark – High. Light – Low.

3.3.2.2 Modelling the Encounter

As mentioned earlier, the meshwork is the encounter one perceives and interacts with while walking along a path. Wayfaring is about experiencing the world in its formation and being constantly astonished in this process. The meshwork is the encountering process that people perceive and interact with. This encountering process involves the world perceived and the social interaction that takes place. Since this research is about social relation, the meshwork is defined as the encountering of social interaction. However, this research first looks at the entire process of encountering the world.



Figure 3. 5 Difference in detail of the grass perceived by an observer (Photo taken by author).

In order to encounter the outer world, the first thing to acknowledge is the role of perception. Perception involves multiple functions of senses. In terms of modelling, the most direct and also most widely applied sense of all is the sense of vision (Briault 2007; Conolly and Lake 2006; Fitzjohn 2007; Lee and Stucky 1998; Llobera 2003, 2007a, 2007b; Llobera et al. 2004; Paliou 2008; Sevenant and Antrop 2007; Wheatley and Gillings 2000, 2002). Visibility research has been widely utilised in multiple themes. The discussion on the function and the interpretation of visibility is an extensive one. In his book '*The Visual and Spatial Structure of Landscape*', Tadahiko Higuchi notices the distance between the perceiver and the perceived may influence the perception of the landscape

(Higuchi 1988: 12-20). Visibility is subject to multiple factors, such as weather condition, individual's eye-sight, the colour contrast of the object perceived, etc. He also points out that the quality of visibility is different in terms of the distance of the visible object (Higuchi 1988). The world perceived through vision is not clear-cut as something visible or invisible. The visual sight is different in its detail in respect to the distance between the perceiver and the perceived, and cannot be considered the same altogether. Take Figure 3.5 as an example: the grass perceived from the mountaintop is totally different according to the distance from the observer. In the nearest range, individual grass is visible and it is possible to identify one grass from the other. In the mid-range, the stroke of the grass is still visible but it is difficult to distinguish between them. In the further range, the grass is only perceived as a plain of green. In this case, the details of the perceived influences the knowledge and information one observes. The visual distance has a significant impact on the way people perceive the world.

Higuchi later defines this visual difference as landscape zones which highlights the understanding and perception between the observer and the perceived. The quality of the perceived is not the distance separating the observer and the observed. Nor is it a direct reference of the observed. The grass is still grass no matter how different it appears from different distances. The quality is the relation between the observer and the observed. It is what Gibson (1986) would call 'affordances' where they relate neither solely to the subject nor to their environment alone but to the relation between them (Gibson 1986: 129). This perceived relation and knowledge is also what the encountering is about in the wayfaring theory. Wayfaring is about forming knowledge through the world perceived while walking one's path. As mentioned earlier in Chapter 1, the process of perceiving is to understand one's relative relation to the outer world. This

relation is fluid since it is perceived through movement to create and experience the world in its formation. In this regard, Higuchi's theoretical framework is a good starting point to understand the world perceived in the wayfaring theory.

In terms of the social interaction of the encountering process, there is a very similar theoretical framework to the quality discussion of visibility: social proxemics. Social proxemics is a framework whereby people structure their immediate space into different functions and interacting behaviours (Hall 1966). On this premises, the classical classification of 'intimate', 'personal', 'social' and 'public' spaces were defined. These four basic proxemics highlight how people structure their surrounding space and interact in different ways with their counterparts. For example, in the closer personal range, people are more likely to observe the counterpart's facial expression, interact with an occasional touch and embody themselves in more emotional conversation. On the other hand, interaction in the social range is more about the verbal content and self-gesturing expression. It is a more general and standard interaction behaviour amongst social acceptance. This proxemics approach regulates how people interact and highlights different behaviour relation between the person and the counterpart based on distance bands.

Wheatley (2014) notices this theoretical link and proposes adapting this concept of social proxemics to model and understand past perception on their environment. He also highlights that through the application of Higuchi and proxemics, 'they offer the possibility of methodological application because they can be modelled and so are amenable to the development of robust, formal methods while they remain at the same time deeply relational and contextual' (Wheatley 2014: 127). This marriage between perception and proxemics provides the route to investigate how past people would have structured their understanding

on the landscape. However, Wheatley's application of social proxemics is not only a way of revealing structured landscape but also an attempt to integrate the issue of multiple senses.

The debate on vision being privileged over other senses has been a subject often addressed lightly. However, it is where agency modelling researches are most criticised (Frieman and Gillings 2007; Gillings and Wheatley 2001). Wheatley's argument is about applying social proxemics to structure landscape as well as attempting to integrate multiple senses in one single model. His discussion acknowledges that vision is possibly the dominant sense in our perception but states that the modelling of other senses should be embraced and can potentially be very fruitful. In terms of modelling, the most profound difference between vision and other senses lies in the process of performing the analysis. While 'viewshed' analysis is only a couple of buttons away, the processes of modelling other senses are far more complicated. Wheatley argues that this should not have stopped researchers exploring the possibility of other senses, but he also understands that this is a technological problem which has favoured visibility analysis (Wheatley 2014: 122).

Through the application of social proxemics, Wheatley attempts to provide a model that is easy to perform and is able to accommodate multiple senses. Social proxemics is about how people interact differently in different proxemics. The interaction itself is a combination of multiple senses. As mentioned earlier, different proxemics involves different ways of social interaction. These interactions can be facial expression, reading, verbal exchange, physical touch or general gestures. Expressions and perceptions are all integrated into each interaction involved in different proxemics. Therefore, the issue of multi-senses are all integrated into the 'type' or 'kind' of social interaction being carried out.

As mentioned earlier, since this research is about social relation, the meshwork is defined as the encountering of social interaction. The theoretical framework and modelling process of social proxemics is conveniently the modelling of different social interaction carried out in different distance zones. The marriage between the meshwork and social proxemics provides the best solution to investigate the wayfaring of social interaction. Therefore, this research adapts the concept of social proxemics to model the social interaction meshwork.

However, the concept of social proxemics is not directly applied to the pathway. In the process of encountering, there are two procedures: 1.) the awareness; and 2.) the interaction. It is believed here that in order for two people to start an interaction, they first need to be aware of the presence of one another. This awareness of presence again involves the perception of different senses. Since social proxemics already integrates the issue of multiple senses, this difference between awareness and interaction should not be a problem. However, the nature of this research would suggest otherwise.

In this research, the social relation between two households is defined as the pathway meshwork linking the two houses. The investigation of this meshwork is ultimately investigating the relation of the two subjects. Everything else in between the two is the context that might have influenced this relation. Walking along this pathway ultimately results in the meeting and interaction between the two households. In a way, this process of walking is an intentional one rather than casually wandering about. The social interaction that may occur along the way is an additional chance of interaction but not a necessity. This nature of ‘casual’ interaction along the path has a big impact on how an encounter is modelled.

In the process of awareness, people first perceive and then choose whether to interact or not. In the case of casual wandering about, people are exploring the environment and waiting for things to happen. In terms of social interaction, it is most likely that interaction takes place once the awareness of the counterparts' presence is made. In this case, the agent is looking for intentional interaction through casual walking. On the other hand, when people walk with intention and purpose, the awareness through all senses do not always end in interaction. With such intention in place, anything else that happens along the way is a casual rather than intentional interaction. This research proposes that in an intentional walk, visibility is the breakpoint to whether social interactions take place. In terms of different senses, touch and taste is in such a close personal range that interaction between two individuals is inevitable. However, the senses of smell and sound are rather different.

In the case, where visual presence of the counterpart is not available, the awareness of the counterparts' presence through smell and sound usually implies that there is an obstruction between the two individuals. Whereas social interaction is still possible in this situation, the obstruction acts as a pushing force for the intentional pedestrian to carry on with his purpose. In order to overcome this obstruction, the agent would have to have extra purpose to interact with the counterpart. This extra purpose then contradicts with the original purpose of investigating the social relation between the agent and destination household. Rather, this should be examined by the investigation of the link between the agent and this observed household independently.

On the other hand, direct visual connection of two individuals usually acts as a force that pulls them together. There is no additional impediment whereby interaction could not be carried out casually. In this case, the agent is more

inclined, and possibly obliged, to carry out social interaction. In terms of different sensory range, touch and taste are both within the area of visibility. Smell and sound are most likely to include areas uncovered through visibility and make the most difference in the awareness area. Such being the case, the area covered by visibility analysis is the breakpoint of possible interaction in this research. Since the research is focused on the investigation of wayfaring in an intentional context, the social proxemics is only carried out under the coverage of the agent's visibility area along the relation pathway.

Some would argue that this approach has fallen into the whirl of sensory debate. Whereas the application of social proxemics is an attempt to accommodate all senses, the visibility restriction of social proxemics coverage in this research is, then, again, a privilege to visibility over other senses. However, it is argued here that the application of visibility restriction is a design intended to investigate specific social relations. If this research is focused on the total perception structure of the landscape, the social proxemics concept should, then, be applied in a casual pedestrian approach. However, since it is specific relation that is of interest, the concept should be applied under the premise of an intentional walk. It is an adaptation to suite specific subjects and themes under investigation. The concept is applied and designed to match the theoretical framework of this research, instead of taking a square mould and hoping to bake a round pie.

The difference between intentional and casual walking is also the main reason why this research is an analysis in a GIS platform rather than an agent-based modelling (ABM) software. In the case of a casual walk, the meshwork is the implication of the world perceived in general through pedestrian exploration. On the other hand, intentional walk is designed to investigate the perception of two

specific households. This is the reason why this research applies LCP in GIS to model movement rather than applying a random movement model in ABM.

In terms of modelling, the randomness in ABM showcases the uncertainty of human behaviour and might be considered a better representation of human movement. However, this results in a casual exploration in the landscape where the relation between places is drowned in the overall final result. On the other hand, the LCP approach in GIS is designed to investigate specific relations between two places. Furthermore, the final result is produced by the accumulation of all these specific relations for the comprehensive social relation. Henceforth, within the final result, researchers can still query specific relation and understand the underlying foundation of what influenced the outcome. Since this is a research of social relations, the strength of this specific query provides more information and can benefit the understanding of the structure of the final result.

Concepts derived from other researches should be adjusted and applied with care in order to suit the specific theoretical framework and purpose. The difference between intentional walk and casual walk has a fundamental impact on how the meshwork is being modelled. This research is focused on social relation; therefore, the models are designed to highlight the relation between individuals and places. Because of this research's focus, the meshwork is modelled in an intentional pathway. This has resulted in a LCP approach of movement model and a restricted social proxemics to emphasise intentional interaction at two ends and casual interaction in between. On the other hand, if this research is focused on the general perception of the settlement space, the model is completely different. In a general understanding of a given environment, the focus of the model is in the agent's exploration and their potential feedback. Henceforth, the meshwork should be modelled in a casual movement where destination is optional, and intentional

interactions are modelled along or in between the pathway. In which case, ABM is possibly a better platform to perform this kind of analysis. As mentioned earlier, it is about finding the right mould for the desired shape of pie.

In terms of modelling, this research applies a visibility restriction to the social proxemics field. In order to achieve this, the modelling is first broken into two parts and put back together afterwards. The first part of the modelling is to create the viewshed of a pathway. The second part is to create the social proxemics field of the same pathway. After the combination of the two results, it is then possible to retrieve the intersection of the two. This intersection provides the final meshwork, in which the social proxemics field is restricted by the visual area.

3.3.2.3 Modelling the Pathway Viewshed

The modelling of viewshed based on a given line is a standard process in GIS (Conolly and Lake 2006; Wheatley and Gillings 2002). However, as far as this research is concerned, it does involve some underlying issues. First and foremost, is the difference between reality and modelling. Wayfaring is about personal perception of the surrounding. This personal experience is based on bodily practice, which is impossible to model in a GIS platform. For example, Ingold has argued that perception is a continuous process along the path one walks. He further stated that there is a difference between continuous perception and perception from points along the line (Ingold 2011: 151). However, this continuous process is impossible for GIS to model. In GIS platforms, visibility analysis always requires the path to be broken down into individual nodes for viewshed analysis. Therefore, a ‘true’ continuous perception is impossible to model in GIS. In fact, personal perception can only be modelled through the same experience. This could be done through physically walking the same path and see the same thing.

Or, it could be modelled through embodying oneself in a 3D reconstructed environment. Even then, personal background can still influence the experience perceived.

Therefore, it is again stressed here that this research is a modelling of wayfaring. Modelling itself is a process of exploration, not a reconstruction of the past. It is a process attempting to explore and understand something that cannot be truly reconstructed. Modelling does not provide what really happened. Instead, it provides information of what possibly happened in given circumstances. Sharing this standpoint, this research explores what might have happened in the past from a spatial perspective. And it is precisely on this foundation that the modelling and later interpretation are carried out.

In the process of modelling visibility, the most important essence is the spatial environment of the perceived: the digital elevation model (DEM). As mentioned earlier in Chapter 2, the DEM is collected through the use of terrestrial LiDAR scanning. The resulting point cloud is manually cleared of vegetation and then sampled through retaining the lowest point for each 10cm cell. The resulting points are then interpolated to provide the digital terrain model (DTM). Furthermore, the house structures and front platforms are later modelled and added onto the DTM to provide the digital surface model (DSM). Since it is visibility that is of interest in this section, the DSM of the settlement is the primary environment model applied.

In terms of modelling visibility, one of the major problems between reality and modelling is the issue of direction. In reality, the visual coverage is directly related to the direction of the individual's facing orientation. However, in terms of viewshed analysis, the visibility is set as an all-round analysis by default. As a

result, the viewshed of a pathway does not model an individual walking in the direction to its destination. Rather, it models visual perception of an individual spinning around like a spinning top along the pathway towards the end. In order to solve this problem, the visibility should be restricted to the direction in which the individual is walking. Therefore, directional viewshed is normally the right choice for modelling perception along a pathway. However, this research still applies the default all-round viewshed.

The visibility analysis of this research is aimed to restrict the area of social proxemics field. It is a limitation to the social interaction area. In terms of social interaction, the awareness of the counterpart's presence does not work in one direction. A neighbour unnoticed by the pedestrian is also capable of engaging a conversation from its standpoint. Therefore, the awareness is not a one-way perception, but works from either side. This, in turn, results in a viewshed field that is all-round rather than singly directional. The viewshed is both what the pedestrian perceives of his surrounding and also where he could be seen.

This two directional awareness not only concludes in an all-round viewshed but also affects the height setting in 'OFFSET'. The 'OFFSET' setting in the pathway fields is aimed to model different directions of visibility (Conolly and Lake 2006: 229; Wheatley and Gillings 2002: 211). The height in OFFSETA is to control the height of the observer located at the given point or line. It is an additional height on the pathway, in this case, to represent the eye height of the pedestrian. Standing alone, OFFSETA is designed to investigate the visual area from the given pathway. On the other hand, OFFSETB is an additional height in the DSM. Standing alone, OFFSETB is designed to investigate the visibility of the given pathway from all the cells in the DSM. Whereas OFFSETA is the visibility analysis 'from' the pathway, OFFSETB is the visibility analysis 'to' the pathway. Since this

section is aimed to investigate the awareness from both directions, both OFFSETA and OFFSETB of the pathway are set as the eye height of a *Paiwan* person. In this case, the resulting viewshed is the representation of the area where direct eye-to-eye contact is possible from the pathway. This direct eye-to-eye contact field is then utilised as the active area of social interaction where social proxemics is applied. One thing noteworthy is that the eye height of a *Paiwan*ese individual is set as 1.6m. Normally, the OFFSET is set as 1.7m in order to represent a modern person's eye height (Wheatley and Gillings 2002: 211). It is based on the modern person's height minus the height of its forehead. However, the *Paiwanese* people are known to be relatively short (Tsai and Lu 2003). Therefore, this research has adapted a height that is shorter than common practice.

3.3.2.3.1 Intervals of the Viewshed Analysis

In terms of the actual modelling process of pathway viewshed, there is also a major issue that needs to be addressed. The viewshed is run (computationally) based on visibility analysis on each node of the pathway. These nodes are the directional changing points on the pathway by default. The viewshed analysis of each node is then accumulated together to highlight the overall visible area. This process suggests that the visibility is not analysed evenly along the path. Only the nodes along the path are utilised for analysis, not the lines in between. That said, the visibility between two nodes far apart is then neglected and this might result in a biased analysis. Practically, it is possible to break the path down into even intervals of nodes and run the viewshed analysis accordingly. In this case, the shorter the interval of the nodes, the finer the visibility analysis results. Therefore, it is theoretically possible to model a continuous perception if the interval is infinitely small. However, the modelling is about finding the right balance between

computational processing time and the final result. There is no point in running a 1cm interval analysis on a 50cm cell size DSM.

To make better use of a given 50cm cell size DSM, the best practice is to divide the path into the same interval size, which is 50cm. In this case, the details of the DSM would be utilised to the fullest and there would be no redundant analysis. In practice, each pathway linking two households can be broken down into 50cm interval points and the viewshed can be run accordingly. However, take the first settlement *Saqacengalj* as an example. There are 80 households in the settlement. Since there are links between every household, there would eventually be 6,320 pathways modelled. Provided that each pathway is half the length of the settlement, it is then an average length of 75m. Each pathway would, therefore, involve 151 nodes. As a result, the visibility analysis, alone, would be performed 954,320 times. This does not include the processing time of dividing and accumulating each visibility analysis back to its original pathway. All this is just to acquire the restriction field for later social proxemics zones. Nonetheless, if this is a necessary process, it has to be done. Therefore, it begs the question of how important this visibility analysis is in the whole process of modelling wayfaring.

This research is about the social relation and interaction from a spatial perspective. In terms of the visibility analysis in this section, it is designed to highlight the difference between intentional and casual walking. The main emphasis still lies on the social proxemics modelling on human intimate interactions. The modelling of visibility is to identify physical barriers that separate intentional and casual interaction. In terms of a settlement scale, this separation is most likely the presence of buildings and structures. Particularly in *Paiwan* settlements, which are located on mountain slopes, the separation between terraces is another major obstruction to visibility due to height difference in

landform. Hence the visibility analysis is aimed to highlight these barriers and suggest differences in intentional and casual walking. From a social interaction perspective, this visibility analysis is not necessary since social proxemics already incorporates multiple senses. However, in terms of investigating specific social relations, this separation of intentional and casual walking is theoretically fundamental. Therefore, the visibility analysis in this research is not the major focus but it does, however, have an impact on the final results.

It is argued here that given the focus on social interaction over visibility, the visibility analysis is therefore performed only to an acceptable degree. Instead of applying a 50cm interval as mentioned above, this research accepts the default of the analysis whereby visibility is analysed according to given nodes along the pathway. The average distance between given nodes are between 1m-2m. In a DSM at 50cm cell size, it is argued here that the existing interval between given nodes is sufficient enough to highlight the effect of buildings and structures. In terms of providing a restriction field to the later social proxemics analysis, the given nodes along the pathways highlight enough details to demonstrate the distinction between intentional and casual walking. As mentioned earlier, the balance is to find a relatively acceptable process time and a good result suitable in detail, which together will highlight the research theme.

3.3.2.3.2 The Problematic Issue of ‘Time’

However, the process of visibility analysis actually raises another major issue, that of ‘time’. Initially, the viewshed analysis provides an outcome that separates the visible from the invisible. It assumes that the environment is seen from all the nodes at once. However, in reality, walking a path takes time. This time property is also present in the viewshed outcome raster where it is possible to

query how many times each cell was seen from all the nodes. Theoretically, the interval issue is also an issue of time. Let's just assume that an individual perceives one visual scene in one second. In that case, a path that involves 30 nodes would mean that the visibility is run 30 times. In turn, it also indicates that it takes the individual 30 seconds to travel the entire path. Unless one is able to travel with his/her eyes closed, the number of nodes indicates the time spent in travelling since perception is a continuous process. If the interval of nodes is an issue of time, it then raises the question whether 'time' influences the modelling of social interaction.

From a modelling point of view, the issue of time is relatively easy to solve. Similar to that of interval problem, if time is to be considered in the analysis, what kind of time interval should be applied? Since the pathway is originally modelled based on time to calculate LCP, it is then logical to model the interval as the distance travelled per second. That is, the pathway would be broken down into nodes that are based on the distance travelled per second. These nodes can then be utilised for visibility analysis. However, this again causes a significant rise in time and effort for the analytical process. Therefore, the researcher faces the same issue as the interval problem above. The problem is whether the 'time' issue is significant in terms of the modelling wayfaring.

In terms of perception, the visual exposure of a given environment is influential in an individual's understanding of the landscape. This visual exposure is similar to what Llobera terms the 'visual prominence' (Llobera 2003: 37). The prominence of visibility is an influential factor in the perception of a given environment. The time issue in modelling viewshed on pathways highlights exactly the same concept. The times-seen value of each outcome cell refers to how many times a place has been seen after walking a pathway. Therefore, this value is a

direct indication of the visual exposure of a place according to the path walked. In consequence, the time issue is extremely significant in the understanding of perception of a landscape. From a modelling point of view, the perception quality of a landscape should be multiplied by the times seen value in order to highlight the ‘time’ issue. However, this is not a research on perception itself.

As far as this research is concerned, ‘time’ is not a problem. This relation between time and social interaction can be explained both practically and theoretically. Practically, indeed, an individual may see the same place multiple times. However, this would not influence the social interaction pattern he/she has with the counterpart occupying that cell. Social proxemics is about social interaction between the pedestrian and the neighbours. Once the pedestrian has an interaction with a neighbour, there is no reason to have another interaction again with the same neighbour just because the person is seen from another angle. This is the difference between social interaction and perception. From a practical point of view, social interaction cannot be timed simply because the same place has been seen multiple times.

From a theoretical point of view, time is also not a problem. In Ingold’s wayfaring, the meshwork forms the knowledge about the surrounding environment. This is precisely the reason why this research utilises the meshwork of the link between two households to investigate their social relation. However, as Ingold states in his example of the spider web, the web is the ‘conditions of possibility’ of interaction, not ‘interaction itself’ (Ingold 2011: 85). The meshwork of the pathway is to investigate the social relation between households on the two ends. Everything else in between is a ‘condition’ for interaction. The social proxemics value applied later is a condition laid out according to the line linking the two households. And since there is only one line, there is only one condition. It

could be seen as gravity moving along one line; the strength of the gravity operating in space is the condition laid out by the source of the gravity. Furthermore, it is fixed according to the distance from its source, similar to that of social proxemics. However, the strength experienced in space does not increase simply because the gravity source exists longer in time. The strength is the condition of the gravity source laid out. Since there is only one gravity source, there is only one condition. However, if there are more than one source of gravity, the strength experienced in space changes accordingly (see further discussion below). In terms of social proxemics, the interaction condition does not change because the counterpart has been encountered multiple times. If the counterpart is at a distance categorized as a social zone where touch and taste are unavailable, encountering multiple times does not make the person closer and change the condition into a personal zone interaction. The condition laid out by the path is a singular one and is not subject to time change. Therefore, based on both practical and theoretical frameworks, it is concluded that time does not influence the modelling of social proxemics.

It is possible to model and solve the issues of both the interval and time scale, but only in respect of good purpose and reason. Although there are better ways of modelling visibility to a finer detail, it is argued here that the results are sufficient enough to separate and highlight physical obstructions based on the default interval setting. As for the issue of ‘time’, it is argued here that social proxemics is laid out as a pathway condition linking two households. It functions in the same way as gravity does and is not subject to time change. As a result, although visual prominence is a significant factor in perception, the times seen value is not influential in modelling social interaction. The choice of applying a default setting in modelling path viewshed is based on both practical and

theoretical modelling thinking, as well as finding a balance between process and results. In consequence, the visibility analysis is performed as a binary 'visible' and 'invisible' restriction field to later social proxemics based on default setting. Again, using the relation exemplified in Figure 3.2, Figure 3.6 shows the visibility analysis of this particular path. This path viewshed provides the restriction field for later modelling of social proxemics.

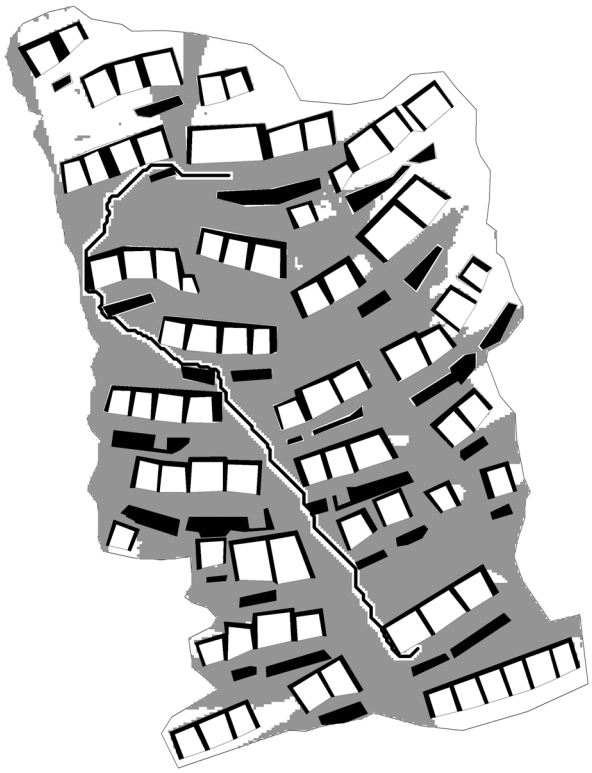

Figure 3. 6 Path viewshed (restriction field) of the relation exemplified in Figure 3.2. Grey – visible. Hollow – non-visible.

However, just like the LCP analysis earlier, there is also a by-product to this visibility analysis. By accumulating all the pathway viewsheds, the result provides something similar to 'path total viewshed'. This path total viewshed highlights, to a certain extent, the visual prominence discussed earlier in this section. Although it is not utilised in the modelling of social interaction, it can still benefit the overall understanding of the settlement, particularly the interpretations and discussions related to visibility, and possibly of power dominance

3.3.2.4 Modelling Social Proxemics

As mentioned above, the encounter is modelled through the restriction field of visibility and the application of social proxemics. The following section is the detailed discussion on how social proxemics is modelled in regard to the visibility field defined above.

This research is about exploring social interaction through a spatial perspective. Based on earlier discussion, the social relation between two households is defined as the meshwork along the pathway linking the two houses on either end. The meshwork is a condition of social interaction one experiences while walking along that pathway. This condition of social interaction is defined through the application of social proxemics. The meshwork is a texture where each knot is an experience woven into the understanding of life (Ingold 2011: 148). The application of social proxemics matches this theoretical approach whereby the proxemics field represents a different interaction relation between the pedestrian and the person occupying the opposing cell. The relation between the two is what Gibson (1986) terms 'affordance', and is the route to understand an individual's perception on social relation and interaction. In terms of the wayfaring theory, this is the perceived social world built from the ground up. It is the exploration of social relation based on intimate human interactions.

The social proxemics is a concept where people interact differently based on the different distance zones. It is composed of two major elements: 1.) the distance bands; and 2.) the interactions. However, as Wheatley has correctly pointed out, a major issue of social proxemics is that it is subject to cultural difference and personal preference (Wheatley 2014: 126). In social proxemics, different interaction in each proxemics zone is regulated by social norms, which are subject to cultural difference and moderation. Specific interactions that are acceptable in the 'personal' zone in A culture can sometimes be prohibited or only acceptable in the 'social' zone in B culture. The same could be said in terms of personal preference between individuals. However, this research is not focused on how people interact but on how spatial arrangements could influence social interaction. This does not mean that this aspect is neglected in this section.

Instead, it is recognised here that social norms and personal preferences do have a significant impact on the interaction in each zones. However, rather than modelling exactly how people interact specifically, this research takes an alternative approach.

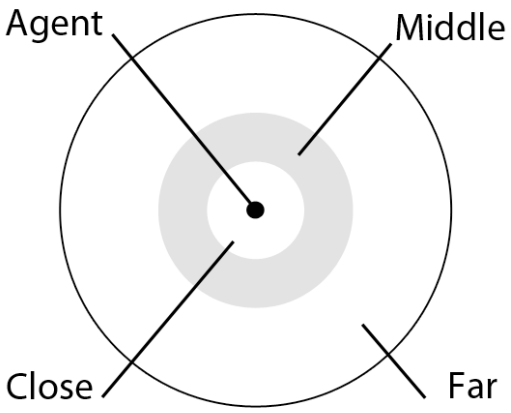

Figure 3. 7 The three-tier proxy zones for modelling social proxemics.

In this research, social proxemics is modelled in a relative approach in order to highlight the difference between individuals. The social norms that regulate interactions are subject to cultural difference and personal preferences. It is an issue that should never be overlooked simply because it has a major impact on the social interaction. Rather than trying to model how people perform interaction, this research is more focused on how spatial arrangements influence the outcome. The modelling is to highlight the different interactions according to the spatial distance between the pedestrian and the counterpart. Therefore, the distance zones are first modelled into three tiers that consist of 1.) close range; 2.) middle range; and 3.) far range (Figure 3.7). This three-tier modelling is not an attempt to represent how people interact, but to explore the concept of how a tier system based on spatial distance influences social interaction.

The three-tier system is designed to highlight a relative approach so that the results can be compared with each other. It is not designed as a two-tier system because it might result in a simplified high-low contrast. In that case, the results will only either be high or low even if the values on the borderline are extremely close. There is no room for an interpretation for normal or standard interaction behaviour. On the other hand, it is also designed not in a four- or five-

tier system, in order to avoid over-complication in the final results and its interpretation. This three-tier system is designed so that relative comparison analysis and interpretations are possible and easily identifiable. Therefore, the three-tier system is applied and it results in three proxemics zones, which represent three different ways of interaction. This case suggests that there are three bubble bands surrounding the pedestrian (Figure 3.7). And within each band, the pedestrian has a kind of social interaction relation with the counterpart.

However, this three-tier system still does not solve the problem of cultural differences and personal preferences in full. It only represents a way of exploring the spatial effect on social interaction. As a result, this research further applies the three-tier system to both the distance bands and interaction. In other words, the distance bandwidth of each proxemics is not fixed to one way of modelling, but three. This three-tier distance banding is designed so that relative comparison analysis is possible and researchers are able to highlight how different distance settings of proxemics influence the final results. Furthermore, a three-tier system is also applied to the social interaction settings. This is also designed to explore the effect of the interaction setting on the final results and can be utilised as relative comparison analysis. This application of three-tier system on both distance bands and interaction is aimed to explore the issue of cultural differences and personal preferences already mentioned earlier and to be highlighted in the design of modelling process below.

The following section demonstrates the model design of the two essential elements in social proxemics: 1.) distance bands; and 2.) social interaction. The three-tier system is first applied in the discussion of distance bands and later on to the social interaction. The application of the three-tier system is aimed to explore

the possibility of different social norms. This social norm is then further discussed and interpreted in the later discussion on social attitude.

3.3.2.4.1 Proxemics of Distance Frame

In terms of setting up different proxemics, the first thing to do is to find a maximum distance of interaction, that is, to define a maximum range for people to interact within. In order to explore the full potential of a given site layout, a maximum range of 50m is introduced to the basic proxemics. This maximum range is not a random figure but one designed to fit the nature of both sites. The definition of 50m is set on the basis of half the width of both sites, which are 55.9m and 57m. This width is then rounded up into 50m for the maximum interaction range. This means that an individual walking through the centre of the settlement would have the ability to strike up interaction with anyone on either side of the village.

Once the maximum interaction range is set up, the next step is to define the first interaction bandwidth. The first bandwidth applied to the basic proxemics is defined as 10 metres in this research. This distance is based on the average width of one household, which is around 5m, plus ‘reserved interaction range’ of 2.5m on either side of the house. This reserved interaction range is placed to make sure that the interaction range covers at least one household. That is, the range is to make sure that there is one other individual that is located at his/her own housing area for the moving individual to interact with. Otherwise, the first band is most likely to be areas restricted on the movement path. In that case, since the area does not include other individuals, the first band has no function in terms of social relations. There would be no social interaction but individual activeness. As a result, the reserved interaction range is designed to make sure that houses are

involved in the first bandwidth. This rounds it up as 10m for the basic immediate range of the social interaction for the agent. This 10m bandwidth is only the first band of the basic proxemics.

Now that the first band and the maximum range are set up, the second breakpoint can then be put in place. In this research, the second bandwidth is defined as 25 metres in the basic proxemics. This 25-metre range is defined based on halfway distance between the moving individual and the maximum bandwidth, that is, the halfway line between 0- and 50-metre range. The 10m-25m-50m proxemics means that the first two bands are both located within the halfway interaction range. This is designed to model a tendency where agents are more likely to interact with people who are closer in distance. However, as mentioned before, this research is not aimed at understand how people interact, but at what social interaction, derived from the spatial layout, indicates in a social context. Therefore, in addition to this basic 10m-25m-50m proxemics, two more different proxemics are modelled to understand how different proxemics affects the social relation.

Based on the 10m-25m-50m proxemics, two more proxemics are modelled with different methods. The first method is using the first band as a base to model different distance ratio. That is, the first band of the proxemics remains the same as 10 metres. However, the following second and third bands are modelled with a different ratio. In this research, the second proxemics is modelled as 10m-20m-30m, following a 1:2:3 ratio as opposed to the basic 1:2.5:5 ratio. This proxemics is designed to explore the difference if people should choose to limit their interaction range to a closer distance. However, since the first band is the same, researchers then have a reference point to stand on for further comparison. In terms of the 1:2:3 ratio, it is merely another simple way of modelling by applying

equal interval as opposed to favouring closer distance. Nonetheless, this difference in ratio raises the question that the maximum range might not be the only influential factor. The difference in ratio might also affect the interaction model. Henceforth, the research also applies the second method for the third proxemics.

The second method is using the maximum distance as a base to model different ratios. The basic proxemics utilises 50 metres as the maximum distance. The second method applies the same maximum distance but a different ratio to the original 1:2.5:5. In terms of the ratio for the third proxemics, the same 1:2:3 ratio is applied so that researchers can compare the results with those of the second proxemics. As a result, the third proxemics is designed as 17m-34m-50m.

In consequence, this research utilises the following three proxemics': 1.) 10m-25m-50m; 2.) 10m-20m-30m; and 3.) 17m-34m-50m. These three proxemics are all designed in such a way that they could later be compared with each other. The first can be compared with the second by the same first band but different ratios. The second can be compared with the third by the same ratio but different maximum distance. And the third can be compared with the first by the same maximum distance but different ratios. This comparability enables the researcher to understand the causes of later analytical results. In turn, it benefits the researcher to better interpret the data and analysis.

In terms of modelling practice, this procedure can be easily performed with the following three steps. The first step is to create a raster that presents the distance to the agent for every cell. Since the agent is walking along a given pathway, this is the distance to the relation pathway. The standard 'Path Distance' function on the given pathway provides the suitable outcome. The second step of

this procedure is to crop the resulting raster of step 1 with the previous path viewshed result. As mentioned earlier, the path viewshed result is the restriction field of interaction. Therefore, the modelling of social proxemics should be constrained to the area of activity defined by the restriction field. There are two ways of achieving this process. The first is to incorporate the path viewshed result as a ‘mask’ setting in the ‘Path Distance’ function. The second is to add the two individual results together by the ‘Raster Calculator’ function. In this way, the null values in the path viewshed result will automatically crop the results from step 1. This research adapts the second approach, as it is more manageable in the ‘Model Builder’ toolkit. The resulting distance raster (Figure 3.8) showcases how the path viewshed restricts the result of step 1.



Figure 3. 8 The cropped path distance raster of the relation exemplified in Figure 3.2.

The third step of this procedure is to categorise the distance raster into appropriate bands. In this case, the distance value within certain range of the pathway will be transformed into a given number that represents its distance band. Since this involves the transformation of raster value, the standard 'Raster Calculator' function is most suitable for this task. Figure 3.9 demonstrates the application of the '10m-25m-50m' band frame on the same example earlier. The algorithm applied in the raster calculation is as follows:



Figure 3. 9 The distance frame of the relation exemplified in Figure 3.2 using the '10m-25m-50m' band frame.

SetNull("Step2" > 50, Con("Step2" > 25, 3, Con("Step2" > 10, 2, Con("Step2" >= 0, 1))))
("Step 2" is the resulting raster from step 2)

The closest range (within 10m of the pathway) is highlighted as band 1, the middle range (10m-25m) as band 2, and the furthest range (25m-50m) as band 3. In addition, the cells farther than 50m are set as 'no data' since they are outside of the interaction range as defined in the social proxemics model.

3.3.2.4.2 Proxemics of Probability and Quality

This section discusses the quality and probability applied to each frame of proxemics. In the previous section, this research has set up three distance frames of proxemics to apply to the path viewshed. However, these frames of proxemics

only deal with the range of interaction, but not the quality and probability of interaction. It is commonly known that social proxemics discusses how people would interact differently in different distance bands (Hall 1966). Therefore, in addition to the distance bands, different ‘interaction’ needs to be assigned to each band. However, the ‘interaction’ assigned to different bands is not of descriptive value in this research. Rather, this research applies a numeric value to each band.

In terms of analysing interaction, there are numerous ways of interaction in each distance band (Wheatley 2014: 126). Therefore, each band cannot be reduced to a single ‘type’ of interaction for analysis. Also, different people may react differently to the same ‘type’ of interaction. In addition, ‘types’ of interaction still need to be transformed into numbers in order to be quantified and analysed. As a result, this research abandons the descriptive value of each band and takes up another approach.

This research assigns numeric values directly to each band in order to represent the quality and probability of the interaction that may take place. As mentioned earlier, the relation between two households is defined as the meshwork along the pathway from one to the other. In this case, since walking the pathway ultimately results in the meeting of two individuals at either end, their interaction can be seen as 100%. However, the households that are located along the path are not subject to necessary interaction. Therefore, the interactions for these households are less than 100%. The only problem is, then: how much less?

In this perspective, the interaction is transformed into numeric values to represent the probability of interaction. Just as Ingold states, the spiderweb (meshwork) lays down the conditions of possibility to interact with the flies (Ingold 2011: 85). These probability values can then be accumulated to highlight the

highest interaction probability area. Nonetheless, by accumulating multiple pathway rates, the resulting probability rate is bound to exceed 100%. In terms of probability, any number exceeding 100% represents the same thing. That is, any rate above 100% means that they will interact. However, different ratings that exceed 100% still indicate different intensity of interaction in a sense. Although probability is the starting point of this numeric transformation, it is not the perfect measure for data interpretation.

The wayfaring theory is about encountering and forming stories, memories and knowledge (Ingold 2011: 141-176). All things being equal, the more stories and memories there are, the more knowledge and stronger bond there is with that specific place (Barrett 1988, 1994). As a result, the higher interaction intensity of a household, the higher the bond is with that specific household. In a world of equality, where personal preference is disregarded and people act in a function of inputs and feedback, the probability and intensity can also be seen as the quality of interaction. That is, the more one interacts with a subject, the more knowledge and stronger the bond with that subject. The probability and intensity are, then, direct references to the quality that is involved in the interaction. Whereas the two households on either end have interaction quality of 100, the households located along the path have interaction rates that are less than 100. The question, again, is: how much less?

Undoubtedly this is a very simplified modelling, not suited for a complex social world that is reality. The quality of interaction cannot be directly accumulated to represent the quality of social bonding, not to mention that the quality of interaction is not dependent on intensity. In fact, sometimes it works the other way around. Personal preference and affordance of social interaction are subject-dependent and most likely random. It is acknowledged here that these

random preferences could be better modelled in agent-based modelling (ABM) softwares. However, this research is about the influence of interaction, not the interaction itself. ABM might provide the clues into how people interacted and what their preference might have been. This research is more focused on how 'space' influences interaction and its results on social relation. Albeit in a very simple way, as Renfrew states, this is the route to understanding social relation from a spatial perspective (Renfrew 1984: 11).

Moving back to the measure of each proxemics band, the question of what value to be assigned in-between the two ends remains. For each proxemics band, this research applies a ratio of decreasing value. The first basic value applied is 80-40-20 in a 4:2:1 ratio. This value is designed so that the next further band is half the value of the previous one. However, there can be multiple combinations based on the same ratio. The value 80-40-20 is designed so that all three values are rounded up, and there is a reasonably high value in the first band. Based on this first proxemics value, two more proxemics are designed.

The second proxemics is defined as 75-50-25 in a 3:2:1 ratio. This ratio is designed by evenly distributing the value of 100 into four shares. The first share is the value 100 to represent the maximum interaction on either side of the path. The other three shares represent the three distance bands in a high-medium-low interaction. Henceforth, each difference in distance bands has an even decreasing value. This method results in a 75-50-25 value in a 3:2:1 ratio.

The third proxemics is defined as 90-30-10 in a 9:3:1 ratio. Compared with the first 80-40-20 proxemics, the values in the second 75-50-25 proxemics are more evenly distributed. Therefore, the third proxemics is designed with the notion that it should highlight a high concentration on the first band. Therefore, this

proxemics is designed so that the next further band is 1/3 the value of the previous one. Similar to that of the first proxemics value, the third proxemics value is chosen so that the first band is higher than the one in the first basic proxemics value. In addition, the numbers are also rounded up and the result is a 90-30-10 distribution.

One thing worth mentioning is that the same ratio is only applied once in designing the value of proxemics. For example, the same ratio 3:2:1 from 75-50-25 is not applied multiple times to create 90-60-30 or 60-40-20 proxemics. The reason behind this is that different proxemics will later be examined by the matching of material remains. This matching process is performed through the successful matching of high interaction area with households with distinct features. However, proxemics with the same ratio will ultimately highlight the same area. The exact value of that area might be different, but it is still in the same relative ratio with less interactive places. As a result, there is no distinguishing amongst the proxemics with the same ratio. Hence, the same ratio is not applied to create multiple proxemics in this research.

The modelling process of this interaction quality is rather straightforward. In the previous section, the settlement space was categorised into three bands according to the different distances to the pathway the agent walks on. The resulting raster (Figure 3.9) consists of bands 1, 2 and 3, representing bands of ‘close’, ‘middle’ and ‘far’ proximities respectively. Now that the interaction quality of each band is defined, they simply need to be applied to their respective bands. One way to do this is to replace the ‘1, 2, and 3’ values in the previous raster with the desired interaction quality ratio. That said, the ‘Raster Calculator’ function can be applied to transform band value ‘1’ to quality value ‘80’, ‘2’ to ‘40’ and ‘3’ to ‘20’, for example. However, a more efficient way of performing this analysis is to take

the original distance raster and perform the ‘Raster Calculator’ with an alternative algorithm:

SetNull("Step2" > 50, Con("Step2" > 25, 20, Con("Step2" > 10, 40, Con("Step2" >= 0, 80))))

By replacing the 1, 2, and 3 band values with ’80, 40 and 20’ quality values in the original algorithm, it automatically sets each band with its assigned quality value. In consequence, the resulting raster will showcase the social proxemics applied with ‘10m-25m-50m’ distance band and ’80-40-20’ quality ratio (Figure 3.10). In this case, instead of performing ‘Raster Calculator’ twice, it incorporates the second calculation in the first algorithm and reduces computational time and workload.

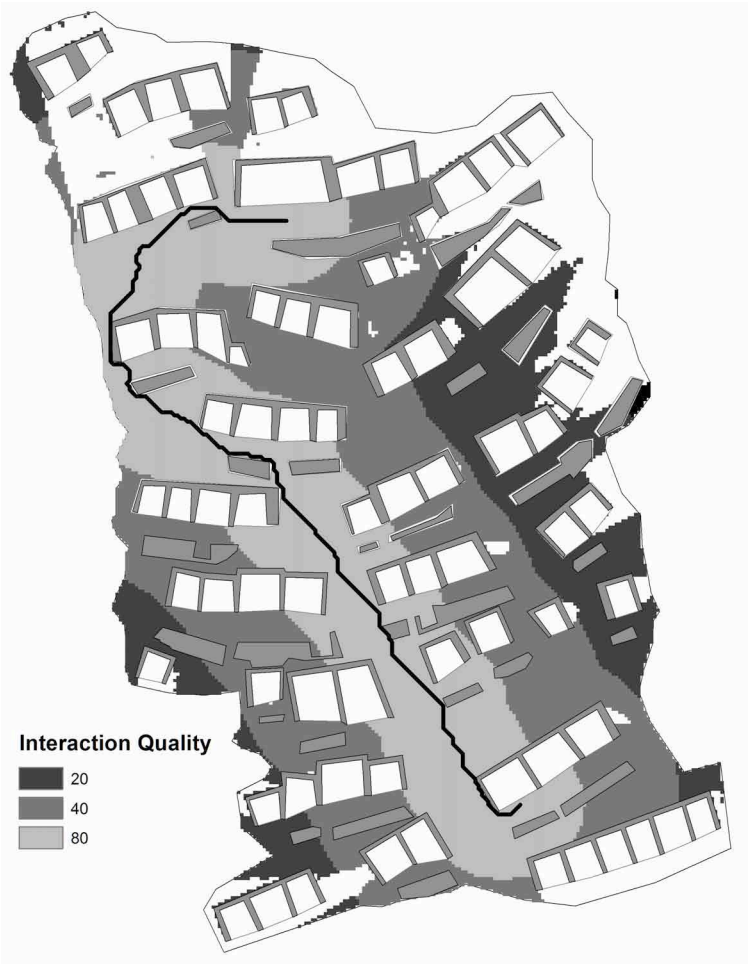

Figure 3. 10 The interaction quality of the relation exemplified in Figure 3.2 using the ’80-40-20’ quality ratio.

3.3.2.4.3 Proxemics and Social Attitude

This section discusses the implication and representation of the different proxemics defined above. As mentioned earlier, social proxemics is subject to cultural difference. In addition, the difference amongst individuals is even larger. This research does not intend to reveal how early *Kaushi* people interacted with each other. All the distance bands and value measures are designed so that they can be compared with each other. The distance bands are comparable in terms of either the maximum distance or the same ratio. The quality measures of each band are designed in ratios so that they can be compared with each other. The results are not intended to answer how they actually interacted. Rather, the results are references for comparison. They are references to investigate a relative and general social attitude amongst different neighbourhoods.

The interaction quality of the proxemics is designed to demonstrate a three-tier interaction. The first and immediate band is the highest interaction zone. The second band represents medium intensity and the third band indicates low interaction. Based on different ratios, this three-tier proxemics is then transformed to highlight different intensity in each band. Using the 80-40-20 measure as a base, this research designs two more measures to highlight a more distributed measure in the form of 75-50-25, and a more close-range intensity measure in the distribution of 90-30-10. As mentioned earlier, these measures are designed to demonstrate relative social attitude. Therefore, the measures are designed based on different ratios.

Based on the difference of ratios, social interaction may be more intense in the first band like the 90-30-10 measure. In this measure, the first band is nine times the value of the third band. This represents a higher intensity in the first

band. On the other hand, social interaction may be more distributed in the form of the 75-50-25 measure. In this measure, each band has the same decrease in value. Also, the first band is only three times the value of the third. Compared with the 90-30-10 measure, the significance of the first band has dropped immensely. The three measures of this research are based on different ratios to highlight their relative difference. They are aimed to examine whether interaction is more close ranged or widespread. This is also the other reason why the same ratio is not applied for different measures. If the ratio is the same, then there can be no comparison in the intensity amongst the three bands.

The three measures of this research are designed to highlight the differing intensity in each band. The first 80-40-20 measure is to provide an average reference measure. The 75-50-25 measure is defined to examine a more spread-out general interaction. And the 90-30-10 is designed to represent a more concentrated intimate interaction in the first band. These three measures are designed to highlight three different human interaction behaviours: 1.) average; 2.) general; and 3.) concentrated. As mentioned earlier, this difference in interaction behaviour is a relative one rather than definite. It is not designed to investigate how people actually interacted. Instead, it is focused on how different ‘kinds’ of interaction behaviour could influence the results.

In terms of distance bands, they are designed to be comparable based on both the distance and their ratio. The first is designed based on minimum 10 metres and maximum range of 50 metres. The second breakpoint is based on half the distance of the maximum 50 metres. This results in a 10m-25m-50m distance band in a 1:2.5:5 ratio. The second distance band is based on the same minimum distance but on a 1:2:3 ratio. This results in a 10m-20m-30m distance band which is shorter in range and has a narrower interaction zone. The third distance band is

based on the maximum range of 50 metres and applies the 1:2:3 ratio. This results in a 17m-34m-50m distance band which has wider first and second bands.

Similar to the three quality measures, the three distance bands are also designed to highlight different human interaction behaviours. Again, the difference in interaction is a relative one for comparison analysis. The three distance bands are designed to model: 1.) narrow; 2.) average; and 3.) wide range of interactions. This design is intended for relative comparison rather than looking for a definite answer. It is not investigating how far people interacted, but is focused on how difference in interaction range could influence the results. The 10m-25m-50m distance band is set as a normal average interaction behaviour. The second 10m-20m-30m distance band is to represent a narrower active range and a less out-going agent. The third 17m-34m-50m distance band is to demonstrate a wider active range and a more out-going agent.

Based on the three distance bands and the three quality measures, there can be nine different combinations of social attitudes (Table 3.1). In the coding table, the code for distance bands are put in front to represent the distance frame applied. The next character is the quality code to indicate the measure applied to the frame. This research utilises these nine different social attitudes to explore how different attitudes could influence the wayfaring results. The nine social attitudes are there to explore the different possibilities a single site layout can offer. In consequence, all nine attitudes are applied to the same path viewshed to create nine social meshworks. The results of different meshworks represent social meshworks created from walking the same path but with different social attitudes. Eventually, the nine meshworks can be accumulated and divided by nine to acquire the average meshwork of the same pathway. Therefore, the same social relation between two households would have ten different meshwork

representations, nine of which are defined by different social attitudes. And, finally, the last one presents the average of those nine meshworks.

	102030 Narrow	102550 Average	173450 Wide
755025 General	NG	AG	WG
804020 Average	NA	AA	WA
903010 Concentrated	NC	AC	WC

Table 3. 1 The nine social attitudes and their code representations.

The social attitude measure is the reference of how people tend to behave in different circumstances. This measure is not aimed at investigating how one individual behaves, but how a collective group of people tend to interact. Therefore, the examination of social attitude is only applied after multiple social relations are accumulated to highlight a certain social meshwork. The social meshwork can then be compared with material remains to decide which of the nine measures is the 'best fit'. This 'best fit' is determined by scrutinising which of the nine measures best highlights the households as distinct. That is, the distinct households are used as indicators of either a positive reflection of a certain attitude or a negative one in this research. This 'best fit' is measured on the basis of the highest ranking order of distinct households or the least accumulated ranking of these households.

It is worth noting that this comparison shows that the presence of distinct households might be a result of certain social attitudes, not the other way around. Thus, it does not suggest that everyone in a given neighbourhood behaves in the same way or has the same social attitude. Rather, the analysis indicates that the presence of the material evidence may have been a result of the collective behaviour and certain attitudes in the neighbourhood. Therefore, the measure is

aimed at investigating how a collective group of people tend to interact, not how one individual behaves (more examples in section 5.2).

3.3.3. Wayfaring the Settlement

Wayfaring is the process of perceiving and understanding the environment while walking one's way through it. In previous sections, this research has already established that the pathway linking two households defines the social relation between them. The meshwork of this pathway is the route to understanding their social relation with the wider settlement. By accumulating all the pathways amongst all households, and all the meshworks that come along with them, the result is not merely the modelling of interaction but also a presentation of the social relation model of the entire site. While the accumulated pathways represent the social network of the settlement residents, the accumulated meshworks represent the social meshworks of the settlement 'inhabitants' (Ingold 2011: 149).

The accumulated meshwork lays out the texture of social relations amongst the settlement. Amongst this texture, the location of an individual represents the interaction rate as well as its social relation status in regards to the social identity of the 'settlement'. Therefore, the social status of this individual can be examined through the extraction of this accumulated meshwork. As mentioned earlier, this research is about social interaction and relation. This has resulted in moving the household representing point from the centre of the house to its front yard, in order to highlight the difference between social and private activities. And it is precisely because of this same reason that the value extraction is not based on the location of the house, which is a predominantly private space. Since the front yard is the main place for social interaction, the social interaction and relation value are extracted based on a 'polygon' that matches the shape of the front yard (Figure

3.11). The neglect of the results in the housing area is a theoretical one as well as a practical modelling one. As previously stated, the model of house buildings and structure is added to produce a DSM that better represents the visible environment. Since the OFFSETB is set as 1.6m in the visibility analysis, it actually analyses the inter-visibility between the pedestrian and someone standing on the rooftop. This obviously results in a biased result in the housing area. Therefore, the results are neglected for both theoretical and practical reasons on the process of modelling.

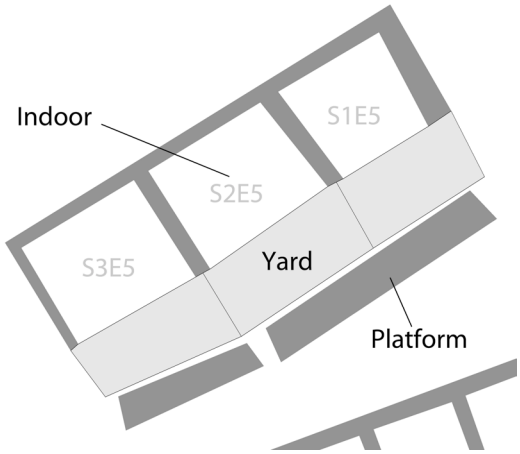

Figure 3. 11 The polygon used to extract interaction rates in the front yard.

Another point worth noting is also an issue of the extraction process. The extraction of the meshwork value is based on a polygon that matches the shape of the front yard. In practice, the extraction process is easy to perform with simple 'Spatial Join' function, whereby the polygons are the spatial extents of extraction and the social meshwork raster is the data layer to be extracted. However, since the polygon represents an area, it is then a collection of multiple cell values. This raises the problem of what kind of value should be extracted. As in a standard practice, the average of the values is the logical choice whereby it is more representative in most circumstances. The minimum value is seldom utilised since it refers to specific discussions such as avoidance and privacy. On the other hand, the use of maximum is similar to that of minimum, but in reverse thinking. That said, the maximum is a great representation in terms of exploring the social activeness of individual households. Focused on social interaction and relations,

this research thus adapts the maximum value to further highlight the social aspect and explore its potential in the models.

The adaptation of a maximum value is to highlight and explore the social aspect of the model. For the sake of later discussion and interpretation, the best practice is to utilise these values as a combination from different perspectives. This is without a doubt how research should be conducted. However, in order to start the investigation, there has to be a standpoint and foundation for further examination. This is normally done through taking the average value and identifying certain characters and anomalies. These characters and anomalies are then discussed and interpreted with the combination of the maximum or minimum values. Nonetheless, the adaptation of an average value in this social interaction research leaves too much room for interpretations, such as cultural differences and personal preferences. Since this wayfaring model is aimed to explore the allocated social status in the settlement, anything that is an anomaly can be interpreted as personal preference to either gain or avoid that allocated 'power'. In contrast, this research adapts the maximum value as a standpoint. It assumes that people utilise their social space to the fullest, and highlights the social activeness in each household. In this case, the anomalies of the results can only be interpreted as the avoidance of this social interaction. Compared with the possible two-way interpretation based on adapting average value, the application of maximum value limits the interpretation to one possibility only. This would benefit the credibility of later interpretation and eliminate multiple uncertainties and possibilities. Therefore, this research extracts the maximum value of each household to represent their social interaction rate (the results of different social attitude and regional relations can be found in Appendix 4-21).

However, the value of the social interaction is not a direct consequence based on individual effort to gain social status. The application of the maximum value only indicates the maximum social interaction one may gain within his/her own active social space. This social interaction is not merely based on an individual's efforts but also on collective ones. In order for an individual to gain such maximum social interaction, it requires other people to pass by his/her surrounding area and interact with the individual. Without the passers-by, there would be no interaction. Again, this highlights that the approach of wayfaring, the social interaction and relation is based on local movement. The maximum value gained from a meshwork is based on the collective movement and interaction of the agents involved. As a result, the value should also be interpreted under that exact context. The social status of one household gained through a specific meshwork should always be examined under the social identity context which the meshwork implies. This brings this research into the next stage, that of different social identity.

As mentioned earlier, the result of the accumulated meshwork above is the relation meshwork of the social identity of the 'settlement'. That is, it is the relation of everyone sharing the same identity. However, just like in social network analysis, the social relations can be broken down into different networks based on specific identity. For example; a network of farmers, a network of hunters, and a network of elites, etc. The modelling of wayfaring meshwork is no different. The only difference is that it is a social relation research based on meshworks rather than networks. Therefore, in addition to the common identity of coming from the same settlement, there are also meshworks based on different identities, such as class, profession, or kinship. The accumulation of the meshworks linking the same identity allows us to investigate that specific community and social relations. In

turn, the wayfaring theory applied in this research is also capable of adapting multiple social identities.

Take the neighbourhood separation identified from space syntax as an example: each neighbourhood has an identity of its own. Henceforth, it is possible to just accumulate the pathways, along with their meshworks, within a single neighbourhood and examine the social interaction and relations at a local neighbourhood scale (Figure 3.12). This examination highlights how the wayfaring model suits the investigation of allocated dominance of a local community. It is not only a contrast between the existing social status structure and the allocated social interaction structure, but also a contrast between the regional settlement and the local community. It allows the specific query and examination of particular identities and relations. This strength of specific query is exactly what separates a LCP-based wayfaring model from an ABM-based wayfaring model. Whereas ABM is able to record the interaction between individuals, the context of that interaction is lost in the overall 'wandering' movement. On the other hand, the LCP-based wayfaring model is based on specific relational movement and context. In that case, the context is documented along with its interaction and can be traced back.

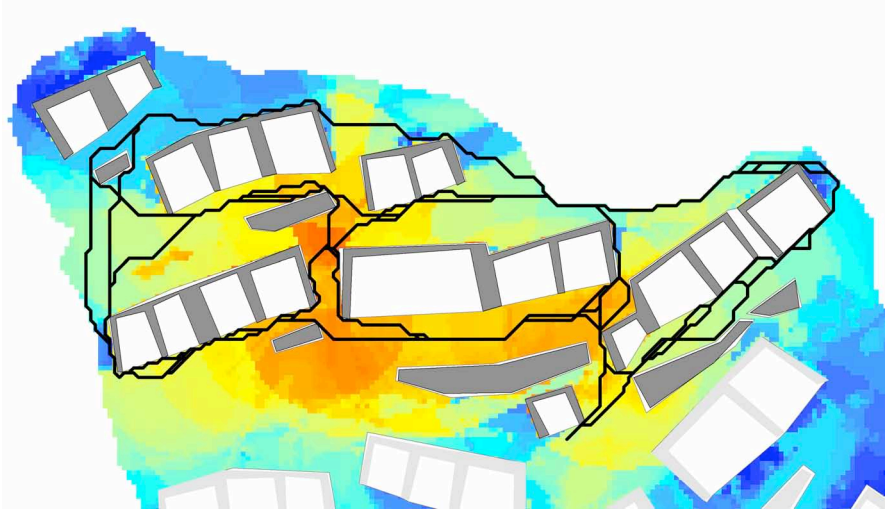

Figure 3. 12 Interaction heat map of neighbourhoods A in *Saqacengalj*.
Red – High Interaction. Blue – Low Interaction.

Depending on one's identity, different meshworks can then be accumulated to highlight that specific social relation. The investigation does not stop at the relation within a given social identity; it also enables the examination of the relation between different identities. That is, it allows the investigation of the relation between social groups. Again, taking the neighbourhood identity as an example: the pathways, along with their meshwork, can be accumulated based on the interconnecting links between two neighbourhoods (Figure 3.13). This results in a social relation in the context of inter-neighbourhood relation examination. From the local point of view, it is possible to examine which household has the highest social interaction rating in its neighbourhood as well as which household in another neighbourhood has the highest interaction rating in this neighbourhood. Likewise, we can only accumulate the pathways leading out to all other neighbourhoods or one specific neighbourhood and see who rates highest in the original neighbourhood, who rates highest in the destination neighbourhood, or who rates highest in a nearby neighbourhood. If multiple social identities within a settlement are thoroughly researched and established, the possibility of this approach can be phenomenal. Various themes, such as local political power dominance, specific household influence on local or external relations, dialogue

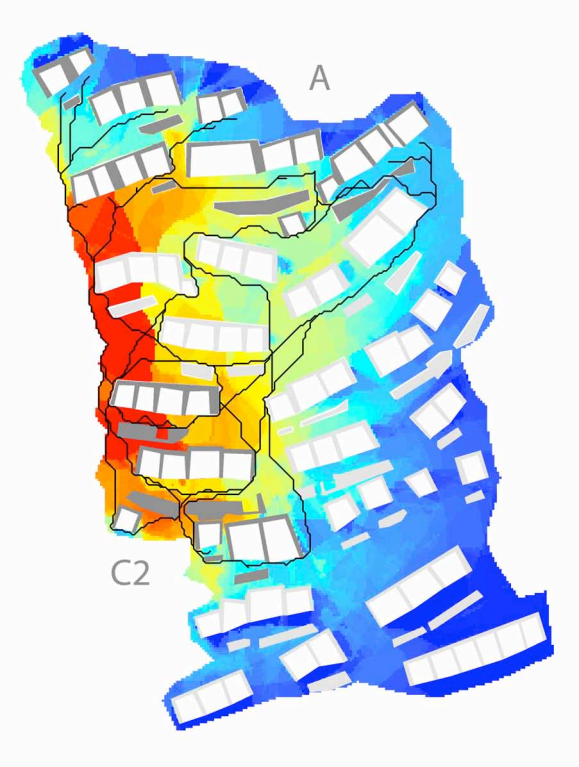

Figure 3. 13 Interaction heat map between neighbourhoods A and C2 in *Saqacengalj*. Red – High Interaction. Blue – Low Interaction.

between the kinship system and political system, or relation between hunters and farmers, can be further discussed and scrutinised respectively or concurrently.

It is acknowledged here that higher interaction rate does not necessarily result in higher allocated social standing. As mentioned in section 3.3.2.4.2 regarding the probability and quality of interaction, the quality and intensity of interaction do not directly represent social bonds with certain households. The strength of social bond is also determined through interaction tolerance, personal preference and various other aspects. Likewise, there is no direct link between interaction rate and allocated social power. The interaction rate merely suggests the quality and intensity of interaction of specific households. However, it is assumed here that higher intensity of interaction allows the specific household to potentially establish a better social relation with the rest of the people involved. Furthermore, this better relation potentially provides the household with higher influence within that specific social group. The higher influence of a household can then be regarded as a reflection of its social dominance within that social group and presents the allocated power emerging through intimate social interaction. Drawing on Thomas's (1996, 2002) concept, this heterarchical power emerges from the ongoing practices of people through their engagements with each other. Therefore, the allocated power is localised and context specific to the community involved (Harris 2014: 85). It is acknowledged that the allocated social power cannot be reduced to simple interaction rate and it is an emergence that involves complex variables. However, this assumption facilitates a possible route to understand the emergence of allocated power through computer modelling of social interactions. Therefore, this research later utilises this assumption as a basis to discuss the emergence of allocated power through social interaction.

The inclusion of multiple identities raises another issue of how they are to be accumulated. As mentioned above, different identity meshworks can be added to highlight the final overall social relations. Nonetheless, this ultimately results in specific relations between two households being accumulated twice. For example (hypothetically), the relation between households X and Y may be added to the final result twice if they are both in the same neighbourhood and both belong to the same kinship group. This issue begs the question of appropriate weighting. It is reasonable to suggest that the relation between households X and Y is stronger since they share the same social status in multiple identities. However, it does not suggest that this social bond is twice as strong as the others. Do kinship relations outweigh professional relations? Furthermore, if there is a hierarchy of relation weighing, what is the ratio between different identities? These are questions most likely without any exact answer. Therefore, how does the wayfaring approach solve the weighting issue of multiple identities? Some would argue that the weighting ratio could have been designed to fit the final evidence of the material remains. In that case, researchers can again benefit from the ratio and perform comparative studies, and maybe utilise it to further investigate the transformation of different identity dominance. However, it is argued here that this approach leaves too many uncertainties and possibilities. The same final result can be achieved by the use of multiple ratios and there is no evidence to validate which ratio is ‘suitable’ or ‘right.’ In consequence, this marks the limitation of the wayfaring approach.

Nonetheless, this limitation actually highlights the strength and proper use of the wayfaring approach. The result of the wayfaring model is not the main objective. What is more crucial is the information and the knowledge researchers gained from the actual modelling process. Similar to that of space syntax, the

wayfaring model can serve as a ‘tool to think with’ (Cutting 2003). The social relations amongst individual identities are in themselves independent contexts. These contexts need to be put back to the material remains to see whether they match the records or not. As a result, the material remains ultimately suggest whether a strong relation of a specific identity exist or not. The model of multiple identities is the exploration of possible existing relations. The confirmation from the material remains merely suggests that the specific relation of a certain identity could have existed. The modelling is about exploring and investigating multiple identities and relations, rather than producing a final product. The final product is a goal that underpins individual aims to be investigated. These individual aims are the different social identity relations that need to be taken into account. It is these individual aims that provide most information in understanding the composition and structure of the past society and social relations. The more details one understands regarding different social aspects of a settlement, the more comprehensive the final product will be.

All in all, the modelling of wayfaring highlights the social interaction from the ground-up. This approach is an attempt to repopulate the empty settlement space as well as fill in the gaps where traditional space syntax approach has being criticised as ‘simplified’ and ‘de-humanised’. It establishes the social status and structure different from that of a delegated social hierarchy. The social status derived from wayfaring is accumulated from intimate face-to-face social interaction rather than forced upon from ideological structure. This approach provides a bottom-up agent-based perspective as opposed to that of a top-down perspective from the social subsystem.

3.4 Social Transformation

The third aim of this research is to scrutinise both delegated and allocated power in order to understand the social transformation. This investigation of social transformation is performed through the examination of the contradiction between the delegated social meshwork and allocated social meshwork. The main theoretical frame of this research is built on the social power conflict of one period and the response from the social hierarchy in the next period to investigate social transformation. It is through this discourse that researchers can investigate and understand the reason behind social transformation.

In order to investigate the social transformation of early *Kaushi Paiwan*, the first part of this research is aimed to establish a better understanding of the given society and its characteristics and habitus in the social structure. This is achieved through the application of space syntax analysis and basic wayfaring modelling. The results of the first section establish a platform to show the social structure and habitus. This platform constitutes the preference of the social hierarchy against which later social conflicts are going to act. In terms of social dominance, this platform is the ideological structure that governs social behaviour. It is a reflection of human behaviour based on their delegated power and social status within the hierarchical system.

On the other hand, the second part of this research is based on more sophisticated wayfaring analysis which includes multiple social identities. The adaptation of wayfaring theory investigates intimate human interaction and highlights a bottom-up approach. Based on the assumption between interaction and social dominance, this approach accumulates allocated social power through direct interaction. This interaction is derived from everyday activities based on

multiple social identities and relations. It highlights a more agent-based social interaction and provides a 'native' perspective on social relations. Depending on the matching of this allocated power with the original delegated power, it is possible to find out whether there is a conflict in social domination or not.

Furthermore, through the examination of settlement development and comparative studies between multiple sites, this research illustrates the reaction of *Kaushi* people in a later period against the social conflict from the earlier period. Through the dialogue between delegated and allocated power, the main goal is to reveal some social phenomenon that occurred at that period and discuss its possible impacts on the existing social structure. These social phenomena are not only the results of individual wayfaring analyses but also the social conflict of a wider social discourse. The adaptation of this wayfaring approach makes the discussion possible and profits researchers' understanding of a dynamic social transformation. In the later sections, the potential and strength of wayfaring approach will be demonstrated in further detail.

Chapter 4:

Space at Work:

Spatial Layout, Interaction and Social Relation

4.1 Meaningful Construction: What was Provided

4.1.1 Settlement Pattern

This Chapter first investigates the nature of *Paiwan* neighbourhoods and the significance of high social status households within each neighbourhood. It explores the settlement pattern through a space syntax approach. This provides a platform on which distinct house-structures and their locations can be investigated in relation to spatial pattern using mathematical methods. Using simple integration rate and mean depth to highlight neighbourhood dominance and accessibility it will show interaction and social relations.

To start scrutinising each neighbourhood, this research adapts the step-depth approach used previously in *Paiwan* settlement pattern analysis (Wu 2010) This approach is designed to identify the clustering and separation of different neighbourhoods within a settlement. It measures the amount of activity areas between house structures rather than just the degree of clustering or distance between different structures (Wu 2010: 56). This is particularly important as all the house-structures are strongly clustered within a single settlement area and usually there are no significant gaps separating one neighbourhood from the others. Thanks to the application of the step-depth analysis, this research can further

examine the significance of specific households within each neighbourhood. The location and the correlation with the house-structure characteristics can then provide insights into building preferences of different social classes and individuals

4.1.2 The Site of *Saqacengalj*

In previous research, step-depth analysis has revealed that *Saqacengalj* comprised five neighbourhoods (Wu 2010: 62). There are two main features of the defined neighbourhoods revealed by the step-depth approach. Firstly, every household is within three steps from at least one other household in its neighbourhood. Secondly, each neighbourhood usually utilises a central axis pathway to connect its terraces. Based on the first feature, the site of *Saqacengalj* was divided into three areas: A, B and C. Furthermore, Area C is again divided into Area C1, C2 and C3 based on the character of the central axis (Figure 4.1) (Wu 2010: 61). In addition, there is at least one 'open space' in each neighbourhood for social gatherings. It was argued that this is evidence that each neighbourhood functioned as an individual social entity (Wu 2010: 62). This research utilises these five neighbourhoods for further examination and exploration.

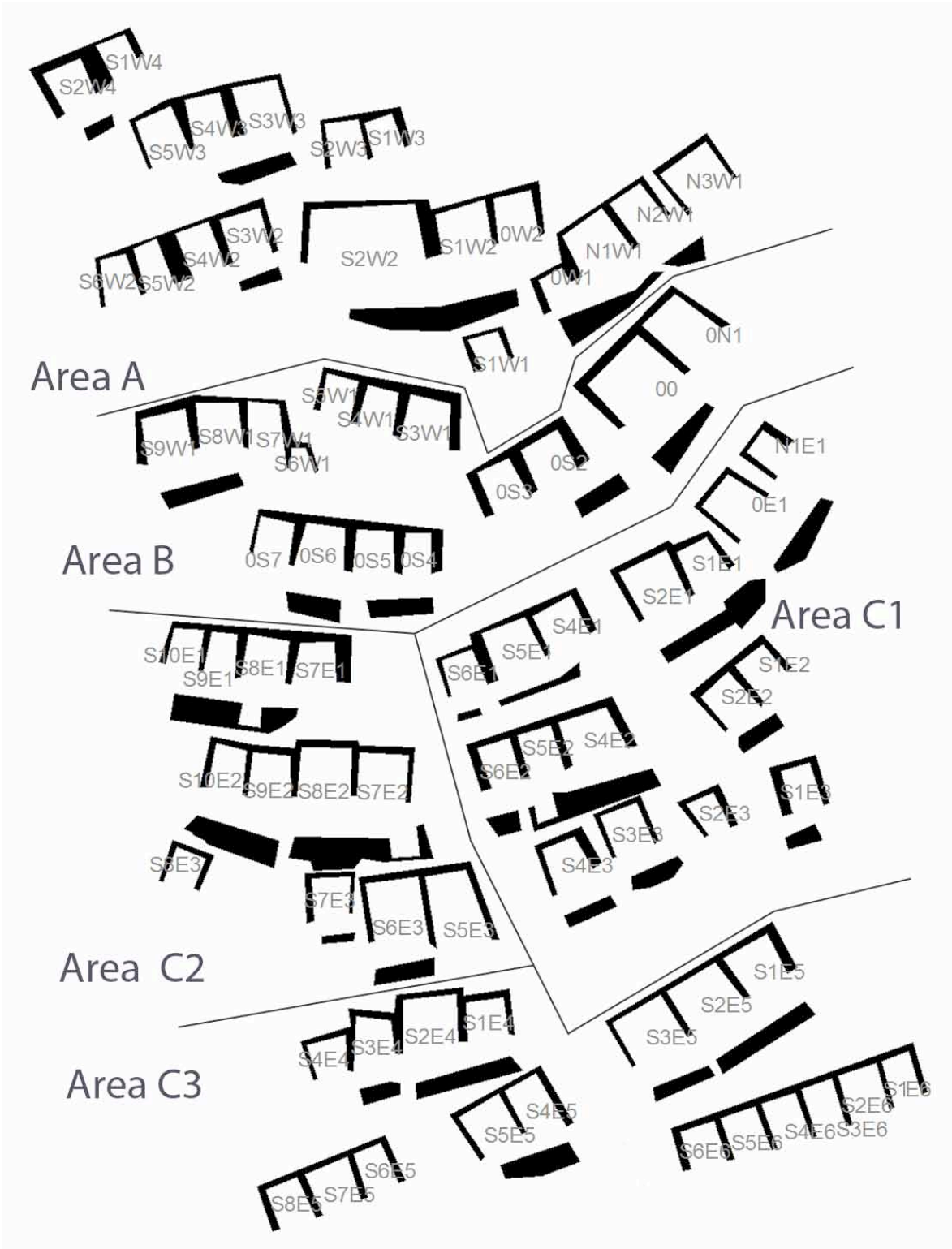

Figure 4. 1 Area division in *Saqacengalj*.

As mentioned before, the abandoned settlements have provided very few material artefacts. What survived are mainly the house-structures and the individual small structures attached to them. As a result, the attributes for each household are the primary sources of data on the socio-political structures of the settlements. The following attributes of the structures were recorded at Saqacengalj: 1.) dimensions, 2.) identity indication structures 3.) location of hearths, 4.) presence of water containers; and 5.) presence of cube stone structures (Wu 2010).

4.1.2.1 Saqacengalj as a Whole

According to the convex map of *Saqacengalj*, the most integrated space is located at the centre of the site (Figure 4.2). This is likely to be an artefact of the method used often criticised for susceptibility to edge effects. Interestingly, Area A shows a much lower value of integration than the other areas. This could stem from the fact that the majority of houses are located in the bottom half of the site, which might have caused statistical-weighting towards the bottom.

In previous research, Wu (2010: 16) has also shown a difference in the pathway patterns between the top half (Area A and B) and bottom half (Area C1, C2 and C3) of the settlement. The pathway layout in the top half is more ‘distributed’ (Grahame 2000) than that in the bottom half. Wu suggested that the difference may be a result of the settlement being constructed from the top towards the bottom. However, he also stated that the pattern of pathways may only be superficially different. The main principle of using one major axis pathway to connect different terraces remains the same in both: the top and the bottom area (Wu 2010: 58).

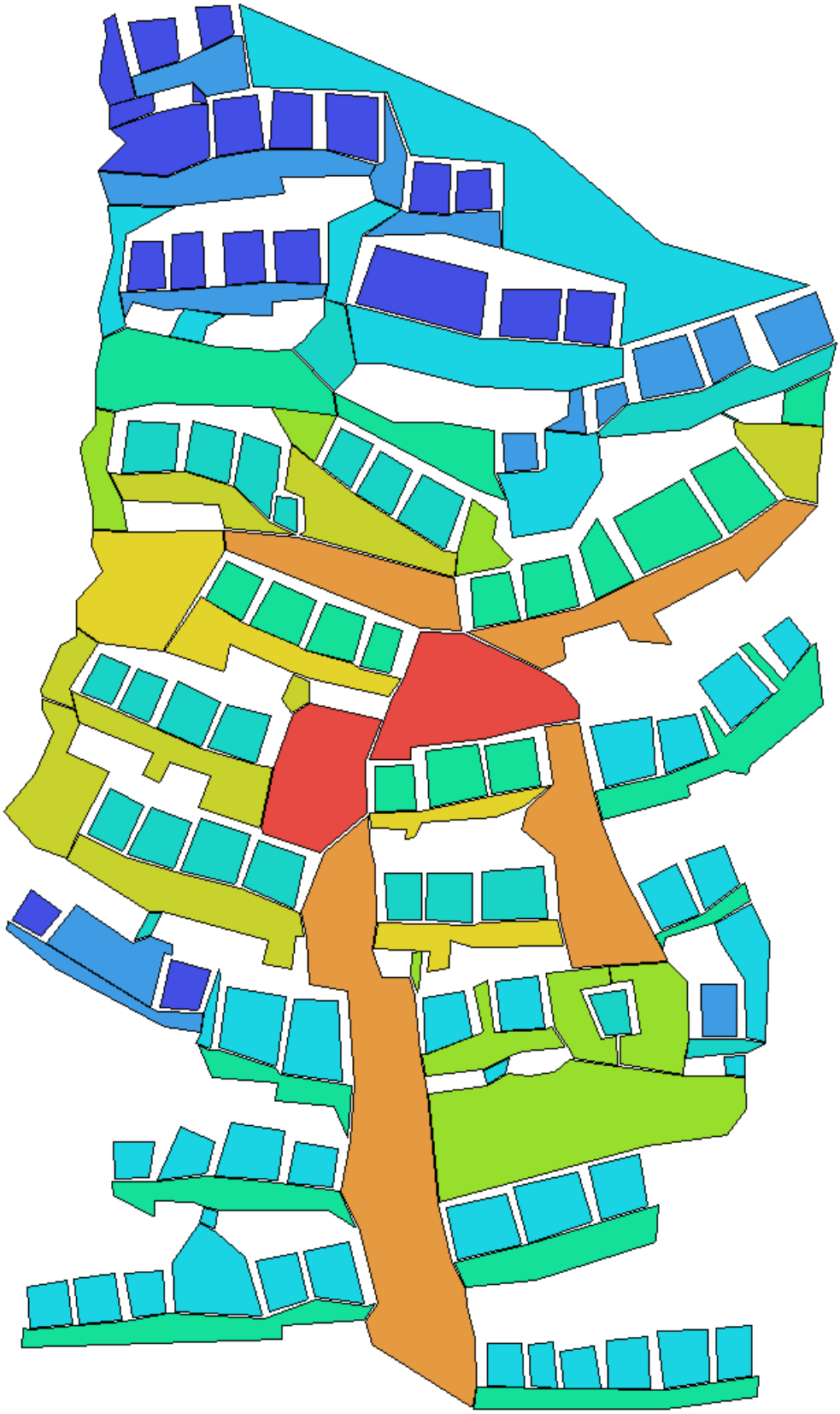

Figure 4. 2 Convex integration of *Saqacengalj.*
Red - high integration rate. Blue – low integration rate.
(Produced with depthmapX.)

In terms of defining the specific function of each structure, only two structures found in the site differ significantly from the others (Figure 4.3). The first one is house-structure 00 marked by the Headman indication stone located in front of it. It is also the best-preserved house-structure at the site, which may indicate a higher quality of the design and the raw materials used in its construction. In addition, the front platform of structure 00 is also well constructed and large in size. However, it is hard to estimate its size since parts of it have fallen down the terrace slope. Finally, structure 00 is the second largest house in the site, therefore standing out amongst the rest of the house-structures. For these four reasons it is assumed here that structure 00 is most likely to be the Headman's residence.

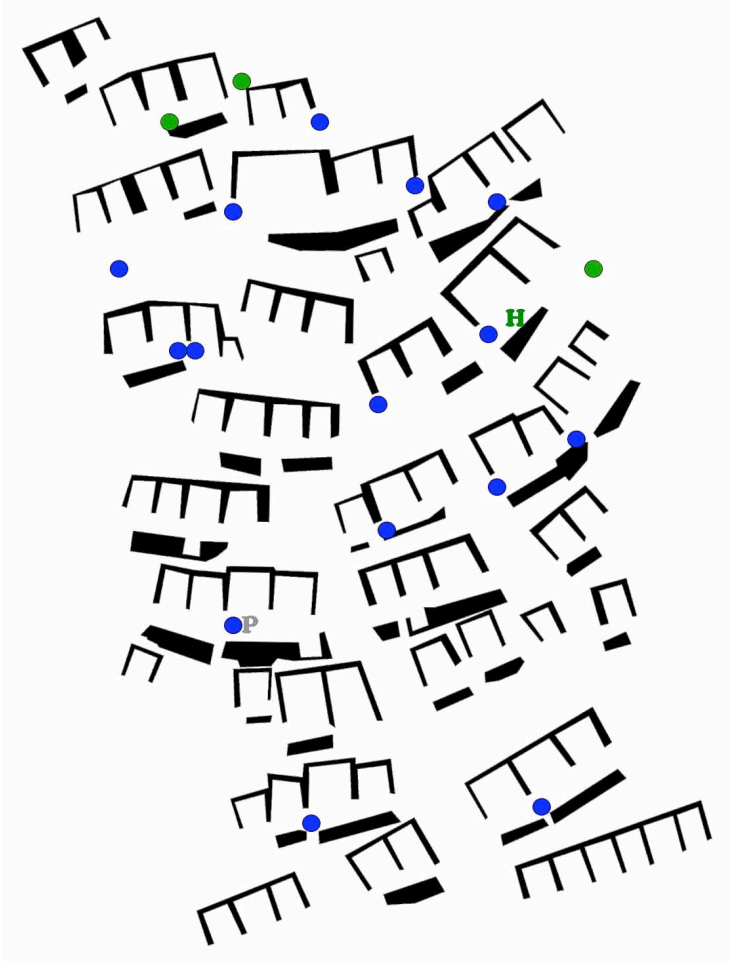

Figure 4. 3 Distinct features of houses in *Saqacengalj*. Blue Dot - Water Container; Green - Cube Stone, H - Headman Stone, P - Human-Shaped Stone.

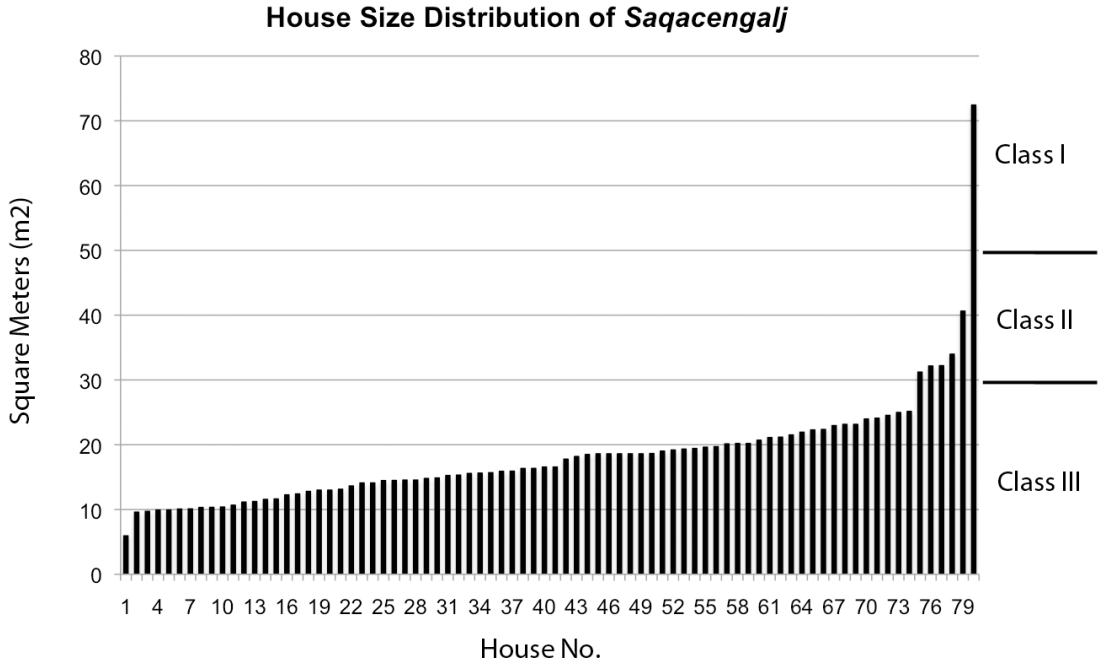

Figure 4. 4 The distribution of house sizes in *Saqacengalj*.

Other than the Headman stone structure, another 'human-shaped' stone structure is located in front of structure S8E2. The exact function of this 'human-shaped' statue is still unknown, however, it is commonly believed that this type of anthropomorphic statue marks a building of religious nature, for example a priest's household. For example, in the contemporary *Kaushi* village the priest's house is decorated with paintings of human figures on its front wall. Nonetheless, although there is no doubt that this house-structure is in itself significant in some way, its identification as the priest's house remains provisional until further excavation recovers more evidence for the association between anthropomorphic depictions and religious structures in *Paiwan*.

The house-structure sizes of the *Saqacengalj* settlement (see Appendix 2) can be categorised into three different classes. The breakpoints of each class are very well defined (Figure 4.4). Figure 4.4 shows two clear breakpoints at 30m^2 and 50-70m^2. Therefore, the house-structures in *Saqacengalj* are categorised into

three classes based on their size. House-structures below 30m^2 are Class III house-structures, 30m^2-40m^2 are Class II house-structures, and house size above 30m^2 are Class I house-structures. The largest structure S2W2, the only house-structure categorised as Class I, is located at the centre of Area A. Four out of five Class II houses are located in the top half of the settlement and only one Class II structure is situated in the bottom half (Figure 4.5). Again, the distribution of large house-structures shows the aforementioned division between the top and bottom halves of the site.

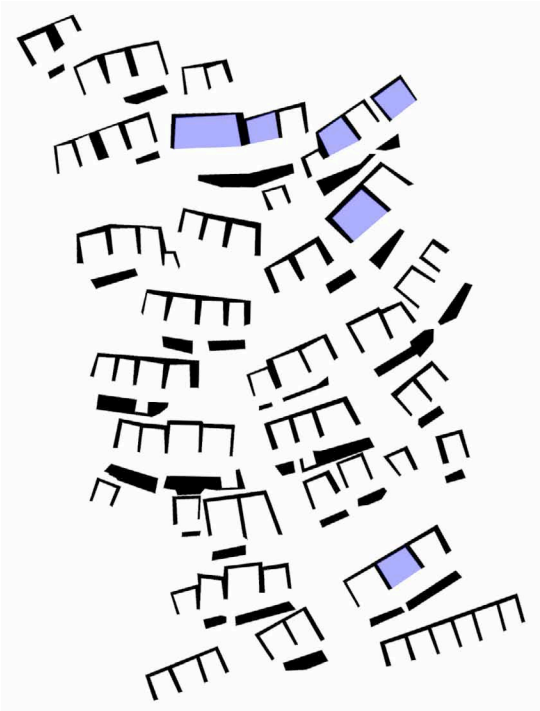

Figure 4. 5 Location of Class I and Class II house-structures in *Saqacengalj*.

The same top-bottom division is also visible in the distribution of both water containers and cube stone structures (Figure 4.3). Nine out of fifteen water containers and all three cube stone structures are located in the top half of the site. In total there are nine water containers used by 35 households in the top half and the ratio is almost twice as high as that in the bottom half (25.7% against 13%). Amongst the 15 water containers, four are located in front of distinct house-structures: 1.) the largest house-structure S2W2; 2.) the Headman's residence 00; 3.) the possible priest or religious house-structure S8E2; and 4.) the only Class II house-structure in the bottom half of the site, structure S2E5. Since a water container is considered a luxurious, hard-to-acquire item, its association with the more exceptional households is not surprising. In previous research, Wu (2010: 68) utilised these

statistics to support his settlement formation argument. He suggested that the richness in luxurious items and the structural complexity in the top half can be explained through the top-down expansion hypothesis. According to Wu the residents of the top half of the settlement were the head families and therefore had higher social status and better access to material goods than their siblings and descendants. However, Wu's proposal is difficult to test since no evidence of specific kinship ties has ever been found at the site.

The last house attribute concerning settlement pattern is the position of the hearth in each household. It is not hard to notice that the location of hearths follows an interval distribution (Figure 4.6). That is, if one household has its hearth located on the right, its next-door neighbours on either side would have it located on the left. The location of hearth usually corresponds with the location of drainage systems channelling out the wastewater from the household. Therefore, having the hearth located in an interval system meant less laborious house construction since two or more households could share the same drainage. However, this principle is not fully practiced throughout the site. There are five areas of the site comprising at least six households that do not follow this principle (Figure 4.6).

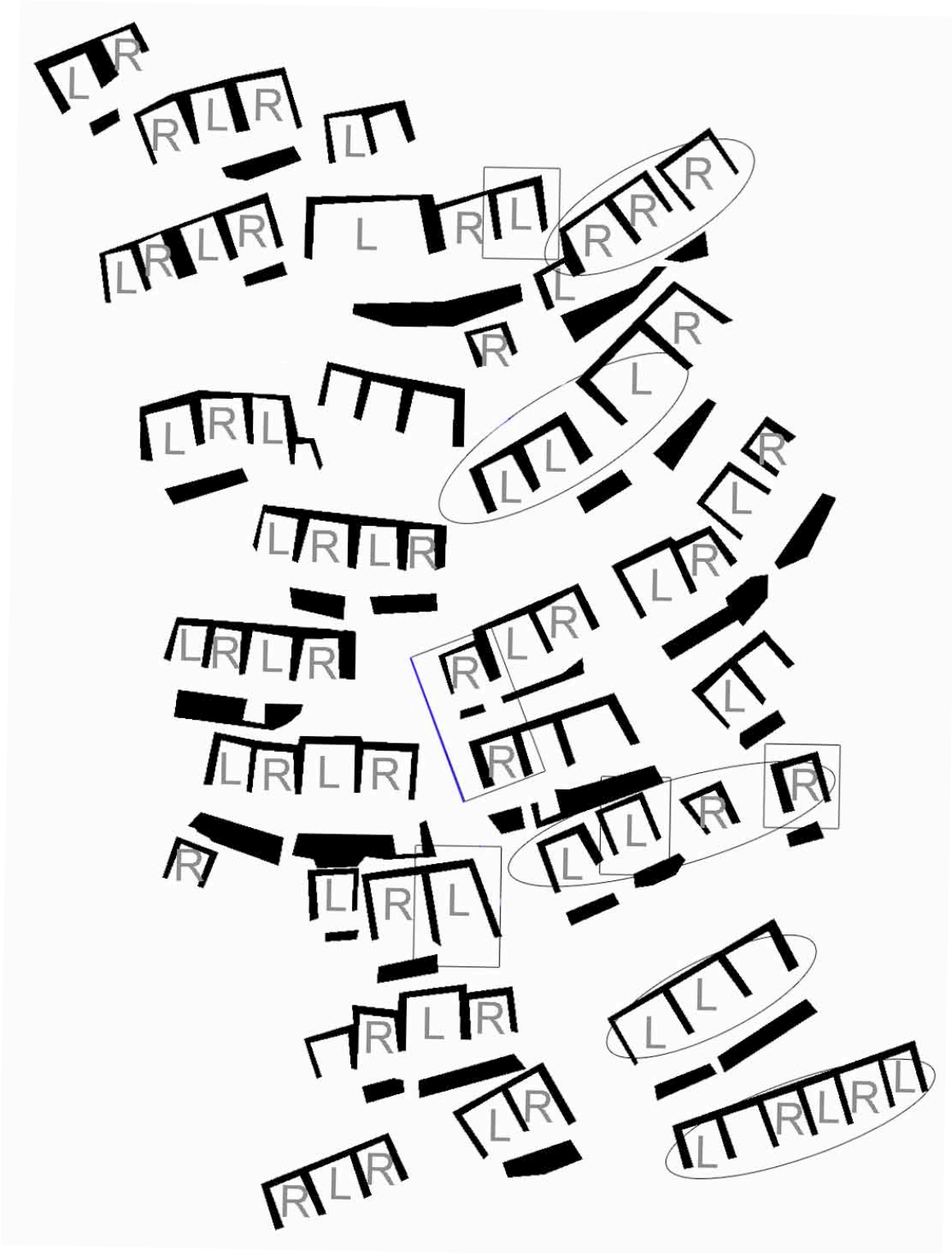

Figure 4. 6 Hearth location in house-structures of *Saqacengalj*. L – hearth located on the left side of the house. R - hearth located on the right side of the house. Eclipses - structures which do not follow the interval principle. Rectangles - structures which do not follow the pathway principle.

In addition to the interval principle, the hearth location also follows another pattern – the pathway principle. In cases when a household is located next to a terrace-connecting pathway, the hearth is usually located on the pathway side of the house-structure (Figure 4.6). Having the drainage system right next to an existing terrace-connecting pathway structure means that instead of constructing a new channel between terraces, the builders could attach the drainage to an already existing structure therefore saving time and effort. However, such as in the case of the interval pattern, amongst the site, there are also exceptions to this rule. Five areas of the site including at least six households do not follow the pathway principle, (Figure 4.6).

To summarise, an examination of the five attributes of house-structures attributes, allow us to establish a few basic principles. The first phenomenon is the top-bottom division. The presence of high status households, higher density of water container and the presence of cube stones in the top part of the site as well as the differences in the house sizes and pathway structures between the top and the bottom areas all indicate a strong dichotomy in the settlement. In addition Wu (2010: 63) argued that the pathway in the bottom half is more 'strategically planned' and the top half possesses richer materials. Although his hypothesis that the site of *Saqacengalj* was established from the top and gradually spread down slope cannot be currently verified no alternative explanations have been proposed so far. The second phenomenon of interest is the position of hearth in the house-structures, which follows two principles: interval and pathway-orientated patterns. In addition to these two observations, more interesting points surface from an examination of the correlations between the five attributes.

Firstly, there is a strong correlation between the location of hearths and water containers. Ten out of fifteen water containers are located in front of the

households who have their hearth on the left side while only three are associated with household with hearths on the right side. Amongst the remaining two, one is unknown since the hearth location is not identified, and one is located in an open space. Furthermore, amongst the ten house structures with water containers located on the left side, there are all four of the possible high-status households mentioned earlier: the largest house-structure S2W2; the Headman's residence 00; the possible priest or religious house-structure S8E2; and the only Class II house-structure in the bottom half of the site, structure S2E5. Statistical analysis also shows that there is a significant relation between hearth located on the left side of the house and the presence of water containers (one-tailed Fisher exact p=0.035). Since it is unreasonable to suggest that inhabitants of households with hearth located on the left have higher possibility in becoming someone significant or wealthy, the more logical explanation is that persons of high-status were more likely to build their houses with a hearth located on the left. This is supported in the case of the structure S2E5, which according to the interval principle should have the hearth on the right. In addition, the principle is also broken in the neighbourhood of the Headman's residence 00 which may indicate that the hearth was specifically built on the left in this high-status structure.

On the other hand, three households with water containers have their hearth built on the right, one of which (structure N1W1) is even a Class II household. The most likely explanation is that they all follow the interval principle. If the household's wealth or social status was gained but not pre-set then the construction of the water container would postdate the location of the hearth. Statistically, these households would have an almost equal chance of having the hearth on the right than on the left. The house-structure N1W1 may be an exception. Given that it is located in a high Class II density area it might have

belonged to the group of high-status households. Thus, following Wu's argumentation, it might have been a household of a head family and amongst those that first settled in *Saqacengalj*. Hence, it possessed better access to resources than its siblings and descendants.

4.1.2.2 *Saqacengalj* as Separate Neighbourhoods

Having described the major spatial patterns of the site and established principles that guided them, this section discusses how these attributes and phenomena may be interpreted at a local level. Using the integration rate of each convex space as a reference this research will examine if and how daily interaction could have influenced and/or been reflected in the spatial layout of the site. However, it must be noted that integration rate is an indicator of accessibility, not the actual interaction or a measure of times-passed at a given location. This section will first discuss individual neighbourhoods and then move on to examine one of the large scale patterns described in the previous section the top-bottom division of the site.

Area A:

This area involves three Class II house-structures (S1W2, N1W1 and N3W1) and one Class I house-structure (S2W2) (Figure 4.7). This makes Area A the highest density area to host high-class house-structures. In addition, there are four water containers located at S1W3, S2W2, 0W2, and N1W1, and one water container on the edge of the large open space on the left side. Two of the five water containers are located on the most integrated terrace, one of which belongs to the largest house-structure S2W2. House-structure N1W1, located on a moderately integrated terrace, has another water container in front of it and it has been interpreted as a possible household of head family as mentioned before. The

locations of the other two water containers require further examination. One is located on a moderately integrated terrace in front of the house-structure 0W2 while the other is situated within the large open space on the left side.

Area B:

Area B hosts one Class II house-structure, the Headman's residence 00 (Figure 4.8). There are four water containers in this area; two of them (0S3 and 00) are located on terrace of the highest integration rate. The other two are located side by side on the left side of the area. The terrace on the right side is one of the terraces where the interval principle of hearth location is ignored.



Figure 4. 7 Integration rate in Area A of *Saqacengalj*.

Red - high integration rate. Blue – low integration rate.

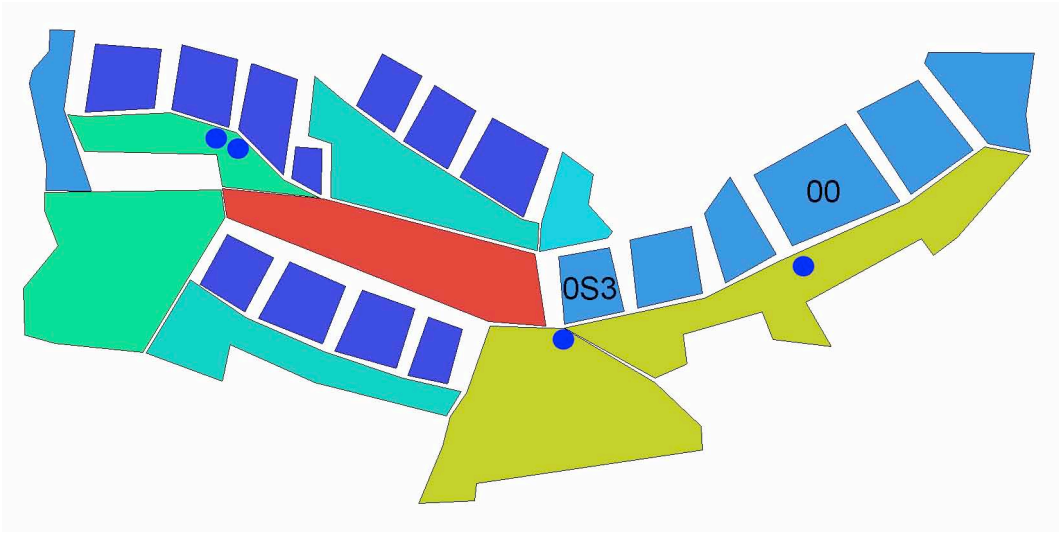

Figure 4. 8 Integration rate of Area B in *Saqacengalj*.

Red - high integration rate. Blue – low integration rate.

Area C1:

There are three water containers found in this area, all located on terraces of moderate to high integration rate (Figure 4.9). The east terrace is another one that does not follow the interval principle of hearth location. In addition, the left end of the top two terraces do not follow the pathway principle.

Area C2:

This area has only one water container, which is located in front of the possible priest's house S8E2 (Figure 4.10). Although it is the most 'organised' neighbourhood it does not follow the pathway principle in the bottom terrace.



Figure 4. 9 Integration rate of Area C1 in *Saqacengalj*. Red - High. Blue - Low.

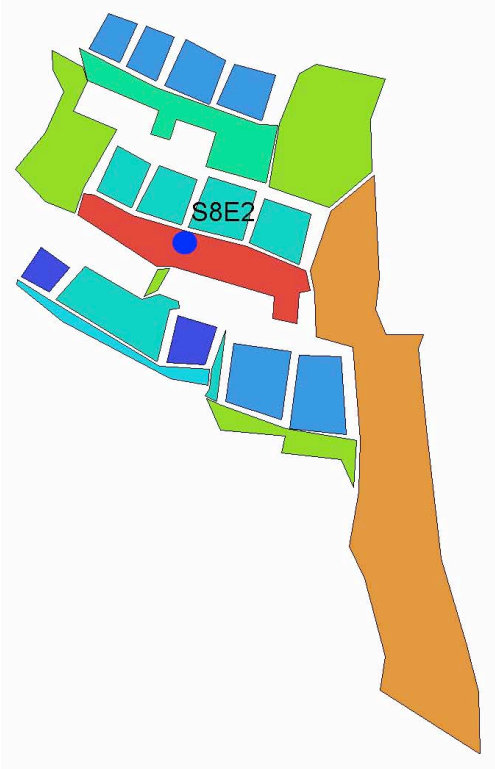

Figure 4. 10 Integration rate of Area C2 in *Saqacengalj*. Red - High. Blue - Low.

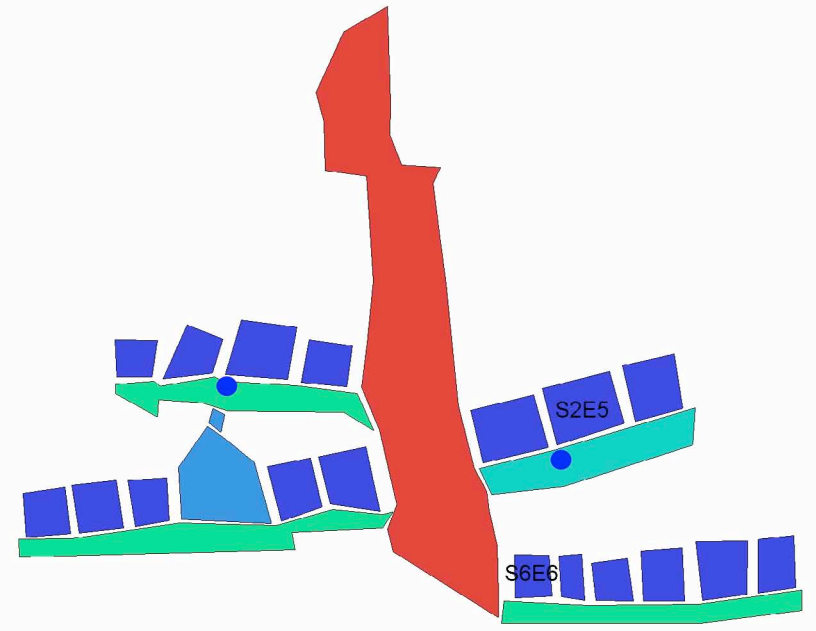

Figure 4. 11 Integration rate of Area C3 in *Saqacengalj*. Red - High. Blue - Low.

Area C3:

Area C3 hosts the only Class II house-structure (S2E5) in the bottom half of the site (Figure 4.11). In addition, S2E5 and S6E6 house-structures are the only two houses that do not follow the interval hearth principle in the neighbourhood. As mentioned earlier in case of S2E5, it could have been a deliberate choice to show its special status. The structure S6E6 breaks either the interval principle or the pathway-orient principle. Choosing one would be a violation of the other. There are two water containers in this area and both of them are located on low integration terraces.

These spatial patterns considered at a higher level reveal some interesting points. First, the most integrated terrace of the top part of the site is located in front of the largest house-structure S2W2 (Figure 4.12). The second highest integrated terrace is associated with the cluster of Class II house-structures. This again highlights the significance of the largest house-structure S2W2, although its function and nature are still to be determined. Secondly, from the perspective of the top of the site, the Headman residence is located on a very low integration terrace, only slightly higher than the lowest integration terrace located just left to it. However, from the whole site level, the terrace where the Headman residence is situated is the most integrated terrace of all (compare figures 4.12 and 4.2).



Figure 4. 12 Integration rate of the top half of Saqacengalj. Red - High. Blue - Low.

In the bottom half of the site, the highest integration terrace is situated in the top centre (Figure 4.13). There is one household (S5E1) with a water container in front of it on this terrace. The possible priest's house (S8E2) is located on a terrace of medium to high integration rate. In addition, house-structure S2E5, which is the only Class II structure in the bottom half, is located on the terrace of the lowest integration rate. In fact, the terrace where S2E5 is located is actually also the lowest rating terrace both in its immediate neighbourhood C3 and in the whole site making it the lowest integrated terrace at all three levels of the analysis. This pattern could offer clues as to why S2E5 is constructed in a way that stresses its different status amongst the neighbouring structures.



Figure 4. 13 Integration rate of the bottom half of *Saqacengalj*. Red - High. Blue - Low.

4.1.3 The site of *Aumagan*

Unlike *Saqacengalj*, where the topography is more continuous and gentle, the site of *Aumagan* is more rugged and prominent in the landscape. The site is divided into the left slope and the right slope by a fault running through the centre. The two slopes are connected by a gentle slope at the top and by another pathway across the fault line at the bottom of the settlement. Therefore, compared to *Saqacengalj* the site has two side axes on either side of the settlement rather than one central axis down the centre.

Wu's approach of step-depth in detecting neighbourhood divisions has proven fruitful in the case of *Saqacengalj* (Wu 2010). Therefore, this section moves beyond *Saqacengalj* and investigates the clustering of households in the site *Aumagan* with the same step-depth approach. The relations between house-structures are removed from high step-depth to low step-depth in turn to scrutinise how the house-structures are clustered together. Again, clear separation appears once the removed step-depths are greater than three steps (Figure 4.14). This division point is the same in *Saqacengalj* where every household is accessible in three steps from at least one other household within the neighbourhood.

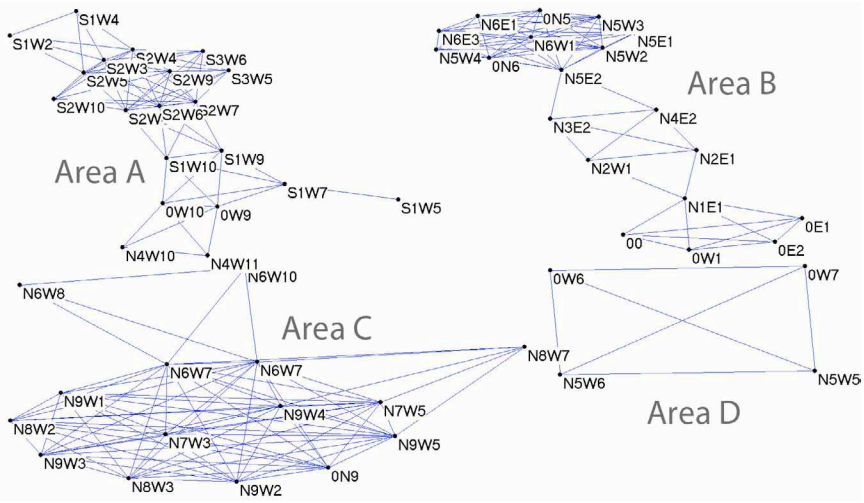

Figure 4. 14 Area separation diagram of *Aumagan*. (Produced with Pajek.)

From this initial analysis, the site should be divided into four areas. However, Area D (Figure 4.15) consists of only four house-structures and raises the question of its ability to function as a self-sustainable community. In addition, it lacks the open space that supports communal activities documented in previous research (Chiang 2003b: 212, Wu 2010: 62). It is noteworthy that Area D is located on the steepest slope in *Aumagan*. This may have caused it to be separated from the other areas since one would have to pass more stairways before arriving in this area. Therefore, Area D could have been part of Area A, B or C. Since it is separated from Area B by the central fault line, it is clear that Area B can be ruled out. In order to examine the links with the remaining two areas, Area A and Area C, an analysis of their spatial patterning was performed.

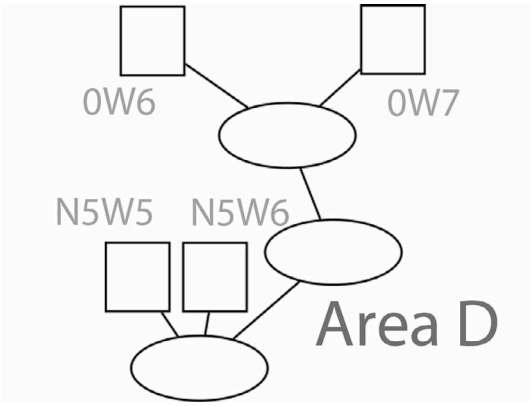

Figure 4. 15 Diagram of Area D in *Aumagan*. Square - House-Structure. Eclipse - Pathway.

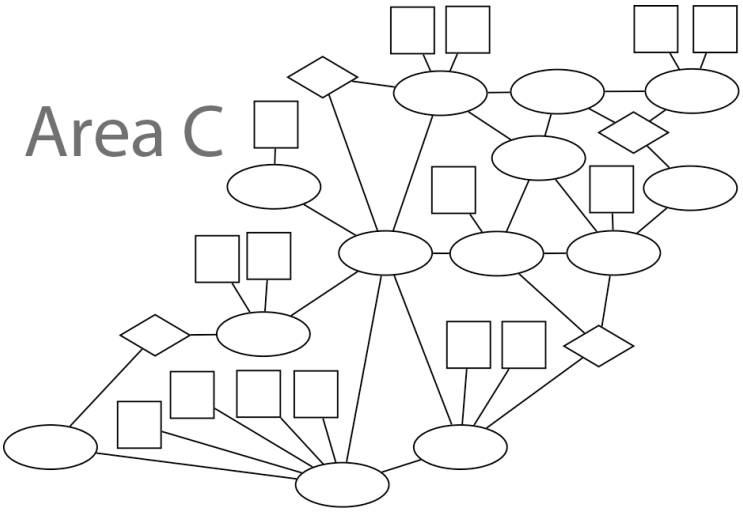

Figure 4. 16 Diagram of Area C in *Aumagan*. Square - House-Structure. Eclipse - Pathway.

The convex map of Area A and Area C shows very different configurations. Area C is highly interconnected and the pathways form a 'spider web' pattern (Figure 4.16). In contrast, the layout of Area A is much more linear, with two side-axes' connected by the pathway located at the top of the hill (Figure 4.17). The terrace on the left side and the far right terrace stretch out from the central point. That said, Area D fits better with the pattern of Area A, where it forms a third axis stretching out from the same central point. In addition, Area D similarly to the other two arms of Area A is located on a very steep slope. In fact, the steep slope separates it from the gentle slope of Area C. Therefore, this research suggests that Area D should be considered part of Area A and the division revealed by the step-depth clustering analysis may have resulted from the natural breaks of the steep and rugged slopes of *Aumagan*.

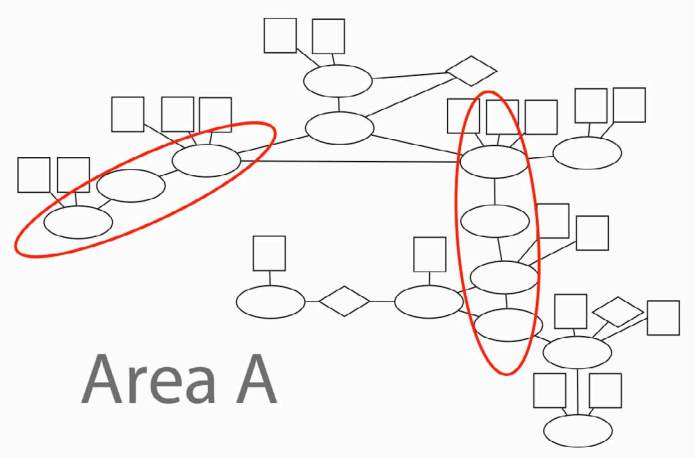

Figure 4. 17 Diagram of Area A in *Aumagan*. Square is House-Structure. Eclipse - Pathway.

In consequence, the results of the step-depth analysis suggest the existence of three neighbourhoods in *Aumagan*: Area A, Area B and Area C (Figure 4.18). There are 24 house-structures in Area A, 19 in Area B, and 15 in Area C respectively. In addition, each area possesses at least one open space for communal activities. This again highlights the nature of segmented neighbourhood communities (Chang 1958: 307; Renfrew 1984: 177).

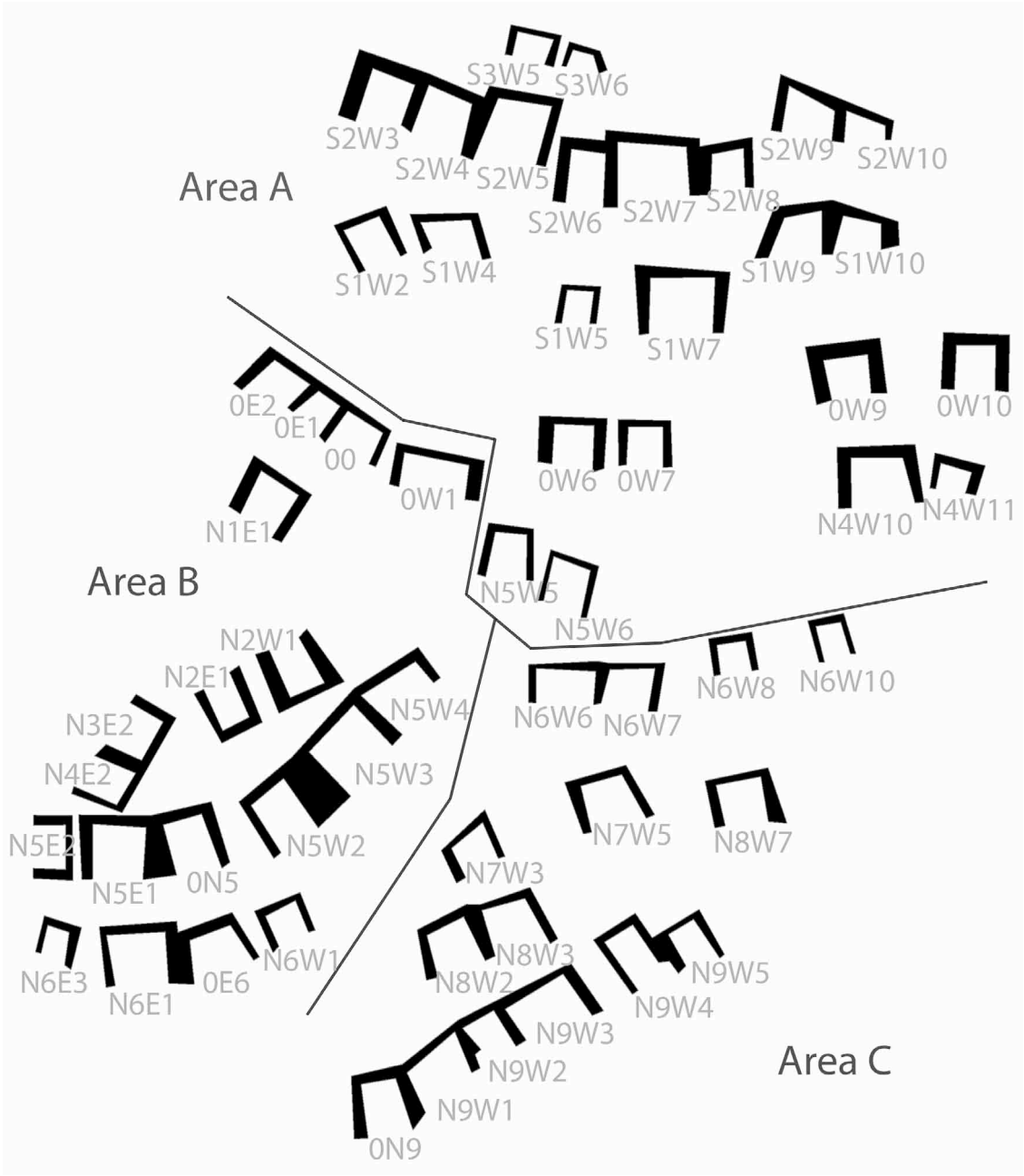

Figure 4. 18 Area division in *Aumagan*.

4.1.3.1 *Aumagan* as a whole

Similarly to *Saqacengalj*, the convex map of *Aumagan* shows that the most integrated space in *Aumagan* is located at the centre of the site (Figure 4.19). Again, this pattern may be an artefact of the 'edge effect' bias that the method is known to be susceptible to. The highest integrated area is located slightly towards the bottom. However, unlike in the case of *Saqacengalj*, the reason behind it is not more houses at the bottom of the hill but the location of the main path bridging the left and the right side of the site, which marks the area of the highest integration rate (Figure 4.19).

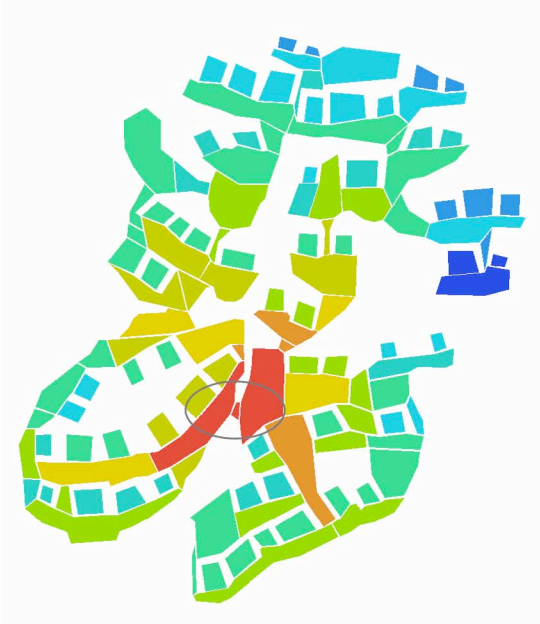

Figure 4. 19 Convex integration of *Aumagan* where red is high and blue is low. Circled area marks the path bridging the two halves.



Figure 4. 20 Convex integration of Area C in *Aumagan* where red is high and blue is low. Circled area is the central pathway connecting terraces.

On the other hand, there are also striking differences between the two sites. The spatial layout of *Aumagan* is a very different pattern from that of *Saqacengalj*. One of the major characteristics of *Saqacengalj* is the use of central axis to connect different terraces. This central axis pattern is used at *Aumagan* only in Area C (Figure 4.20). This lack of the central axis pattern is likely to be a result of the need to adapt the settlement to the rugged terrain with open areas scattered between topographic breaks.

In consequence, open spaces suitable for construction are limited in number and smaller in size. Since the central axis pattern relies heavily on wider platforms, the topographic conditions at *Aumagan* are not suitable for this layout. The only area with a sufficient width for a formation of the central axis layout, apart from Area C, is the top half of the Area A. However, even though the top of Area A would be suitable, the bottom half of the area is divided all the way down to the bottom of the site by the main fault forcing the split of Area A into two side-axes rather than one central axis.

All areas in *Aumagan* differ from one another on both convex and axial maps. Area A follows a linear pattern with two side-axes connected by a single path at the top of the site. Area B is mainly composed of a circular layout circumscribing a small hill on the bottom left side. And finally, Area C follows the central axis rule and is laid out on a relatively open and gentle slope at the bottom right side of the site.

As previously stated, no material remains were found at the site to indicate a specific social status of any of the households in *Aumagan*. Having neither such indicators nor water containers at the site is undoubtedly a real disadvantage in terms of examining the status of individual households. However, there are still two major structural characteristics available for investigation of the settlement: 1.) the size of each house-structure; and 2.) the location of hearths inside the houses.

The house-structures in *Aumagan* (see Appendix 3) were categorised into two classes based on their breakpoint (Figure 4.21). The site has no Class I house-structures similar to the one found at *Saqacengalj* (structure S2W2). However, the breakpoint between Class II and Class III rises from $30m^2$ in *Saqacengalj* to $40m^2$ in *Aumagan*. Nonetheless, the size range of Class II remains

20m^2, ranging from 40-60m^2 rather than 30-50m^2 at *Saqacengalj*. As a result, the average house size shifts from 18.29 ± 8.71 m^2 in *Saqacengalj* to 26.76 ± 11.43 m^2 in *Aumagan*. The Mann-Whitney U-test shows that the houses in *Aumagan* are significantly larger in size than those in *Saqacengalj* (U=1132.5, N_1=80, N_2=58, two-tailed p<0.001). The reason of this increase in house size remains unknown and needs further scrutiny.

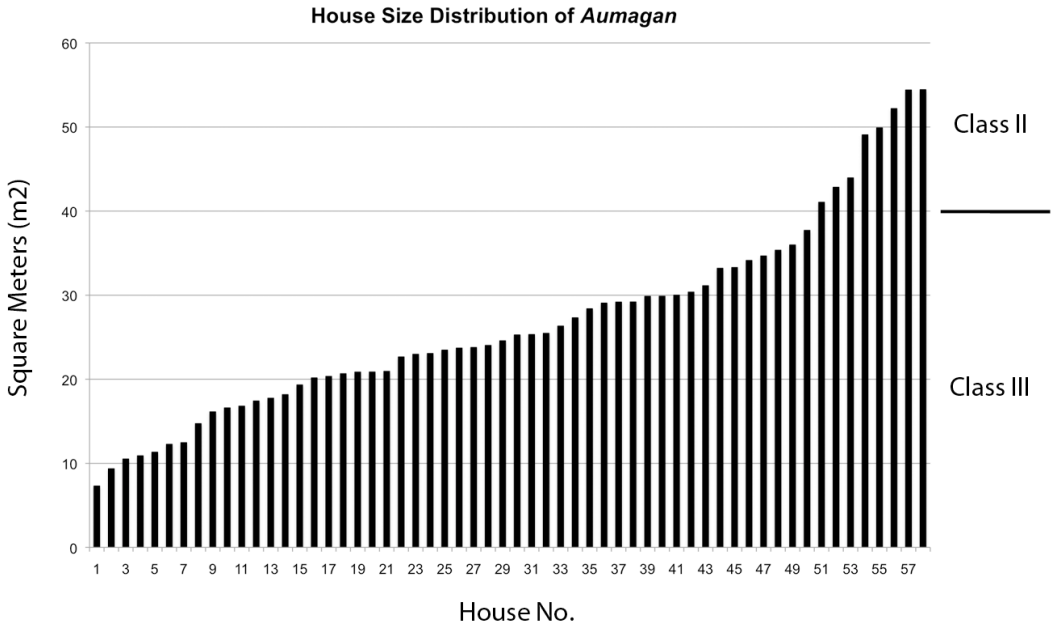

Figure 4. 21 Breakpoint of house size in *Aumagan*.

The Class II house-structures in *Aumagan* are more equally distributed amongst the three areas (Figure 4.22) compared to those in *Saqacengalj*, where they were focussed in the top right corner (Figure 4.5). Three out of eight Class II house-structures are located in Area A; four of them in Area B; and just one in Area C. Thus, every neighbourhood has at least one Class II house-structure. This observation supports the notion of Chang (Chang 1958: 306-307), that each neighbourhood belonged to a separate community, perhaps a kinship. In contrast, there are two neighbourhoods without Class II house-structures in *Saqacengalj*.

The possible reason behind this is that *Saqacengalj* was a settlement that grew from a small group of people into a larger community. Therefore, the head families were likely to remain in their original neighbourhood rather than in the neighbourhood where most of their kin eventually settled in. After they moved to *Aumagan*, they had the choice of living amongst their own kin in the same neighbourhood.

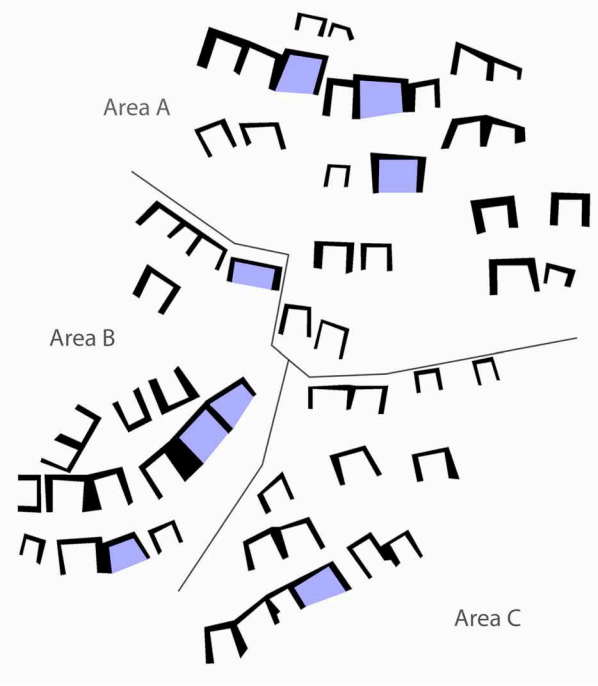

Figure 4. 22 Location of Class II house-structures in *Aumagan*.

Another difference with *Saqacengalj* is the location of hearths amongst the Class II house-structures. Out of eight Class II house-structures in *Aumagan*, only one has a hearth located on the right side (N5W4). In *Saqacengalj*'s case, the ratio between right and left hearths is 50/50. As mentioned earlier in *Saqacengalj*, all three Class II house-structures with their hearths on the right are located in area A considered to be the original settlement area and containing the households of the head families (more evidence in Chapter 5). As the settlement in *Saqacengalj* grew larger, the head families were able to accumulate more wealth and to expand their houses. Their larger houses manifesting their higher social status were gained through the growth of the settlement and proliferation of their offspring.

As previously stated, the spatial configuration of *Aumagan* is very different from that of *Saqacengalj*. *Saqacengalj* is a site that went through a long process of gradual growth, whereas *Aumagan* is likely to have been built almost instantaneously. The correlation between higher social status households and

hearths placed in the left part of the houses, observed at *Saqacengalj* could explain why the three households in *Aumagan* chose to build their new home with the hearth on the left when they moved from *Saqacengalj*. The case of N5W4, the only Class II house-structure with its hearth on the right, becomes very interesting and will be examined further later in this chapter.

The location of the hearth within the household also highlights the difference between *Saqacengalj* and *Aumagan* at a higher level. As previously stated, the location of the hearth follows two major principles: 1.) the interval principle; and 2.) the pathway principle. Compared with *Saqacengalj* (Figure 4.6), there are less violations of these two principles in *Aumagan*. There are only six violations of the two principles in *Aumagan*, four of which are in locations that were bound to violate either one or the other principle (Figure 4.23). Only two of them are clear and intentional violations (structure 0N6 and N9W3). Both of these two structures are Class II house-structures, which again supports the conjecture that high social status families had a tendency to build their hearths on the left side.

The overall hearth location layout shows that, since *Aumagan* was strategically built in a short time span, the house-structures and the drainage system could have been planned ahead. In contrast, *Saqacengalj* was a product of gradual growth. Thus, violations were more likely to occur when two existing opposite systems were joined together through subsequent expansions.

To sum up, the settlement pattern of *Aumagan* at a site level has three noteworthy characteristics: 1.) Unlike *Saqacengalj*, *Aumagan* is not a site that experienced long-term gradual expansion but rather a site where people fled to after they abandoned *Saqacengalj*. 2.) The topography of *Aumagan* is very scattered, and therefore, the site layout together with its road system is a direct

reflection of the adaptation to the topography, for example, only Area C retains the central axis principle. 3.) The Class II house-structures are distributed almost equally in each area of the site, suggesting that the head families were living with their kin within the same neighbourhood.

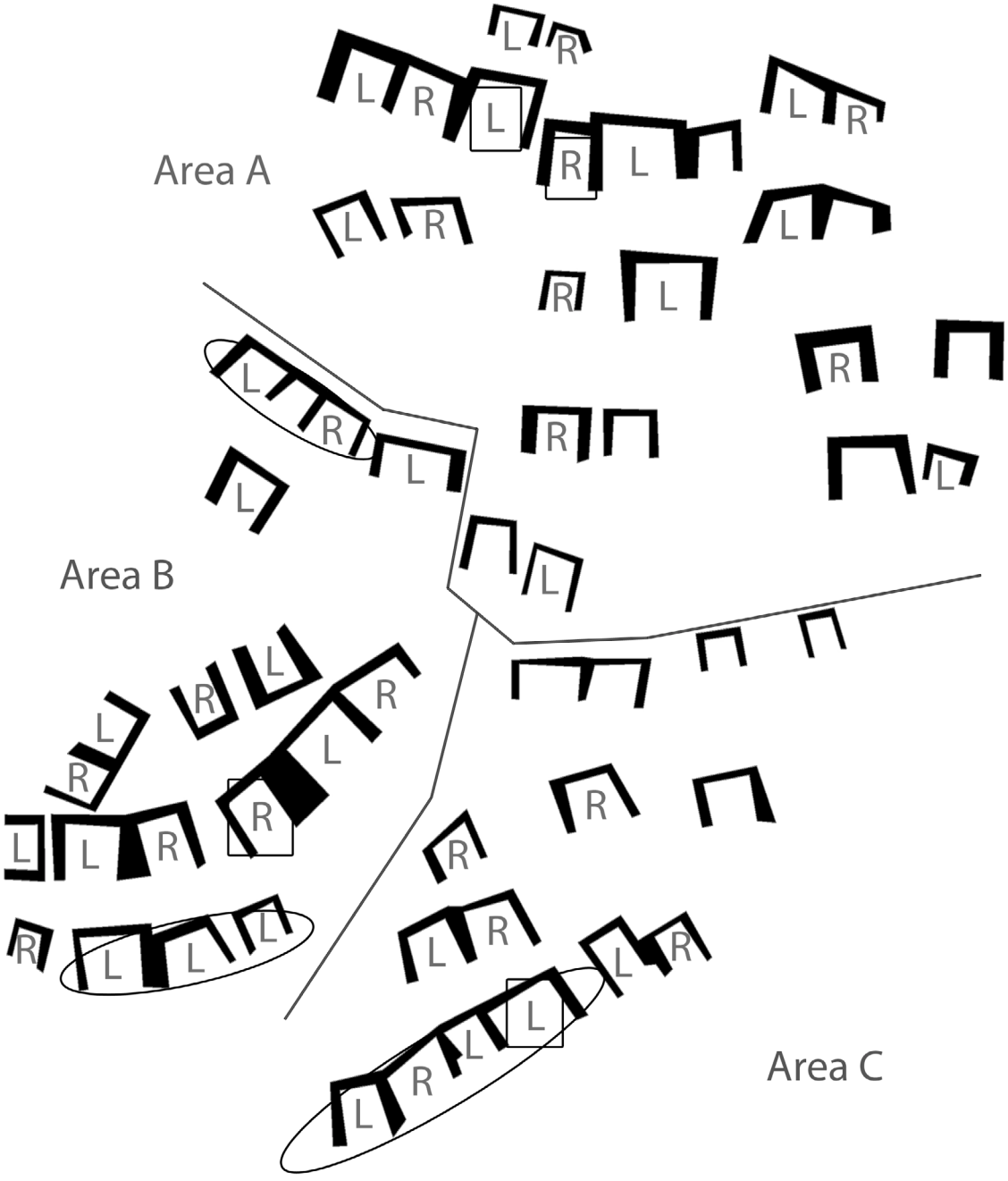

Figure 4. 23 Hearth location in house-structures of *Aumagan*. Eclipses - structures which do not follow the interval principle. Rectangles - structures which do not follow the pathway principle.

4.1.3.2 *Aumagan* as Separate Neighbourhoods

Area A:

Area A has three Class II house-structures: S1W7, S2W5 and S2W7. S2W7 is located on the second highest integrated platform, whereas S2W5 and S1W7 are located on the third and fourth respectively (Figure 4.24). All the three house-structures have their hearths built on the left side. The layout configuration of Area A is very linear following the topographic features. Therefore, the average depth of this area has a high rate of 5.61. This suggests that Area A is the most difficult neighbourhood for its inhabitants to move around.

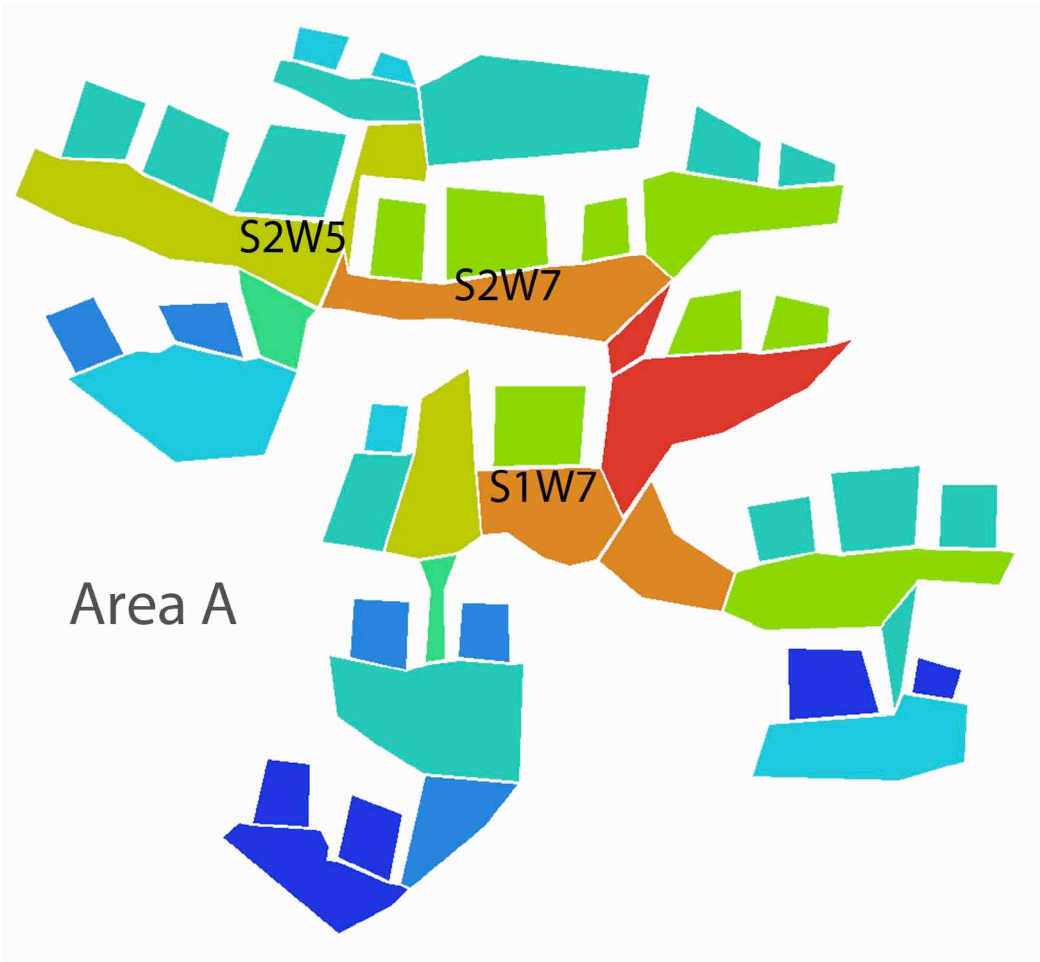

Figure 4. 24 Integration rate of Area A in *Aumagan*. Red - High. Blue - Low.

Area B:

This area has four Class II house-structures: 0W1, N5W3, N5W4 and 0N6. N5W3 and N5W4 are both located on the highest integration terrace while 0W1 and 0N6 are situated on low integration terraces. Amongst the four Class II house-structures, N5W4 is the only one at the site that has its hearth on the right. In addition, house-structure 0W1 possesses the largest and best-preserved front platform in *Aumagan*. In terms of hearth location, 0N6 is one of the two Class II house-structures in the site that intentionally violate both the interval and pathway-orientated rules in order to build its hearth on the left.

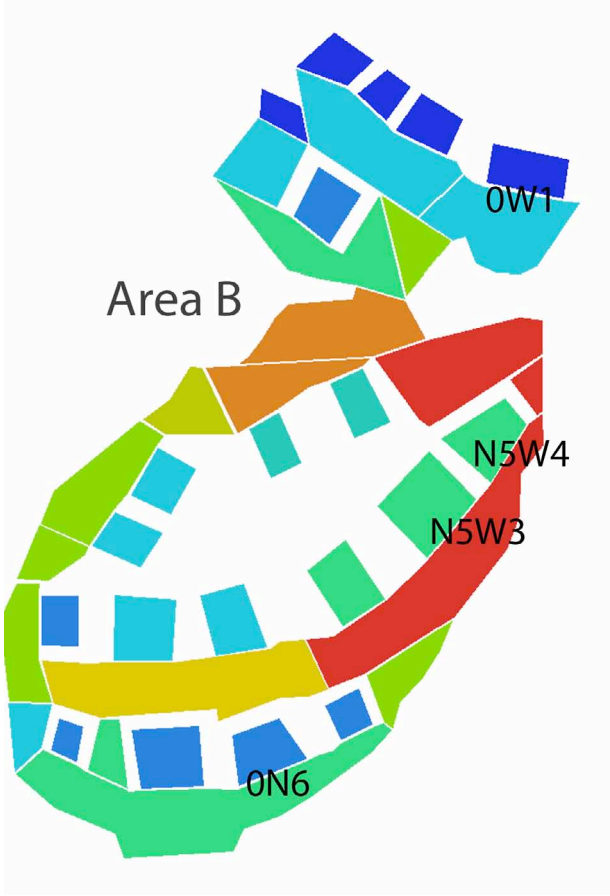

Figure 4. 25 Integration rate of Area B in *Aumagan*. Red - High. Blue - Low.

Similar to Area A, Area B shows strong adaptations to local topography. The layout of the house-structures surrounds a small hill at the bottom left corner. This is also reflected in a high area mean depth score of 4.56 as the inhabitants would have been unable to cut across the centre of the hill, and were therefore forced to go around it. As a result, Area B is also relatively difficult for people to move around, but better than area A.

Area C

Area C is the only neighbourhood that still retains the central axis pattern. This is due to the fact that it is located on a much gentler and open slope. The only Class II house-structure, N9W3, is located at the bottom centre of the area. Similar to the structure 0N6 in Area B, N9W3 is another example of an intentional violation of both interval and pathway rules by placing the hearth to the left to highlight its high social status. N9W3 is also located on the third highest integration terrace in the neighbourhood. The mean depth of Area C is the lowest of the three, 3.26. This suggests that Area C is the most accessible neighbourhood in terms of internal movement.

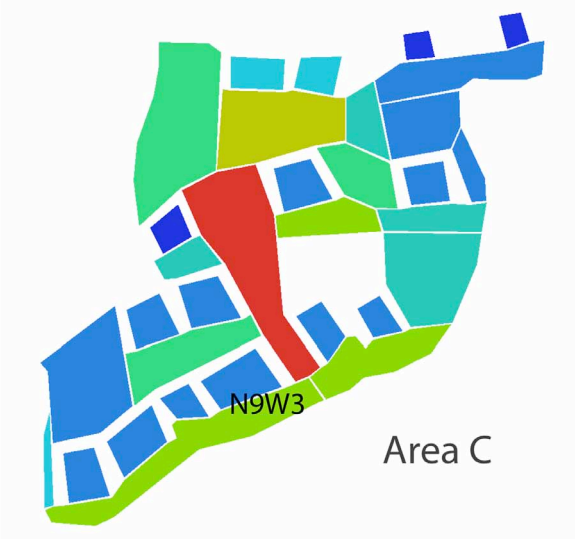

Figure 4. 26 Integration rate of Area C in Aumagan. Red is high. Blue is low.

4.1.4 Summary

Based on the initial analysis of convex mapping of the two sites, three basic spatial patterns could be identified. First of all, Class II house-structures are preferentially located in moderate to high integration areas in both *Saqacengalj* and *Aumagan*. Furthermore, the only Class I house-structure is located on the highest integration terrace both at the scale of its neighbourhood and at the scale of the top half of the site. This suggests that high-class households tend to choose a dominant location in their neighbourhoods. Secondly, the majority of high-class house-structures in *Saqacengalj* is concentrated in the top right corner of the site. In contrast, the Class II house-structure distribution in *Aumagan* is more spread out and at least one high status structure can be found in each neighbourhood.

The third major spatial pattern is the preference of having the hearth built on the left side in high status households. While only 50% of high-class house-structures in *Saqacengalj* have their hearth located on the left, only one Class II house-structure in *Aumagan* has its hearth on the right. In addition, three Class II house-structures (S2E5 in *Saqacengalj* and 0N6, N9W3 in *Aumagan*) intentionally violate both the interval and pathway rules only to have their hearth on the left side.

In this part of the analysis this research was able to identify some key characteristics of the spatial layout of the two sites, such as hearth location principles, location preference of high status households, and a possible history of the settlements' growth and transformations. However, it is not hard to see that the integration rate is based on individual terraces and therefore lacks the flexibility to evaluate specific house-structures independently, such as those structures with water containers in front of them and those that do not follow general principles. Also, the integration and the mean depth rating merely suggest spatial layouts and accessibility. They do not provide insights into where or how people interacted. To approach these issues this research will adapt Ingold's wayfaring theory (Ingold 2011) in the following section.

4.2 Constructing Meaning: What Happened

4.2.1 Structure of Interactions

In the previous section this research identified the house building preferences of a specific social class and how they affected the spatial layout of the settlements. The initial space syntax analysis highlights that both Class I and Class II households were preferentially constructed at dominant locations and in areas of easy accessibility.

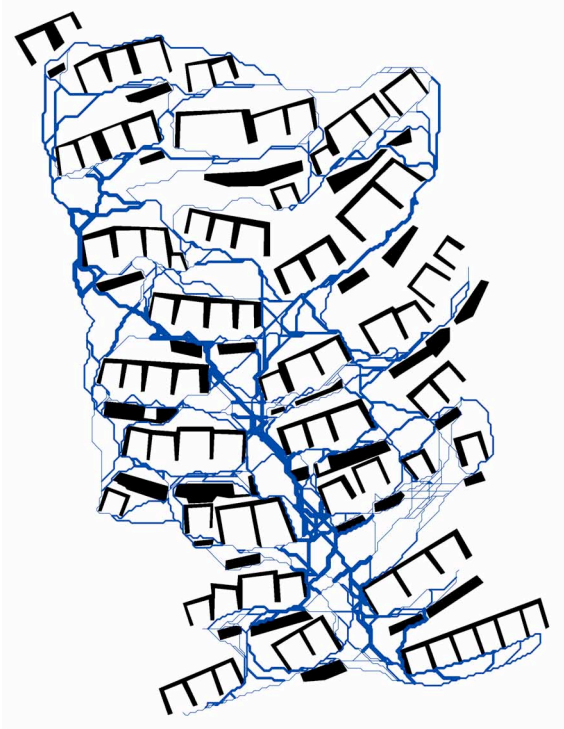

Figure 4. 27 The 6320 paths modelled in *Saqacengalj*. The thicker the line the more often the pathway was used.

Space syntax has been widely criticised for its detachment from the real space (Cutting 2003; Fairclough 1992; Foster 1989; Hillier et al. 1987; Ratti 2004). It has been argued that it analyses spatial patterns out of their original contexts and in the process loses key factors in spatial development, such as the distance, size and activity. That said, the dominant position of high-class house-structures only exist in a detached and idealised syntactical sense: the high-class households may think they are located at a dominant position, but the reality may be different.

In this section, this research investigates how households can gain power and social status from everyday interactions. By adapting Ingold's wayfaring theory, this section shows how the factors missing from a space syntax analysis, such as distance and human intimacy, can be brought back to create a more coherent picture. It scrutinises how human interaction can play a significant part in

shaping social relations not only at a local and regional scale but also at an inter-neighbourhood level. The wayfaring results discussed below are based on the average social proxemics in terms of 'social attitude' (see Chapter 3 and further discussed in Chapter 5).

4.2.2 *Saqacengalj*

As mentioned in Chapter 3, there are two major elements in Ingold's wayfaring theory: 1.) movement, which is the path the agents walk along; and 2.) the encounter, which is the location of the social interaction of the agents' experiences. To reconstruct the walking pathways between house-structures in *Saqacengalj*, first 6320 (80 starting households x 79 destination households) paths were modelled (Figure 4.27). The resulting pathway network shows how people could move around the site visiting each other. Secondly, the concept of social proxemics is applied to all 6320 paths and accumulated to provide the overall site interaction rate index (Figure 4.28). This section focuses on the results of the pathway meshwork, which give the interaction rate, in order to investigate further how people might have interacted with each other within the studied settlement.



Figure 4. 28 Accumulation of 6320 pathway meshworks in *Saqacengalj*. Light colour indicates higher interaction and vice versa.

From the initial analysis (Figure 4.28), it is not hard to see that the interaction is focussed at the centre of the settlement. Similarly to the space

syntax analysis, this is due to the fact that movement of each individual is based on the least time cost, which gives preference to a more direct and straight path. However, even though it suffers from edge effect, it is stressed here that the analysis is based on possible human movement rather than the relative spatial layout. This is clearly visible in Figure 4.27, where the path movement in the top half of the site is more focussed on the wings rather than the centre. This resulted in higher interaction intensity on the top left corner in Figure 4.28. Another point worth noting is that the focus of the interaction shifts slightly to the bottom. This phenomenon is again due to the fact that there are more house-structures at the bottom, which inevitably weights the results towards the more densely occupied areas.

However, although the overall results do not differ much from the space syntax analysis, the main strength of the wayfaring approach lies in the ability to break down the results into individual areas allowing researchers to scrutinise internal and external relations amongst individual neighbourhoods. The results shown in Figure 4.28 are accumulated from all the 6320 pathway meshworks, which means every household has a relation with everyone else. The results of this in depth analysis will be showcased in the following section.

4.2.2.1 The Neighbourhoods

As mentioned before the main strength of the wayfaring approach is that it allows individual inquiry on subject of specific themes and scenarios. First of all, this research utilises the neighbourhood identity parameter to break the settlement down into individual areas and examine social interaction of the individuals and communities living in these areas. According to Wu (2010: 73), the neighbourhood is an entity where most household collaboration is carried out. It is the place where

most daily interactions take place and where the identity of spatial belonging is formed. The following section examines each neighbourhood individually and demonstrates how social interaction might have influenced the settlement pattern. For detailed interaction rate of all neighbourhoods, please see Appendix 4-21.

Area A:

The first step of the analysis is to accumulate all the interactions that are linked between households within Area A but not between Area A and other areas. Therefore the results will also only show internal relations of Area A. The results indicate that the largest house-structure S2W2 is located in area of the highest social interaction rate. On the other hand, the three Class II house-structures are located in areas of average ratings. Apart from the one in front of the S2W2 structure, all water containers are also located in areas of average to low rates.

The second step of the analysis is to accumulate all the relations linking the households in Area A to households in other areas but not between households within the Area A. Therefore the result will show who in Area A has better external relations with people in other areas. The results indicate that house-structure S5W2, which is located on the left side of the neighbourhood, is the highest rated household. In general, the higher rated areas are located on the left side of the area. This is a direct result of people's choice to walk out of the area. They tend to utilise the route on the left rather than the ones in the centre and further right because it is the most efficient i.e. the least-time-cost choice. The largest house-structure S2W2 is ranked third in Area A and other house-structures with distinct features are mostly located in areas of average to low rating.

The third step of the analysis is to add up the first two in order to provide an overall rating of Area A. The result provides the overall social rating of Area A.

From this analysis, the largest house-structure S2W2 is again ranked as the highest rating one in Area A. The second highest area is located on the terrace to the left, which is mostly due to its high external relation rating. Again, the households with distinct features are located in areas of average to low ratings.

According to the initial results of Area A, two phenomena can be identified. The first one is the significance of the largest house-structure S2W2. Although the function of this house-structure is not yet defined, this as well as other strands of evidence indicate that it had a unique position in the neighbourhood. Not only is it the largest house-structure in the site, but also it is situated in the highest social ranking location of Area A. In addition, S2W2 is also located on the most integrated terrace according to the space syntax analysis. These all show that S2W2 is not only easy to access but also located at the centre of the neighbourhood's social activity. The second phenomenon identified by the wayfaring approach is that the households with distinct features are located in areas of lower social rating.

Area B:

In terms of the internal relations in Area B, the highest-rating household is house-structure 0S3. House-structure 0S3 is also located on the highest integration terrace and has a water container. Most of the interaction is located in the centre of Area B, which leaves the households with distinct features in areas of average to low rating, including the house of the Headman.

As for the external and overall rating of Area B, the high interaction area is roughly the same, located in the centre of the neighbourhood. In both cases, the highest rating household is house-structure 0S4 largely due to its strong external relations with the bottom half of the settlement. Nonetheless, house-structure 0S3

is still ranked third and second accordingly. Apart from the one in front of 0S3, the other three water containers are all located in low-rating areas, similar to those indicated by the internal relation analysis.

Area C1:

Area C1 is an interesting area since it shows the most consistent ranking in internal, external and overall rating. At all levels of relations, house-structure S4E2 is always the highest rating household and S5E1 is always the second highest household. House-structure S4E2 is of normal size with no particular features distinguishing it from other households. S4E2 seems to be an average normal household, yet it is situated in a very significant location as far as Area C1 is concerned. This will be further discussed later in this section.

House-structure S5E1 is another interesting household. Usually, a household located on either end of a terrace is more likely to have higher rate since the terrace-connecting route is next to it providing more opportunities of movement and hence higher interaction rate. However, S5E1 is located in the middle of the terrace, and nevertheless it is the second highest rating household at all three levels. The explanation of this seemingly contradictory observation is that S5E1 is a perfect example of how the banded rating system can escape such over-simplified generalisation. The reason for the high integration rate is that

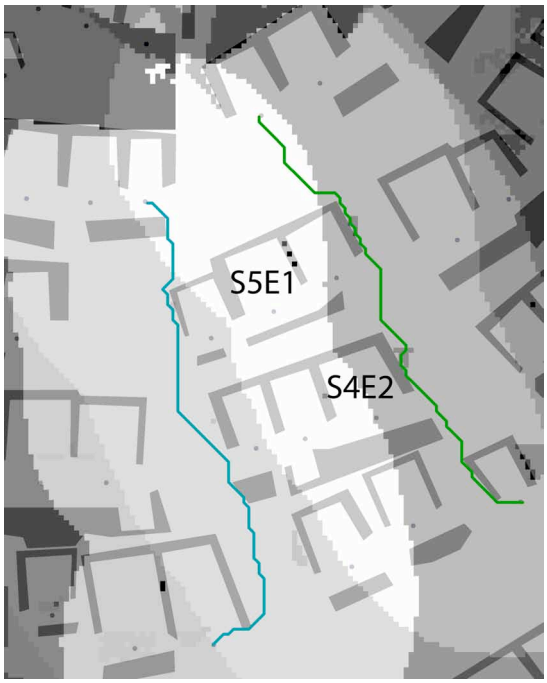

Figure 4. 29 Interaction rate of S5E1 in *Saqacengalj* benefits from routes on both sides.

household S5E1 is sandwiched between two house-structures, which both have terrace-connecting pathways on the opposite sides (Figure 4.29). Therefore, the interaction rate of household S5E1 can benefit from both pathways through the banded rating which raises its rating by combining the other two.

There are three water containers found in Area C1. One is located in front of house-structure S5E1 and the other two are located on a terrace of an average to low rating to its immediate right. The pattern found in this area may raise question about the accuracy of wayfaring theory since it does not correspond well with the material record. However, it is argued here that the pattern detected does not undermine the validity of the method but rather, it highlights how it can be properly applied.

The aim of the wayfaring approach adapted here is to highlight areas that could benefit from a bottom-up social interaction. House-structure S4E2 is an average household located in a high interaction rate area. This merely suggests that S4E2 has the opportunity for an increased number of interactions with other households in Area C1. Whether the people living in household S4E2 choose to exploit this potential is a separate matter. On the other hand, household S5E1, the second highest rating household at all three levels, has a water container, which indicates its better wealth. This only suggests that the wealth or social status of S5E1 could have been the result of exploiting its potential to the fullest. Similarly to household 0S3 in Area B, their wealth and social status could have been established through local social interaction as indicated by the results of the wayfaring approach.

On the other hand, the other two water containers found in front of S1E1 and S2E1 in Area C1 and the households with distinct features in Area A and B

are located in areas of average to low rating. This suggests that these households preferred a location with less social interaction or accessibility, but it also insinuates that higher interaction does not necessarily correspond with higher social status. Therefore, an area of high interaction rate is where a better social standing can be gained if properly exploited but not a deterministic factor. Social status can be established through other means, such as kinship or professional expertise. The use of this wayfaring theory is limited to recognising which of the wealthy and high social status people could have benefitted from living in an area with high level of social interaction. Simple correlations are incorrect as the results of the analysis neither suggests that higher interaction rate households automatically gain higher social status, nor does it imply that higher social status directly results from direct social interaction.

Area C2:

The results of internal relations analysis in this area show that house-structure S8E2 has the highest interaction rate. S8E2 also possesses the only water container in this area and has a human-shaped stone structure, which indicates that it is a possible residence of a priest. House-structure S8E2 is also the highest rating household in terms of its overall interaction rate and comes in second in the external relations analysis. The highest rating in that measure is house-structure S9E2, which is located just next-door to S8E2. At all three levels, the terrace where household S8E2 is located rates higher in all measures than any other terrace. This may be due to the fact that it is the terrace situated in the centre of the area.

Area C3:

In terms of internal relations in Area C3, house-structure S4E5, located right in the centre of this area, is the highest rating household. There are three water containers found in this area situated, like in most of the other areas, on average to low rating terraces. This also includes the only Class II house-structure S2E5, which is located in an area of average to low interaction at all three levels. Because Area C3 is located at the bottom of the site and is only accessible by the main central axis road, therefore most higher-rating households in the external relations measure are located along this specific road. However, in both external and overall relations measures, the highest household is still house-structure S1E4, which is located in Area C3.

Looking from a higher level, the largest house-structure S2W2 again tops the ranks in internal relations in the top half of the site. House-structure 0S4 and its next-door neighbour 0S5 are tied first the external relations measure. House-structure 0S3 is the highest household in the overall rating. This agrees with the other strands of evidence pointing out the significance of households S2W2 and 0S3. According to Wu's conjecture (Wu 2010), since the settlement was constructed from the top to the bottom, house-structure S2W2 could have played an important role in the early stage whereas household 0S3 established better social relations in the later stage.

In contrast to the top half of the site where the highest rating households are more spread out, the results of the bottom half of the site show a more congested pattern. Most of the higher rating households are located along the main central axis road, which is the main pathway that connects different terraces. The highest rating households in internal and overall relations are house-

structures S4E3 and S6E2 respectively. As for the external relations measure, house- structure S7E1 is ranked highest.

Overall Internal Relations:

As discussed earlier, the significance of a neighbourhood is based on intimate interactions. It is very unlikely that everyone had a relation with everyone else at the site. Instead, the neighbourhood is an entity where most of the interaction between households is carried out. Therefore, at all three levels, the internal relations measure is the most representative for the discussion on social relations within each neighbourhood. Following the premise that the neighbourhood is the spatial entity in which people would interact, the next step of the analysis is to accumulate all the internal relations measures of each neighbourhood in order to examine the social relations of the whole settlement.

This analysis again highlights some of the already mentioned households. House-structure 0S3 is the highest rating household amongst the whole settlement. The largest house-structure S2W2 is ranked third and household S5E1 is ranked sixth. As mentioned earlier, house-structure 0S3 and S5E1 are both Class III households. However, these three house-structures all possess water containers – an indication of their special wealth or social status. The results suggest that the higher social status of these three households may have been the result of social interactions. That is, their social status could have been established through their relations with others rather than their existing social identity within the *Paiwan* social structure hierarchy or kinship system and confirmed by the construction of water containers in front of them.

Amongst the three house-structures mentioned above, S2W2 is a Class I house-structure. Given the size of S2W2, it could very well be a household of very

high social status or extremely wealthy family. This interpretation would support Wu's previous observation that house-structure S2W2 could have been the residence of the Big Headman (Wu 2010: 65). However, so far this research has shown that people with high social status tend to live in less interactive area. More importantly, house-structure S2W2 does not possess the iconic headman stone feature, which is commonly regarded as a symbol of headman status in the *Paiwan* culture. Therefore, it is unlikely that house-structure S2W2 was the residence of the Big Headman. What is evident though is that it is located in a very socially interactive area. Considering its location and size, it is suggested here that house-structure S2W2 could have been a community building where people gathered for social activities and could have even served as a council building. However, the nature of house-structure S2W2 is still under debate and requires further examination.

4.2.2.2 Direct Relations Between Neighbourhoods

The stress on the neighbourhood internal relations above is not to downgrade the significance of the external relations. In fact, the external relations still play an important role in examining the source of interaction rating. This section demonstrates how the relations between neighbourhoods can provide further insights in terms of social interaction.

Social Interaction between Area A and Area B:

The analysis performed here was carried out by accumulating all the interactions between Area A and B to investigate who benefits the most from the external relations between Area A and B. This could provide information such as to whom would people approach to discuss matters when inter-neighbourhood issues occurred. In terms of the relations between Area A and B, the house-

structure S2W2 in Area A again ranks the highest amongst all of the buildings. On the other hand, house-structure S5W1 is the highest rating household in Area B. Still again, households with distinct features are all located in areas of average to low rate of interactivity apart from S2W2.

Social Interaction between Area A and Area C1:

In terms of interaction between Area A and Area C1, the house-structure S5E1 in Area C1 tops the rating chart again. This indicates that the high social relation status of household S5E1 not only benefited from local internal relations but also could have taken advantage of its relation with people living in Area A. The highest rating household in Area A is S5W2 and the house-structure S2W2 is ranked second in Area A.

Social Interaction between Area A and Area C2:

The result of the interaction rate between Area A and C2 shows that the highest rating area is located on the left side of the site. This again reflects that the preferred outbound route from Area A is not the central route that passes directly through Area B but one around it through the left path. There are two neighbouring households in Area C2 with the same highest interaction rate, S8E1 and S9E1. House-structure S5W2 is the highest rating household in Area A. Both the largest house-structure S2W2 and the possible priest residence are located in areas of average rating.

Social Interaction between Area A and Area C3:

With regard to the relation between Area A and C3, the house-structure S1E4 in Area C3 tops the chart along with ten other households of the same rating located along the main central axis road. This again shows how Area C3 is

dependent on the central path to connect it with the other neighbourhoods. House-structure S5W2 is the highest rating household in Area A.

Social Interaction between Area B and Area C1:

In terms of the relations between Area B and C1, the highest rating households are 0S4 and 0S5 located in Area B. House-structure S5E1 in Area C1 has the second highest rating and is the highest amongst Area C1. House-structure 0S3 is in third overall and is the second highest in Area B. Similar to the rating between Area A and C1, household S5E1 has shown high rating within the top half of the site. This suggests that household S5E1 probably had a very good relation with the 'old' parts of the settlement. In addition, the result also suggests that household 0S3's high social status could have come not only from internal relations but also from their relations with Area C1.

Social Interaction between Area B and Area C2:

The result of the relation between Areas B and C2 shows that S7E1 in Area C2 is the highest rating household and 0S5 is the highest in Area B.

Social Interaction between Area B and Area C3:

Similar to the relations between Areas A and C3, the result here also shows that the highest rating area is located along the main central axis road. Eleven households situated along that road have the same highest score. Amongst them, household S1E4 is located in Area C3 and households 0S4 and 0S5 are located in Area B.

Social Interaction between Area C1 and Area C2:

The result of the relation between Areas C1 and C2 shows that S6E2 in Area C1 is the highest rating household and S7E2 is the highest in Area C2.

Social Interaction between Area C1 and Area C3:

The result of the relation between Areas C1 and C3 shows that S4E3 in Area C1 is the highest rating household and S1E4 is the highest in Area C3.

Social Interaction between Area C2 and Area C3:

The result of the relation between Areas C2 and C3 shows that S5E3 in Area C2 and S1E4 in Area C3 have the highest score.

From the results of the analysis of relations between neighbourhoods it is not hard to see that the suggested high interaction areas in the bottom half of the site do not correlate with the location of house-structures with distinct features. Apart from the household S2W2 in Area A and S5E1 in Area C1, none of the other higher rating households has any distinct features. There are four possible explanations for this phenomenon. The first is that further research may change our opinion on the status of these households, for example there may be smaller material artefacts not found yet in these households that would indicate their special social status. However, the nature of these abandoned settlements yields very few material remains within house structures. In addition, there are a good number of structural features indicating their social identities and significance that have already been correctly identified. Therefore, it is acknowledged that this hypothesis may be possible. Nonetheless, this research still only utilises the five house features as indicators for different social status.

The second hypothesis focuses on the spatial distribution of households with distinct features. For example, there are only three households with distinct features in Areas C2 and C3 compared to twelve located in the rest of the site. Therefore statistically, Area C2 and C3 would have a much lesser chance of having households with distinct features located in high rating areas than other neighbourhoods. However, the analysis is not just focused on these two areas alone but performed to inspect the relations between any two neighbourhoods. As a result it also takes into account other areas with reasonable amount of distinct features. However, even the records from these material-rich areas do not match the results. Therefore, it is unlikely that the phenomenon is caused by the distribution pattern.

The third explanation is that the phenomenon is caused by a misinterpretation of the nature of the wayfaring theory. As mentioned earlier, the wayfaring approach adapted here is to highlight the area where higher social interaction and better relation can be gained should one decide and have the means to exploit this potential. Since the analysis results do not match the material record, one logical explanation is that the inhabitants decided not to or were unable to take advantage of the opportunity granted by the location of their households. However, although plausible for some of the cases it is unlikely that virtually almost none of the households were able to exploit the potential of their favourable location.

The fourth explanation is that the phenomenon is caused by the nature of this specific analysis. Extending the logic of the third explanation, the key point not only lies in the question of how people did not utilise the potential of social interaction, but also in how these relations *were* negotiated. The analysis was performed to examine the relation between any two neighbourhoods. In both

matching cases (between Area A and C1, and Area B and C1), they both have matching records on either end of the neighbourhood. In other words, they both have households with distinct features located in high interaction areas. In terms of the relations between Area A and C1, there are two matching records: S2W2 in Area A and S5E1 in Area C1. And in the case of the relations between Area B and C1, the matching records are 0S3 in Area B and S5E1 in Area C1. What is important is that the social interaction rate is not simply based on efforts of one household; rather, it is based on the rating of the relation between one neighbourhood to another neighbourhood on the opposite end of the site. The analysis is conducted by linking all households in one neighbourhood with all households in another. The successful match of high rating areas with households possessing distinct features does not reflect an individual's effort of becoming highly sociable. Instead, it reflects a good relation between the two neighbourhoods.

Take Area C1 as an example. The fact that household S5E1 is highly rated in the analysis of relation between Areas A and C1 is only made possible because of all the other C1 households' interest in Area A. It would not be the most highly rated household if the households in the left end of the Area C1 had not established good relations with those in Area A. If that had been the case, the rating balance would have shifted to the right side of Area C1 and S5E1 would have no longer be situated in the highest rating area. Therefore, it is clear that household S5E1 established its social status not simply on its own merits, but thanks to the accumulated efforts of the whole neighbourhood. Therefore the analysis does not stop at examining only which household is the most influential in the two neighbourhoods but allows researchers to identify how good the relation is between them.

Thus, the successfully matching records in the two cases mentioned above indicate that there was a well-established relation between Areas A and C1, and between Areas B and C1. In the case of the relation between Area A and Area B, only S2W2 in Area A matches the result but there is no matching record from Area B. This does not suggest that there is a one-direction relation between the two areas. Since the result is based on all the households involved in the two neighbourhoods, the interaction link is accumulated from both directions. Therefore, the result suggests that there was a reasonably good relation between the two neighbourhoods and that the household S2W2 is the most influential one in this particular case.

As for the two communities in Area C2 and Area C3, the results suggest that they probably did not have a well-established relation with other neighbourhoods. If the hypothesis that the bottom half of the site was built later is correct, this could very well be a result of the lack of good historical bound with older neighbourhoods. However, in the case of Area C2, although their external relations do not match with material records, their internal relations do. It suggests that even though the community might have not had a good external relation, they still formed a closely bounded community. On the other hand, Area C3 does not have any matching records. This could suggest that they are a newly formed community where people just started moving in and have not yet established any good relation, be it internal or external. Again, this supports Wu's settlement growth hypothesis.

4.2.2.3 Summing Up the Analysis of *Saqacengalj*

This section has shown the potential of wayfaring theory in investigating settlement pattern at *Saqacengalj*. The results have established four general

points. First of all, Class II house-structures tend to be situated in less interactive areas. Secondly, the results of the interaction rate analysis should be interpreted as the possibility of establishing good social relations rather than an indicator of 'where' high social status individual were located. As a result, it was identified that the social status of house-structures S2W2, 0S3 and S5E1 could have benefitted from their location of particularly high intimate social interaction rate. Thirdly, this section has shown that external relations rates between two communities should be interpreted as indicating how good the relation was between two communities rather than individual households. The analysis suggests that Area A, B and C1 had better external relations amongst them, whereas Area C2 and C3 did not have well-established external relations with the rest of the settlement and were loosely connected with other communities. Last but not the least, the analysis of this section again supports Wu's settlement growth theory of *Saqacengalj* with slight adjustment. The settlement was probably established starting with the house-structure 00 since the Headman is usually the first person to inhabit a landscape. Slowly and gradually, the settlement was built from the top-right corner and then spread to the left and towards the bottom. This would explain why Area A, B and C1 are more closely bounded together and Area C2 and C3 are less connected.

4.2.3 *Aumagan*

Just like *Saqacengalj*, the two key elements, the movement and encounter, are first modelled to present the wayfaring of *Aumagan*. The reconstruction of the movement was created by connecting the 58 house-structures (Figure 4.30). Secondly, the concept of social proxemics was then applied to all pathways and accumulated to generate the overall site interaction index (Figure 4.31).

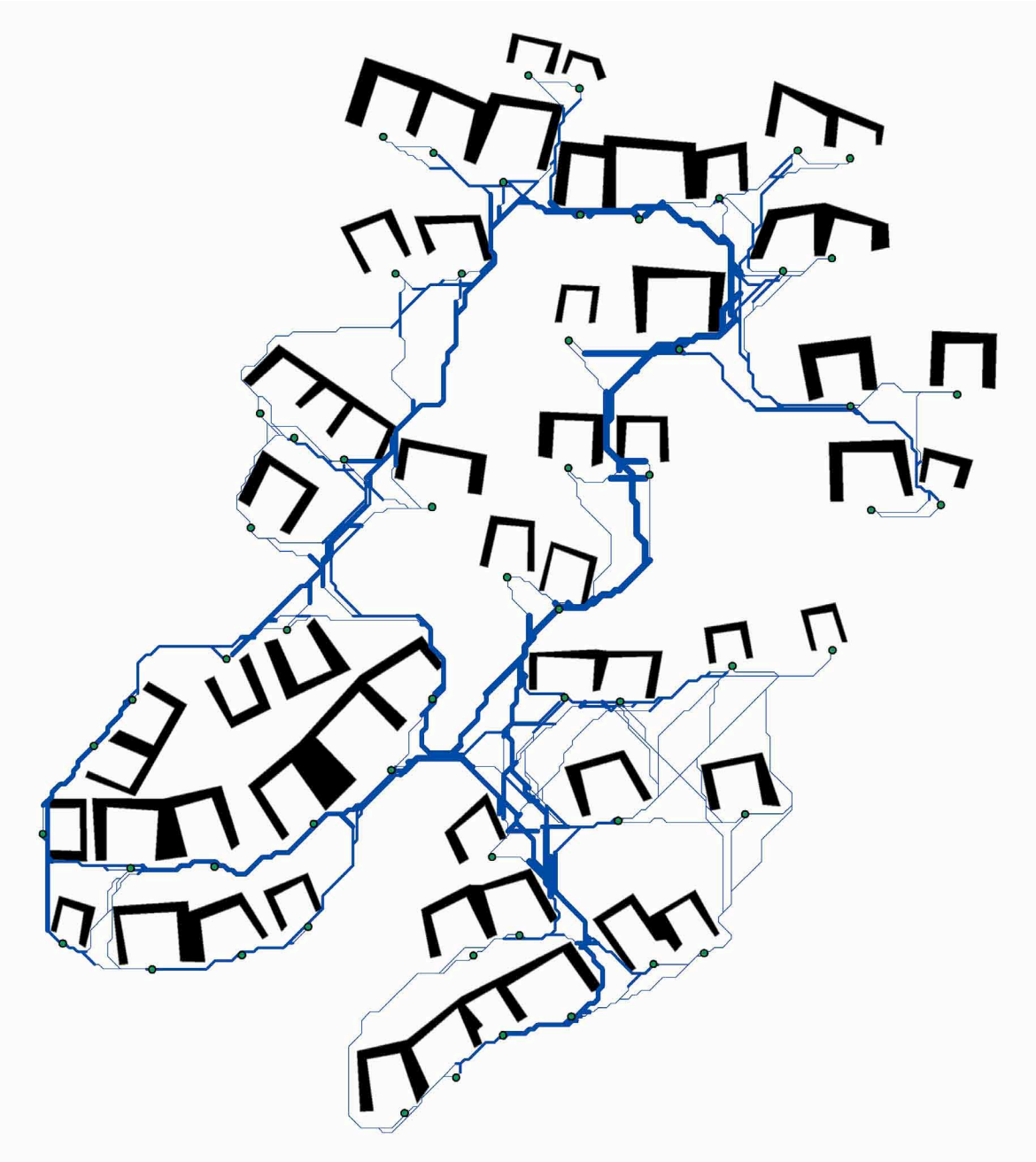

Figure 4. 30 The 3306 paths modelled in *Aumagan.*
The thicker the line the more often the pathway was used.

The results show significant differences from *Saqacengalj*. The result of the pathways analysis in Saqacenglaj highlights the extensive use of the central axis pathway running through the centre of the settlement (Figure 4.28). However, due to topographic adaptation, the pathways in *Aumagan* were laid out to get around the central fault. This resulted in the divide of movement into two side-axes down each side of the hill (Figure 4.31). In addition, the movement-count leading

towards the bottom end of Area B is lower than that in Area C. This is probably caused by the pathways in Area B going around a small hill in the centre of the area. On the other hand, the movement of Area C is integrated by the use of the central axis running through the heart of the neighbourhood. These two phenomena again stress one of the key features of wayfaring approach: the later interaction rate is based on human movement, which is a way to avoid the edge effect.



Figure 4. 31 Accumulation of 3306 pathway meshwork's in *Aumagan*. Light colour indicate higher interaction rate and vice versa.

Even though the accumulated pathway of *Aumagan* shows strong differences from *Saqacengalj*, the result of accumulated pathway meshworks is very similar. The highest interaction rate area focuses on the centre of the site despite the movement division. This is mainly because the side-axes are not so far apart. Therefore, the central area of the overlay of social interaction from either of the side axes is still able to accumulate a higher interaction rate. If the right axis had been further to the right side, then there would have been no overlay and the interaction rate would have been more evenly distributed. The result of the accumulated viewsheds is a phenomenon that appears like an edge effect, but is not dominated by it.

4.2.3.1 The Neighbourhoods

Based on the convex mapping results, six out of eight Class II house-structures in *Aumagan* are located in relatively high integration areas in their

neighbourhoods. This is a trait shared with *Saqacengalj*, where most of the Class II house-structures are located on moderate to high rated terraces. However, there are also two Class II house-structures located in low integration areas, both in Area B. In addition, the wayfaring results of *Saqacengalj* have already shown that although Class II house-structures are in relatively dominant positions, they are usually situated in very low interaction rate areas. This section examines the nature of Class II house-structures in *Aumagan* and takes a closer look at the differences between *Saqacengalj* and *Aumagan*.

Area A:

Both the overall and internal relations analyses in Area A highlight two Class II house- structures (S1W7 and S2W7). These two house-structures are always on the top of the rating chart in terms of interaction rate, and they are also located in the high integration areas. With regard to external relations, N5W5 is the highest rating household in Area A. However, the N5W5 household has no distinct features. This may suggest that the external relations of Area A are not very well established.

Area B:

The analysis of overall and external relations of Area B both point out to three Class II house-structures (0W1, N5W3 and N5W4) as having the top three interaction rates. N5W3 and N5W4 are also located on the highest integration terrace. On the other hand, 0W1 is located on a low integration terrace. The analysis of internal relations reveals another story. Both households N5W3 and N5W4 drop considerably down to the lowest five ratings. The high interaction rate area shifts towards the terrace in the central left area. Nonetheless, 0W1 remains the structure of a high rank in internal relation suggesting that 0W1 is dominant in

both internal and external relations. The match between the high status Class II house-structures and high external relations rate indicates that Area B might have had a good relation with both Areas A and C. In addition to the three house-structures above, there is also another Class II house-structure (0N6) located at the bottom terrace of Area B. However, 0N6 is located in low interaction area at all three levels and is also on the low integration terrace.

Area C:

Area C hosts just one Class II house-structure (N9W3), which is located on the third highest integration terrace. It also tops the interaction rating in terms of internal relations. However, the overall and external relation rating does not fit with any distinctive house-structure. This may indicate that the inhabitants of Area C had a good relation only amongst themselves, but were not closely linked with the rest of the settlement.

Overall Internal Relations:

In terms of the internal relations amongst the whole site, the centre of Area A is clearly higher than the other two neighbourhoods. This is mainly due to the fact that there are more households in Area A (24), compared with Area B (19) and C (15). Therefore, after accumulating all the internal interaction rates, it weights the results towards Area A. Since there were more people in Area A, it is likely that there were also more interactions going on. The structures S1W7 and S2W7, both located in Area A, top the ranks in terms of overall internal relations. However, house-structure 0W1 in Area B is also amongst the top ranked households.

4.2.3.2 Direct Relations Between Neighbourhoods

Social Interaction between Area A and Area B:

The interaction rate between Area A and B shows that the high rating regions are located at the connection point between the two areas. House-structure 0W1 in Area B, again, tops the interaction rating. The area of high interaction Area A in the bottom left of the neighbourhood is populated with common households.

Social Interaction between Area A and Area C:

Again, the high rating areas are located in places where the two areas intersect, that is, the bottom of Area A and the top of Area C. There are no distinctive house-structures located in the high interaction area of either of neighbourhoods. This could suggest that the relations between Area A and Area C are not very well established.

Social Interaction between Area B and Area C:

Similar to the relation between Area A and B, the relation between Area B and C is reflected by the presence of Class II house-structures N5W3 and N5W4 in Area B. The two house-structures are tied top in terms of interaction between Area B and C. However, there are no distinctive house-structures located in high rating areas in neighbourhood C.

The results of the direct neighbourhood relation analysis clearly highlight Area B as the dominant neighbourhood linking the other two areas. Both the relations between Area A and B, and Area B and C result in highest rating area located in Area B (concentrated on house-structures 0W1, N5W3, and N5W4 respectively). On the other hand, the relation between Area A and C is not evident.

This would suggest that while the relation between Area A and C might have not been well established, all the three neighbourhoods were connected through Area B. As mentioned before, since the direct neighbourhood relation is established on the basis of the collective efforts of each neighbourhood, the result also indicates that both Area A and C are more closed communities than a well-connected community of Area B.

4.2.3.3 Summing Up the Analysis of *Aumagan*

The results of wayfaring analysis highlight two major characteristics. The first is that most of the Class II house-structures are located in areas of high interaction rate. This is the case for all Class II house-structures in Area B except for 0N6, which is consistently located in an area of low interaction rate. This characteristic stands in sharp contrast to *Saqacengalj*, where most Class II house-structures are located in lower interaction rate areas. This difference of location preference will receive detailed discussion in Chapter 5 and 6.

The second characteristic of *Aumagan* is that the three neighbourhoods are connected through Area B. The result of wayfaring analysis has shown that each neighbourhood has very good internal relations, which shows that each area had a strong individual community. However, the external relations between Area A and C is not evident in the results, which suggests that it was not well-established. On the other hand, the relations between Area A and B, and Area B and C are supported by the presence of Class II house-structure in a high interaction region of Area B. Nonetheless, the lack of support from either Area A or Area C indicates that Area B is the most dominant force in terms of external relations. As a result, Area B was most likely the key neighbourhood that connected and kept the three neighbourhoods together as a larger settlement.

4.3 Social Structure and Activity

In this chapter, this research established some basic traits of *Paiwan* settlements as well as gave a glimpse of the pattern of their transformation. The basic settlement layout analysis has shown the interval and pathway-orientated hearth location pattern. The correlation with water containers and house sizes has highlighted a preference for having the hearth built on the left side. Also, while the bigger size of houses indicates higher social status of their owners, the water containers are indicative of wealth.

From the space syntax analysis, both sites of *Saqacengalj* and *Aumagan* have shown that high-class households tend to be located on moderate to high integration rate terraces. This reflects the preference of positioning them in more dominant locations within their neighbourhoods. This phenomenon repeats at both sites, which suggests continuity in the structure of social activity. However, results of wayfaring analysis provide insights to suggest otherwise.

The results of wayfaring analysis have shown significant differences between the two sites. In *Saqacengalj*, high-class households tend to be located in low social activity areas, with the single exception of the Class I house-structure S2W2. However, most of the high-class households in *Aumagan* are located in higher, if not the highest, social interactive areas. Only one Class II household 0N6 is located in a low interactive area. This may suggest that while in *Saqacengalj* high social status households can be found in more peaceful areas, in *Aumagan* they position themselves in the centre of daily life of the settlement.

Chapter 5

Identity at Work: Status, Wealth and Power

5.1 Inequality and Power

5.1.1 Social Structure within the Community

In order to unveil the mechanisms behind the changes in social interaction, it is necessary to first understand the nature and composition of the neighbourhood community. The two main questions are: what is the structure of the community and how does this structure affect the social behaviour in the neighbourhood.

While space syntax was designed for and orientated towards spatial analysis in architecture, Hillier and Hanson also recognised its analytical potential at a settlement level (Hillier and Hanson 1984: 82-142). This type of analysis was then adapted in archaeological research to investigate the spatial segregation and social divisions (Ferguson 1996; Potter 1998; Shapiro 1999; Stone 2000; Van Dyke 1999). Their results have shown the potential of the technique as an approach to understand the spatial design and its influence on social and political structures.

The original intent of space syntax analysis is to understand the relation between residents of a community and the accessibility of outsiders. Therefore, it is originally a research approach aiming to detect the separation between private and public space and to investigate how physical barriers within open space would

affect the accessibility for outsiders (Hillier and Hanson 1984). The layout of communities can be shallow or deep, depending on the mean depth measure reflecting accessibility. This accessibility measure is the key element for calculating ‘relative asymmetry’ and ‘integration’ rates (Hillier and Hanson 1984: 108-115) which highlight location dominance as demonstrated in Chapter 4.1. However, this one type of application does not mark the limit of space syntax.

Other than the accessibility of settlement layouts, Hillier and Hanson also looked into the fragmentation of spatial layouts. In this respect, they argued that communities can be viewed on a continuum stretching from high fragmentation at one end and low fragmentation at the other (Hillier and Hanson 1984: 98-104). The fragmentation is the measure of how open space in the community is separated and divided into numerous small areas. In a highly fragmented community, the residents are scattered amongst different small areas at any one time. This results in the residents’ inability to acknowledge the presence of others in another area and decreases the interaction and communication within the settlement as a whole. In such a case, the spatial layout of the settlement would encourage the formation of subgroups as social divisions are more likely to take place in a more fragmented community. On the other end of the spectrum, less fragmented communities would show a layout encouraging a better integration of all the residents in a single location at any one time. In such a case, the residents are more likely to be more integrated into a single shared identity.

In this fragmentation analysis, Hillier and Hanson proposed two key measures: 1.) articulation; and 2.) ringiness (Hillier and Hanson 1984: 98-104). The convex articulation index is measured by dividing the number of buildings into the total number of convex spaces. The result indicates the amount of open space that is available for each household. The lower score of convex articulation

indicates fewer breakups of open space and such spatial arrangement increases the integration of more residents into a single location at any one time. This also encourages higher interaction between households. On the other hand, a higher score of the convex articulation index indicates that there are more barriers within the open space. Hence, it results in more fragmented space and subdivided areas scattered in different locations. This limits the social interactions between different areas and, in turn, encourages the emergence of local subgroups. The same concept can be applied to axial maps to measure the axial articulation. In that case, lower value would indicate fewer pathways leading to open spaces and encouraging people to take the same route. In contrast, a higher value of axial articulation suggests that people have more variety of paths to choose from and may take different routes.

As to 'ringiness', it is the number of 'rings' in the convex system in proportion to the maximum possible planar rings for that amount of spaces (Hillier and Hanson 1984: 102). The measure of ringiness indicates the rate of distribution of the convex system with respect to itself. The lower the value of ringiness, the greater the fragmentation of open space and the greater the control of interaction in that space (Stone 2000: 205). Again, the same concept can be applied to axial maps. The axial ringiness reflects the fragmentation and control over the pathways in the community.

In addition, there is another measure relating to both convex and axial fragmentation: axial integration. Axial integration is calculated by dividing the number of convex spaces into the number of axial lines in the community. This measure is usually applied to investigate the ease of movement between spaces within the system: the lower the score of axial integration the easier the movement

from one space to another. In consequence, this measure also indicates lower number of barriers to the residents to interact and communicate between areas.

In all the five measures, there are four key elements that need to be identified in order to perform the calculation: 1.) the number of rooms; 2.) the number of convex spaces; 3.) the number of axes; and 4.) the number of islands. The first three factors are relatively simple to measure and can be interpreted as 1.) the number of house-structure; 2.) the number of open space areas; and 3.) the number of path axes. The fourth element, the number of islands, is defined as features that are completely surrounded by public space and may include a number of room blocks (Stone 2000: 202). In effect, islands are essentially the physical clustering of several house-structures together in order to form a larger entity. In the case of *Paiwan* slate-stone settlements, islands can be identified as individual terraces. Due to the fact that *Paiwan* slate-stone settlements are usually located on mountain slopes, each terrace is actually sandwiched between slopes below and above. In addition, each terrace is also clearly defined to its sides either by a pathway or by a dead-end. Thus, in this analysis this research identifies the terraces as clearly defined islands that consist of one or more house-structures. With the help of these four key factors, the five measures can then be calculated and one can start to investigate the nature and structure of each neighbourhood's community.

5.1.2 Neighbourhood Structure of *Saqacengalj*

	A	B	C1	C2	C3	Top	Bottom	All
Convex Articulation	1.052	0.733	0.937	0.833	0.388	1	0.652	0.825
Convex Ringiness	0.2	0.235	0.28	0.266	0.444	0.174	0.272	0.204
Axial Articulation	0.947	0.6	0.75	0.666	0.333	0.911	0.521	0.725
Axial Ringiness	0.225	0.307	0.368	0.363	0.571	0.192	0.348	0.234
Axial Integration	0.9	0.818	0.8	0.8	0.857	0.911	0.8	0.878
Mean Depth	3.33	3.07	3.13	3.29	3.05	4.48	3.96	5.91
Number of Households	19	15	16	12	18	34	46	80
Number of Class II Households	4	1	0	0	1	5	1	6
Number of Terraces	7	4	7	4	4	11	15	26
Number of Convex	20	11	15	10	7	34	30	66
Number of Axis	18	9	12	8	6	31	24	58

Table 5. 1 Fragmentation analysis of *Saqacengalj*.

From the initial analysis of the five measures (Table 5.1), the most distinct phenomenon lies in the significant difference between the top and the bottom half of the settlement. The results show that the top half is almost twice as fragmented as the bottom in all articulation and ringiness measures. This suggests that in *Saqacengalj* the top half is more scattered and fragmented than the bottom half. This supports the results and interpretation of the analysis in Chapter 4. However, more information can be gained from the analysis of individual neighbourhoods.

Amongst the individual neighbourhoods, Area C3 is the most distinct. It has the lowest score in both convex and axial articulation, as well as the highest score in both convex and axial ringiness (all by a significant margin). This suggests that Area C3 is the least fragmented neighbourhood in space and the most integrated

in movement In terms of the social composition, this result indicates that Area C3 is the most homogeneous of all neighbourhoods.

In contrast, Area A has almost three times the value of the articulation index compared with Area C3. Also, its ringiness scores are less than half of that in Area C3. These five measures indicate that Area A is the most fragmented neighbourhood. This result could be explained by the fact that Area A is the only neighbour to accommodate all three classes of households. Since spatial fragmentation is an indicator for subgroups, it may be a result from the separation amongst different classes. However, the two lowest fragmentation areas, Area B and C3, both accommodate two different classes of households. On the other hand, Area C1 and C2 have higher fragmentation value than the previous two, but only accommodate only one class of house-structures. This shows that the fragmentation of space is not a direct outcome of inhabitants belonging to a number of different social classes in a single neighbourhood. Therefore, the amount of fragmentation might indicate a different line of division in the socio-cultural identity.

What the fragmentation measure results suggest is that the spatial layout of this area strongly encourages the emergence of social subgroups. This research suggests that this fragmentation was the result of the most prominent social distinction: kinship (see Chapter 2) rather than the division between different classes in the social structure. As mentioned in Chapter 4, Class II house-structures may be interpreted as belonging to the head families of different kin groups. In this case, Area A would have three head families in one single neighbourhood. As a result, the three different lineages could cause the fragmentation of space and encourage the residents to express their own kinship identity. On this note, it is very likely that Area C3 is a typical neighbourhood

where their head family is living amongst their own kin (Chang 1958: 306-307; Renfrew 1984: 176-177). As mentioned in Chapter 2, families from the same kinship would normally reside with each other due to land ownership. Therefore, even if Area C3 includes two different classes of house-structures, it may have only accommodated members of one single kin. This would explain the low score in fragmentation in Area C3.

Having established that the fragmentation could be a result of separate kin groups, it is necessary to see how this knowledge could be applied to the other three neighbourhoods. Amongst the three, Area B is the most intriguing. Although it is located in the highly fragmentised top half of the site, it has the second lowest convex articulation score. This suggests that this area is less fragmented and more likely to host a homogeneous social group. Given that this is the neighbourhood where the Headman house is located, it could be interpreted as the neighbourhood of the Headman's kin. Due to the fact that house location is mainly affected by land ownership, the Headman's family would have better option to choose from than other families. As mentioned earlier, the Headman is usually the first settler in the village and originally owns all the land in the settlement. Later residents would have to negotiate with the Headman by paying tributes and taxes for land to form a 'contract' and to establish a social order (Tan 2003: 220; Wei 1960: 86). Thus, the kinsman of the Headman had a higher chance to stay close together. On the other hand, early common residents would have no choice but to settle at the lands the Headman had chosen for them. If the supposition that the site grew from the top to the bottom is correct, Area A could have been the neighbourhood of early common settlers and Area B the neighbourhood of Headman's kin. This, in turn, supports the observation that the head families located their houses in Area A.

On the other hand, Area C1 is a neighbourhood with a relatively high fragmentation within the less fragmented bottom half of the settlement. Nonetheless, both its ringiness score and axial integration value suggest differently. The ringiness of Area C1 is higher than that of the less fragmented Area B. This indicates a lower level of control over the spatial access for the residents. In addition, Area C1 has the lowest value for axial integration, which suggests easy movement between spaces. What the five measures suggest is that even though the space is more fragmented in general, the ease of movement encourages integration to a certain degree. This stands in a significant contrast to the situation in Area A. Area A not only scores the highest in articulation but also scores the lowest in ringiness. What is more, the axial integration in Area A is also the highest. The five measures in Area A indicate that not only is the space in the neighbourhood highly fragmented but the accessibility between spaces is also highly controlled and therefore not easy to move through. This difference in the ease of movement shows certain degree of integration in Area C1.

The co-relation of the five measures in Area C1 is also seen in Area C2. In fact, there is very little difference in both ringiness scores and axial integrations between Area C1 and C2. The only difference is that the articulation score in Area C2 is slightly lower, which suggests a slightly higher spatial integration. What is more interesting, the similarities between Area C1 and C2 do not stop at the five fragmentation measures. Area C1 and Area C2 are the only two neighbourhoods to accommodate only one class of house-structures suggesting that in terms of a division into social classes, these two areas are the most homogenous of all. It may indicate the presence of two groups of common villagers living in separate communities. The only exception would be the possible house of a priest in Area C2 – a structure usually considered as of a higher social status. However, the five

fragmentation measures suggest that the residents of these two neighbourhoods are likely to be a mixture of people who are integrated into their respective communities through common connections or interests. This similarity may have been a result of the social structure and settlement growth and will be explored further in Chapter 6.

The initial fragmentation analysis on *Saqacengalj* highlights the difference in social structuring amongst neighbourhoods. The low spatial fragmentation in both Area B and C3 suggests their social integration as well as a simple kinship composition. The presence of only one Class II household in each of these neighbourhoods indicates that both areas may have the head families living amongst their kin. In contrast, the high fragmentation and lesser accessibility of movement in Area A may indicate higher complication in kinship composition in the neighbourhood. This composition may involve three different kinship families and thus encourage subgroup formation. Last but not the least, Area C1 and C2 have shown that they are possibly a mixture of people integrated together through some kind of common connection or interest.

5.1.3 Neighbourhood Structure of *Aumagan*

	A	B	C	All
Convex Articulation	0.916	1.052	1.133	1.137
Convex Ringiness	0.307	0.257	0.275	0.228
Axial Articulation	0.875	0.894	0.866	1
Axial Ringiness	0.324	0.310	0.380	0.261
Axial Integration	0.954	0.85	0.764	0.878
Mean Depth	5.63	4.57	3.26	8.51
Number of Households	24	19	15	58
Number of Class II Households	3	4	1	8
Number of Terraces	12	9	8	29
Number of Convex	22	20	17	66
Number of Axis	21	17	13	58

Table 5. 2 Fragmentation analysis of *Aumagan*.

In *Aumagan* the results (Table 5.2) of the fragmentation analysis are very different from that of *Saqacengalj*. The distinction amongst neighbourhoods is more apparent in *Saqacengalj*, whereas the five measures of *Aumagan* show very little difference. The numbers of each neighbourhood are within a very close range and it is difficult to separate them from each other. This has resulted in the difficulty to interpret what the numbers mean and represent. However, there is still some information to take away from the analysis.

The first interesting point is that the convex articulation value in all *Aumagan*'s neighbourhoods indicates a high degree of fragmentation in the settlement, compared with that in *Saqacengalj*. This suggests that the spatial layout of Auamagan encourages creation of subgroups within the community. As mentioned earlier, the topographic form of *Aumagan* is more rugged than that of *Saqacengalj*. This has directly resulted in a more fragmented spatial division and smaller open spaces in the settlement layout. It is highly likely that the higher value of convex articulation is a direct reflection of the complex topography rather than a

result of division in the social structure of groups inhabiting the settlement. This is also supported by the relatively higher ringiness and average axial integration score, compared with those of *Saqacengalj* which indicates lower control of space and good integration of movement. The value of the five fragmentation measures therefore should be interpreted in the context of their environmental nature and the supporting evidence of material remains.

The second interesting point is the counter intuitive results of convex articulation values of Area A and C. Area A hosts three Class II households and Area C only hosts one. Based on the assumptions formulated in the analysis of *Saqacengalj*, Area A hosted three different kinship families, whereas Area C hosted a much simpler social group. If that was the case, it would be reasonable to expect Area A to have a higher convex articulation score than Area C. Nonetheless, the results have shown that Area C has the highest convex articulation value and Area A has the lowest amongst all neighbourhoods. However, as the difference between the two is very small, it is extremely hard to differentiate their characteristic on the basis of such a small margin.

Even though most of the five fragmentation measures are relatively similar, the axial integration measure highlights some more pronounced differences amongst the three neighbourhoods. The axial integration measure has shown a high score in Area A and low score in Area C. This suggests that it is easier to move between spaces in Area C than in Area A. As mentioned earlier, the topography of *Aumagan* had directly influenced the spatial layout of the settlement. The top part of Area A and the whole of Area C are situated on much smoother and gentle slope and therefore they can be considered as the best locations for house building. In Area C the area of gentle slope is the largest. Nonetheless, there are only 15 house-structures in this neighbourhood, scattered within a

sizable open space. Due to this dispersion, Area C is broken down into more 'small spaces' between households. This has resulted in a higher score of convex articulation, particularly in the top-right corner of the neighbourhood (Figure 5.1). However, this picture can be corrected with the help of axial integration.



Figure 5. 1 Spatial scatteredness at the top right corner of Area C in *Aumagan*.

Similarly to Area C1 and C2 in *Saqacengalj*, Area C in *Aumagan* has a high convex articulation and a low axial integration. This suggests that even though the space is more fragmented in the neighbourhood, the households in Area C in *Aumagan* are still relatively integrated. The difference between *Saqacengalj* and *Aumagan* is that the higher convex articulation score in Area C in *Aumagan* results directly from its small number of households within a larger amount of available space. On the other hand, the spatial layouts of Area C1 and C2 in *Saqacengalj* do not show this regularity as the houses-structures are clustered together within a smaller area. In these two cases, the causes of the high fragmentation of space

are fundamentally different. In *Saqacengalj*, the spatial fragmentation is a result of an intentional design, while in Area C in *Aumagan* it reflects the underlying topography. Seen from this perspective, the low axial integration score of Area C in *Aumagan* may indicate the intent of its inhabitants to achieve a more integrated spatial arrangement in the highly fragmented Area C.

In contrast to Area C, Area A has higher scores in both convex articulation and axial integration and its convex ringiness (CR) value would have been considered high in *Saqacengalj*, but is average in *Aumagan*. As mentioned in Chapter 4, the steep slopes in the bottom half of Area A have forced the spatial dispersion in this neighbourhood. Furthermore, the three outstretched pathways located on the steep slope are the very reason for the linear layout pattern and the high value of both convex articulation and axial integration. Judging from the results of the fragmentation and spatial layout analyses, it is very likely that this neighbourhood is more fragmented than the convex articulation suggests.

Last but not the least, the analysis identified the close-knit community nature of Area B. Area B is neither located on a steep slope, nor does it consist of a few households located within a larger space. Its average scores on the five fragmentation measures indicate that it was a well-clustered community similar to that of *Saqacengalj*. The only distinctive feature of Area B is the presence of a small hill in the lower left corner. Although this has affected the direction the house-structures face (towards the downhill vista) this difference does not have any effect on the distribution and connection of spaces and pathways. Therefore, none of the factors identified earlier seems to be biasing the results of the analysis in Area B and it is likely that the values can be considered as representative.

It has to be acknowledged here that the direction a household is facing may have significant effect on the actual social interaction. Inhabitants of two households facing each other are more likely to interact since they share a common activity area. On the other hand, households facing away from each other would not encourage interaction since their inhabitants are less likely to meet. Nonetheless, interaction between people has to happen at the same place at a single time and since spatial boundaries are already defined in the convex maps, it already assumes that a single activity can only be performed in a single convex, not in multiple separate spaces. This highlights the activity division characteristic of adapting a space syntax appraoch.

The results of the analysis of Area B in *Aumagan* are very similar to that of Area A in *Saqacengalj*. Both areas have a high articulation score and low ringiness score. In addition, their axial integration scores are also not too far apart. Interestingly, the two neighbourhoods both have the same amount of households: 19, which make them appropriate for a comparison. Another good neighbourhood for comparison in terms of number of households is that of Area C3 in *Saqacengalj*, which has 18 households. The two comparable neighbourhoods, Area A and C3 in *Saqacengalj*, fall at the two extreme ends in the analysis of spatial division, which further highlights the similarity between Area B in *Aumagan* and Area A in *Saqacengalj*. Clearly, a neighbourhood of the same size as Area C3 of *Saqacengalj* can be extremely different in terms of spatial arrangements. However, this does not mean that the residents in Area B in *Aumagan* came directly from Area A in *Saqacengalj*. Rather, their similarity in terms of more fragmented spatial arrangement merely suggest they both encourage the formation of subgroups, as well as they both have higher control over individual space and movement. The only difference between the two neighbourhoods is the ease of movement. Area B

has a slightly lower value in both axial articulation and axial integration. This suggests that even though it is an area that encourages subgroup formation, it is slightly more integrated than Area A in *Saqacengalj*.

Based on the initial analysis above, it can be concluded that each of the three neighbourhoods in *Aumagan* is spatially fragmented in a specific way. The axial integration of Area C has shown a clear intent for a more integrated spatial arrangement. This conclusion corroborates with the count of Class II house-structures in each neighbourhood. There are three, four and one Class II households in Area A, B and C respectively. However, it is difficult to directly relate the fragmentation with the number of kinship families in each neighbourhood. Again, the results of the five measures are very close, with little difference and few distinctions making the interpretation difficult. What can be concluded is that all the three areas are fragmented in their own specific way, but Area C is less fragmented than the other two.

5.1.4 Summary

By applying the fragmentation analysis, this research has offered a glimpse into the social structure and community composition of each neighbourhood. A better understanding of the social structure and composition is a key to further investigation of the relation between differences in social status on the site and their correlation with the neighbourhoods. The fragmentation and composition analysis is utilised as a foundation for interpreting the results of the wayfaring analysis. It will provide information regarding the cultural influence on the spatial layout.

Space syntax has been previously criticised of depopulating space and losing the human aspect of spatial analysis. This issue will be solved in the

following section by introducing socio/cultural weighting which adds different social relations and social interaction into the empty settlement layout.

5.2 Introducing Socio/Cultural Weighting

5.2.1 Social Attitude, Control and Relations

As mentioned in Chapter 3, the modelling of social interaction is defined by social proxemics. Different proxemics and the weight measures of each band are reflectors of social attitude of the agents in action. It is acknowledged that the distance and intensity measure of interaction varies from culture to culture. It may also differ significantly from person to person within the same culture. However, this section does not aim to determine who is more socially active or who is more conservative. Rather, it aims to model this social interaction in a more general way and investigate the implications and influences of different social attitudes and relations within the community.

In order to model different social attitudes, three different distance bands were applied. The three distance bands are defined as 1.) narrow; 2.) average; and 3.) wide. These three different bands provide a good comparison with different bases: 1.) minimum distance; 2.) maximum distance; and 3.) active ratio (1:2:3 and 1:2.5:5).The basic distance band is defined as 10m-25m-50m as it sets a minimum width of a normal household and covers most of the settlement at its maximum distance. Thereafter, the second distance band 10m-20m-30m is defined to represent a narrower area of interaction populated by less out-going agents. Finally, the third distance band 17m-34m-50m is defined to examine a wider area of interaction explored by people with more out-going personality.

Having established three different distance bands, three different interaction measures are then applied. The three rating measures are defined as 1.) concentrated; 2.) average; and 3.) general. They are designed with different ratios (4:2:1, 9:3:1 and 3:2:1) to examine the difference in interaction weight. The first is a rate defined as 80-40-20 to provide an average reference measure. The second rate is defined as 90-30-10 to represent a more concentrated intimate interaction in the closest distance band. The third rate is defined as 75-50-25 to examine a more spread-out general interaction. Each rating is applied to each band, therefore, the application of the three rating measures to the three distance bands results in nine different social attitudes (Table 5.3).

	102030 Narrow	102550 Average	173450 Wide
755025 General	NG	AG	WG
804020 Average	NA	AA	WA
903010 Concentrated	NC	AC	WC

Table 5. 3 The nine social attitudes and their code representations.

In this section, the nine different measures will be applied to each neighbourhood in order to investigate their social atmosphere (Appendix 4-21). For each neighbourhood under scrutiny, a single social attitude is assigned on the basis of the best 'fit'. This 'fit' is determined by comparing the results of the nine measures with the material remains and by examining which measure best highlights the households identified as distinct. That is, the distinct households are used as indicators of either a positive reflection of a certain attitude or a negative one. This best 'fit' is based on the highest ranking order of distinct households or the least accumulated ranking of these households. It is worth noting that this

comparison shows that distinct households result from certain social attitudes, not the other way around. Thus, it does not suggest that everyone in a given neighbourhood behaves in the same way or has the same social attitude. Rather, the analysis indicates that the presence of the material evidence may have been a result of the collective behaviour and certain attitudes in the neighbourhood.

In addition to examining each neighbourhood as a whole, the nine measures are also applied to investigate both the internal and external relations amongst them. The results show a range of diverse outcomes that cover much of the possible social attitudes spectrum (Table 5.4 and 5.5). However, not surprisingly there is little consistency amongst the three levels in each neighbourhood. This is perfectly understandable as people would interact differently depending on who they interact with. This makes these statistics very difficult, if not impossible, to interpret since they involve individual human attitudes and preferences. Therefore the only way to understand these results is to see if they show any form of patterning and similarity.

	A	B	C1	C2	C3	Top	Bottom	All
Convex Articulation	1.052	0.733	0.937	0.833	0.388	1	0.652	0.825
Convex Ringiness	0.2	0.235	0.28	0.266	0.444	0.174	0.272	0.204
Axial Articulation	0.947	0.6	0.75	0.666	0.333	0.911	0.521	0.725
Axial Ringiness	0.225	0.307	0.368	0.363	0.571	0.192	0.348	0.234
Axial Integration	0.9	0.818	0.8	0.8	0.857	0.911	0.8	0.878
Wayfaring	AG	WG	AA	AA	NG	AG	WA	
Wayfaring In	NC	WG	AG	AC	WC	NC	AG	
Wayfaring Out	WA	AG	AA	NC	NG	WG	WG	

Table 5. 4 Social attitude compared with fragmentation measures in *Saqacengalj*.

	A	B	C	All
Convex Articulation	0.916	1.052	1.133	1.137
Convex Ringiness	0.307	0.257	0.275	0.228
Axial Articulation	0.875	0.894	0.866	1
Axial Ringiness	0.324	0.310	0.380	0.261
Axial Integration	0.954	0.85	0.764	0.878
Wayfaring	AG	WG	WG	
Wayfaring In	AG	AG	NG	
Wayfaring Out	WA	WG	AG	

Table 5. 5 Social attitude compared with fragmentation measures in *Aumagan*.

Although this method is originally designed to investigate social attitude amongst neighbourhoods, there are two other different perspectives to interpret the results: 1.) power dominance; and 2.) relation indicator. In the first of them, the social attitude measure is based on the distance bands and the interaction rates assigned to the bands. A ‘wider’ and ‘general’ measure indicates that the interaction is more spread-out and distributed widely amongst all the households. In such a case, it is assumed that the social power is more evenly distributed

amongst the residents. On the other hand, a ‘narrow’ and ‘concentrated’ measure indicates that the interaction is more focused on the paths where the people walked. That said, the gap between high social rate and no social rate is more significant. If such gap occurs it suggests that social dominance is more focused on specific households which were likely to have established higher social control. This interpretation can easily be validated through correlation with the ringiness measure described above since they both examine the control rate in a neighbourhood. In addition, it can also be further supported if a successful match is achieved between high integration areas in convex spaces and high interaction areas in wayfaring modelling.

In addition to social attitude and power dominance, the other perspective, relation indicator, is even harder to interpret and understand. From its perspective, the main indicator of social relations would be the distance band. It is assumed that in a well-established neighbourhood, people usually have better relations with everyone else and excluding certain individuals is rare. Therefore, the social relation rate is expected to be more spread-out. Its measure should result in a ‘wider’ or ‘average’ distribution since it will cover larger ground in maximum width and provide interaction rate to most people. In contrast, a ‘narrow’ distribution indicates no interaction outside of the given bandwidth. i.e. poor relations with people living outside of the range. Thus, the bandwidth measure can potentially serve as an indicator of good or bad social relations between neighbourhoods.

On the other hand, the interaction rating assigned to each bandwidth is fundamentally a ‘relative ratio’. Therefore, it is not an absolute measure of the quality of interaction, but a relative quality in comparison to different bandwidths. Good relation values amongst all of them can be both ‘general’ and ‘concentrated’ depending on the level of social dominance. As a result, the social interaction rate

should not be used as an indicator of defining good or bad relations. The difference in relative ratio rate, along with the difference in interacting bandwidth, is a better reflection of preferred interaction style. In contrast, the interaction rate is better utilised as an indicator of the social attitude.

The complexity of possible interpretation of the bandwidth and the interaction rate is a direct indication that there is not one “correct” explanation or interpretation of any measure. Similar to the fragmentation measure described in section 5.1, they are both a result of multiple possibilities and need to be interpreted with great care within their context. The fragmentation measure generally provides three indicators: 1.) the fragmentation of space; 2.) the control of space; and 3.) the accessibility of space. It only suggests subgroup formation, power dominance, and ease of movement. However, it does not indicate what kind of sub-group was forming or the reasons behind easy accessibility. Likewise, the attitude measure does not give the reasons why a neighbourhood has a narrower social bandwidth, or why the social interaction is more concentrated in the immediate surrounding. The results need to be examined within the context of the neighbourhoods’ composition and social relations. The analysis does not tell the full story but, with the support from other lines of evidence, it can provide very useful insights into the human attitudes and interactions. Based on these assumptions, the following section highlights how the social attitude measures can reveal insights into the nature of individual neighbourhoods.

5.2.1.1 Control and Social Dominance

As mentioned above, the comparison between the social attitude and the fragmentation measure could potentially be informative in terms of detecting power dominance. Take Area A of *Saqacengalj* as an example. The fragmentation measure has shown that it is a very fragmented and highly controlled neighbourhood. In addition, its wayfaring result has shown a narrow and concentrated social attitude in internal relation. This combination suggests that the fragmentation of space could cause the inhabitants to be more interactive within their immediate surroundings. In contrast, in the Area C3 of *Saqacengalj* the fragmentation is low and it shows a wider but still concentrated social attitude in internal relations. What this combination might suggest is that the easy access and unrestrained movement allow the inhabitants to carry out interaction within a wider bandwidth. Looking at Tables 5.4 and 5.5, this spatial fragmentation and bandwidth correlation is apparent in terms of internal relations on both sites. This example showcases that the bandwidth of wayfaring can potentially provide information on the control over communal space.

Another example is Area C of *Aumagan*. The bandwidth measure in *Aumagan* has shown relatively consistent ‘average’ and ‘wide’ results. Only the internal relation in Area C has a narrower distribution of the bandwidth measure. In addition, Area C has the highest convex articulation score amongst all the neighbourhoods under investigation. This again supports the correlation between bandwidth and spatial fragmentation. An alternative explanation would be that the similarity amongst neighbourhoods, and the lack of the ‘concentrated’ measure, in *Aumagan* suggests an error stemming from the ‘sensitivity’ of the wayfaring model design. However, this is proven not to be the case in later analyses.

In the earlier discussion of fragmentation in Area C, it was concluded that even though the spatial layout is fragmented, the neighbourhood is still rather integrated thanks to a higher ease of movement. Furthermore, the high score of spatial fragmentation might be biased due to fewer houses distributed within a larger space. Since the wayfaring model does not concern the spaces and pathways defined in the fragmentation analysis, it treats the settlement as a continuous space for people to move about freely. Therefore, the results of a 'narrower' measure in Area C actually confirm the fragmented spatial layout may be a result of social interaction nature.

In practice, if Area C is more integrated, the relation scores amongst the residents are expected to be more spread-out as the residents form a more even and cohesive entity. This should have resulted in a 'wider' and 'general' outcome in the social attitude test. However, if the results follow a 'narrower' distribution falling on the opposite end of this scale, this would support the argument of the fragmented spatial layout and might indicate the existence of a subgroup in the neighbourhood. Although, it could also be interpreted as representing personal preferences, the attitude measure is based on a collective result and would indicate a collective effort of adapting a 'narrower' social bandwidth. If it is a collected effort, it is more likely a social phenomenon that occurred in the neighbourhood. In turn, the result supports the fragmented spatial layout argument and might indicate the existence of a subgroup in the neighbourhood (more evidence in Chapter 6).

5.2.1.2 Social Attitude

A good way to highlight the social attitude preference is to compare Areas C2 and C3 of *Saqacengalj*. Both have been classified as the two neighbourhoods

in the settlement formed later. In terms of their external relations with other neighbourhoods, Area C2 shows a narrow and concentrated attitude, whereas Area C3 shows a narrow but general attitude. Both areas have shown a narrow bandwidth, which may suggest that they built their relations predominantly with their immediate area. If they had established a good relation with the people further away, this would have been reflected by an average or wider bandwidth result. This shows that the bandwidth is not a direct reflection of a single causal factor, such as spatial fragmentation, but it can be an indicator of social relation between neighbourhoods. Nevertheless, the interpretation of the results needs to be complemented by the understanding of the contexts and a variety of factors that may influence it.

Interestingly, it has already been established in Chapter 4 that both Area C2 and C3 at *Saqacengalj* have poor external relations with other neighbourhoods. The attitude measure has a 'narrow' distribution in both areas, which again supports this conclusion. In addition, the difference between Areas C2 and C3 lies within the quality ratio of interaction. Area C2 has shown a high concentration of interaction while C3 has exhibited a more general one. This might indicate that Area C2 was trying to establish a strong social bond with other neighbourhoods. On the other hand, Area C3 seems to have had less interest in this matter. This conclusion showing the differences in intent between different neighbourhoods is supported by further evidence below. This case study showing the contrast in intent between two areas of one site is a good example of how social attitude can be used to allow a glimpse into past human preferences.

5.2.1.3 Relation Indicator

In addition to the neighbourhood analysis results described above, the social attitude measure is also applied to the direct neighbourhood relations to examine if and how can it serve as a relation indicator (Table 5.6, 5.7). Tables 5.6 and 5.7 show that the measurements did not suffer from the issue of insufficient sensitivity – an issue raised earlier in the social attitute analysis of *Aumagn*. It was suggested in section 5.2.1.1 that the similarities of recorded measures values amongst the neighbourhood in *Aumagan* might have been a sign of the low sensitivity of the analysis leading to the absence of the 'concentrated' measure. However, the results shown in Table 5.7 reveal the presence of 'concentrated' measure is interaction quality indicating that the sensitivity of the analysis is fully functional. Furthermore, it highlights the conclusion that the consistency of analysis results in *Aumagan* is a valid and significant phenomenon and should be investigated further.

	A	B	C1	C2	C3
A		AG	AG	AG	AC
B	AG		AG	WA	AC
C1	AG	AG		WG	AC
C2	AG	WA	WG		WA
C3	AC	AC	AC	WA	

Table 5. 6 Social attitude measure of direct neighbourhood relations in Saqacengal.

	A	B	C
A		WC	WA
B	WC		AC
C	WA	AC	

Table 5. 7 Social attitude measure of direct neighbourhood relations in *Aumagan*.

As mentioned earlier, the social attitude measure can be very difficult to interpret without supporting information or clear patterns. However, it is exactly this characteristic of the social attitude measure that makes this analysis so interesting and potentially highly insightful. There is a clear patterning of 'AG' cluster amongst Areas A, B and C1 (Table 5.6), indicating that the neighbourhood relation amongst these three areas is showing the same 'average general' attitude. The recurring result of this measure amongst these three neighbourhoods is striking considering there are nine different measures to choose from. One only needs to take a look at Table 5.4 to see how the measure can vary amongst areas and even in a single area. This consistency of the pattern stretching over the three areas strongly indicates some kind of phenomenon that was established socio-culturally.

Furthermore, Area A, B and C1 are considered to be the oldest three areas that had more time to develop better neighbourhood relations, as demonstrated in the results of the wayfaring analysis in Chapter 4. Following the discussion on the direct neighbourhood relation in Chapter 4, the presence of distinct households in locations of high interaction rate suggests that the relation amongst these three areas is well established. This argument was also used to support the settlement growth model suggesting that the neighbourhood relation amongst these three areas was better because they were established earlier and had more time to develop. As a result, the social measure of 'AG' may have been an indication of a well-established and balanced relation.

In contrast, Area C3 has shown a constant 'AC' social measure with the three areas in Table 5.6. It was also established in Chapter 4 that, assuming Area C3 was the latest neighbourhood added to the settlement, it is likely not to have a good relation with the other neighbourhoods. This process may be reflected in the social attitude measure where 'AC' suggests an undeveloped relation.

In addition to the clear 'AG' patterning in Area A, B and C1, Table 5.6 also shows the same 'AG' distribution between Area A and Area C2. This may suggest that the neighbourhood relation between Area A and C2 is well established as well. In the previous section discussing social attitude, it was theorised that Area C2 and C3, although both were established later, they had different attitude towards neighbourhood relations. Area C2 has shown intent to establish better relations, whereas Area C3 has not. Based on the results summarised in Table 5.6, this difference in the eagerness to deal with external relations is further supported for Area C2. However, an alternative interpretation would be to see the casual sequence the other way around. There might have already existed a good relation between Area A and C2 that encouraged the people in Area C2 to exploit their external relations leading to the discussed results. On the other hand, Area C3 remains the most isolated neighbourhood of the settlement.

What the results (Table 5.6) also suggest are stages of development in terms of social attitudes in this specific period of *Kaushi*. Based on previous results of the neighbourhood relation wayfaring analysis and the nature of social attitude measures, the relation progression can then be marked as: AC-WA-WG-AG in the *Saqacengalj* period. The early stage of relation development was an 'Average Concentrated' attitude. At the final stage of this development, a change to 'average general' attitude marks a more balanced and well-developed relation. This observation can then be applied back to the previous results (Table 5.4) to further scrutinise the implication of different social measures. However, social attitude is a product of many factors and there might have been many other factors that could potentially lead to this pattern. Therefore, the use of this interpretation in terms of progress should be dealt with great care and consideration.

Similarly, it is important to highlight that social attitude is a very fluid entity. It can change with time, differ depending on the space and vary for different persons. The results of the analysis so far (Table 5.6) have shown a clearly defined collective behaviour in that specific period. However, the results can only be interpreted in the same space-time for example, only at *Saqacengalj* but not at other sites. Therefore we cannot interpret the results of the social attitude analysis at *Aumagan* through the lens of the situation in *Saqacengalj*. It is not only a different place, but also a different period. The social attitude considered 'balanced' might have changed after the people left *Saqacengalj* and developed a different kind of 'appropriated balance'.

In terms of *Aumagan*, the social attitude results (Table 5.5) show a very consistent 'general' distribution of the interaction rates. The only exception is the external relation of Area A. This may suggest that the settlement growth of *Aumagan* developed into a more stable relation when people found balance in their social relations. Even though Area A has the 'average' distribution, the difference between 'average' and 'wide' is not a very strong distinction. In addition, the social attitude measures of direct neighbourhood relations (Table 5.7) show very different results. The analysis reveals a high frequency of 'wide' and 'concentrated' distributions, in a stark contrast to the external relation analysis where 'concentrated' is not featured at all (Table 5.5). This difference, as well as the variation in the results, has in effect made identifying progression of social attitude at *Aumagan* impossible. In addition, the scarcity of material remains and the simplicity of the three areas have also contributed the difficulty in interpreting the results of the social attitude analysis of *Aumagan*.

Another important point raised by the results of the relation indicator analysis is the correlation with the results of the external neighbourhood relation

wayfaring analysis (Tables 5.4 and 5.5). It is obvious that the results in Tables 5.6 and 5.7 are not comparable with those in Tables 5.4 and 5.5. Take Area A of *Saqacengalj* as an example. Its direct neighbourhood relation results show a quite consistent 'AG' distribution. However, the external neighbourhood relation of Area A shows a 'WA' result. This difference in social attitude occurs because the measure is determined basically by the 'best fit' of distinct households in the neighbourhoods concerned. In other words, the external neighbourhood relation is the best fit of all distinct households in all the neighbourhoods with priority to the ones in the original neighbourhood. On the other hand, the direct neighbourhood relation is only concerned with distinct households in the two neighbourhoods involved. In consequence, the direct neighbourhood relation social measure is more specific at the neighbourhood scale. Nonetheless, this does not decrease the importance of the external relation measure.

The essence of the external neighbourhood measure has its basis in a wider collective effort. While the direct neighbourhood measure is more specific, the external relation measure is supposed to reflect the same social attitude toward the rest of the settlement. Both sets of results, from the external relation and the direct relation analyses, are calculated on the basis of the best fit of distinct households. The only difference is that the external relation analysis involves more people and a larger region, i.e. it is a more general measure applied at a larger scale. Just like any other analytical method, the results are dependent on the scale of analysis, which is, in turn, dependent on the research questions asked.

5.2.2 Social-Cultural Weighting

The wayfaring models are based on social meshworks. As mentioned in Chapter 3, the wayfaring modelling is not about ‘how’ people move or ‘how’ people interact with each other, but rather about understanding the social interactions, social relations and their structure. The method concerns social relations rather than trying to model actual human behaviour. The wayfaring models are used to investigate the social meshwork by breaking down multiple social connections and then scrutinise specific relations amongst them. Similarly to social network analysis, wayfaring can also serve as a tool that allows researchers to represent and analyse relations between people within a formal mathematical framework. As shown in Chapter 4 and Chapter 5.1, it is through the process of modelling that researchers gain information and understanding of the nature and interconnection in the meshwork of social relations.

The strength of the wayfaring model lies in its ability to break down the available evidence mirroring past relations into chunks small enough to be meaningfully analysed and then put them back together again for a final comprehensive result. For example, since the social interaction rate is a relative measure, it can be weighted and accumulated or deducted on the basis of the known social relations. Thus, researchers can produce the final social meshwork by accumulating different measures representing a variety of social relations. However, it has to be stressed that even though the final result may be informative as it provides a more comprehensive view, the major strength of wayfaring modelling lies in the reflective process of producing the model. Below are three different kinds of weighting systems that can be beneficial in this process: 1.) social identity weighting; 2.) social relation weighting; and 3.) avoidance paths. These three different weighting systems can be further utilised to produce the final

comprehensive view of the social meshwork of the settlements. The examples below are performed on the data from the site of *Saqacengalj*.

5.2.2.1 Social Identity Weighting

In terms of re-introducing the socio-cultural aspect into an otherwise static modelling in the wayfaring analysis, the starting point is to establish the differences in social identity. The term 'social identity' refers to the people sharing the same identity, such as family identity, profession, wealth or kinship, etc. They are the building blocks of the multi-scalar communities set out in Chapter 1. Once a shared identity is recognised in archaeological finds, the people sharing the same identity can be accumulated to highlight community relations. Although it is impossible to re-establish all these aspects for a fully comprehensive social identity weighting, a simplified model is achievable. In addition, the aim of this research is largely to reflect on the 'process' of producing the model and, as a result, gaining understanding and insights into the relations between communities of the investigated settlements. For this reason, constructing the weighting from known proxies fulfil the scope and aim of this research. Any understanding of social identity gained in due course can later be adapted and adjusted to produce a more comprehensive measure. As the starting point, this research first utilises the distinct households identified in Chapter 4, such as the large households belonging to Class I and II or households with water containers. This will enable researchers to highlight the differences in social identity amongst the residents and communities and to demonstrate the potentials of the weighing system.

The first type of social identity is the different class of households. It has been formerly suggested that Class III households are likely to belong to sibling families and common villagers whereas Class II households are possibly a marker

of higher social status and potentially of head families. In short, this research assumed a class separation in social identity based on different classes of households. In terms of modelling this identity difference, the simple way would be to produce a meshwork by accumulating Class III households (Figure 5.2) and another meshwork by accumulating Class II households (Figure 5.3). However, when doing so, an important issue arises: what kind of social attitude should be applied to the connections amongst households? Ideally, the social attitude applied to each connection would be based on the results of the social attitude analysis (Table 5.4 and 5.6). In this case, each meshwork would be tailored to its specific subject and provide a more 'customised' and 'realistic' result. Nonetheless, working through individual relations and applying their respective social attitudes consumes massive amount of time (over 10,000 relations). Therefore, this research applies the social attitude in respect to the scale and nature of the particular 'social relation' (see below). This method provides the necessary diversity amongst different social relations and also speeds up the analysis process.

The idea of different social classes is a very general concept in terms of social identity. As mentioned earlier, people have different attitudes towards a larger group or specific person within that group. In addition, the matter of scale comes into play when discussing appropriate social attitudes. In this case, the difference in social class is a very general one and therefore the specific social attitude between neighbourhoods may be, arguably, not suitable for analysis at this scale. Instead, a general average of the nine social attitude measures was applied for this particular purpose.

The first part of the analysis represents the meshwork of the Class III households, which are generally considered to belong to common folks. The results (Figures 5.2 and 5.3) highlight an interesting pattern. Figure 5.2 bears a clear similarity to the results of the overall interaction meshwork of *Saqacengalj* (Figure 4.28). This is not surprising since only six households belonging to Class II and Class I are removed from the overall analysis. The result has also shown a concentration of interaction along the main central axis road in the bottom half of the site. On the other hand, the second part of the analysis based on connections of Class II households, probably belonging to the head families, produced very different results (Figure 5.3). If the assumption that larger houses are a marker of high status, they are occupied by people who are born with superior social status to their siblings and kin and have more authority and decision-making power. It is therefore interesting that the meshwork analysis of their households highlights two areas: the terrace of the Headman's household and the corner considered to be the oldest in the settlement. These results demonstrate the tight control of delegated social power in the settlement, and that this delegated power is concentrated in the corner area amongst households of people with a higher status.

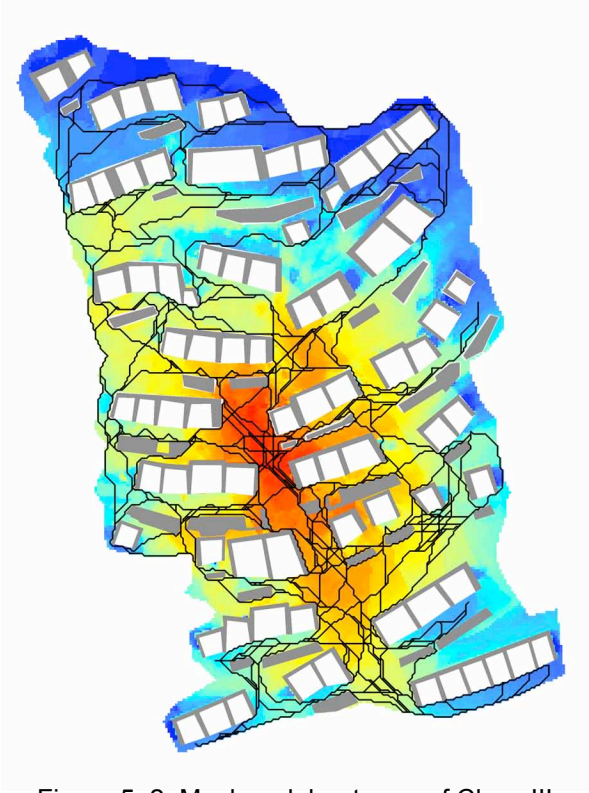

Figure 5. 2 Meshwork heat map of Class III households in *Saqacengalj*. Red - High Interaction. Blue - Low Interaction. Black lines - Social Network.

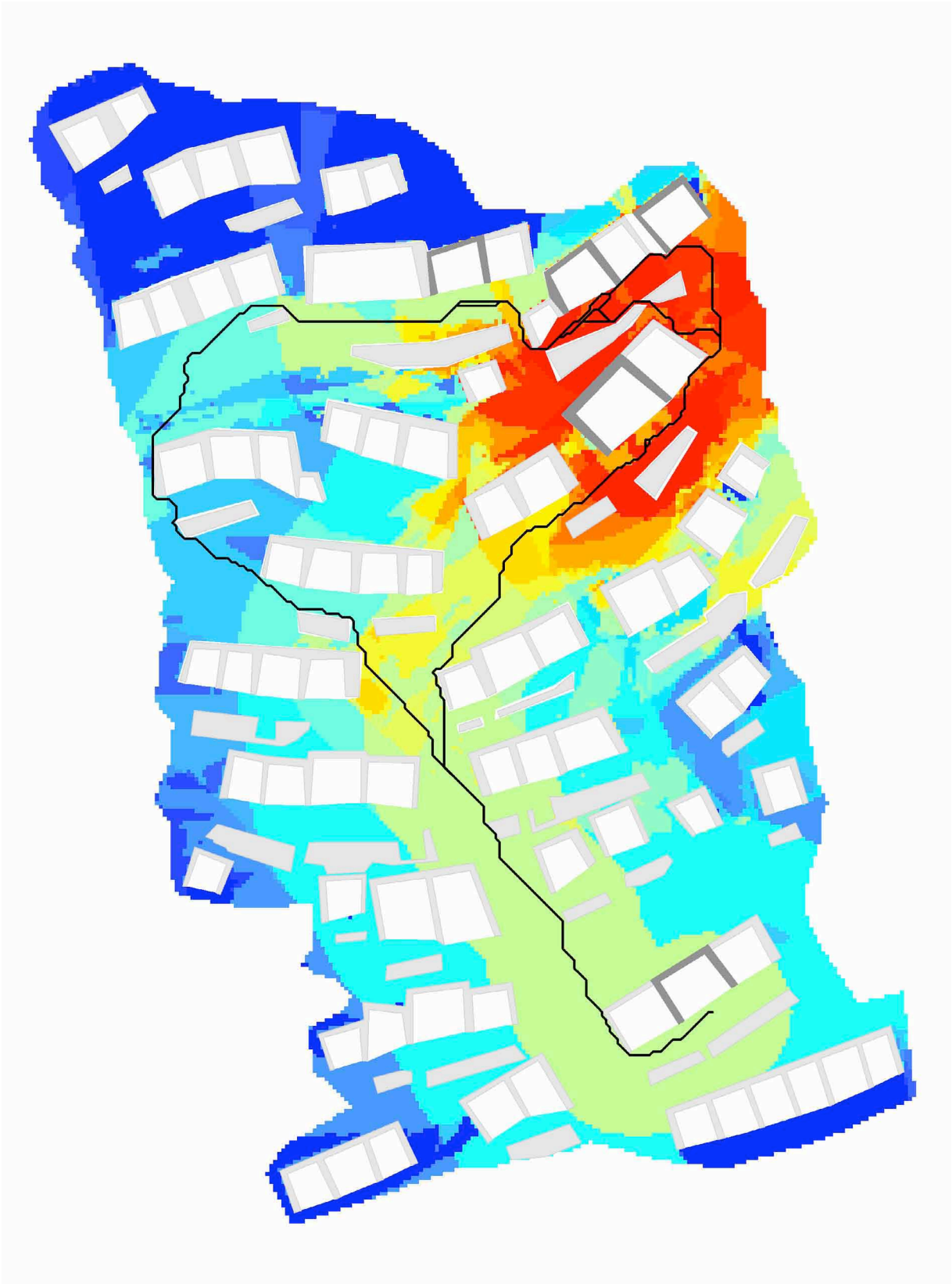

Figure 5. 3 Meshwork heat map of Class II households in *Saqacengalj*. Red - High Interaction. Blue - Low Interaction. Black lines - Social Network.

The second type of social identity weighting is the high status of the Headman. Since the Headman is the leader of the community (Chou 2011: 551; Tan 2003: 13), it is therefore apparent that everyone in the settlement would have an unique relation with him. Again, this is a very general concept and can therefore be applied with general average social attitude measure (Figure 5.4).

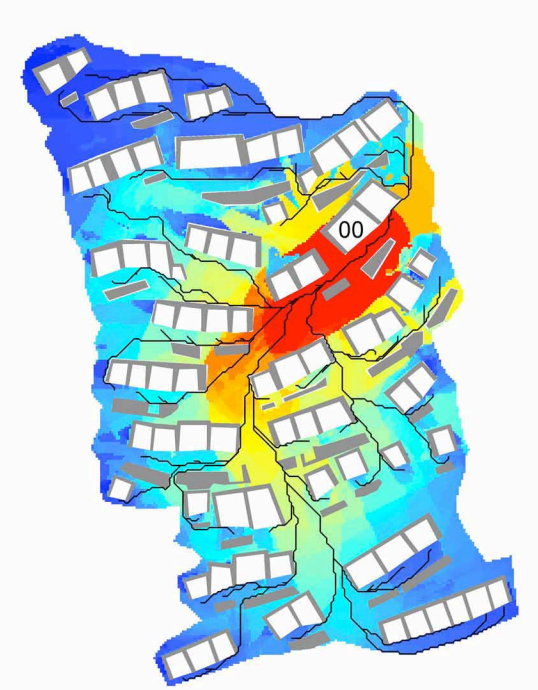

Figure 5. 4 Meshwork heat map of Headman's (00) social relation in *Saqacengalj*. Red - High Interaction. Blue - Low Interaction. Black lines - Social Network.

The third type is the assumed significant social identity of households with water containers. It has been established that the possession of water containers can be regarded as a symbol of wealth at the very least but probably also of high social status. However, there is a difference in the way that their wealth was accumulated. In the previous chapter, it suggested that these households accumulated their wealth and resources through intensive social interactions and good social relations (for example, 0S3 and S5E1) or through other, not identified, means. Therefore, the households that possessed water containers can be distinguished as a separate class representing high social status acquired with time. In this case, one can categorise the meshwork of wealthy households (Figure 5.5) into the two additional meshworks based on the way the wealth was accumulated (Figure 5.6 and 5.7). The model is also applied with general average social attitude measure.

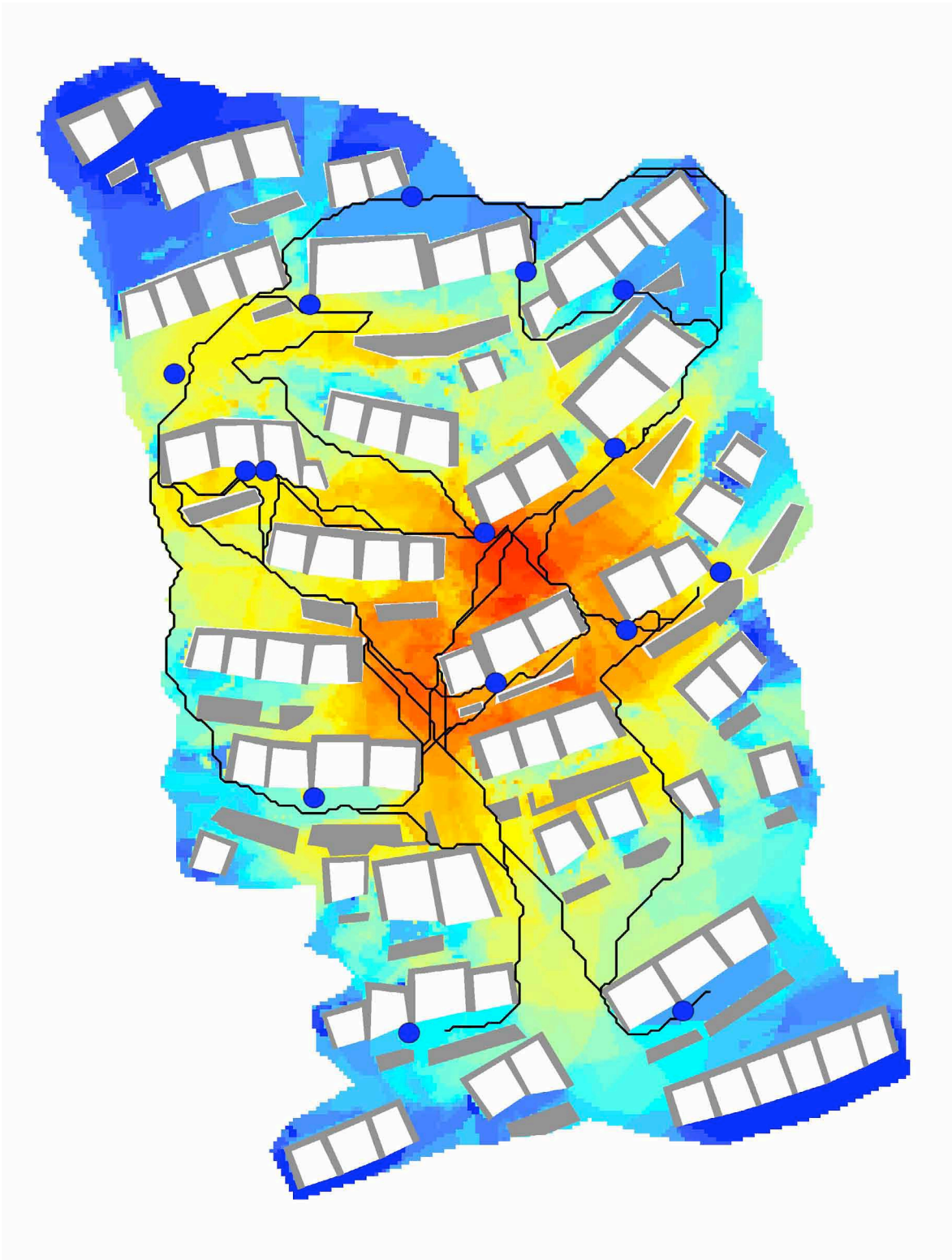

Figure 5. 5 Meshwork heat map of wealthy households in *Saqacengalj*. Red - High Interaction. Blue - Low Interaction. Blue dot – Water Container. Black lines - Social Network.

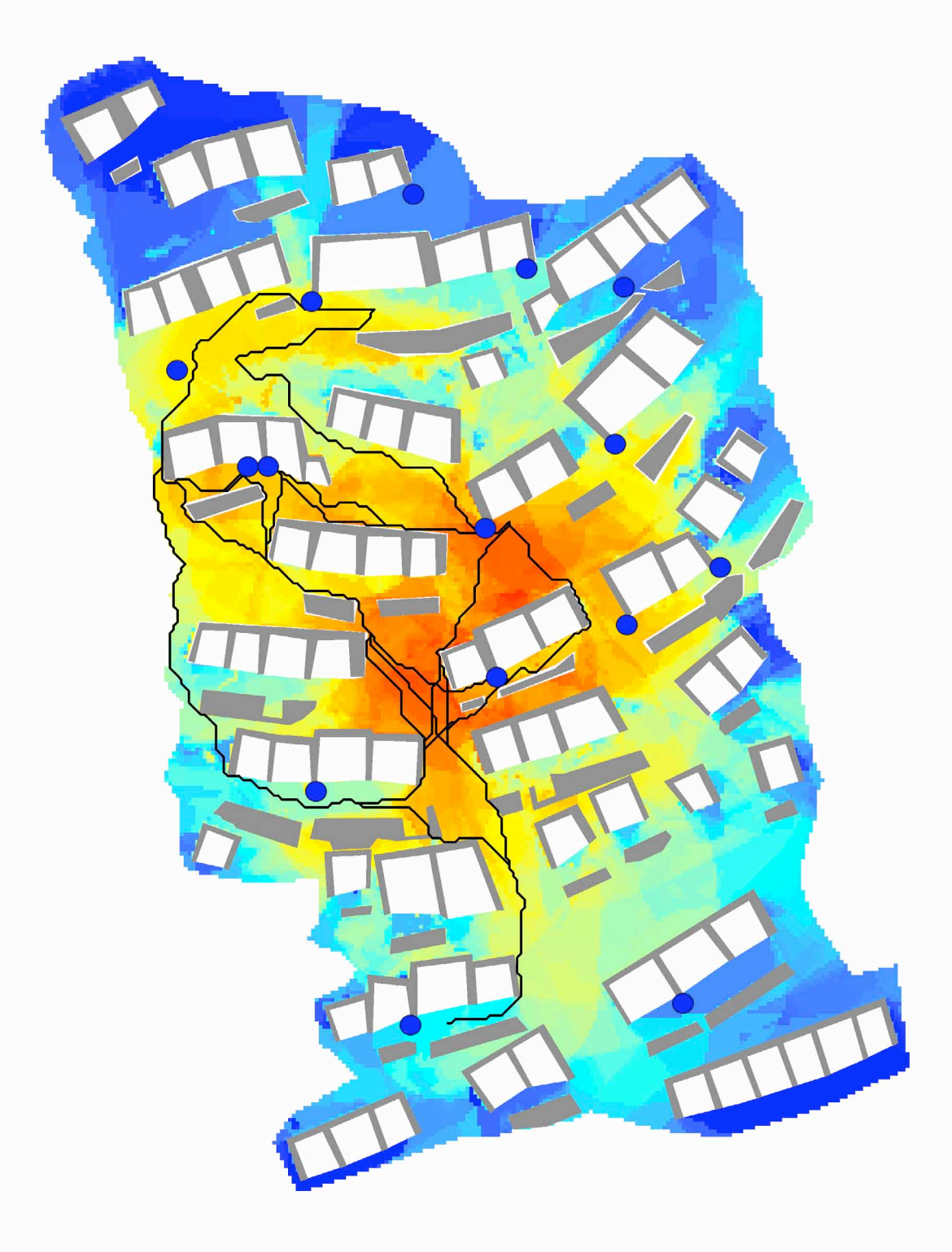

Figure 5. 6 Meshwork heat map of wealthy households where the wealth is gained from allocated social status in *Saqacengalj*. Red - High Interaction. Blue - Low Interaction.
Blue dot – Water Container. Black lines - Social Network.

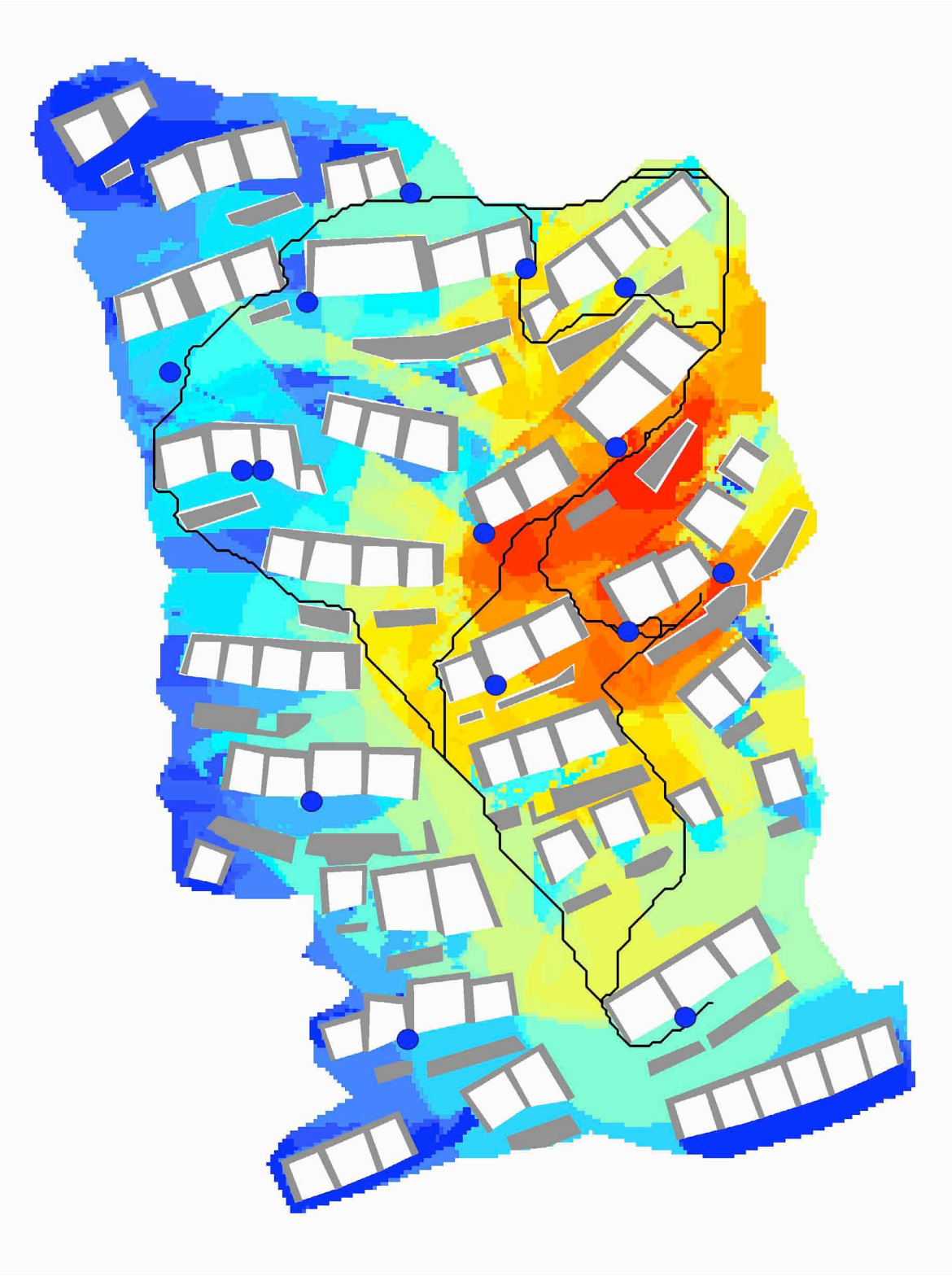

Figure 5. 7 Meshwork heat map of wealthy households where the wealth is gained from delegated social status in *Saqacengalj*. Red - High Interaction. Blue - Low Interaction.
Blue dot – Water Container. Black lines - Social Network.

The results of the third type of analysis share a very similar pattern with the first type. Figure 5.5 is the meshwork of all wealthy households in the *Saqacengalj*. The main concentration area of interaction is located at the centre of the settlement. Figure 5.6 is the social meshwork of households whose wealth may have been gained through higher intensity of social interaction. Since these households are located in high interaction areas, it is possible that they established good relations with other people and, therefore, had the potential of using their better social relation to gather more resources or to gain more resources from others. It best represents the meshwork of people who accumulated allocated power through direct social interaction. Figure 5.7 shows the meshwork of households whose wealth is not accumulated through social interaction. Their wealth could have been gained through specific profession or existing social status, etc. These are social statuses that are predefined and considered delegated power within the existing social structures. The most intriguing observation is that the area of the highest concentration of the households with delegated power is, again, located in the surroundings of the Headman's household. On the other hand, the concentration in the meshwork of households with allocated power moves away slightly towards the bottom left direction. This may suggest that as the settlement was growing in space, the centres of allocated and delegated powers began to separate (further discussion in Chapter 6).

The fourth type of analysis is concerned with the social identity of individual neighbourhoods. Similar to the overall internal relation discussed in Chapter 4, this social identity analysis is concerned with the households sharing the same neighbourhood identity. This does not necessarily suggest that there is a hierarchy amongst different neighbourhoods. It simply states that there are different

neighbourhoods in the settlement and each neighbourhood is a self-sufficient community. Unlike the three types of analysis described above, this neighbourhood identity analysis is performed on a local scale and therefore it is better to apply its appropriate social attitude to internal neighbourhood relation. As a result, the internal social attitude shown in Table 5.4 is applied to each neighbourhood respectively and is then accumulated to highlight the full meshwork of the site (Figure 5.8).

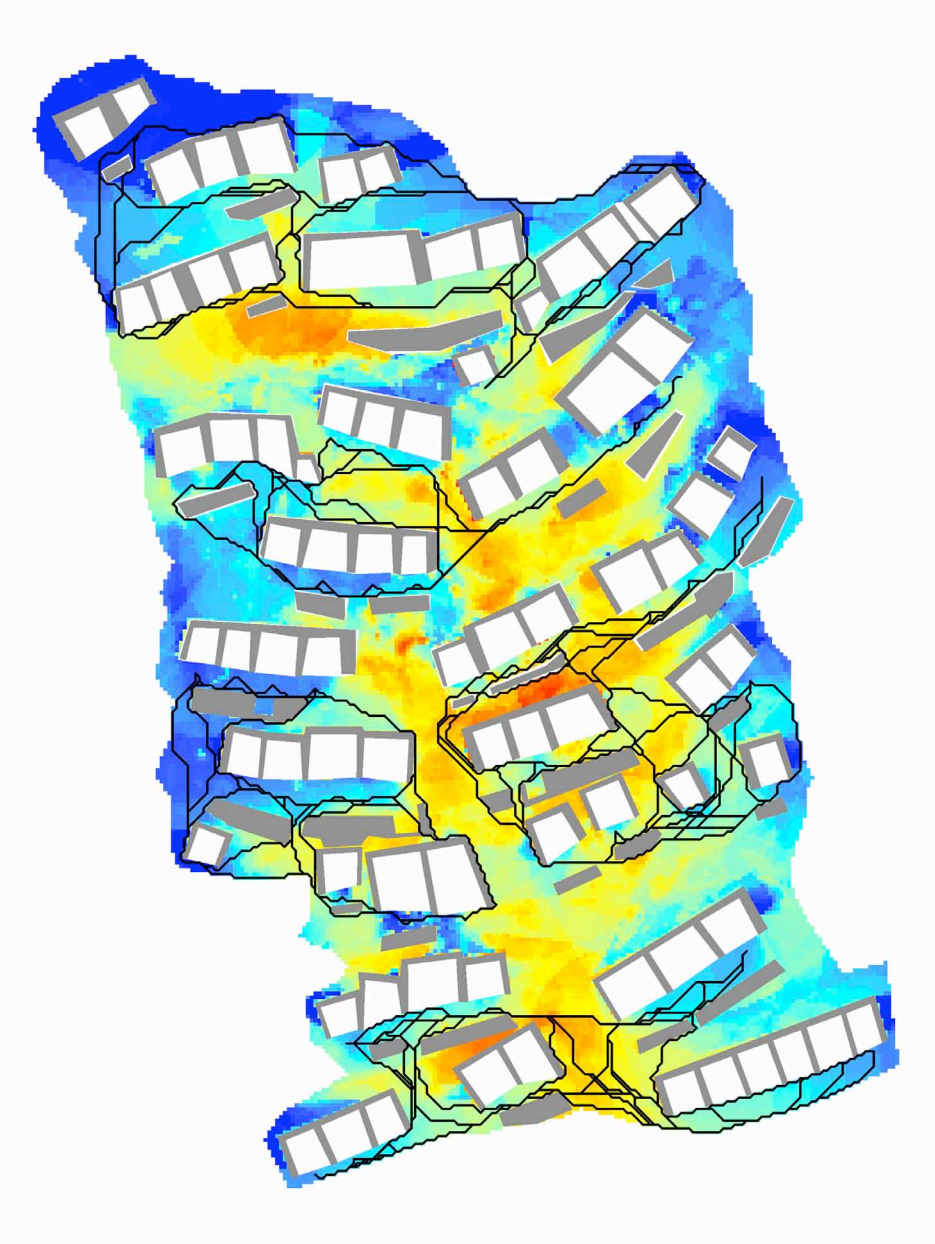

Figure 5. 8 Meshwork heat map of individual neighbourhood relations in *Saqacengalj*. Red - High Interaction. Blue - Low Interaction. Black lines - Social Network.

The result of Figure 5.8 is quite interesting in that there seems to be two high interaction areas in *Saqacengalj* following its repeatedly recognised divide into the top and bottom halves. The high interaction area in the top half of the site is located in front of the Class I, possible Council house house-structure S2W2. Since S2W2 is located at the heart of the old part of the settlement this result could be expected. The more surprising outcome is the location of high interaction focus area in the bottom half of the site in the vicinity of the Class II household S2E5. This unexpected result could inspire ideas about dispersion of power, however, it is likely that this pattern is caused by the topography and household weighting. Since the model is based on visibility, the lower ground will always have a better visual exposure. In addition, because there are more households in Area C3, the accumulated interaction rate is higher than in the other areas. The highest interaction area of the bottom half is also the area where the three neighbourhoods overlap, allowing it to accumulate a higher interaction rate. The final argument for rejecting the hypothesis of authority dispersion is that the area right in front of S2E5 has actually a low interaction value, denoted by the blue colour suggesting that S2E5 is in fact located in a low interaction area.

5.2.2.2 Social Relation Weighting

In this section, the meshwork is accumulated according to the social relations weighting rather than the social identity weighting. The “social relation” here is defined as any known existing relation between two or more social classes. As opposed to social identity, which represents a fixed identity within specific hierarchy, this measure is concerned with the relations between different social classes within the same hierarchy. This research identified the following two types of social relations: 1.) between neighbours; and 2.) between the head families and their kin.

The first type of social relation is the direct relation between neighbourhoods. As extensively discussed earlier in this chapter, the respective social attitude measure is applied to each relation in order to highlight the degree of each neighbourhood's friendliness. That is, by applying the social attitude measure shown in Table 5.6 to household relation, the results show the nature of the relation between the neighbourhoods (Figure 5.9).

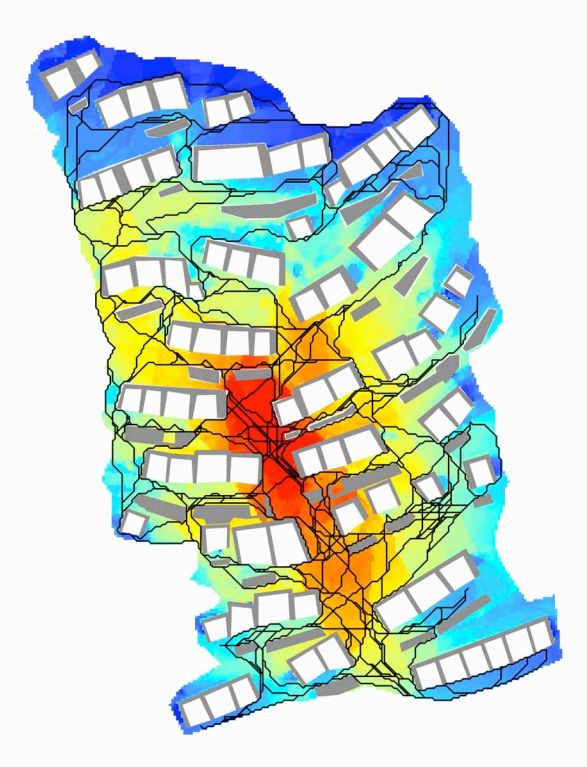

Figure 5. 9 Meshwork heat map of external neighbourhood relations in *Saqacengalj*. Red - High Interaction. Blue - Low Interaction. Black lines - Social Network.

The second type of social relation is between a head family and its kin. As mentioned before, the Class II households are likely to belong to the head families. The Headman's kin in Area B in *Saqacengalj* is a clear example of the head family living amongst its kin. The same situation is also established for Class II household S2E5 in Area C3 of *Saqacengalj*. This kinship relation can be established by accumulating the meshwork between the Class II household and the rest of the households in the neighbourhood (Figure 5.10). On the other hand, the head families may not always reside amongst their kin. However, this does not affect the nature of the relation. Once the relation is established, the same model can be applied by accumulating the meshwork between the Class II households and the common households in a given neighbourhood.



Figure 5. 10 Meshwork heat map of the Headman and his/her kin in *Saqacengalj*. Red - High Interaction. Blue - Low Interaction. Black lines - Social Network.

5.2.2.3 Avoidance Path

As informative as all the specific social meshworks can be, the original overall settlement meshwork plays an important role in extending the understanding of social relations in the investigated settlements. The 'What if' type of questions has always played a significant part in modelling human behaviour (Bulluck 2014). This section shows how to model a different kind of social attitude: 'avoidance of high interaction areas'. The overall settlement meshwork can be used as proxy for people's basic understanding of where main social interaction took place. In other words, it can serve as a friction surface for modelling least-cost pathways. High interaction areas are represented as high friction surface, and vice versa. Obviously there are various ways of using this friction surface to represent a more 'realistic' way of movement. However, the aim of this research is to investigate how modelling this 'what if' scenario can benefit researchers' understanding of social relations. To achieve this, the overall settlement meshwork, without any transformations, is directly used as a friction surface for least-cost path analysis.

Figures 5.11 and 5.12 show the difference in the meshwork representing the movements in *Saqacengalj*. Figure 5.11 is a density map of all accumulated least-cost pathways from the site's topography. It shows a high concentration of movement on the central axis road in the bottom half of the site. This is the foundation of a high social interaction rate in the same area shown in Figure 4.28. Figure 5.12 is the density map of all accumulated least-cost pathways built with Figure 4.28 as its friction surface. In contrast to Figure 5.12, it shows that the movement is divided into two side-pathways avoiding the central social interaction area. This result needs further investigation since the two side-pathways pass

along many significant households that are not located in the high interactive areas recognised in the original analysis.

Furthermore, a complete analysis based on this friction surface may broaden the understanding of the social relations in the settlement. An additional wayfaring analysis, additional neighbourhood relation indicator, additional social attitude measure, and their correlations with distinct households can provide information as to who preferred avoiding social interaction, who benefitted from this kind of social behaviour, and who remained in a dominant location under all conditions. All this information contributes to a more comprehensive understanding of what might have happened in the past.

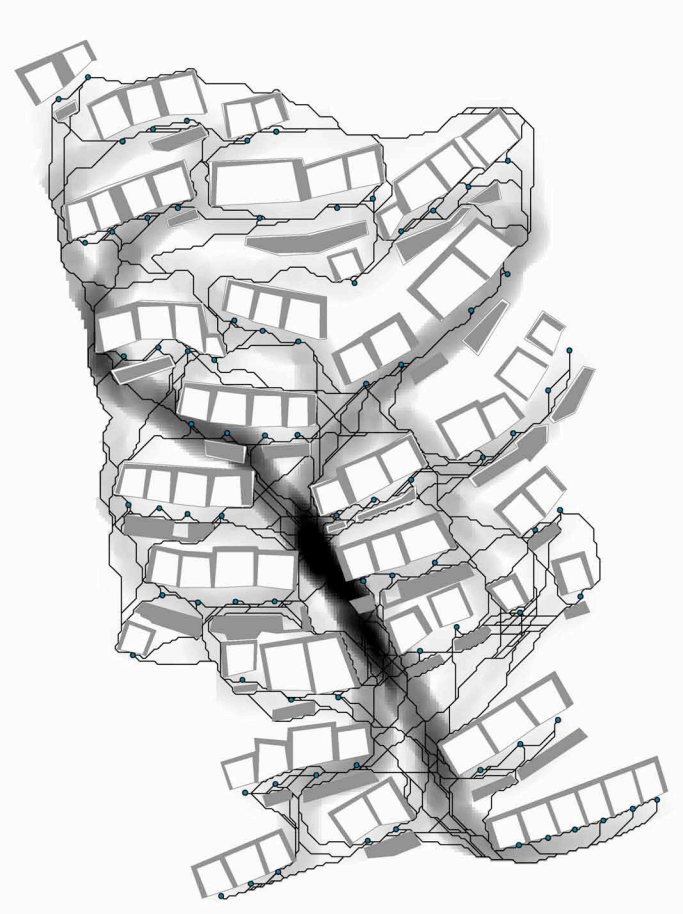

Figure 5. 11 Density map of all accumulated least-cost pathways built using *Saqacengalj*'s topography. Dark - High Density. Light - Low Density.

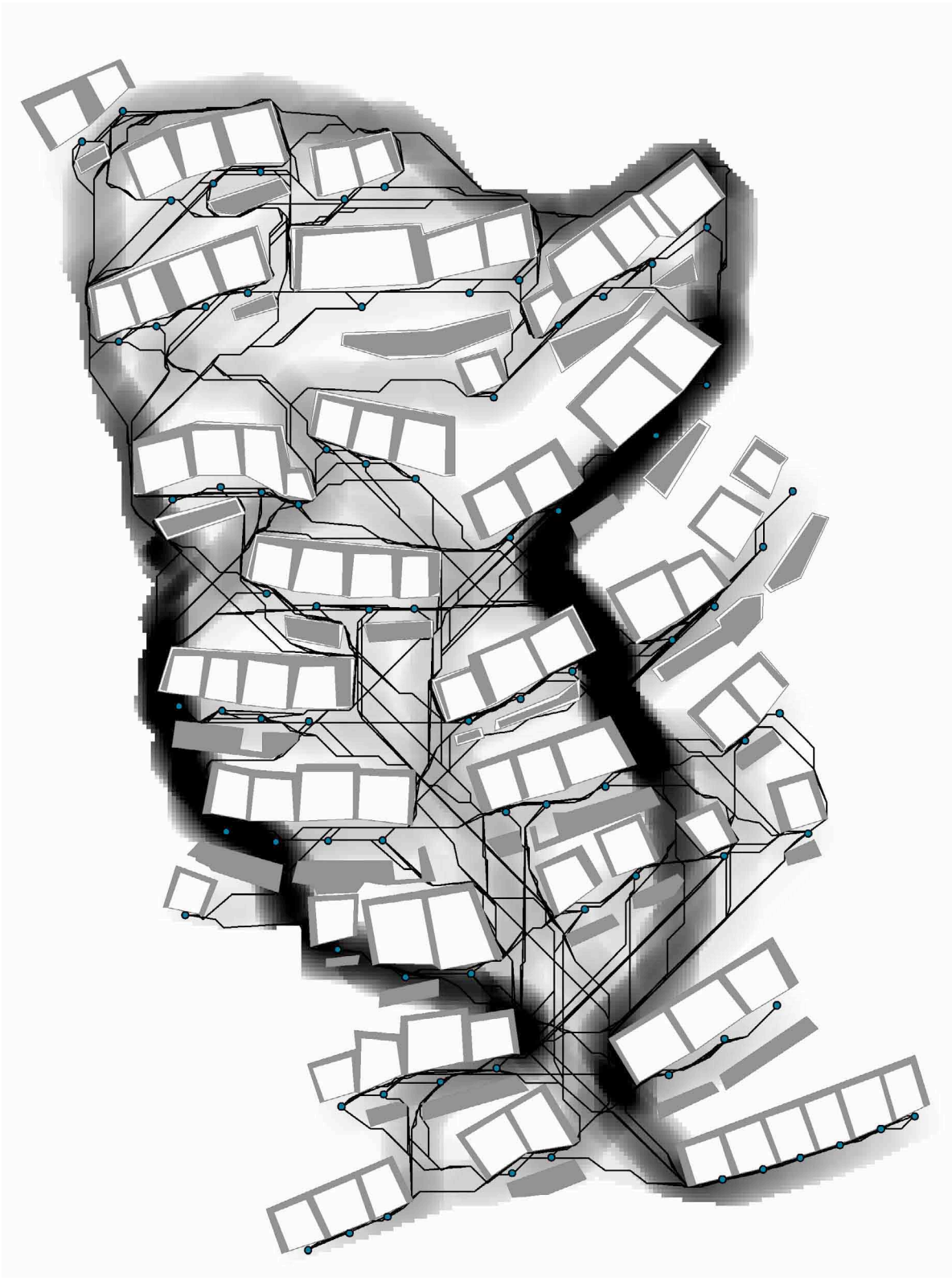

Figure 5. 12 Density map of all accumulated least-cost pathways using the social interaction rate of *Saqacengalj* as a friction surface. Dark indicates high density areas and light - low density ones.

5.2.3 The Effects of Social Identity in Understanding Social Transformation

The social attitude measure is a type of analysis, which is extremely hard to understand and interpret without clear patterning. Furthermore, its results should be examined in light of the context of the investigated site. The results of the set of analysis applied to the two sites clearly suggest that *Saqacengalj* was a much more complex settlement than *Aumagan*. In addition, they reveal that the social attitude of *Kaushi* people has gradually changed to a more 'general' interaction in terms of interaction quality. Whether this is the result of a change in social attitude or the result of an increasingly better-structured spatial layout of the settlement is currently unclear and requires further investigation.

The nature of social attitude and social weighting provides the means to understand the difference in the allocated and delegated powers. Unlike Chapter 4, which deals with a purely spatial aspect of wayfaring, this section re-introduces the socio-cultural aspects of human life into the spatial analysis. As mentioned before, the wayfaring model is not just about space and does not reject socio-cultural aspects of life. Instead, the meshwork model of wayfaring is designed to support interpretations of different kinds of social identity and activity. It provides additional information as to how different social identity worked in the settlement and enables researchers to gain insights into how social interaction might further influence its social structure. However, these results need to be put back into their original context, the fragmentation analysis of neighbourhoods, in order to provide a comprehensive interpretation of the development and transformation of social interaction and social structure at the investigated sites.

It is through the process of putting these results back into context that the researchers can better grasp the social transformation that took place in the past.

For example, the initial results in this section have indicated a shift of allocated power away from the original delegated authority. This is a dominance conflict caused by the contradiction between the delegated and allocated social power. However, in order to gain insights into how the people of *Kaushi* reacted to this matter, researchers need to look at the social relation at the later stages of the evolution of the settlement. This process requires a more comprehensive understanding of the settlement development and changes that occurred in later periods. To achieve this, this research will demonstrate how delegated power and allocated power influence each other and investigate this dynamic transformation in the following chapter.

5.3 Conclusion

The fragmentation analysis and the social meshwork analysis presented in this chapter provided clear insights into 1.) the nature and structure of each neighbourhood; and 2.) the question of how socio-cultural aspects can be re-introduced into the settlement layout. The combination of the two can further a more comprehensive understanding of a social development and transformation. While producing the final product, in form of analytical results and their interpretation, is pivotal to any research, it is worth stressing here that the process by which these results were obtained is equally significant. Just like space syntax, the modelling of wayfaring provides researchers with the measures of different aspects that then require further interpretation. More importantly, it forces researchers to think about what kind of social identity meshwork to use and how to model different social meshworks. It is an analytical tool as well as a heuristic tool or ‘tool to think with (Cutting 2003)’. The understanding of how social relations are

broken down and what each relation represents is equally informative to the final interpretation. It is all the interpretation and information this process has produced so far that shape the most detailed nuances in the understanding of the structure and development of the investigated settlements. Nonetheless, the pieces of jigsaw need to be fitted together eventually. In the next chapter, this research will demonstrate how all the social relations and meshwork analyses are assembled to produce the final meshwork and, furthermore, how the process of producing the final meshwork of the two sites can inform archaeologists about the social transformations in the early history of *Kaushi*.

Chapter 6

Social Transformation:

Settlement Growth and the Merge of Two Communities

6.1 The Settlement Growth and the Socio-Political Structure

Mehrer (2000) pointed out that the investigation into the discourse between delegated and allocated social power enables researchers to better understand the context and mechanisms behind dynamic social transformation. Following this discourse framework, researchers are able to examine the forces that drive dynamic change and the reasons why transformations took place.

In previous chapters, this research has shown how the combination of fragmentation and wayfaring analyses provides insights into social relations and social phenomena. The aim of this chapter is to put individual social relations back to their context of specific time periods. Through the comparison and examination of individual periods, this research investigates the changes and transformations that occurred. In the following sections, this research first identifies the characteristics of the two settlements and discuss the process of settlement growth. This will provide the context to the social phenomena, which will then be further examined in that context. The comparison of social phenomena in the different periods of settlement growth will provide insights into social transformation.

6.1.1 The Case of *Saqacengalj*

The analyses in Chapters 4 and 5 have borne out some interesting points regarding the site of *Saqacengalj*. First and foremost, they supported Wu's settlement growth hypothesis (Wu 2010). Wu suggested that the difference between the top and bottom half of the site is the result of settlement growth. He proposed that the site of *Saqacengalj* was originally built in the top half of the hill and then gradually grew towards the bottom. This process of settlement growth is detected both in the pattern of pathways and the distribution of water containers (Wu 2010: 63).

According to the results of the wayfaring analysis of direct neighbourhood relations presented in Chapter 4 (section 4.2.2.2), in particular due to the presence of distinctive households (S2W2, 0S3 and S5E1) in high interaction locations, the relation between Areas A, B and C1 was evaluated as good. In addition, this good relation is also apparent in the results of the social attitude detection analysis of inter-neighbourhood relations in Chapter 5 (section 5.2.1.3). Table 5.4 shows consistent 'AG' social attitude amongst the three neighbourhoods. This clear patterning of social attitude is unlikely to be a coincidence given that there were nine, equally possible options. Therefore, the clustering pattern must be a result of socio-cultural influence. According to ethnographic studies, the Headman is usually the first settler in the village (Chiu 2001: 56; Tan 2003: 217). Therefore, it is possible to associate the location of the Headman's residence as the original core of the settlement. In terms of *Saqacengalj*, the Headman's residence is located at the top right corner in Area B. This location is also at the zone where the three areas (A, B and C1) overlap. Since the three areas are possibly the old parts of the settlement, it is likely that their good relations resulted through long-term processes related to settlement growth.

On the other hand, the results shown in Chapters 4 and 5 have suggested that the inter-neighbourhood relations of Areas C2 and C3 are poorly established. This observation can be interpreted as supporting the settlement growth hypothesis outlined above. Since Areas C2 and C3 are part of the later settlement phase of *Saqacengalj*, they would have less time to develop their relation with the original residential areas A, B and C1, and therefore score poorly in inter-neighbourhood relations indices. This inter-neighbourhood analysis again reconfirms Wu's hypothesis of settlement growth.

The second interesting conclusion coming out of Chapters 4 and 5 is the nature of Class II households. All the Class II households in *Saqacengalj* are located in terraces with mid-high integration rates but in low interaction rate areas. Furthermore, four out of five Class II households are located in the top half of the settlement, i.e. the old part of the site. The only exception is S2E5 located in Area C3, the bottommost neighbourhood. This analysis coupled with fragmentation tests (section 5.2.1.3), led to the conclusions that the Class II households are most possibly the residences of the head families.

All the four Class II households in the top half of the settlement are clustered in the top right corner, in proximity to the Headman's residence, itself one of the Class II households. Except the Headman's residence, the other three Class II households are located in Area A. Table 5.1 shows that Area A has the highest fragmentation score in *Saqacengalj*. This suggests that social processes strongly encouraged the formation of sub-groups in this area. In Chapter 5, this research has argued that these processes are likely to be related to the most prominent social identity in *Paiwan* culture, that of 'kinship'. This argument is supported by the correlation between the high fragmentation of Area A and the large number of Class II households in the neighbourhood. Following the

settlement growth hypothesis, the four Class II households most likely formed the village during the earliest phase. According to *Paiwan* customs, the head family would remain in their house while their siblings move out and build new houses of their own (Chiu 2001: 58). Therefore, as the settlement grew in size, the head families stayed in their original house while their siblings moved out to their own houses. In consequence, this process resulted in a high cluster of Class II households in the top right corner and a lack in the younger neighbourhoods.

The link between Class II households and the head families are also shown in Areas B and C3. Areas B and C3 have the lowest fragmentation score in all neighbourhoods suggesting that both of them are integrated rather than fragmented. In the context of kinship, this most likely means that they comprise fewer lineages. The case of Area C3 is somewhat special. The neighbourhood has the lowest fragmentation score of 0.38, almost a third of Area A and half the score of any other neighbourhood indicating a high level of integrity of the local community. In addition, the inter-neighbourhood relation of Area C3 is also poorly established according to wayfaring analysis in Chapters 4 and 5. Finally, the only class II house structure (S2E5) outside of the top part of the site is located in area C3. Based on Wu's settlement growth hypothesis Area C3 is the latest neighbourhood to be established in *Saqacengalj*. Thus, there is a possibility that the whole kin group moved into *Saqacengalj* at a later stage and occupied Area C3. As a result, their head family would not be located in the old parts of the settlement, leading to a low level of relations between Areas A and C3. In this case, Area C3 is most likely a neighbourhood where the head family is living amongst its kin. This is supported by observation by Chang (1958: 300) who stated that the same kin would normally reside with each other due to land ownership. This could very well be the case in Area C3 if the kin moved into the

village at a later date and had therefore an opportunity to establish their joint residence. Further, the poor relation with other neighbourhoods, indicated by the wayfaring analysis results may be due to the fact that they moved into the site at a later stage and did not have enough time to develop strong relations.

On the other hand, Area B has the second lowest fragmentation score in *Saqacengalj*. This suggests that Area B might have hosted fewer lineages. As discussed in Chapters 4 and 5, this may result from the fact that Area B is the neighbourhood of the Headman. The Headman is the first to settle in the village and thus own all the land. As a result, the Headman's kin would have the choice to live closer together, whereas the rest of the villagers would have to settle with what was left. Seemingly the correlation between the fragmentation measure and distinct kin lineages breaks down in Areas C1 and C2: both neighbourhoods have a relatively high fragmentation score, but neither of them has any Class II households. As mentioned in Chapter 5, although both neighbourhoods show a relatively high fragmentation score, their axial integration scores are the lowest in the site. Their low axial integration suggests the ease of movement and strong integration of spaces. In combination, the five fragmentation measures indicate that both neighbourhoods were composed of a mixture of people who were integrated into their respective community. One noteworthy observation is that, according to the cluster analysis of step depth, Areas C1, C2 and C3 originally categorised as a single area 'Area C'. According to Wu's settlement growth hypothesis, while the Headman's kin could stay together in Area B other ordinary villagers had to share the land the Headman gave them. Once the available space in Area A reached its limit, new families had to find somewhere else to move to. Area C could have been the place for newly formed families to settle down outside the crowed old parts of the village. In consequence, the siblings of the head

families who could not stay in their original houses moved into Area C and integrated with other lineages through marriage. This scenario is supported by the results of the five fragmentations measures, which suggest that both Areas C1 and C2 are a mixture of people coming from different kin lineages who are integrated into their respective community.

Nonetheless, the argument above does not render the separation within Area C redundant. The division of Areas C1, C2 and C3 has proven very beneficial in the understanding of diverse aspects of the history and structure of the site, such as site formation, neighbourhood relations, the nature of Class II households, and the composition of individual neighbourhood. Without the division into subareas C1, C2 and C3, it would have been impossible to investigate these aspects in detail. Although the separation of these three neighbourhoods is not immediately apparent in step depth analysis, it is stressed here that the division of Area C is not a random function. The step depth cluster analysis of *Saqacengalj* only resulted in the division of Areas A, B and C. In this result the number of households in Area C (46) is out of proportion to that of Areas A (19) and B (15). The combined surface area of Area C is so large that it covers more than half of the site. Therefore, in terms of highlighting more fine-grained interactions and patterns, the results of analyses treating Area C as one entity are not detailed enough. In consequence, it was deemed appropriate to divide Area C into Areas C1, C2 and C3 based on the central axis principle and their distribution pattern (Wu 2010). As a result *Saqacengalj* was divided into five neighbourhoods of similar size, each possessing at least one open space to support community activity.

The particularity of ‘Area C’ is highlighted further by many phenomena that constantly highlight the difference between the top half and the bottom half of the

site. This difference is, for example, apparent in the spatial pattern of pathway connections, the number of Class II households, the higher presence of water containers, the neighbourhood relations revealed in the Chapter 4, and in the five fragmentation measures. Most of these peculiarities of the Area C are likely to stem from the fact that it was established later than other neighbourhoods. This characteristic had a big impact on all kinds of spatial, as well as social, aspects of the area. For example, the pathway connections could have been planned ahead rather than grow organically as was the case in Areas A and B. Similarly, as the head families resided in their original houses in the top half of the sites, the local residents did not have enough time to develop better neighbourhood relations. Just as the head families shaped the character of the old parts of *Saqacengalj*, the nature of areas where their siblings moved to in the later stage shaped the character of Area C.

The division of Areas C1, C2 and C3 has also furthered the understanding of the settlement growth within Area C in detail. The inter-neighbourhood analysis revealed that Area C1 had a better relation with the old parts of the settlement and therefore, most likely was the first neighbourhood that was established in Area C. Area C2 did not have that good relation with the older parts of the settlement but had well-developed relations within the neighbourhood itself. Since Area C3 has a poorly developed neighbourhood relation with the rest of the site, it may indicate that it was the last neighbourhood to be established in Saqacegnlaj and may represent a kin lineage that moved later into the settlement.

The identification of local subareas, therefore, has furthered the understanding of the composition of different communities and their characters. Also, it is through the examination of these local neighbourhoods' fragmentation and wayfaring traits that the nature of Class II households and the significance of

water containers became apparent. Echoing the discussion in Chapter 3, this chapter shows that the investigation of these local neighbourhoods can hugely profit our understanding of the spatial and social settlement patterns and can also assist more detailed interpretation of artefacts recovered from each area. However, the contribution of investigating local neighbourhoods does not stop here.

6.1.1.1 A Single Lineage Neighbourhood

As shown in previous discussions on Areas B and C3, these two neighbourhoods mark the typical community where the head family resides with its own kin. According to Chang, families of the same lineage would normally live close together due to land ownership (Chang 1958: 300). In terms of community composition, it is concluded that Area A is the older part of *Saqacengalj* and hosts most of the head families, while Areas C1 and C2 are neighbourhoods composed of a mixture of people who are integrated into their respective community. According to the discussion above, Areas C1 and C2 are most likely the places where the siblings of the head family settled after they formed new families. However, even though the siblings had to move out of their original houses, they would normally settle on land owned by their families. That is, if the member of family A gets married to a member of family B and leaves their original house, they would move to a place owned by either family A or B, or to an unclaimed land in another, more distant, region. It is highly unlikely that they would settle on a land owned by the Headman or by families they did not belong to. Therefore the composition of Areas C1 and C2 actually raises a question: who owned the land in these two neighbourhoods?

As previously established, Class II households most likely belonged to the head families. It is also asserted that Area B is the neighbourhood of the Headman's kin. Finally, the Class II household S2E5 in Area C3 belonged to the

head family, which was the latest migrant to *Saqacengalj*. Other than Areas C1 and C2 mentioned above, Area A is also a neighbourhood where the land ownership is unknown as there are three Class II households in that area. In fact, the number of Class II households in *Saqacengalj* corresponds to the number of identified neighbourhoods. Although this may be a coincidence, it may also indicate some kind of relation pattern. It is not suggested here that each neighbourhood was only occupied by one lineage. For example, in the case of *Aumagan*, the number of Class II households is not equal to the number of neighbourhoods, which shows that the relation is not definite and can vary significantly. However, taking into account the principle that siblings would move to land owned by their family and, given the number of head families in *Saqacengalj*, it is likely that the number of Class II households relates to the land division of the settlement. In this case, it is likely that the land in *Saqacengalj* was divided into five parts, each of which was owned by a head family.

This land ownership hypothesis is also supported by the neighbourhood relation analysis (Chapters 4 and 5). It showed that Area C1 had good relations with both Areas A and B. The direct neighbourhood relation analysis in Chapter 4 also shows that Area C1 has a particularly good relation with Area A based on the presence of distinct households in the high interaction areas of both neighbourhoods (S2W2 in Area A and S5E1 in Area C1). On the other hand, Table 5.4 shows that Area C2 has an exceptionally good relation with Area A based on the 'AG' type of social attitude, representing a well-established relation developed through time between these two areas. These two direct neighbourhood relations indicate that Area A was the core of the settlement that bound the other neighbourhoods together. This was likely a result of a specific a socio-cultural link between Area A and the other neighbourhoods. A likely candidate for such a link is

the model of land ownership by the head families living in Area A and the other two neighbourhoods occupied by their sibling families.

However, although the land ownership proposal is supported by the wayfaring results, it is still very difficult to confirm both the pattern and its interpretation with a high degree of confidence without further evidence. Furthermore, the inter-marriage amongst different families complicates the identification of lineage belongings even further.

This difficulty in determining kinship identify is not just an issue for modern researchers; it might have also been a problem amongst the past residents. This may be the reason why Areas A, C1 and C2 all have a high fragmentation score. As previously stated, the high fragmentation score with an ease of movement in both Areas C1 and C2 suggests that their inhabitants were a mixture of people integrated into one community by some kind of common interest. The wayfaring results again highlight this ambiguity in these inhabitants' identity and support the view that these two areas were the places where the siblings of the head families moved in. In consequence, this research argues that the land ownership model is not suggesting a clear-cut division amongst different lineages. Rather, the nature of these neighbourhoods suggests they were occupied by families that moved into the community because they had some sort of connection with the person who owned the land. This connection can either be through the host's family or the hostess' family. The question is, which neighbourhood relates to which head family?

As previously shown in Chapters 4 and 5, the strength of the wayfaring approach is its ability to identify and examine specific social relations that manifest themselves in spatial patterns occurring in the settlement. Therefore, the wayfaring approach may be used to try answering the question raised above. Areas A, C1 and C2 are three neighbourhoods of unknown ownerships, while Class II

households S1W2, N1W1 and N3N1 in Area A are likely to have belonged to three different head families related to these three neighbourhoods. Thus, by investigating the relation between the head families' households and each neighbourhood, the wayfaring analysis can evaluate if any of these households had a particularly strong relations with one of these neighbourhoods.

In the investigation between head families and the three neighbourhoods, this research examines the relation between each area with Class II households in turn, starting with Area C2. First, the relation meshwork of each head families with Area C2 was accumulated to detect any differences between the three relations (Figure 6.1, 6.2 and 6.3). As before the presence of distinct households in high interaction area is regarded as a positive confirmation of a well-established relation. In this case, the relation between Class II household S1W2 and Area C2 shows a significant difference. This relation highlights distinct households in both Area A and Area C2 (S2W2 in Area A and S8E2 in Area C2), as well as distinct households located in Area B (S8W1). This indicates a strong relation between Class II household S1W2 in Area A and Area C2. On the other hand, the relations of the other two distinct households of Area C2: N1W1 and N1W3 only point to two distinct households in Area B (00 and 0S3) and one in Area C2 (S8E2). In previous inter-neighbourhood relation analysis between Area A and Area C2, a well-established relation between these two neighbourhoods was suggested based on the distinct households of S2W2 and S8E2. These two distinct households are also highlighted in the relation between S1W2 in Area A and Area C2. In fact, the relation meshwork between Areas A and C2 highlights the same area showcased in S1W2's relation with Area C2. Therefore, it is concluded here that head family S1W2 had a better relation with Area C2 than the other two head families did. In consequence, the results suggest it is highly possible that the

households in Area C2 are mostly siblings of the head family which occupied S1W2.



Figure 6. 1 Meshwork heat map between N3W1 and Area C2 in *Saqacengalj*.

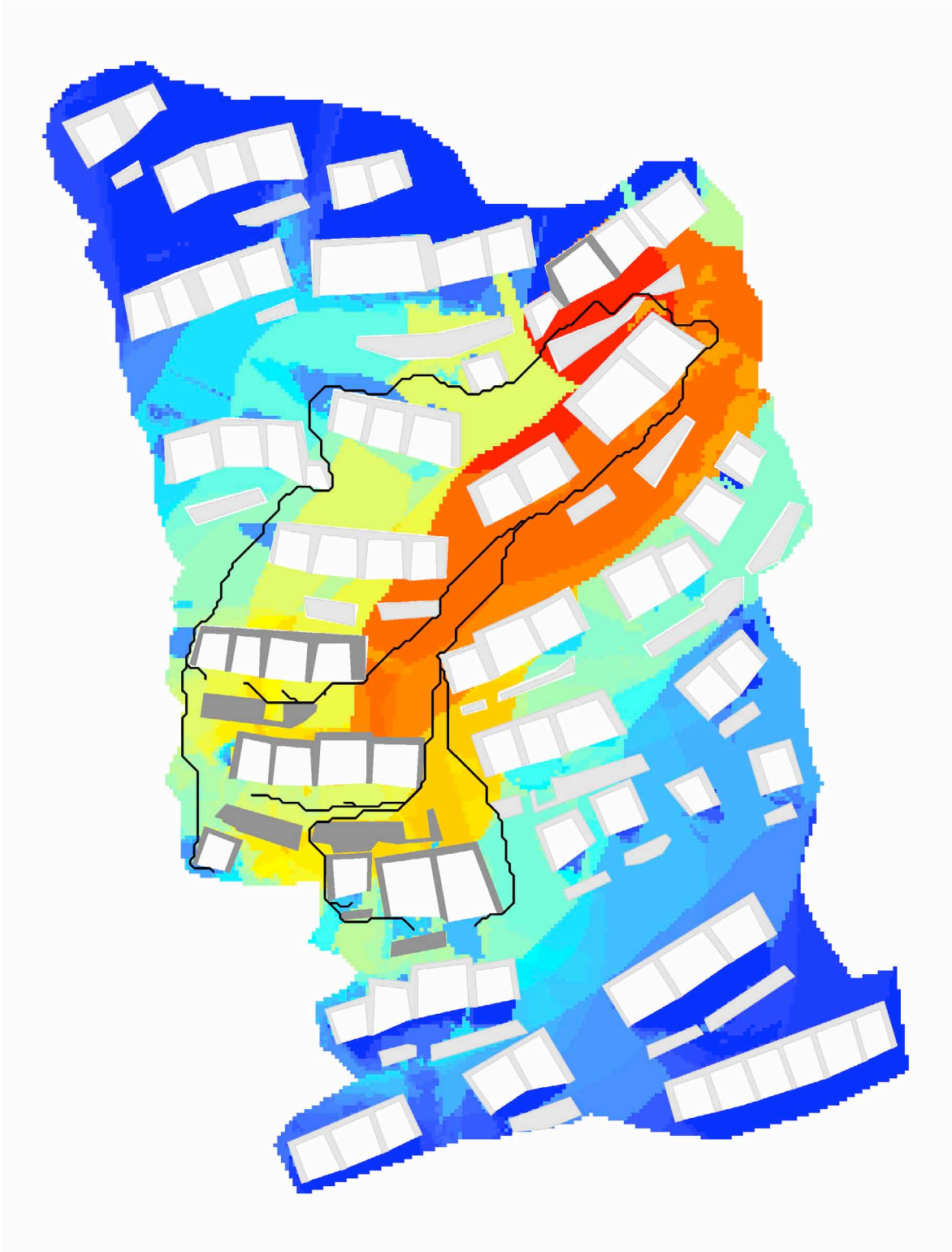

Figure 6. 2 Meshwork heat map between N1W1 and Area C2 in *Saqacengalj*.



Figure 6. 3 Meshwork heat map between S2W1 and Area C2 in *Saqacengalj*.

A clear identification of the relation between the other two head families and Areas A and C1 is very difficult. The reason is that their households are only one house apart. There is very little difference in their relations with either of the two neighbourhoods. As a result, this research 'assigned' Area A to head family N1W1 and Area C1 to head family N3W1 on the basis of the fact that N1W1 is located in a more central location of Area A and in a slightly higher interaction rate area (Figure 6.4). It should be stressed here that this assignment is based on weak evidence and should be regarded as tentative.

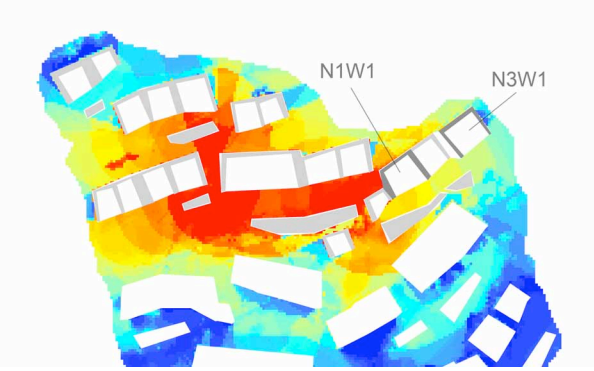

Figure 6. 4 Meshwork heat map of Area A, and the location of N1W1and N3W1 in *Saqacengalj*.

It is worth emphasising that this is not an attempt to define a clear-cut ownership or authority of any of the head families over a specific neighbourhood. In fact, as mentioned earlier, it was the Headman who owned all the land in the settlement (Chiu 2001: 56; Tan 2003: 217). Common villagers had to share the land parcels the Headman had promised them and although they had the right to use that land they did not actually own it. Hence, the three neighbourhoods were most likely composed a mixture of people coming from all lineages including members from the Headman's kin. What the wayfaring results suggest is that the people within a neighbourhood had a better relation with a specific head family. What this may imply is that, within that neighbourhood, there might have been more people from a specific lineage that results in a better relation with their head family. Just as concluded in the discussion of S1W2, It is highly possible that the households in Area A are mostly siblings of N1W1, and the households in Area C1 are mostly siblings of N3W1.

Based on the analysis and discussion above, it is possible to propose further interpretation of the composition as well as the growth of *Saqacengalj*. As the first settler, the Headman's residence marks the origin of the settlement. Surrounding the Headman's residence are the three Class II households, which belonged to the three head families. Together, the four households formed the core of the village from which it started to grow from that corner. The kin of the Headman had the privilege to stay together and lived on their own parcel of land, which later grew into Area B. The rest of the villagers had to share the land with each other and thus formed communities of a mixed identity in Area C. However, each neighbourhood still had strong bond with a specific head family. Area C2 had a good relation with the head family living in S1W2 whereas Areas C1 and A had good relation with the occupants of the households N3W1 and N1W1 respectively. Later on, the head family occupying the household S2E5 and its kin moved into the village. They settled in Area C3, which was the latest addition to *Saqacengalj*. Having gone through this long transformation, *Saqacengalj* grew into a large settlement. This raises the questions of how the settlement was socially maintained and structured.

6.1.1.2 *Cakalj*, the Men's House

According to ethnographical sources (Chou 2011: 551; Tan 2003: 13), in the *Paiwan* social structure, the Headman is the highest person in the social hierarchy and the only leader of the village. The Headman possesses the absolute authority over whatever happens in the village. Furthermore, the Headman owns the land of the settlement and has the authority to grant land to other people. However, this is not a transfer of ownership but a form of renting arrangement. Therefore, the Headman enjoys the privilege of taxing his tenants.

However, the distribution graph of house dimension has shown that in the village there is one building larger than the Headman's house (Figure 4.4). At the size of 72.44 m^2, S2W2 is the only Class I house-structure in *Saqacengalj*. The size structure of households shows a pyramid shape where there is only one household belonging to Class I, several in Class II, and the large number of common households belong to Class III. Based on the results of Chapters 4 and 5, house-structure S2W2 is located at the heart of the oldest part of *Saqacengalj*. At both scales: the local 'neighbourhood' scale and the regional 'top half of the site' scale, the terrace, on which S2W2 is located, is the most integrated terrace as indicated by the space syntax convex mapping. The overall internal neighbourhood relation described in Chapter 4 also highlights that S2W2 is located in one of the most interactive areas in the settlement. This stands in a stark contrast with all the Class II households, which are located in areas of low interactive rate. This suggests a difference in the nature of these two classes of buildings. Given the size of S2W2, its dominant and interactive location, and the clear divergence from the spatial pattern of other large house-structures in *Saqacengalj*, it is likely that S2W2 may have served as a house for communal gatherings in the settlement. Ethnographical literature mentions one such type of building: the '*Cakalj*'.

The *Cakalj*, in East *Paiwan* term, commonly known as the 'Men's House' (Ferrell 1982), was the gathering place for men. According to ethnographical sources (Jen 1956: 149-159; Lusausatj 2012), the Men's House's main purpose was to educate younger members of the society in hunting and battle skills, as well as to re-enforce the social structure and appropriate cultural behaviours. Furthermore, it was the place to organise the labour force of the village and to distribute the communal tasks. In sum, it was the place that the village community

integrates and is organised to help with tasks that enable the settlement to function. The presence of 'the Men's House' is very common amongst the indigenous groups of Taiwan. It is present in the Amis, the Tsou, the Rukai and the Puyuma cultures (Jen 1956: 153-159; Lusausatj 2012). It is also known from *Paiwan* villages in the east of Taiwan, which is argued to be a result of Puyuma influence (Jen 1956: 158; Lusausatj 2012).

A number of characteristics suggest that house-structure S2W2 was most likely the 'Men's House' of *Saqacengalj*. First of all, S2W2 is the largest and the only Class I house-structure in the settlement. The size of this house-structure shows that it is capable of hosting a large number of people, who would be able to gather and perform various communal activities under one roof. Secondly, S2W2 is located in the most dominant and interactive location in the site. Its location indicates a good accessibility from anywhere in the settlement and a high integration rate of *Saqacengalj*'s people. This spatial arrangement would allow people to come and go easily, and encourage interaction amongst people from different neighbourhoods. Thirdly, S2W2 is located in Area A, i.e. the old part of the settlement. This location suggests that it was built in a fairly early stage, which reflect the dominant socio-cultural norm. If a Men's House is a normal occurrence in a social system, then it is reasonable that it would be built early rather than later. Lastly, since S2W2 is located in Area A, it has a particularly good access to the head families who lived in close proximity. This is especially significant as the tradition and cultural knowledge would be passed onto the younger generations in the Men's House by exactly those social group. This would benefit the reinforcement of the social structure and appropriate cultural behaviours.

Based on the four points above, it seems more likely that the house-structure S2W2 is the Men's House, rather than a Council house. However, this

does not preclude that the Men's House in *Saqacengalj* did not function as a Council house on occasion. The role and function of the Man's house differs amongst different ethnicities. In fact, its exact function and regulation guarding its use can be very diverse even within the same culture. In sum, the spatial layout of the settlement and the characteristics of house-structure S2W2 suggest that it is highly possible that S2W2 was the Man's House of *Saqacengalj*. However, whether it functioned as a Council house or not requires future investigation.

There is no ethnographic record that registers the presence of the Man's houses in South *Paiwan* culture and the *Cakalj* was only documented amongst East *Paiwan* villages and was commonly considered as a result of Puyuma influence. However, the influence of having a 'Men's House' from Puyuma culture might have dated from much earlier than expected. Equally, such influence might have come from the other direction. As Chen has pointed out (Chen 2008: 237), *Saqacengalj* is possibly the earliest *Paiwan* settlement recorded by researchers, and it was occupied and predates the ethnographic documents compiled during the Japanese occupation period. Furthermore, the types of house-structures of both *Saqacengalj* and *Aumagan* are extremely similar to that of the North *Paiwan* villages, and differ significantly from the South *Paiwan* settlements. This suggests that the divisions imposed on the *Paiwan* society by both ethnographers and archaeologists may not be suitable for understanding early *Paiwan* history. Setting aside the possibility that the South of Taiwan may have been the cradle of *Paiwan* culture (Chen 2008: 237), early Japanese scholars actually categorized *Paiwan*, Rukai (Calisian) and Puyuma as the same ethnic group (Chiang 2003a). This highlights that there is a possibility that they originally had the same ancestral roots and therefore very similar structure and traditions. As a result the division proposed for late *Paiwan* culture may not suffice in the investigation of earlier

periods predating the times when the ethnographic documents widely used to interpret the *Paiwan* society were produced. Chen suggested (Chen 2008: 238), the subject under investigation requires an archaeological approach to derive meaning and significance predominantly from material remains. Although the ethnographic information can be insightful, the data should speak for itself.

This research acknowledges the fact that there is no ethnographically attested instances of the *Cakalj* in South *Paiwan* cultures but argues that both the results of fragmentation analysis and wayfaring model suggests the presence of a community building which might have served a similar function. Given the ambiguous nature of the division amongst *Paiwan*, *Rukai* and *Puyuma* in the early periods, this research argues that S2W2 functioned most likely as a community centre similar in nature to the 'Men's House' - a very common institution amongst the indigenous cultures in Taiwan. However, whether it is the same as the *Cakalj*, or what its main function was is still to be investigated in future studies. What clearly emerges from this research and in particular from the results of both the fragmentation and wayfaring analyses is that it exhibits all the characteristics of a community building. Therefore, this research argues that it is most likely a community building that functioned similarly to that of a 'Men's House'.

6.1.1.3 The Growth and History of *Saqacengalj*

Following the discussion on community composition and settlement growth above, this research proposes the following four stages of the settlement growth of *Saqacengalj*. In the first stage, the Headman along with the three head families settled in Area A of *Saqacengalj* (Figure 6.5). Household 00 was the first family to settle in *Saqacengalj*, and is therefore the family of the Headman of this small community. Together with the three other head families, they formed the core of the community, which later grew into the settlement of *Saqacengalj*. In the second

stage, this community started to grow and expand, formulating the early development of the old parts of *Saqacengalj* (Figure 6.6). It is possibly in this stage that the construction of the Men's House also started to maintain the social bound and social structure of the growing community.



Figure 6. 5 Stage 1 of *Saqacengalj.*

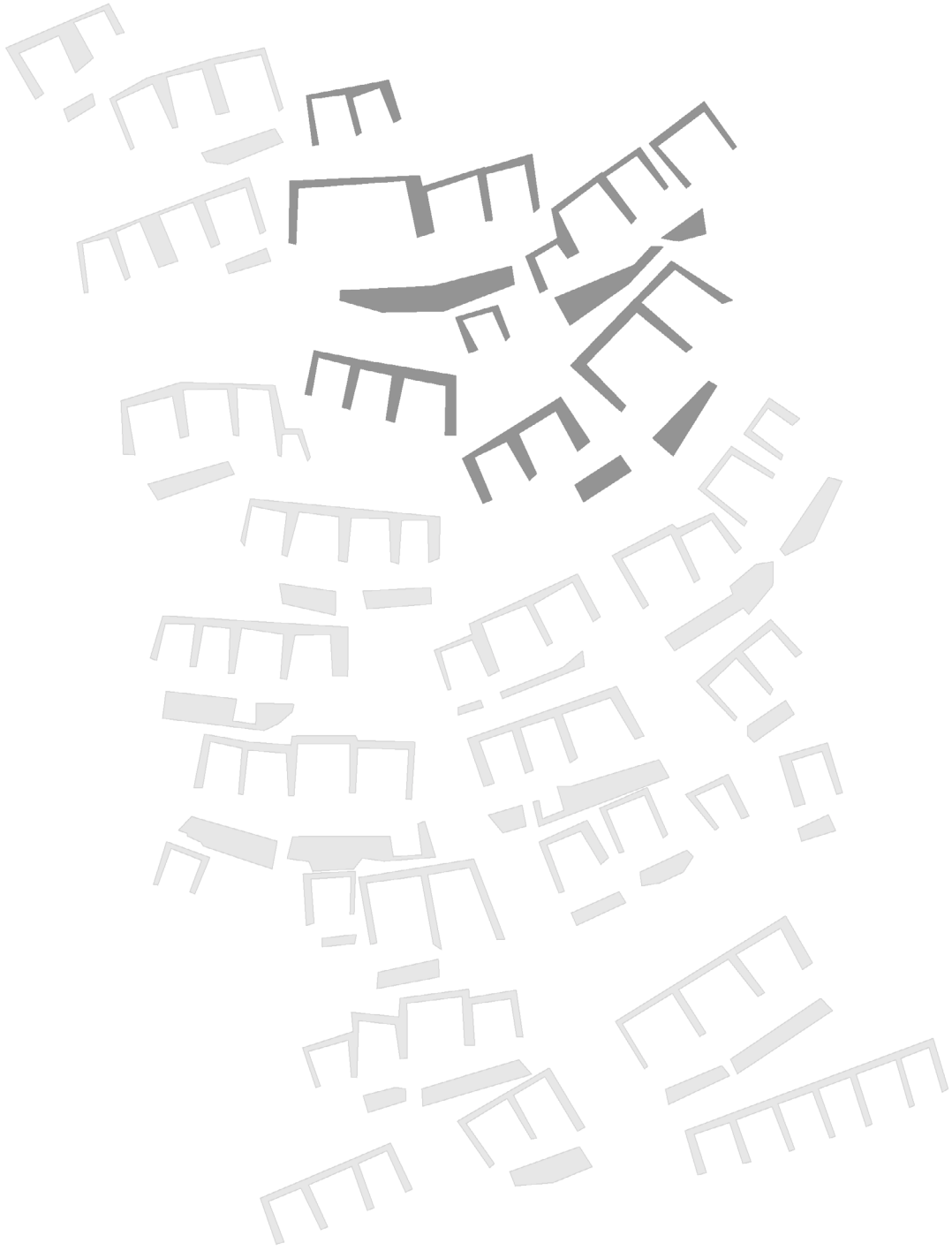

Figure 6. 6 Stage 2 of *Saqacengalj.*

In the third stage, Area C1 was formed and the top half of the site reached its capacity (Figure 6.7). It is possibly at this stage that the inhabitants started utilising the central axis principle to connect terraces – a pattern evident in the spatial structure of Area C1. In the fourth stage, Areas C2 and C3 were formed (Figure 6.8) and the kin of the head family residing in the house-structure S2E5 moved into Area C3. It is also at this stage that the central axis principle was utilised to the fullest extent integrating the sibling families living in the bottom half of the site. The latest addition of Areas C2 and C3 completed the final layout of *Saqacengalj* that is recorded today.



Figure 6. 7 Stage 3 of *Saqacengalj.*



Figure 6. 8 Stage 4 of *Saqacengalj.*

In further chapters this research utilises this division into four stages to discuss the social transformation of *Saqacengalj*. However, the story of *Saqacengalj* does not stop here. As mentioned in Chapter 2, *Saqacengalj* was abandoned after an unfortunate suicide event had occurred. As a result, the settlement was considered an ill place, and the Headman ordered the village to be abandoned and a new place for a settlement searched for. In the end, some villagers went to live with their relatives in other villages, while some followed the Headman and moved into *Aumagan*. Therefore, in order to gain a more comprehensive view of the social transformation of *Kaushi*, this research follows the people of *Saqacengalj* and move on to discuss the site of *Aumagan*.

6.1.2 The Case of *Aumagan*

According to ethnographical sources, most of the *Kaushi* people followed the Headman and moved into *Aumagan*. However, *Aumagan* had already been an inhabited settlement. The migration process was therefore not as simple as moving into a new, uninhabited landscape. The merging of the two groups of people must have involved negotiation and, in turn, a transformation of socio-political nature. This transformation process is also reflected in the material remains of *Aumagan*, which stand in contrast to those of Saqacegnalj.

First of all, the average size of a house-structure rises from 18.26m^2 in *Saqacengalj* to 26.76m^2 in *Aumagan*. The change of 8.5m^2 constitutes a 47% increase in size. This is also reflected in a rise of the breakpoint between Class II and Class III house-structures from 30m^2 in *Saqacengalj* to 40m^2 in *Aumagan*. In addition, the number of Class II households increases from five in *Saqacengalj* to eight in *Aumagan*. The Class II house-structures change not only in number, but also in their spatial distribution. In *Saqacengalj*, the concentration of Class II households is located in the top right corner of the site. In *Aumagan*, the Class II

households are distributed amongst all neighbourhoods. This change in layout suggests that the head families are more spread-out as compared to *Saqacengalj*. However, the most significant change in the spatial layout of *Aumagan* lies in the absence of Class I house-structures. All these changes suggest a transformation in the socio-political structure of the community that moved from *Saqacengalj* to *Aumagan*. In order to gain more insight into the nature this transformation this research examines the social relation and composition amongst the three neighbourhoods of *Aumagan*.

Based on the wayfaring results in Chapter 4, this research concluded that Area B is a core neighbourhood in *Aumagan*. The correlation between distinct households and high interaction areas suggests that Area B had good relations with both Area A and Area C. However, the same type of relation was not found between Area A and Area C suggesting that the relation between Areas A and C was not well established. In this case, Area B therefore served as a neighbourhood bridging Areas A and C and binding the whole settlement together. In sum, the results of the direct neighbourhood relations analysis have highlighted the significance and dominance of Area B in *Aumagan*.

As discussed in Chapter 5, there are a lot of similarities between Area B in *Aumagan* and Area A in *Saqacengalj*. These similarities are drawn from the fragmentation measures of each neighbourhood. The fragmentation measures have showcased that in both settlements these areas have a high articulation score and a low ringiness score. Furthermore, their axial integration scores are also not too far apart. The fragmentation measures suggest their similarity in a more fragmented spatial arrangement, which encouraged subgroup formation as well as higher control over individual spaces and movement of people. In addition, it was also pointed out in Chapter 5 that there is a similarity between Area C in

Aumagan and the bottom half of *Saqacengalj* as both have a higher convex articulation and a lower axial integration. This suggests that even though the spatial distribution is more fragmented in these neighbourhoods, they are still relatively well integrated. The similarity amongst these places may be interpreted as indicating continuity in social coherence despite the migration. Could the people of *Kaushi* move into Areas B and C in *Aumagan* after they had abandoned *Saqacengalj*? In order to clarify this possibility, this research further investigate the detailed traits of the composition of these two neighbourhoods.

6.1.2.1 The Merging of Two Communities

The results of the wayfaring analysis presented in Chapter 4 highlight a change in the location of Class II households in *Aumagan*. It showed that while in *Saqacengalj* Class II households are all located in low interaction areas, in *Aumagan* most of them are located in high interaction areas. In the case of *Aumagan*, there are only two Class II households not located in high interaction areas, both in Area B: 0N6 and 0W1. Having come from another settlement, people often carry the 'traditions' and 'social memories' to the new home (Carsten and Hugh-Jones 1995; Lévi-Strauss 1987; Van Dyke 2004). Traditions and heritage are a big part of people's lives and thus are carried to their new settlement. Thus it is possible that the former residents of the top half in *Saqacengalj*, i.e. the 'old part' of the settlement created the community of Area B in *Aumagan*. Here this research investigates the wayfaring results, which suggest the possibility that the one came from the other.

6.1.2.1.1 The Headman

Unlike in *Saqacengalj*, there is no evidence of a Headman stone in front of any household in *Aumagan*. The reason behind this is still unknown. Therefore, it is difficult to identify where the Headman lived without clear material evidence. However, as mentioned in Chapter 4, household 0W1 possesses the largest front platform in *Aumagan*. According to ethnographical sources, the household of the Headman usually had the largest front platform for social gatherings and giving out orders (Chen 2008; Tan 2003: 23). In addition, further investigation has revealed more similarities between 0W1 in *Aumagan* and the Headman household 00 in *Saqacengalj*.

The Wayfaring results of the Headman's residence 00 in *Saqacengalj* show that it is located in a low interaction area both on micro scale of Area B and meso scale of the top half of the site. Nonetheless, the overall internal site meshwork highlights 00 amongst the top houses in the ranking of distinct households (4th). This highlights that even though the Headman's residence is located in low interaction area at a local scale, it is still the heart of interaction at a larger, settlement level, macro scale. This contrast between micro and macro scale is also evident in the Class II household 0W1 in *Aumagan*. At the scale of local neighbourhood, 0W1 is located in low interactive areas in Area B, however, at the scale of the whole settlement, 0W1 is situated at the heart of social interaction (3rd place amongst distinct households). This contrasting nature is shared between the Headman house in *Saqacengalj* and 0W1 in *Aumagan*. These results of the wayfaring analysis together with the presence of the largest and well-preserved front platform in front of 0W1 suggests that it might have belonged to the Headman moving from *Saqacengalj*.

6.1.2.1.2 The Men's House

The similarities amongst distinct households between those of Area B in *Aumagan* and those of the top half in *Saqacengalj* are not limited to the Headman's residence. As mentioned earlier, although there are more Class II households in *Aumagan* than in *Saqacengalj*, no Class I house-structure has been found on the site. This suggests that the Men's House identified in *Saqacengalj* disappeared or took another form after the *Kaushi* people had moved to *Aumagan*. This prompts some questions: what happened to the Men's House? Did it loose its importance due to changes in the society and has never been rebuilt? Or perhaps, its function was taken over by another structure? This research takes a closer look at the integral and communal nature of the Men's House in *Saqacengalj* in order to answer this question.

Other than being the largest and the only Class I house-structure in *Saqacengalj*, house-structure S2W2 is also located in a very dominant position. From a space syntax perspective, S2W2 is situated on the most integrated terrace both at the micro, neighbourhood scale and at a slightly higher 'top half of the site' meso level. However, in contrast to Class II households, it is located in high interaction areas as indicated by the results of the wayfaring analysis. In fact, of all the households in the old parts of *Saqacengalj*, S2W2 has the highest interaction rate. It is this location in a high interaction spot as well as its larger size that indicates the communal and integrating nature of this house-structure. Based on the proposed development of *Saqacengalj* through four stages discussed above, S2W2 was built at the time when it was still located at the heart and centre of the settlement. It is this ease of access and location supporting interaction that enabled the Men's House to function properly and increase the level of social coherence in the village.

In the case of *Aumagan*, there is a house-structure similar to that of S2W2 in *Saqacengalj*. The largest house-structure in *Aumagan* is N5W3, located in Area B. From a space syntax perspective, house-structure N5W3 is located on the terrace that scores the highest integration rate in Area B. In addition, that terrace is linked to the only passage connecting the left and the right slopes of *Aumagan* in the bottom part of the settlement. In consequence, N5W3 is located at the highest integration terrace at both: meso scale (Areas B and C put together) and at the macro scale (the whole site) (Figure 4.19) highlighting the dominant location of N5W3. On the other hand, the wayfaring analysis also shows that this house-structure is located in the location of the highest interaction rate. As described in Chapter 4, house-structure N5W3 is located on the terrace of the highest interaction area in Area B. Furthermore, N5W3 is also the indicator of a well-established relation between Area B and Area C. This, again, is due to the fact that it is located next to the passage that connects these two Areas. As a result, it is located in the highest interaction area of Areas B and C put together (Figure 6.9).

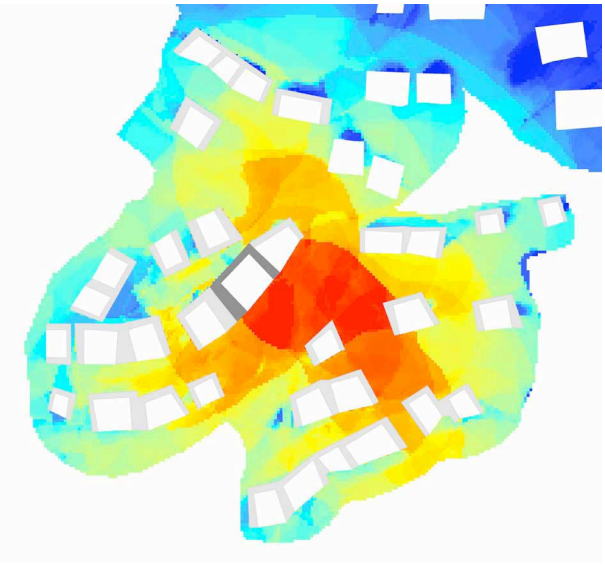

Figure 6. 9 Meshwork heat map of Areas B and C combined in *Aumagan*. Dark grey is N5W3.

The results of both space syntax and the wayfaring analysis strongly highlight the similarity between house-structures S2W2 in *Saqacengalj* and N5W3 in *Aumagan*. Both of them are located on high integration terraces and in high interaction areas. In addition, in both cases their dominant position is not limited to a local neighbourhood scale, but raised to a slightly higher inter-neighbourhood level. Such dominant locations complemented by their larger size, must have

encouraged communal activity and social interaction. Nonetheless, the similarities of these two house-structures do not stop here.

Other than the size and location of the possible Men's House, both house-structures are also similar in their relative relation with other distinct households. In their respective settlements, they each mark the only place where the higher Class households were next-door neighbours. In the case of *Saqacengalj*, the next-door neighbours of the possible Men's House is a Class II household (S1W2), located to its right. As for *Aumagan*, another Class II household, N5W4, is located directly to the right of N5W3.

According to ethnographical sources (Jen 1956; Lusausatj 2012; Tan 2003; Wu 1993), the surroundings of the Men's House can be very diverse in different settlements. In some cases, the Men's House is right next to the Headman's house (Jen 1956; Wu 1993). In other cases, it is located on a terrace marked by significance features (Lusausatj 2012: 13). In still other cases, it is situated next to a spirit house (Lusausatj 2012: 7). Lastly, there are also settlements where it is located next to the house of an 'enforcer' or 'care-taker' (Jen 1956; Wu 1993). It is very difficult to establish that a particular structure was a Men's House solely on the basis of its surroundings and without further evidence. However, this 'next-door neighbour' phenomenon was clearly a meaningful spatial pattern in *Paiwan* culture which further strengthens the similarity between S2W2 and N5W3. Whether it is a spirit house, an enforcer's house, this phenomenon highlights that S2W2 in *Saqacengalj* and N5W3 in *Aumagan* share another distinctive characteristic. Furthermore, if the interpretation of S2W2 and N5W3 as the Men's Houses is confirmed, it is possible that their direct neighbours might have served as another building important to the community such as the spirit house or the enforcer's house. However, the nature of this 'coupling effect' needs future

investigation. Since it is not the main subject of this research, it is not explored here in depth. Nevertheless, the similarities described above demonstrate that, just like S2W2 in *Saqacengalj*, house-structure N5W3 possibly served as a Men's House in *Aumagan*.

6.1.2.1.3 The Merge

Based on the discussion above, this research argues that there is a strong link between *Saqacengalj* and the two areas, Areas B and C, in *Aumagan*. The results of both the integration and the wayfaring analyses suggest that the house structure 0W1 in *Aumagan* was possibly inhabited by the Headman that originally lived in the house-structure 00 in *Saqacengalj*. They also imply that the house-structure N5W3 in *Aumagan* took over the function of the Men's House from the house-structure S2W2 in *Saqacengalj*. These similarities suggest that Area B in *Aumagan* may be composed of the inhabitants of the top half of *Saqacengalj*. This suggestion also supports the previous proposal that the *Kaushi* people moved from *Saqacengalj* into Areas B and C in *Aumagan*. Furthermore, the fragmentation analysis suggests a strong similarity between Area B in *Aumagan* and the top half of *Saqacengalj*, and between Area C in *Aumagan* and the bottom half of *Saqacengalj*. In addition, Area C in *Aumagan* follow the spatial pattern of the central axis pathway, previously seen in the bottom half of *Saqacengalj*. All these phenomena indicate that it is likely that the inhabitants of the top half of *Saqacengalj* moved into Area B in *Aumagan*, while those who had lived in the bottom half of *Saqacengalj* moved into Area C in *Aumagan*.

If this interpretation is correct the residents in Area A in *Aumagan* are likely to constitute the original population of the settlement. This notion is further supported by the spatial distribution pattern of Class II households in *Aumagan*. As previously established, Class II households are most likely the homes of the head family of different lineages. The Class II households in Areas B and C are relatively distributed, except for the location of the Men's House. They are surrounded by common households and keep some distance from each other. This supports the proposal that the head families chose to live amongst their kin when they moved into *Aumagan* and reflects Chang's argument that families from the same kin normally reside together due to land ownership. However, the Class II households in Area A show a clear cluster at the centre of the neighbourhood (Figure 6.10). This pattern is very similar to the cluster of Class II households in the most ancient part of *Saqacengalj* in the top right corner. In the case of *Saqacengalj*, the first settlers of the village who preferred to stay close to each other for defensive reasons created this cluster. As the settlement grew larger, the early settlers stayed in their original houses respecting their traditional custom and thus formed a cluster of the head families. This clustering pattern is similar in the case of Area A of *Aumagan*. It is likely that the three head families - the original settlers of *Aumagan* formed the cluster at the centre of Area A. In time, their siblings settled around them and the neighbourhood grew. This clustering



Figure 6. 10 The cluster of Class II households in Area A, Aumagan.

phenomenon lends additional support to the proposal that the population of *Saqacengalj*'s moved into Areas B and C of *Aumagan*.

6.1.2.2 A Multi-Lineage Neighbourhood

However, given so many similarities between *Aumagan* and *Saqacengalj*, there are also some clear differences. For example, there are eight Class II households in *Aumagan*, three more than *Saqacengalj*. If the supposition that Class II households belonged to the head family of different lineages, except the Men's House (N5W3), then the society of *Aumagan* was divided into seven different lineages: three in Area A, three in Area B, and one in Area C. However, there are only three neighbourhoods identified through step depth clustering analysis. This is a clear contrast to the 'one head family – one neighbourhood' correlation found in *Saqacengalj*. Nonetheless, this phenomenon does not overrule the previous conclusions.

According to Chang's observation (Chang 1958: 300), families from the same kin would normally reside together due to land ownership. However, it does not indicate that each neighbourhood is definitely composed of members of one single kin. The pattern found in *Saqacengalj* indicates that each neighbourhood was most possibly composed of the same kin due to well-established relations with specific heads families. This also holds good in case of *Aumagan*, where families belonging to the same kin lived together. As mentioned earlier, most head families in *Aumagan* kept a distance from each other. In addition, the head families were surrounded by Class III households in their respective local areas suggesting that they lived amongst their kin on their own land. The difference from the spatial pattern in *Saqacengalj* is therefore most probably caused by the size of individual kin. The size of individual kin in *Aumagan* was not large enough to form a single neighbourhood distinguishable in the step depth cluster analysis. Therefore,

neighbourhoods and their communities in *Aumagan* were composed of multiple kin rather than a single one.

The multi-lineage nature of the *Aumagan*'s neighbourhoods means that a different method of identifying the relation between the head families and their kin must be used. In the case of *Saqacengalj*, this relation could be identified through a one head family to one neighbourhood relation. Since there are multiple lineages in each neighbourhood in *Aumagan*, the method utilised in *Saqacengalj* is not appropriate. However, since the spatial layout of *Aumagan* suggests that the head families are residing amongst their kin, it was possible to utilise the traditional Thiessen-Polygon method to identify the land ownership of the head families and the connection between them and their kin. The Thiessen-Polygon approach applied in analyses of segmented villages has proven successful and useful in investigating territorial separations before (Renfrew 1984, 165-199), making the application of this method most suitable in the current case, especially given the link between the head families and local land ownership.

The result of Thiessen-Polygon analysis (Figure 6.11 and Figure 6.12) is first adjusted in respect to local topography in two locations. As mentioned earlier, the impact of topography of *Aumagan* on the spatial layout of the village is very prominent. However, Thiessen-Polygon analysis treats the subject under investigation as a flat universal space. In consequence, the results may not fully match the reality of a given landscape and its landforms. In order to eliminate this bias, the territorial separation needs to be adjusted in respect of local topography. The first step is to enforce separation between 0W1 and S2W7 following a clear division between their two territories in the form of a central fault that separates *Aumagan* into the left and right slopes. Therefore, the line of separation between these two territories was moved to mirror the presence of the central fault. The

second adjustment is between the territories of 0W1 and N5W4. There is also a clear division between the two in the form of the small hill in Area B, which also causes the diverse orientation of households in Area B. Therefore, the line of separation between these two territories was moved to reflect the location of the ridge of this small hill.

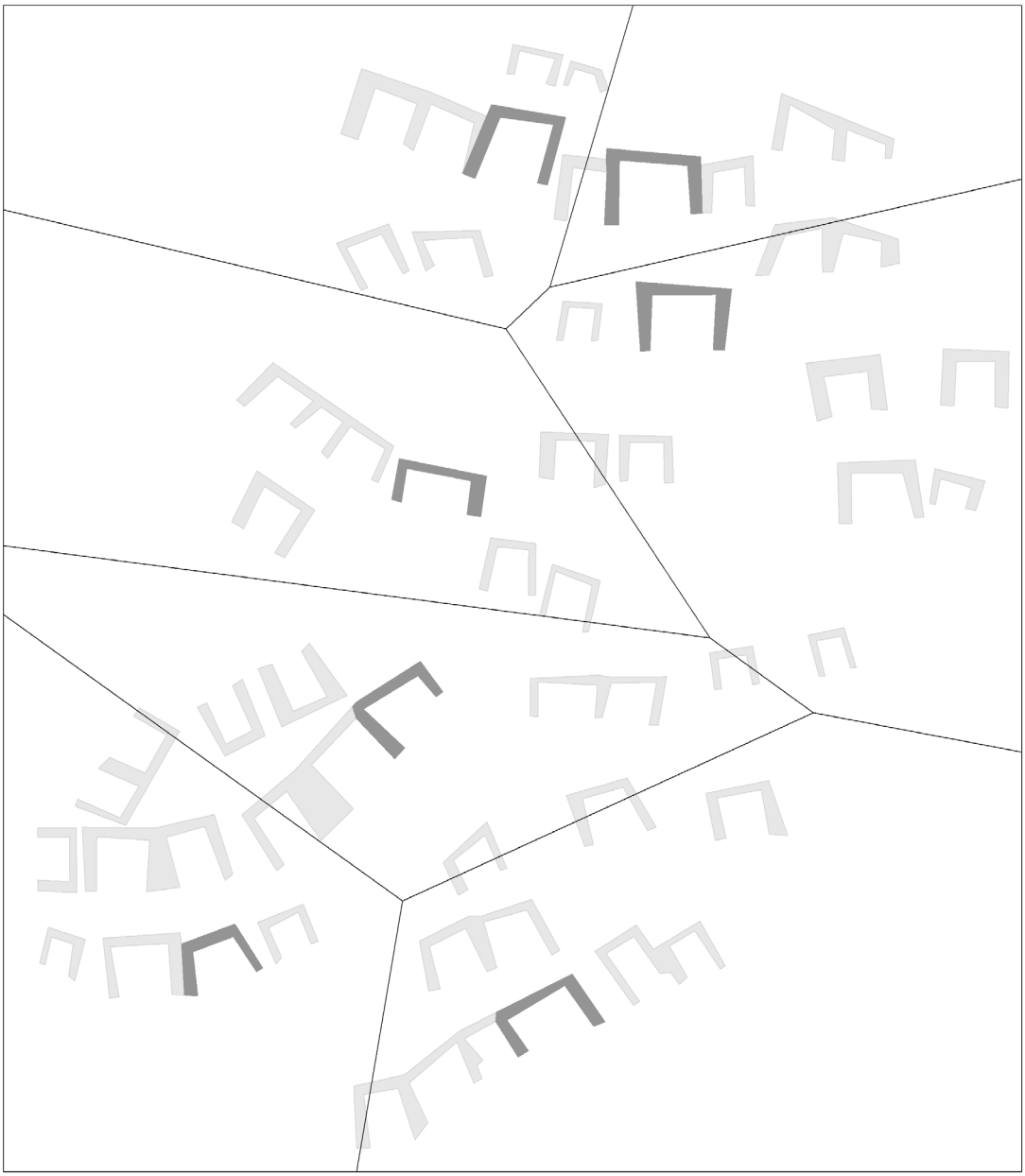

Figure 6. 11 The result of Thiessen-Polygon analysis on head families in *Aumagan*.



Figure 6. 12 The adjusted result of Thiessen-Polygon analysis on head families in *Aumagan*.

After this slight adjustment in respect to local topography, the Thiessen-Polygon approach yielded very interesting results. Comparison between Figure 4.18 and 6.12 shows that the territorial boundary of individual head families matches very well with the neighbourhood boundary defined by step depth, except for the location of the Men's House and the Class II household next to it. This supports the division of neighbourhoods by step depth and consolidates the approach first developed in the investigation of *Saqacengalj* (Wu 2010). It is also significant that the multi-lineage nature of the neighbourhoods is not just reflected in the distance kept between the head families. In fact, the fragmentation analysis in Chapter 5 has already supported and confirmed that the neighbourhoods in *Aumagan* are all highly fragmentised.

Another interesting point is concerned with the fragmentation of Area C. As mentioned in Chapter 5, the fragmentation analysis shows that Area C is highly fragmentised, a tell-tale sign of multiple lineages living in one neighbourhood. However, there is only one head family in the neighbourhood suggesting that there is only one lineage in Area C. Normally a single lineage neighbourhood has a lower fragmentation score as shown in *Saqacengalj*. The high level of fragmentation in Area C does not match with this interpretation. However, the Thiessen-Polygon analysis on *Aumagan* shows that Area C is in fact composed of two lineages and the head family of the second lineage resides in the house-structure N5W4 located in Area B, directly overlooking its kin in Area C (Figure 6.13). This pattern is yet another very interesting similarity between N5W4 in *Aumagan* and S1W2 in *Saqacengalj*.

In the case of *Saqacengalj*, there are only two head families identified as not living in the same neighbourhood with their kin. The first one is N3W1, which had a particularly good relation with Area C1. The second one is S1W2, which had

a well-established relation with Area C2. S1W2 is also the house that is next-door neighbour of the Men's House. In almost the same fashion, N5W4 in *Aumagan* is the next-door neighbour of the Men's House and the only head family who does not live in the same neighbourhood as its kin. The only difference is that N5W4 actually still lives close to its kin but is separated due to the central fault separating the two areas. This similarity between N5W4 in *Aumagan* and S1W2 in *Saqacengalj* again supports the proposal that the people of *Saqacengalj* moved into Areas B and C in *Aumagan*.



Figure 6. 13 Viewshed of N5W4 showing visual dominance over its kin in *Aumagan*.

6.1.2.3 The Growth and History of *Aumagan*

Following the discussion on the merge of the two settlements, this research proposes that there were three stages in the growth of the settlement *Aumagan*. In the first stage, the three heads families in Area A came into this region and settled down. They formed the core of the village, which later grew into a larger settlement. The second stage of *Aumagan* saw the three head families and their kin grow into a larger community that shaped the early form of Area A. The rapid expansion of *Aumagan* showed that the local landscape is capable of sustaining the economic needs of a large *Paiwan* society. It is also possibly at this time that the Headman of *Saqacengalj* came to negotiate land to accommodate its people.

After the suicide event, *Saqacengalj* was considered an ill land. The Headman gave orders to abandon the settlement and move on to somewhere else. In the search of a new landscape to inhabit, they observed that *Aumagan* had shown the capability of accommodating a large population and, therefore it was the right place to go. In this migration process, three head families followed the Headman, along with most of their kin, and moved into *Aumagan*. In the third stage, the majority of people from *Saqacengalj* moved into Areas B and C, forming the final spatial layout of *Aumagan*. According to the similarities in both fragmentation and wayfaring analyses, it is most likely that people from the top half of *Saqacengalj* moved into Area B in *Aumagan*, and the inhabitants of the bottom half moved into Area C.

One interesting issue in the merge of the two sites is the negotiation process between the two settlements. As the leader of *Saqacengalj*, the Headman would most likely represent the settlement in the negotiation process. This, however, raises the question of who represented *Aumagan*. As mentioned earlier, there is no obvious feature indicating the Headman status of any house structure

in *Aumagan*. The link between the Headman in *Saqacengalj* and the household 0W1 in *Aumagan* is purely based on their similarities in the fragmentation and wayfaring analysis, as well as the presence of the largest and well-preserved front platform. Other than that, there are very few material remains elsewhere to indicate any significant differences in social identity. This is one of the most pronounced differences between *Aumagan* and *Saqacengalj*. While *Saqacengalj* is rich in terms of distinct features, *Aumagan* has fewer material remains to indicate socio-political significance. As a result, *Aumagan* yields less information for researchers to build up further conjectures.

However, the Thiessen-Polygon analysis highlights some distinctive phenomena in Area A. The first phenomenon is the size of the S1W7 lineage. Based on the Thiessen-Polygon analysis, this lineage is composed of 12 households. It is already half the size of Area A, and is almost 50% larger than the average size of a lineage (8.29) in *Aumagan*. The size of its lineage puts the head family S1W7 in a dominant position in terms of Area A. In addition, household S1W7 is located in a sizable open space and possesses a relatively large front platform. This highlights S1W7 as a good candidate for the home of the leader of Area A and of the original population of *Aumagan*.

The second phenomenon is the issue of Area D. As mentioned in Chapter 4, *Aumagan* was originally separated into 4 areas based on the step depth analysis. However, since Area D is composed of only four households and lacks an open space for social gathering, it was concluded in Chapter 4 that it is not a self-sustainable community and was merged into Area A. The original Thiessen-Polygon analysis (Figure 6.11) shows that Area D is part of the lineage of 0W1. This is an unexpected result since the two areas are separated by the central fault. However, the result of Thiessen-Polygon analysis on the head families shows that

Area D is sandwiched between the lineages of 0W1 and S1W7. A possible interpretation of this pattern may refer to the negotiation between the two settlements. If 0W1 is correctly identified as the Headman of *Saqacengalj* and if S1W7 was the leader of Area A in *Aumagan*, then there must have been a negotiation between the two when the two settlements merged. One of the possible scenarios could have been that none of them would erect the iconic Headman stone so as to show an equal status and mutual respect between the two leaders. The other sign of mutual respect could have been an arranged marriage between the offspring of the two Headmen, which was relatively common practice amongst *Paiwan* nobles and elites (Chiu 2001: 106). In this case, Area D would be a perfect location for the households of their offspring as it bridges the two areas where the two Headmen lineages resided. Although possible these scenarios are extremely difficult to prove solely on the basis of the spatial layout of the site. Without more material remains and deeper understanding of the Area A and of *Aumagan* altogether, the negotiation process remains a research issue for future investigations.

6.1.3 The Early Development of the *Kaushi* People

In the discussion above, this research identified the historical development of two settlements belonging to the *Kaushi* people. In the period when they lived in *Saqacengalj*, the first village of the *Kaushi* people went through four stages of settlement growth. *Saqacengalj* first started in the area of the top right corner of the site and was composed of four head families. As the settlement grew, each neighbourhood maintained a good relation with their respective head families as reflected in the homogeneity of the single lineage neighbourhoods. In addition, the Men's House was also built at the heart of the old parts of *Saqacengalj* in order to

integrate the villagers as well as to maintain their traditional customs and social order.

At the same time when *Saqacengalj* went through a phase of rapid expansion, *Aumagan* just started to come into shape in the southwest part of the region. It started with the three head families settling in Area A and forming the core of the settlement. After the unfortunate suicide event in *Saqacengalj*, the Headman of *Saqacengalj* gave order to abandon the settlement and they moved to *Aumagan*. In the process of migration, the Headman of Saqacenglaj negotiated terms with the leader of *Aumagan*, and the people of *Kaushi* were allowed to settle on further downslope from the existing *Aumagan* settlement. In consequence, the inhabitants of the top half of *Saqacengalj* formed Area B, while the families who previously lived in the bottom half created Area C. Having moved into a new settlement, the head families of *Kaushi* chose to settle amongst their kin as reflected in the multi-lineage and more fragmentised neighbourhoods.

Having identified each stage and the development of the settlements this research will now further investigate the social transformation in detail. Through the investigation of each stage, researchers should be able to gain insights into the social relation of specific periods. Furthermore, this also enables the comparison between different stages and the examination of the differences and transformations in social relations. In the following section, this research will apply different aspects of social meshwork analysis back onto each individual stages to further investigate the social transformation of the *Kaushi* people.

6.2 Social Transformation

6.2.1 The Discourse Between Delegated and Allocated Social Power

In the discourse between delegated and allocated social power, Mehrer (2000) suggested that the contradiction and conflict between the two could trigger social transformation. This dialogue offers a framework of analysis by which a complex society can be broken down into a more manageable individual delegated and allocated social meshworks composed of interactions and relations, each of which can be then considered individually. And it is precisely this conceptual framework that this research uses to investigate the social transformation of *Kaushi*.

The identification of each stage of the settlement growth allows researchers to examine the social composition and structure of each period individually. Furthermore, through the comparison of different stages, it was then possible to identify the changes and transformations of social relations. With particular focus on the dialogue between the local community and the regional authority, the wayfaring analysis reveals how the interaction of the two settlements stimulated the dynamic growth and transformation of the society related to allocated and delegated power. Mehrer (2000) defined the difference between the allocated power and delegated power in the following terms: the allocated power is the social support derived through local interaction, while the delegated power is the authority gained through the fixed social hierarchy. The wayfaring approach allows us to investigate the dialogue between these two social powers.

In this case study, the social relation meshworks of different social aspects can be modelled and compared with each other linking local interaction with the specific interaction of fixed social status, and therefore explore the social phenomena triggered by the contrast between allocated and delegated power.

Furthermore, the social conflict raised by the contrasting social relation meshworks of each stage forms a particular 'social phenomenon'. Thus, this phenomenon can be compared with the emerging structures and relations in the following stages of the settlement. Based on this discourse between the social relation meshwork and additional structural features, this research will examine the social transformation of *Kaushi*.

6.2.2 The Social Transformation of *Kaushi*

In the following section, this research will investigate the social relation meshworks of the development stages and highlight their characteristics as well as the social phenomena involved. In addition, this research will compare different stages and further showcase the changes and transformation of the *Kaushi* society.

6.2.2.1 The Case of *Saqacengalj*

6.2.2.1.1 The First Stage of *Saqacengalj*

The long history of the *Kaushi* people starts with the first stage of the settlement of *Saqacengalj*. As the Headman, the resident of house-structure 00 was the first settler on this site. Joined by three other families, the four households were the 'four fathers' of *Kaushi* people. The social meshwork of this small cluster of households is very straightforward (Figure 6.14). The result shows that the Headman's house was located in the highest interaction area. In addition to the relation of this cluster of distinct households, there was also the relation between the Headman and the commoners. In this case, an additional relation meshwork was modelled to highlight this structural relation in social hierarchy (Figure 6.15). The results again highlight the dominant position of the Headman's residence. This correspondence of the two analyses highlighting the same area suggests that the authority of the Headman was dominant and solid. To give the global picture

the two meshworks were accumulated together to showcase the overall social meshwork of the first stage of *Saqacengalj* (Figure 6.16).

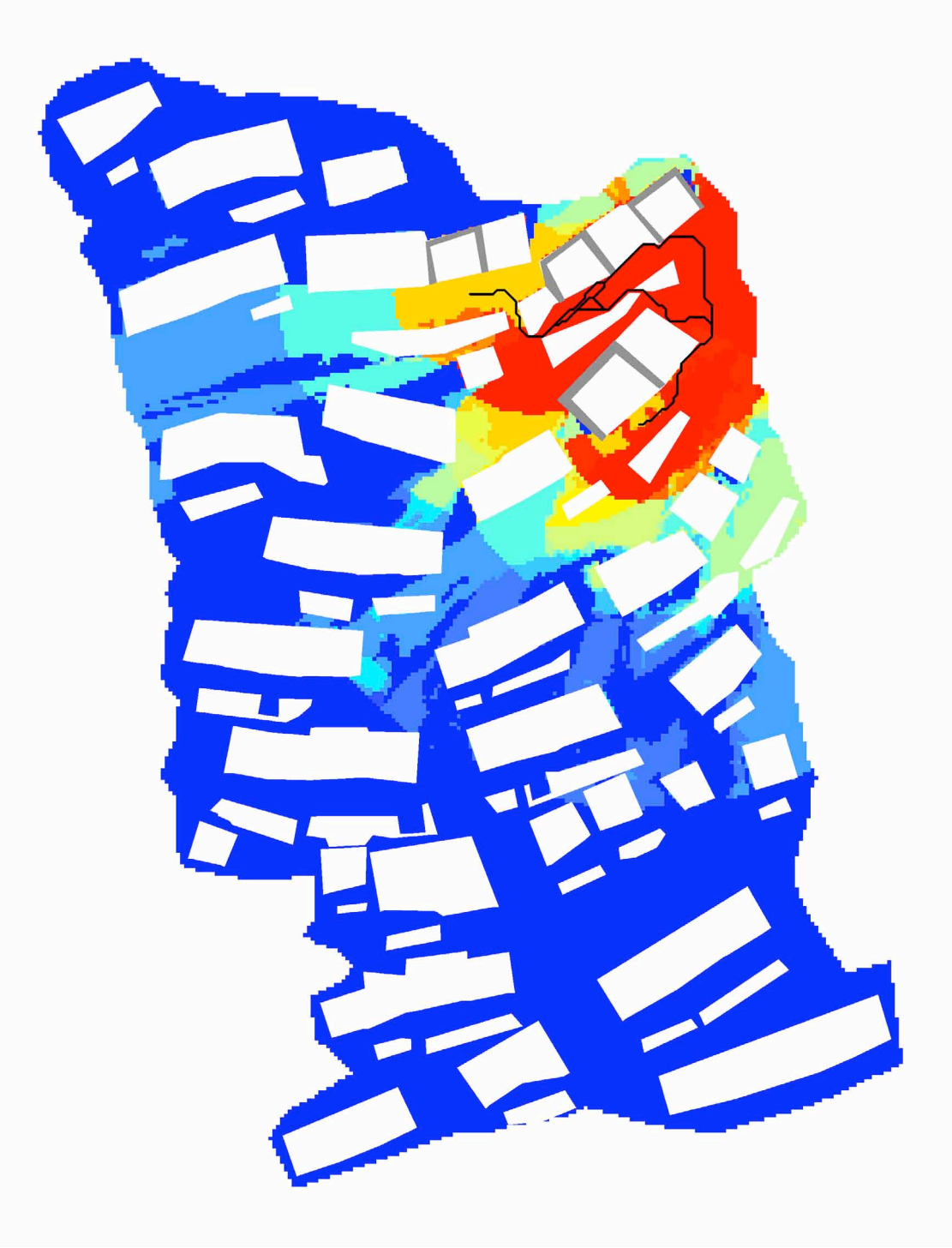

Figure 6. 14 Meshwork heat map of the four families in stage 1 of *Saqacengalj.*



Figure 6. 15 Meshwork heat map of the Headman's relation in stage 1 of *Saqacengalj.*

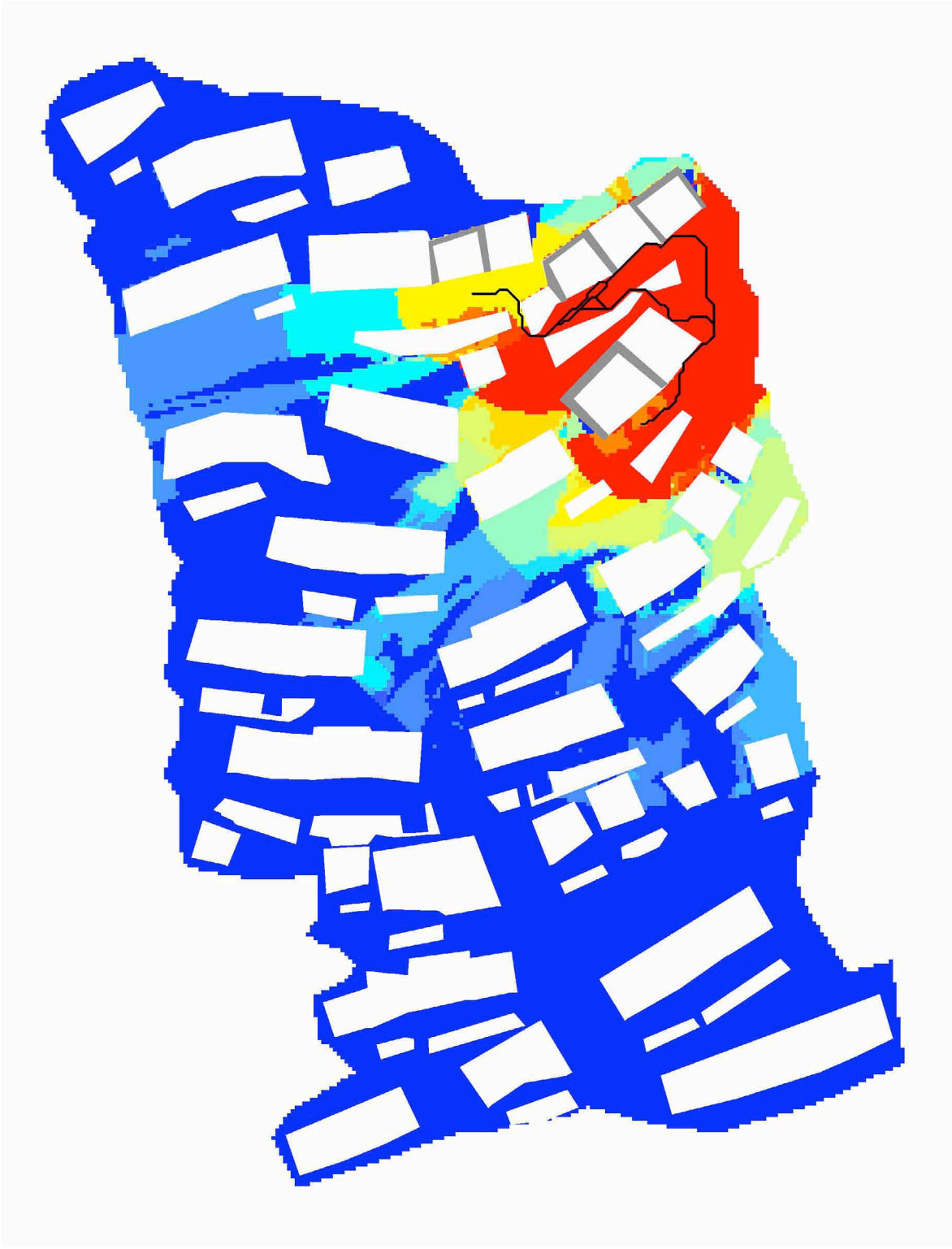

Figure 6. 16 Meshwork heat map of the overall social relations in stage 1 of *Saqacengalj.*

6.2.2.1.2 The Second Stage of *Saqacengalj*

In the second stage of *Saqacengalj*, this cluster of households started to grow and expand, and formed the early form of the old parts of *Saqacengalj* (Figure 6.6). In this stage, *Saqacengalj* grew into a reasonable size settlement occupied by a coherent community governed by four main social relations. The first is the common identity of the community (Figure 6.17). The result of this meshwork shows that the Headman's residence was no longer located in the highest interaction area. Instead, the highest interaction area shifted to the location of house-structure N1W1. The second social relation is the relation between the Headman and the commoners (Figure 6.18). It highlights the Headman as the dominant authority. The third social relation is the relation between head families (Figure 6.19). It shows the social balance amongst the nobility where it is focussed slightly to the top area. This contrast in allocated (Figure 6.17) and delegated (Figure 6.18 and 6.19) power highlight a shift of social dominance away from the Headman. In this case, this shift of social power is a social phenomenon that occurred in this stage. The fourth social relation is that of the Men's House.

As mentioned earlier, it is most likely that the Men's House was built at this stage. The Men's House had an integrative function and tied the community together (Jen 1956; Lusausatj 2012). It was a place used to organise manual labour as well as to educate new generations of the traditional customs and social order (Jen 1956; Lusausatj 2012). It is also known that the Men's House usually answered to the Headman's order and its very existence symbolized the authority of the Headman (Jen 1956; Lusausatj 2012; Wu 1993). However, the presence of the Men's House formed a new social relation meshwork that concerned everyone in the community (Figure 6.20). Although the fourth meshwork highlights the Men's House as the dominant location, this dominance is a reflection of the Headman's

authority. That said, it is likely that the Headman had noticed the shift of social power, which stimulated the decision to build the Men's House. Therefore, the social phenomenon that occurred in this stage was immediately met by the response from the social hierarchy in the form of the Men's House opposing the shift of social power.

In order to produce the final meshwork of this stage, the four social meshworks are accumulated together (Figure 6.21). Figure 6.21 shows that the Men's House is in the most dominant position. It is significant that the relations between the sibling families and the head families are not involved in the final accumulation of meshworks in this stage. This is mainly due to the fact that it is still early stage of settlement development and it is difficult to identify the relation between the households and specific head families. Therefore, the social relation between these two classes are not involved in the final accumulation process.



Figure 6. 17 Meshwork heat map of the community relations in stage 2 of *Saqacengalj.*

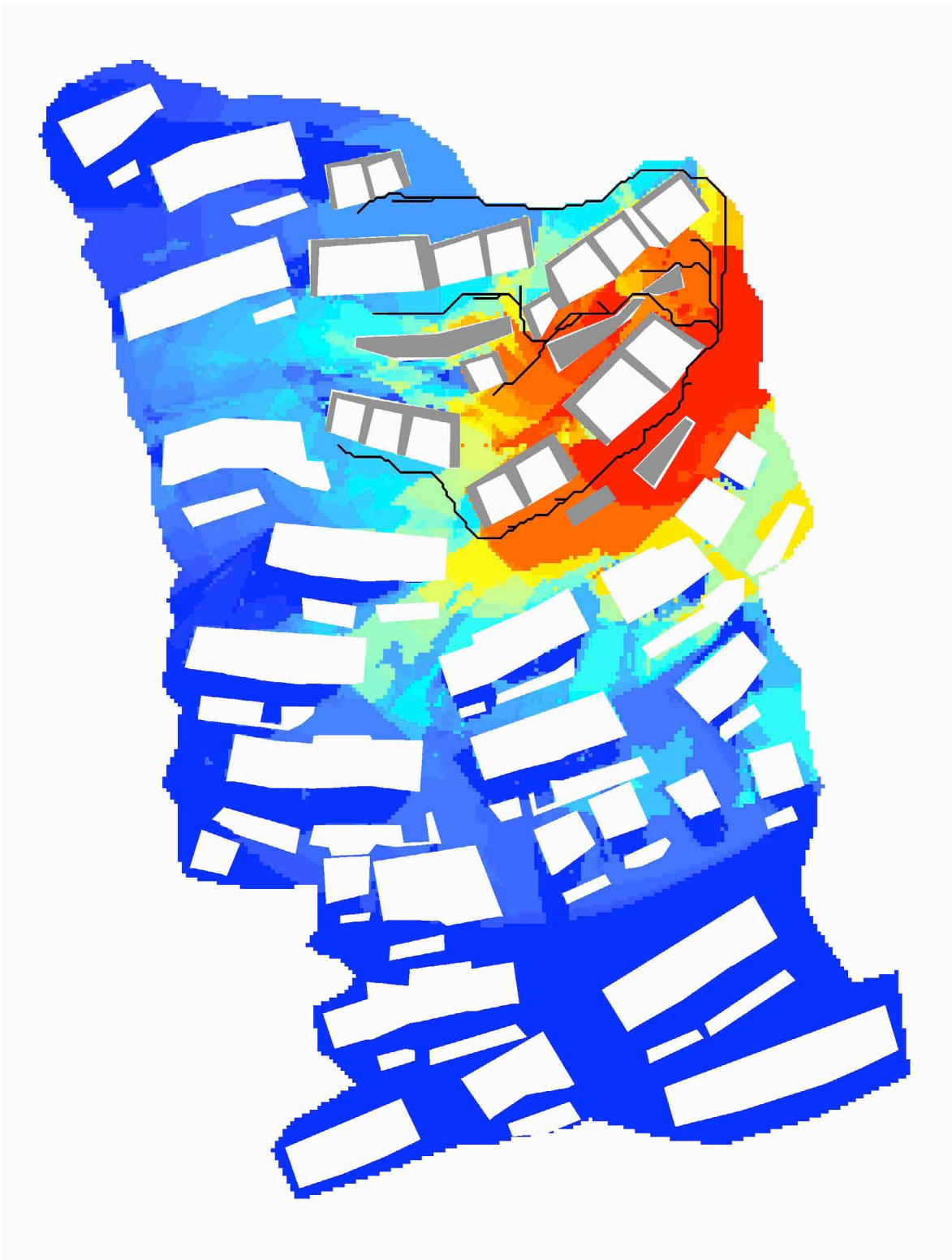

Figure 6. 18 Meshwork heat map of the Headman's relations in stage 2 of *Saqacengalj.*

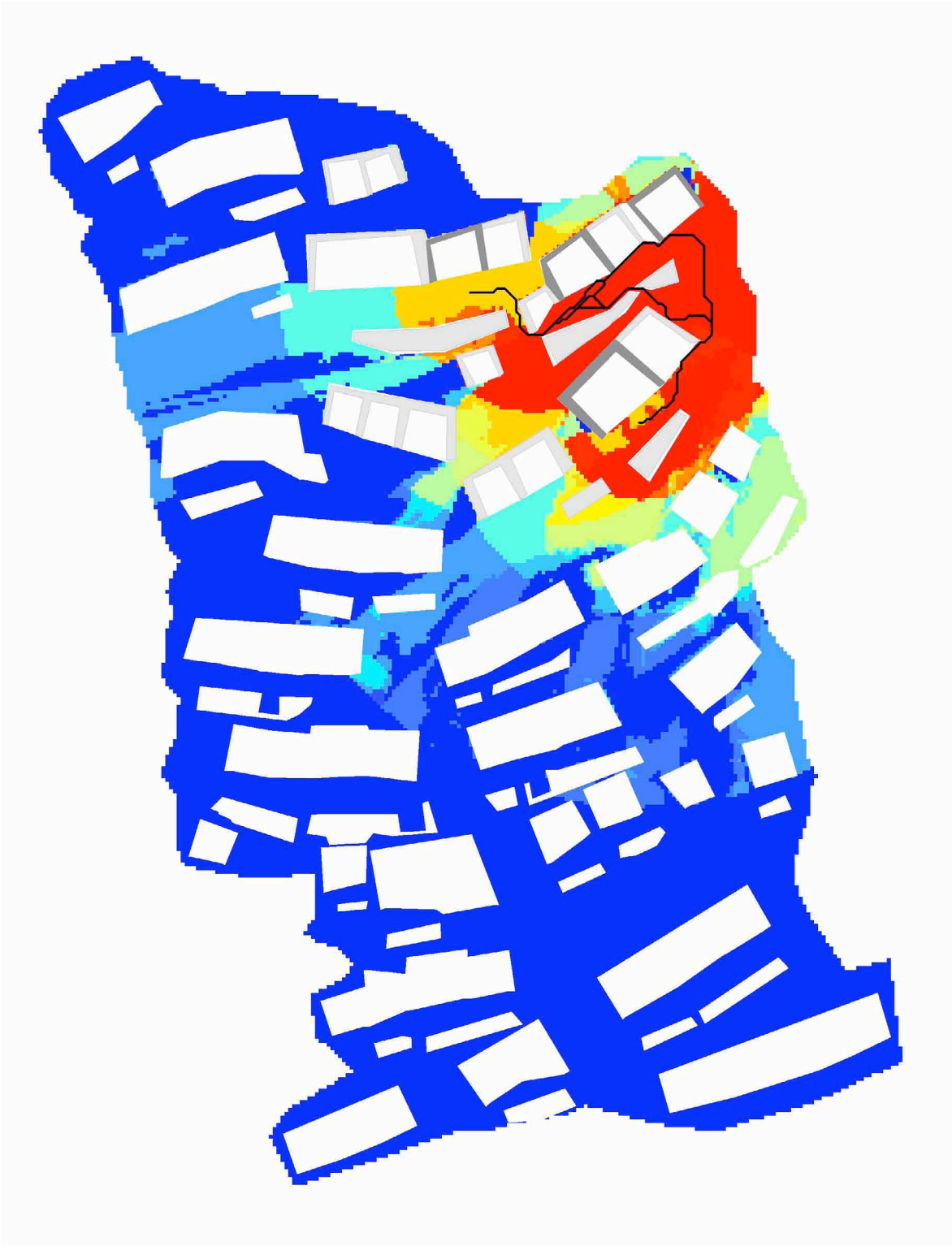

Figure 6. 19 Meshwork heat map of the head families in stage 2 of *Saqacengalj.*

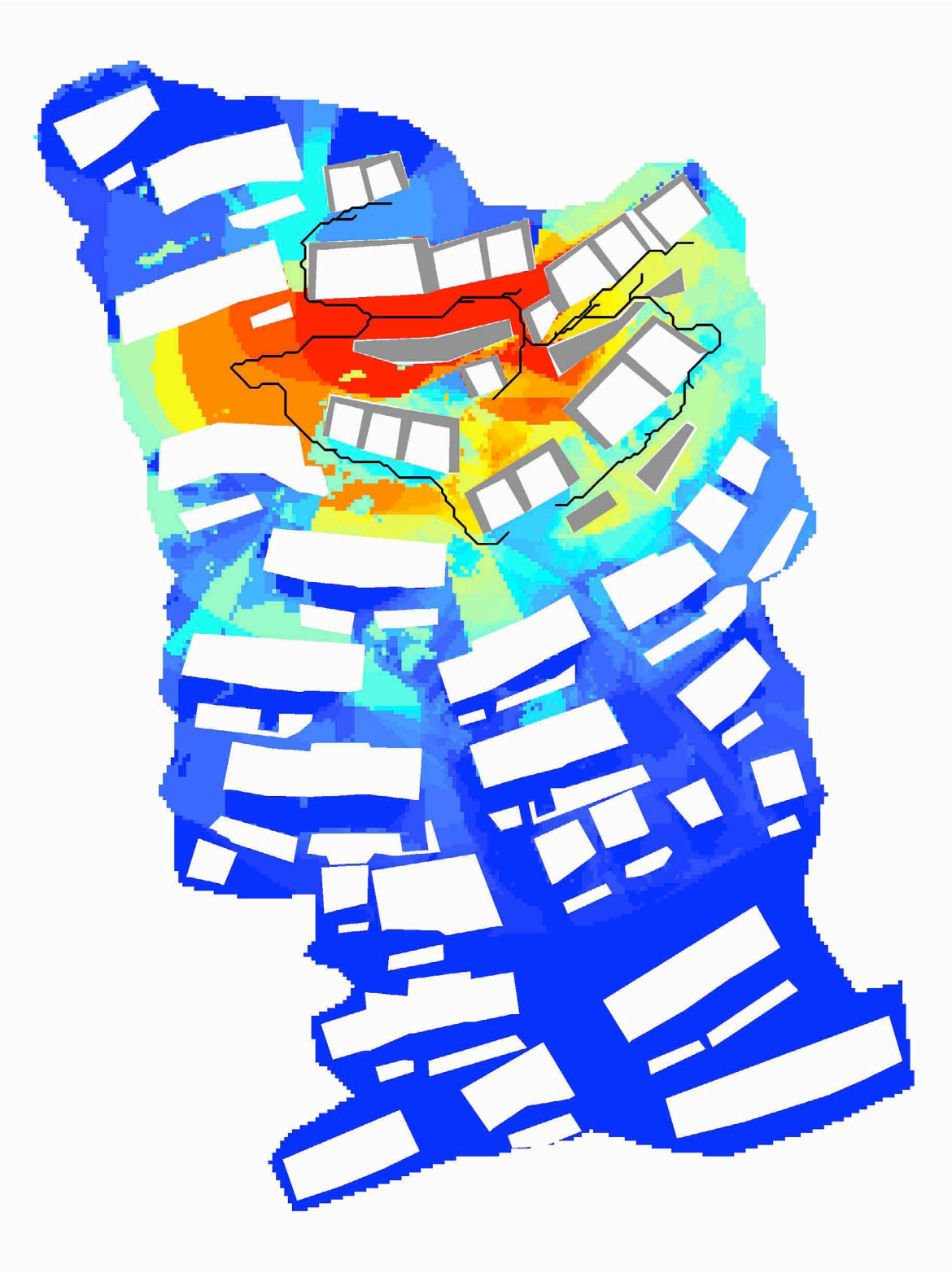

Figure 6. 20 Meshwork heat map of the Men's House's relations in stage 2 of *Saqacengalj.*



Figure 6. 21 Meshwork heat map of the overall social relations in stage 2 of *Saqacengalj.*

6.2.2.1.3 The Third Stage of *Saqacengalj*

In the third stage of *Saqacengalj*, the top half of the site reached its capacity limit, and the growing population spilled out forming Area C1. In addition, the settlement showed the first clear sign of division into individual neighbourhoods: Areas A, B and C1. In terms of social relations, five different meshworks can be identified. The first social meshwork is the neighbourhood identity (Figure 6.22). As an individual community, the neighbourhood is the smallest social unit that involves a group of people who reside together and have frequent face-to-face interaction (Murdock 1949). This face-to-face daily interaction contributes to the feeling of belonging and a shared identity. Figure 6.22 shows this local community meshwork and highlights the allocated social power of individual households in each neighbourhood. However, it also shows that the Headman was still located in a relatively dominant area.

The second social meshwork is the relation between Class III households and Class II households. As discussed in previous sections, Class II households belonged to the head family of different lineages. Thus, the relation between Class III households and Class II households indicates the social relation between head families and their sibling families. Previous analyses discussed in this Chapter demonstrated that there were clear relations between the neighbourhoods in *Saqacengalj* and individual head families. The second meshwork (Figure 6.23) showcases this kinship relation but it also highlights that despite the strength of the relatively specific and local relations formed by lineages, the Headman was still located in a dominant area.

The third and fourth social meshworks relate to the social relation of all the households with the Headman and the Men's House (Figure 6.24 and 6.25). Since they are both considered the authority of the Headman, they reflect the delegated

power in the social hierarchy. In addition, the fifth meshwork was composed on the basis of the relation between the head families. It also highlighted the dominance of the Headman (Figure 6.26).

In all the cases the five social meshworks highlight the same central authority of the Headman. The difference between the previous stages and this stage lies in the formation of individual neighbourhoods and the development of lineage relation. However, these additional meshworks still place the Headman in a dominant position. These social phenomena may be interpreted as the consolidation of central authority. Accumulation of the five meshworks above produces the final social meshwork of stage three (Figure 6.27). Unsurprisingly, it also shows that the Headman's residence was located in a high interaction area.

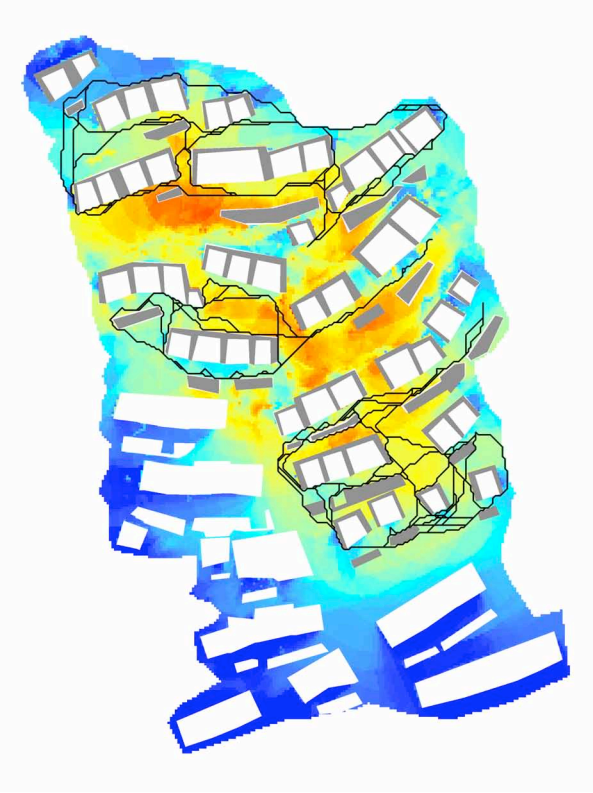

Figure 6. 22 Meshwork heat map of individual neighbourhoods in stage 3 of *Saqacengalj.*

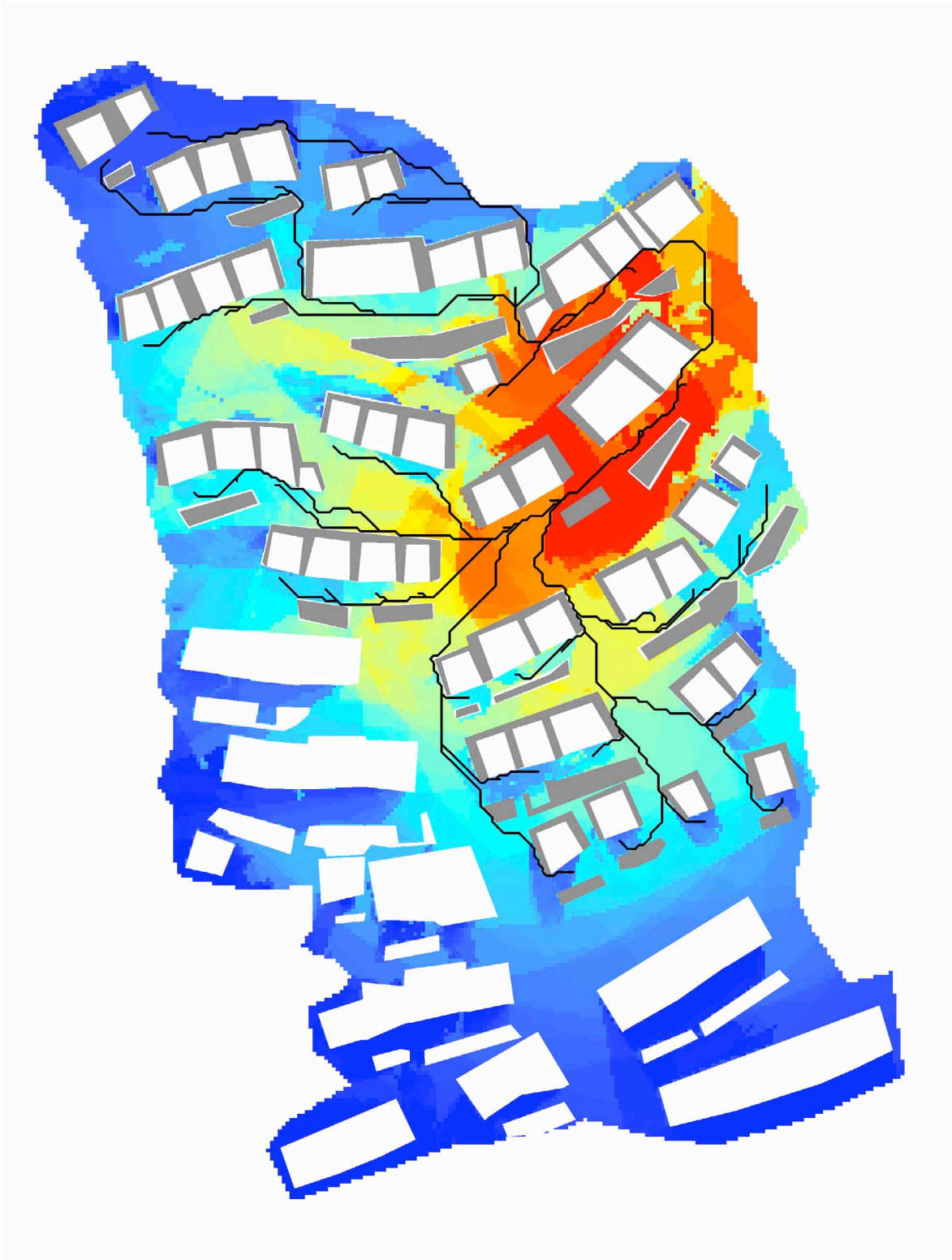

Figure 6. 23 Meshwork heat map of individual lineages in stage 3 of *Saqacengalj.*

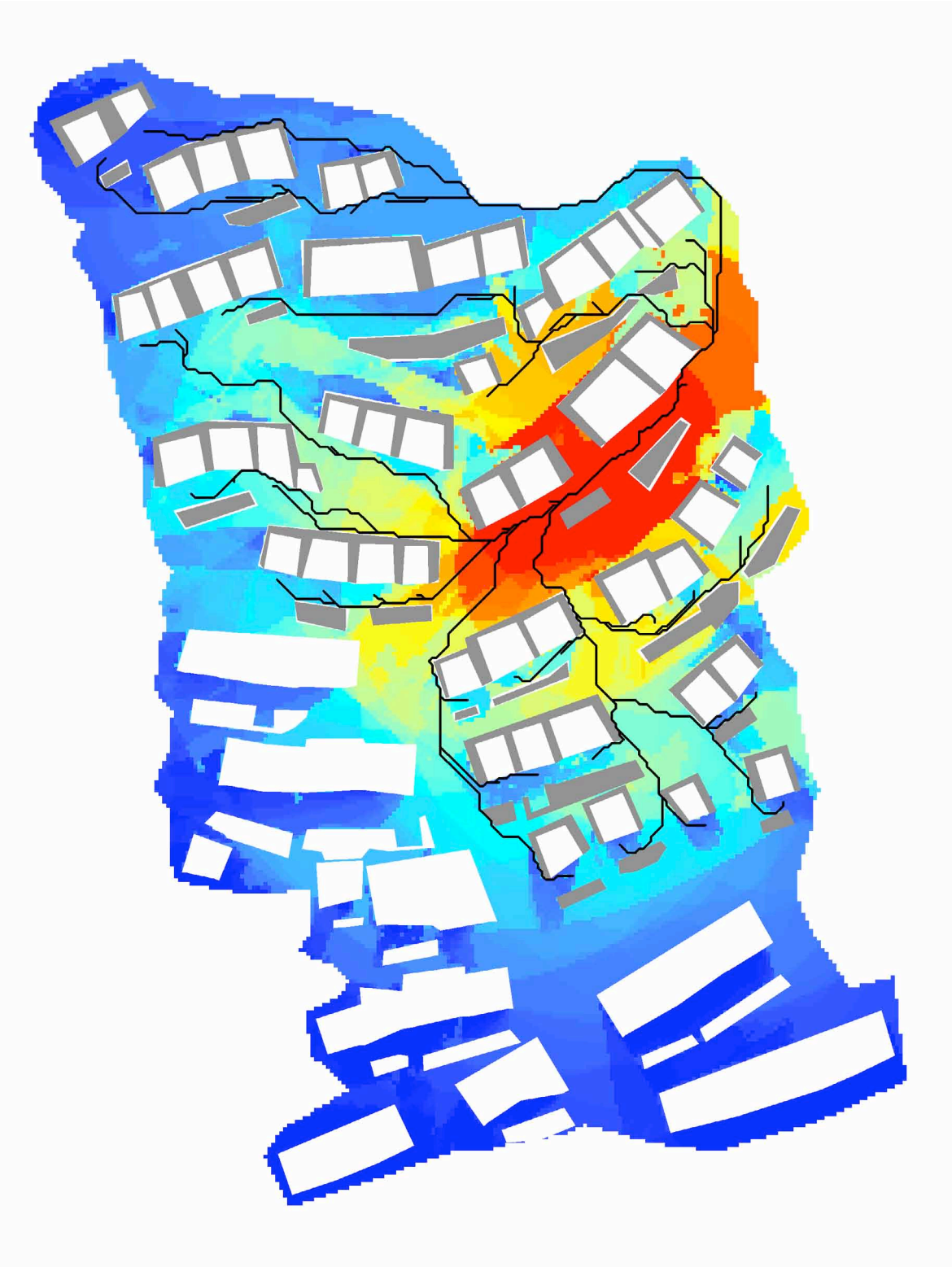

Figure 6. 24 Meshwork heat map of the Headman's relations in stage 3 of *Saqacengalj.*

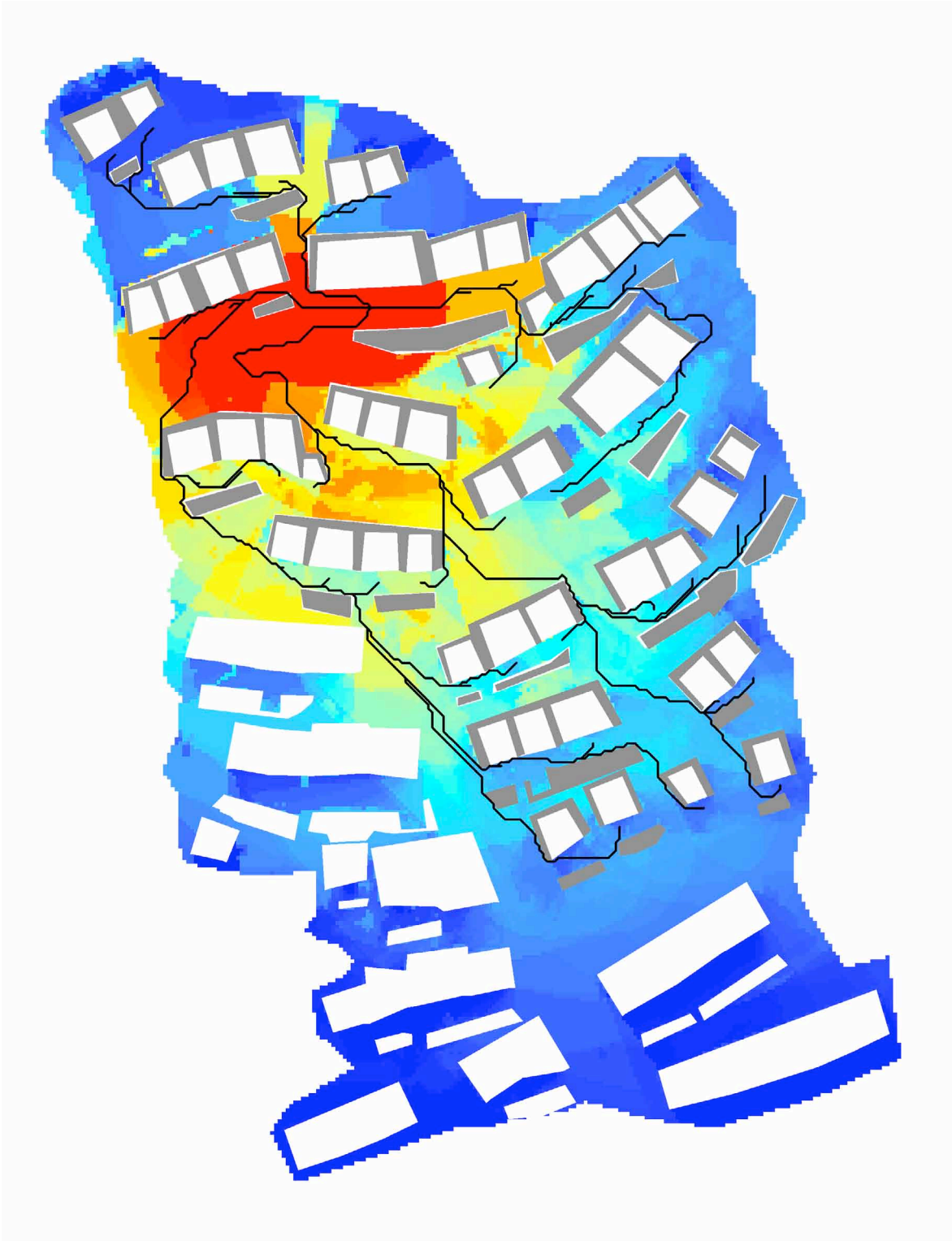

Figure 6. 25 Meshwork heat map of the Men's House's relations in stage 3 of *Saqacengalj.*

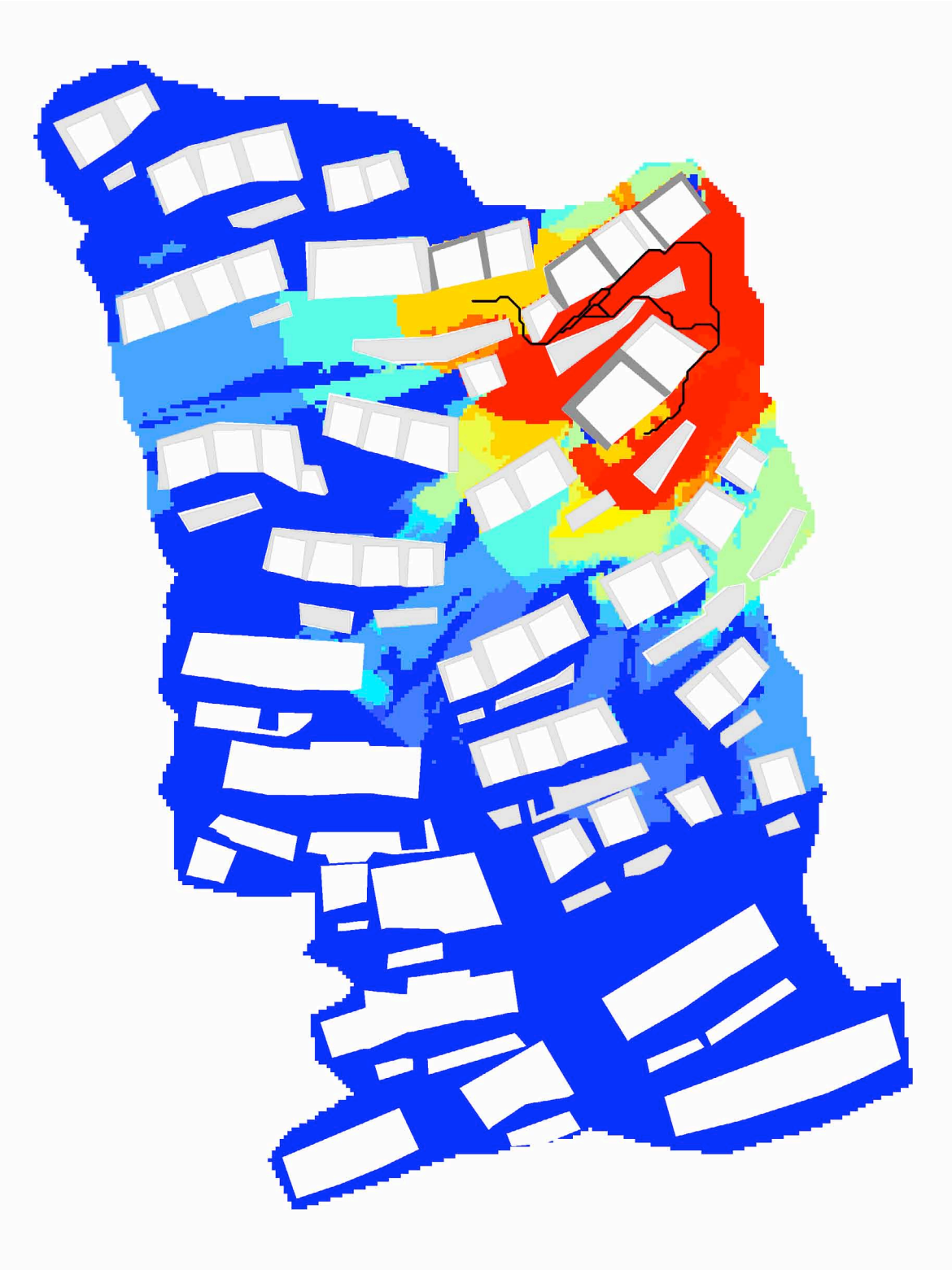

Figure 6. 26 Meshwork heat map of the head families in stage 3 of *Saqacengalj.*

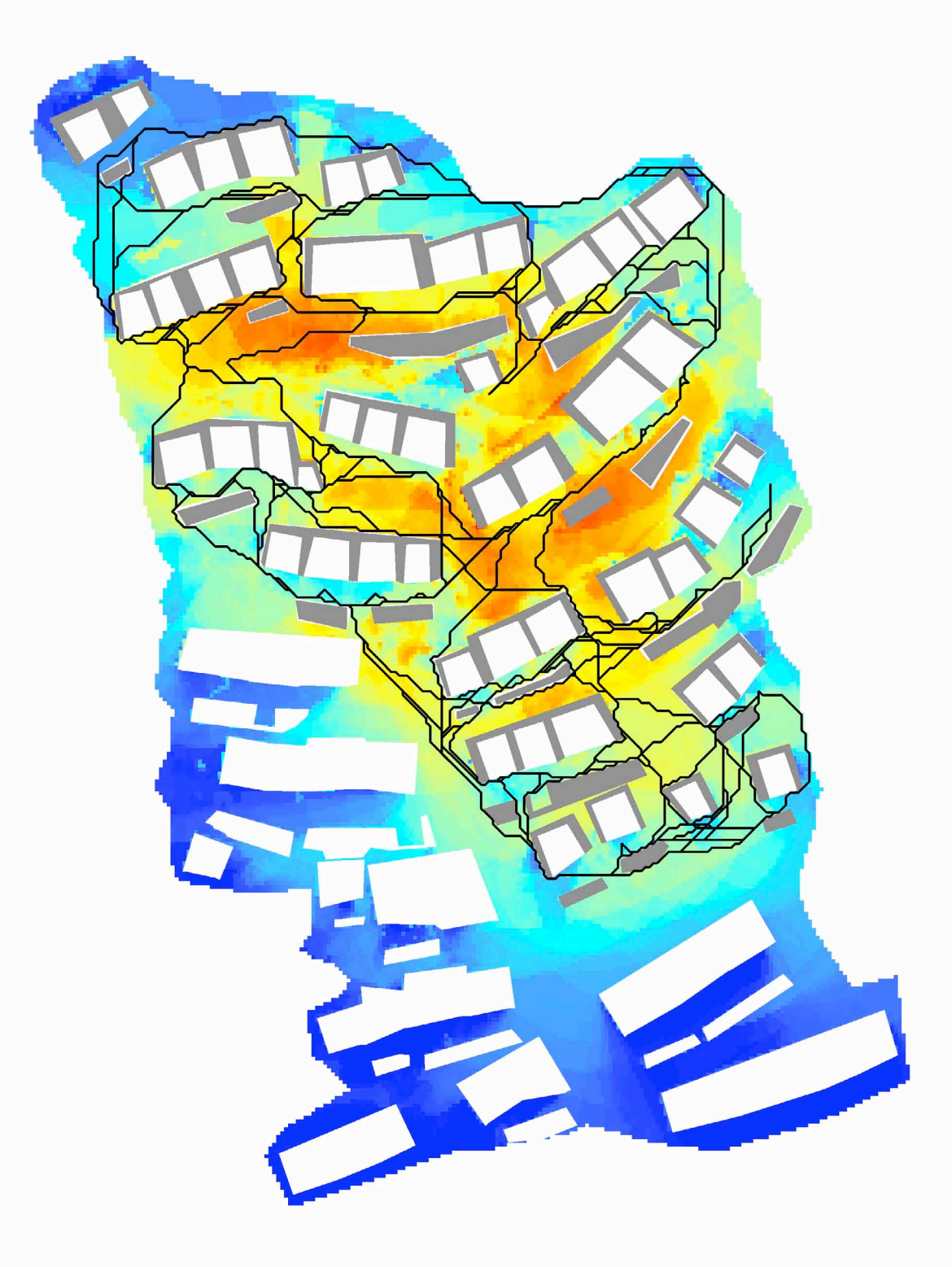

Figure 6. 27 Meshwork heat map of the overall social relaions in stage 3 of *Saqacengalj.*

6.2.2.1.4 The Fourth Stage of *Saqacengalj*

The fourth stage is also the last stage of the development of *Saqacengalj*. In this stage, Area C2 was formed, and the kin of the head family residing in S2E5 moved into Area C3. In terms of social relations, seven different meshworks were identified. The first and the second social meshworks denote the social relation of all the households established with the Headman and the Men's House respectively (Figure 5.4 and 6.28). Not surprisingly the two meshworks highlight the domination of the central authority. Therefore, they are still in line with the previously identified social structure and the dominating power of the Headman. The third social meshwork is the relation between the head families (Figure 5.3). The main difference between the meshworks of this and the previous stage is the presence of the house-structure S2E5 in Area C3. However, its presence actually strengthened the dominance of the Headman. This is due to the fact that the link between S2E5 in Area C3 and two of the head families in Area A (N1W1 and N3W1) pass through the location of the Headman's house. As a result, instead of stretching the social power towards the bottom half of the settlement, it actually consolidates the dominance of the Headman in the spatial layout of the site.

The fourth social meshwork is that of the neighbourhood identity (Figure 5.8). As mentioned earlier, this social meshwork is composed of the local relations and it reflects the allocated social power derived from local communities. The difference between this stage and the previous one lies predominantly in the new neighbourhoods, i.e. Areas C2 and C3. Whereas the neighbourhood meshwork of the previous stage supported the dominance of the Headman, Figure 5.8 shows that in this phase there was a slight shift towards the bottom half of the site. This is because the additional two neighbourhoods increased the overall social power derived from the bottom half of the site.

The fifth social meshwork is that of the relation between head families and their kin (Figure 6.29). Again, this is also a very local relation meshwork that is derived from specific interpersonal relations. However, it can be considered as representing both: allocated power and delegated power. Theoretically, this meshwork reinforces the importance of the social status of the head families which can be seen as strengthening the social order of the society. However, this social power is also a local relation that does not directly involve the authority of the Headman. Therefore, it can also be seen as allocated power separate from the central authority, making it difficult to decide which type of social power this meshwork should be categorised as. In consequence, this research examines its characteristics and their development through time. Similar to that of the neighbourhood meshwork, the difference between this stage and the previous stage lies in the addition of two new neighbourhoods. The meshwork of the relation between them and their head families shows the intensive interaction in the peripheral areas (Figure 6.30). Even the relation between Area C2 and the head family living in the house-structure S1W7 concentrates on the route through the left edge rather than through the centre of the site. This again demonstrates a slight shift in the overall kinship relation meshwork away from the central authority.

The sixth and seventh identified social meshworks are the social relation amongst wealthy households. As mentioned in Chapter 5, the possession of water container is a symbol of wealth and can be used as a distinct feature of a separate class of social identity. Figure 5.5 showcases the social meshwork amongst the households with water containers. These households can be further categorised into two different groups based on the manner in which their wealth was accumulated. As discussed in Chapter 5, some of the households accumulated

wealth through their well-connected social relation (Figure 5.7), while others used their social status or other means (Figure 5.6).

Figure 5.6 showcases that the social meshworks of wealthy households of a high social status are clearly focused in the area close to the Headman's house. Being a part of the fixed social structure, they represent the delegated social power gained through the existing social hierarchy. In contrast, Figure 5.7 highlights the area further towards the left side where the wealth of households was accumulated through social interaction. Therefore, this meshwork represents the allocated social power amongst the wealthy households. The results from the social relations amongst wealthy households suggest a strong contrast in delegated and allocated social power.

The seven social meshworks above are accumulated to produce the final meshwork of the fourth, and last, stage of *Saqacengalj*'s development (Figure 6.31). Figure 6.31 shows that the Headman and the Men's House were still located in relatively dominant locations. However, the final meshwork also shows a slight shift towards the central area of the site compared with the previous stage. This is mainly due to the addition of Areas C2 and C3 in the bottom half of the site that changed the dynamics of the settlement. This change and shift are even more apparent in the four social meshworks discussed above suggesting the move of social power away from the central authority. This shift again acted as a social phenomenon but was not dealt with while they were still in *Saqacengalj* because the suicide event occurred and the Headman ordered the abandonment of the village. In order to find out the social transformation that follows, this research will turn to the next settlement of *Kaushi* people, *Aumagan*.

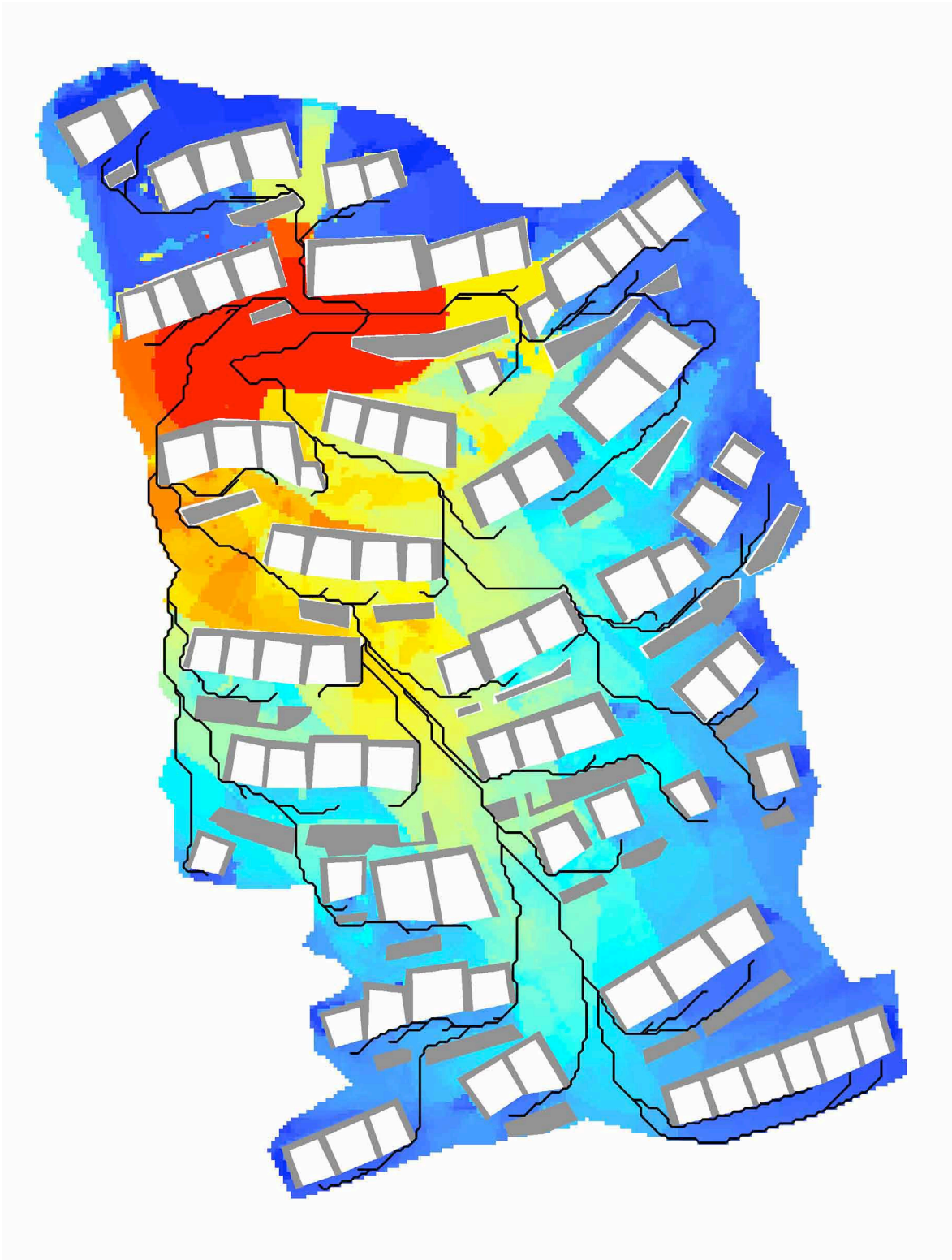

Figure 6. 28 Meshwork heat map of the Men's House's relations in stage 4 of *Saqacengalj.*

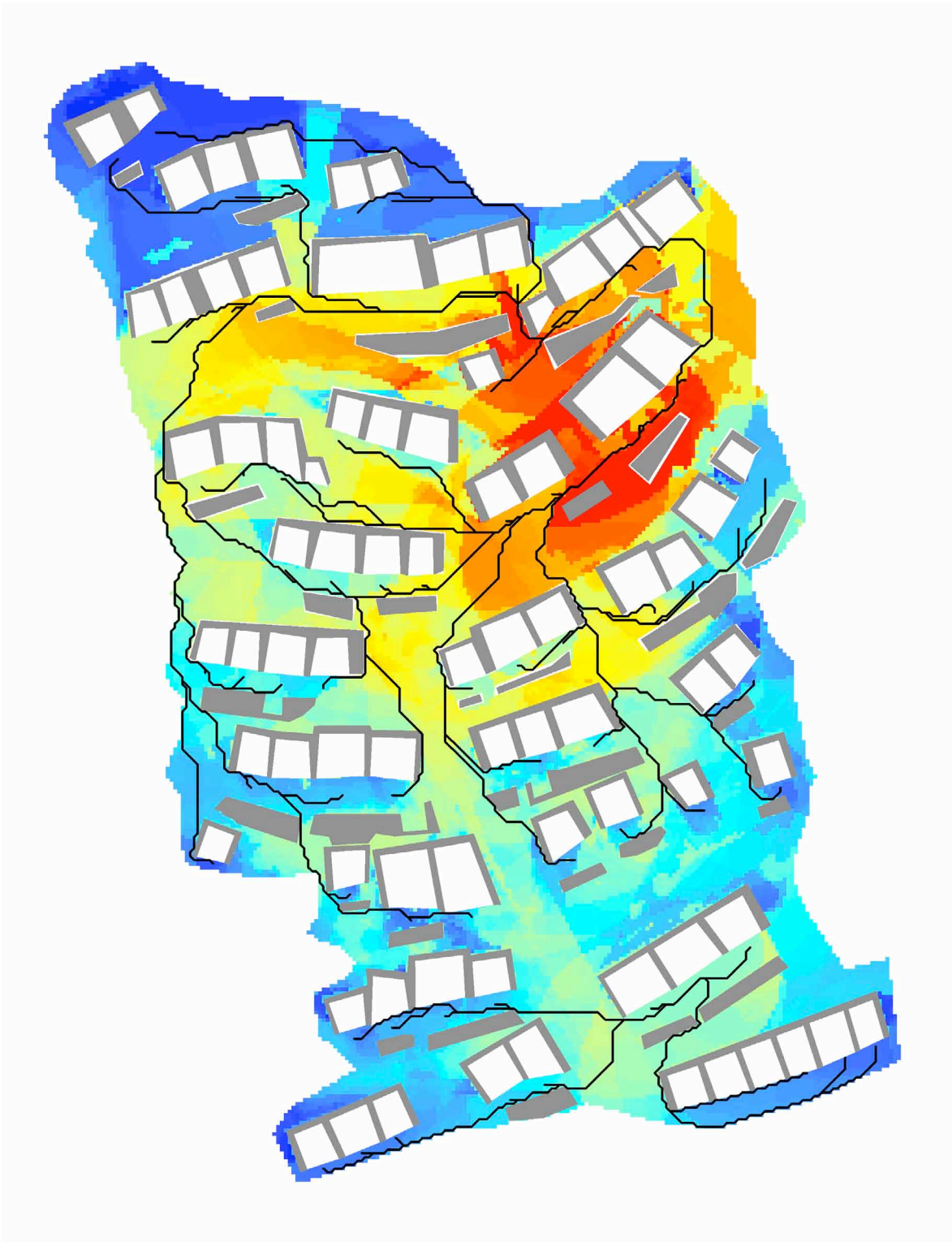

Figure 6. 29 Meshwork heat map of individual lineages in stage 4 of *Saqacengalj.*

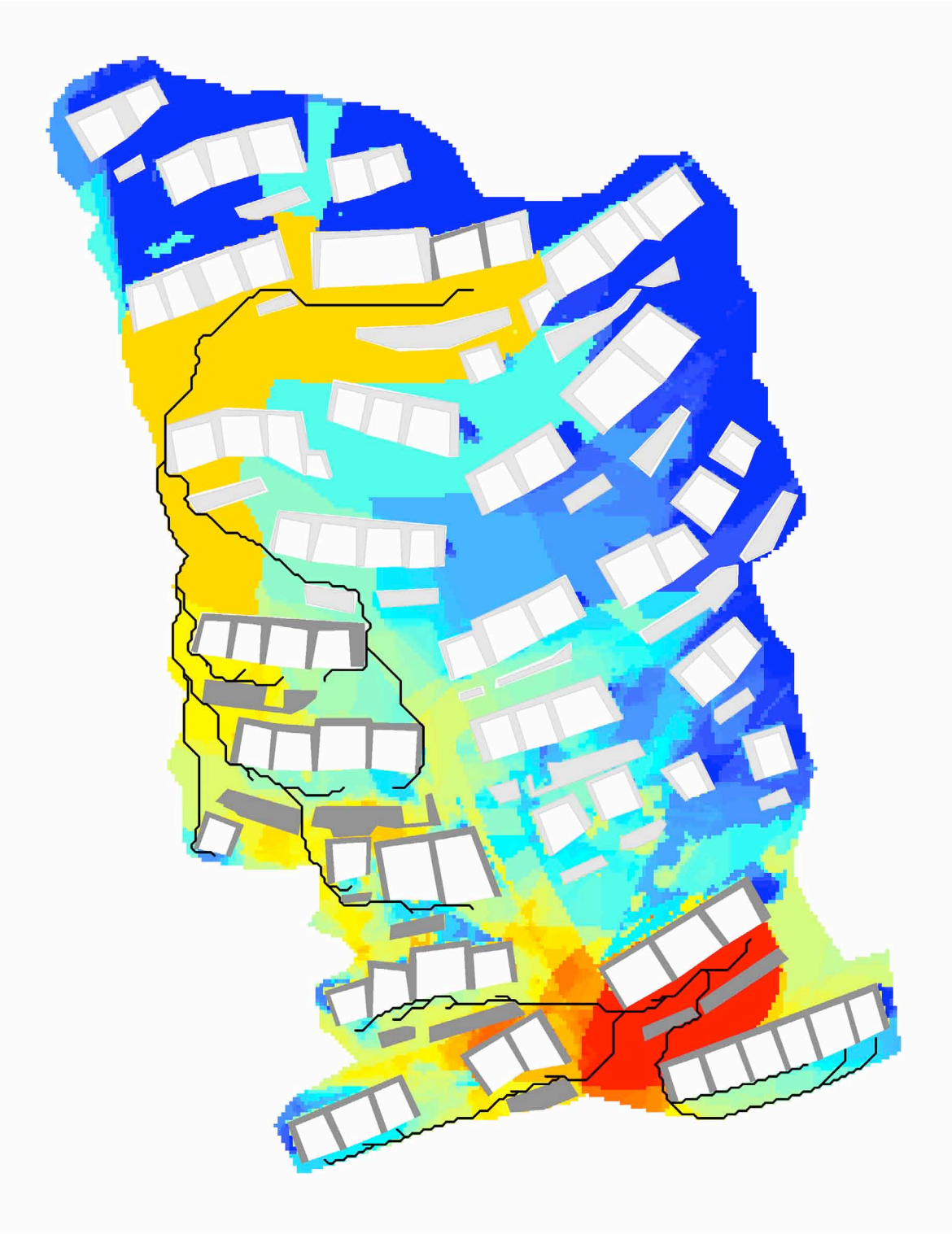

Figure 6. 30 Meshwork heat map of the two lineages (S2W1 and S2E5) in stage 4 of *Saqacengalj.*

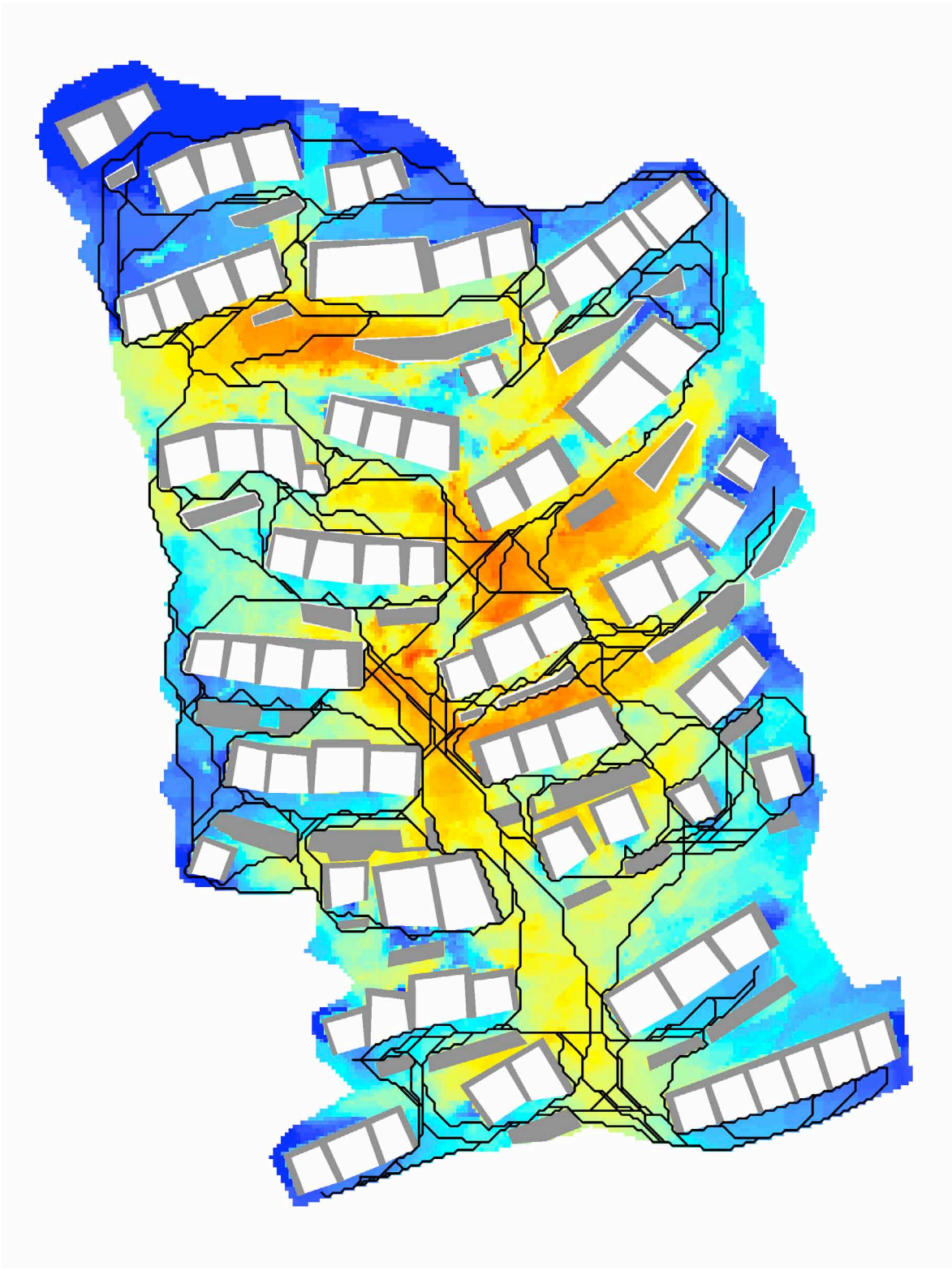

Figure 6. 31 Meshwork heat map of the overall social relations in stage 4 of *Saqacengalj.*

6.2.2.2 The Case of *Aumagan*

Earlier, this research has identified three stages of the settlement growth of *Aumagan*. The history of *Aumagan* began before the *Kaushi* people migrated into the settlement. At the time when *Kaushi* people moved in, *Aumagan* had already been an established and functioning community living in a landscape rich in resources capable of sustaining a large village. Before examining the impact of the merge of the two settlements, this research will first look into the dynamics of the original *Aumagan*'s community.

6.2.2.2.1 The First Stage of *Aumagan*

In the first stage of *Aumagan*, the three head families came into the region and settled down in Area A. They formed the cluster of households that formed the core of *Aumagan*. Similar to the first stage of *Saqacengalj*, the social meshwork of these three head families is straightforward to interpret (Figure 6.32). However, since it is difficult to identify the household of the Headman, the relation between the commoners and the Headman cannot be analysed. The result (Figure 6.32) highlights S2W7 as the household that is in the highest interaction area.

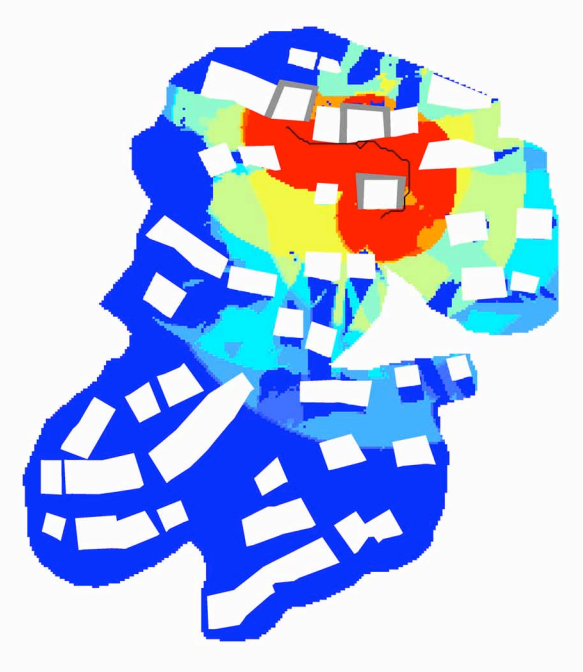

Figure 6. 32 Meshwork heat map of the three head families in stage 1 of *Aumagan.*

6.2.2.2.2 The Second Stage of *Aumagan*

The second stage of *Aumagan* saw the three heads families and their kin grow into a larger community and they shapes the early layout of Area A. Three social meshworks can be identified in this stage. The first is the common identity of the community (Figure 6.33). The second social meshwork is the relation between the head families (Figure 6.34). The third social meshwork is the relation between the head families and their sibling families identified earlier through Thiessen-Polygon analysis (Figure 6.35). Interestingly, all three meshworks highlight roughly the same area, located between house-structures S1W7 and S2W7. This result may be caused by the distribution of households. Since the head families were clustered quite close to each other in the centre of the Area A, the houses of the siblings families were distributed along the outer edge of the neighbourhood. Even though the local relation of each lineage highlights their individual area, the accumulation of the three lineages shows the same effect as the other two meshworks because of their tight clustering. As a result, all three meshworks highlight the central area of the neighbourhood, as do the final accumulated social meshwork (Figure 6.36). However, the larger amount of sibling families of household S1W7 meant that the dynamic of social relation shifted very slightly to S1W7.

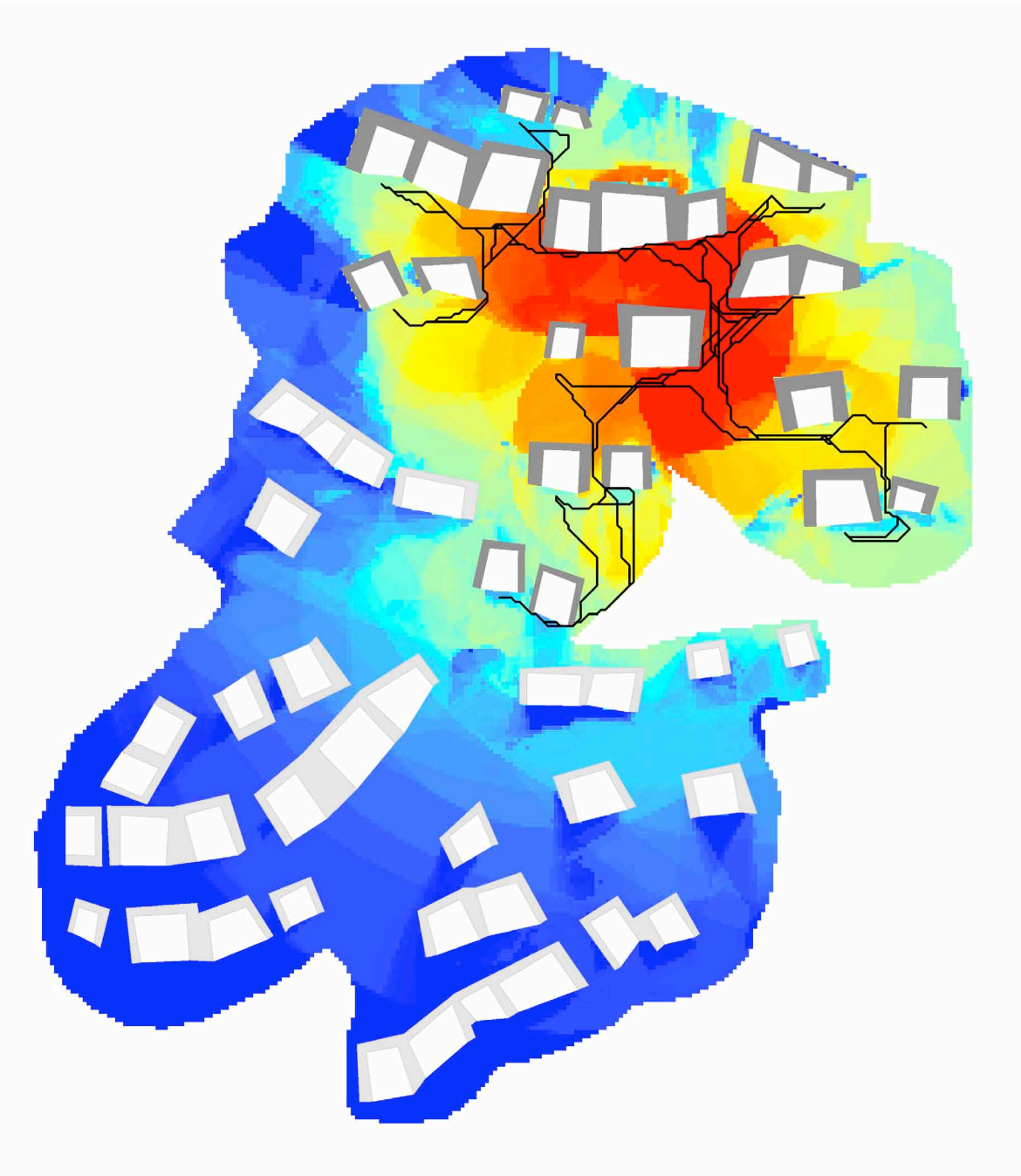

Figure 6. 33 Meshwork heat map of the community relations in stage 2 of *Aumagan.*

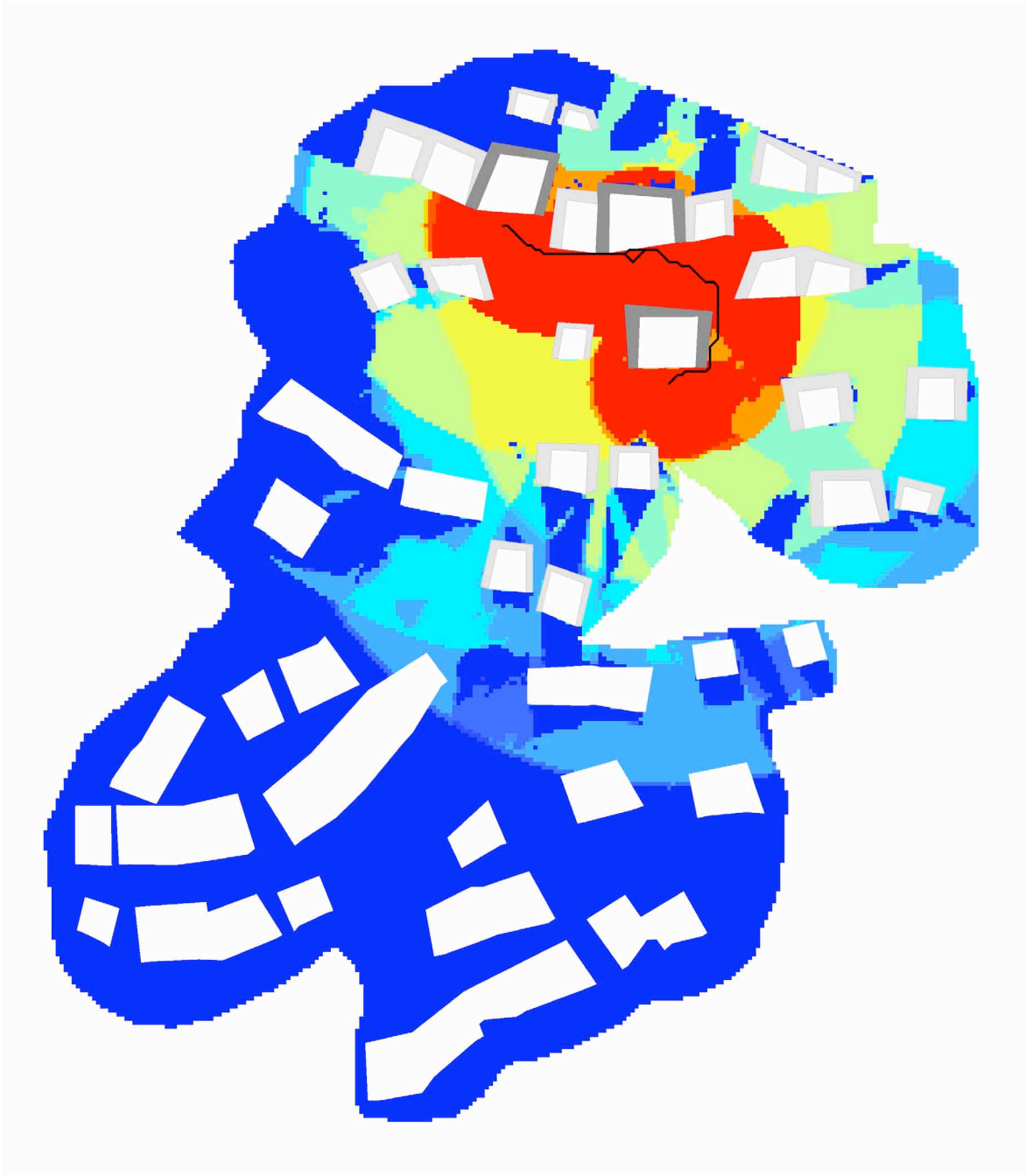

Figure 6. 34 Meshwork heat map of the head families in stage 2 of *Aumagan.*

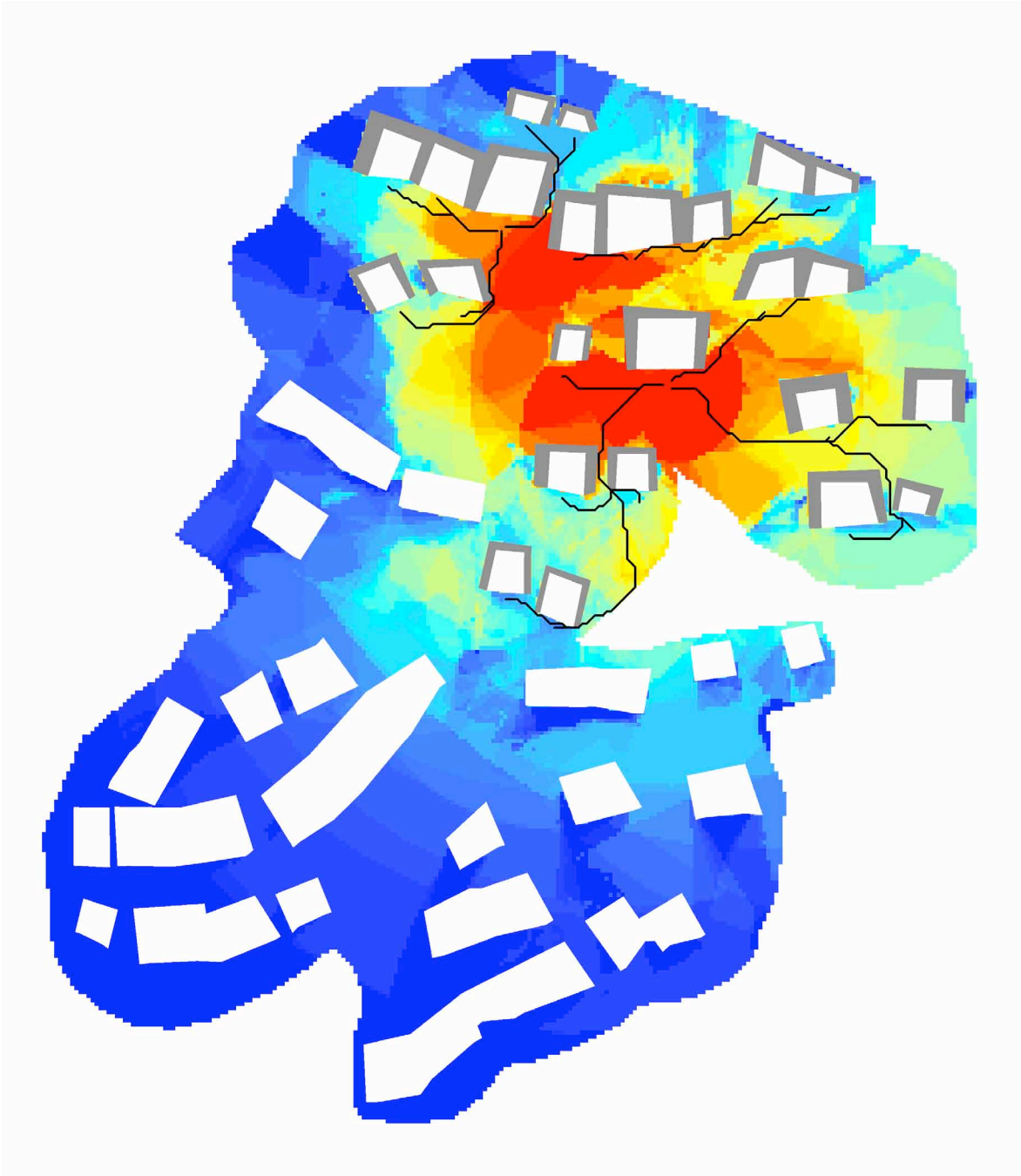

Figure 6. 35 Meshwork heat map of individual lineages in stage 2 of *Aumagan.*

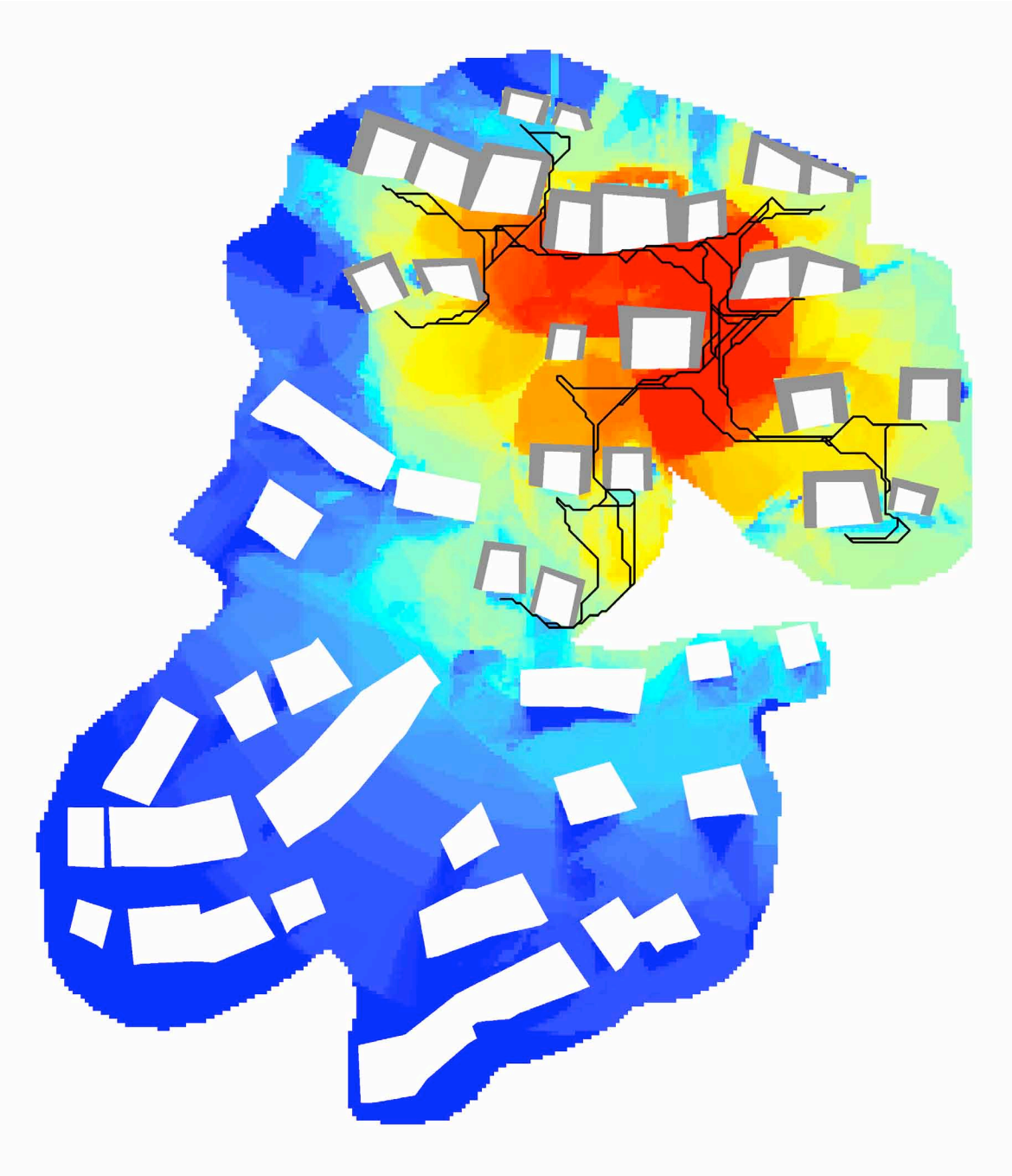

Figure 6. 36 Meshwork heat map of the overall social relations in stage 2 of *Aumagan.*

6.2.2.2.3 The Third Stage of *Aumagan*

In the third stage, the people from *Saqacengalj* moved into Areas B and C, and formed the final layout of *Aumagan*. Considering the similarities in both fragmentation and wayfaring analysis, it is most likely that the people from the top half of *Saqacengalj* moved into Area B in *Aumagan* while the inhabitants of the bottom half moved into Area C. Five social meshworks were identified in this stage. The first social meshwork is the neighbourhoods (Figure 6.37). As mentioned in Chapter 5, the internal neighbourhood relation of *Aumagan* highlights two house-structures S1W7 and S2W7 in Area A. This is due to the fact that Area A was composed of more households and thus accumulated more social power. However, as previously stated, this neighbourhood meshwork also shows that 0W1 was amongst the top ranking house-structures. This highlights the relation between S1W7 and 0W1, indicating that they may be the two households involved in the negotiation process during the merge of the two sites.

The second social meshwork is the lineage relation between the head families and the families of their siblings (Figure 6.38). It showcases that S1W7 and the Headman (0W1) were both located in the dominant areas. This is very interesting since these two households were thought to be the leading households of their respective communities in the merging of the two villages (section 6.1.2.3). This supports earlier discussion on the negotiation of socio-political power between the two village leaders.

The third social meshwork is the relation between head families (Figure 6.39). It highlights the dominance of household 0W1 suggesting that it was the most well connected household amongst the village nobility. This supports the proposal that 0W1 might have been the household of the *Saqacengalj* Headman and that his household bound the people from two settlements together.

The fourth and fifth social meshworks are the social relation of the common households with the Headman and the Men's House (Figure 6.40 and 6.41). However, since the Headman and the Men's House originally came from *Saqacengalj*, Area A of *Aumagan*, with its social system and structure established before the merging of the two settlements and therefore independent from that of *Saqacengalj*, was excluded from the analysis. It is likely that Area A retained its independency as there is no Headman stone in Areas B and C, suggesting that the Headman of *Saqacengalj* did not dominate the settlement. Therefore, Area A were not involved in the modelling of Figure 6.40 and 6.41.

The accumulation of the five social meshworks demonstrates the social relation in the final stage of the development of *Aumagan* (Figure 6.42). It highlights the dominant location of the S1W7 and the Headman's residence (0W1) that originally came from *Saqacengalj*. However, the social intensity is more focussed around the area S1W7 is located, rather than the area of Headman from *Saqacengalj*. This is a contrast to *Saqacengalj* where the Headman is located in the most dominant and activity area (Figure 6.27). Given that the Headman brought most of the people from *Saqacengalj* with him, it is curious that he failed to establish a better social position in *Aumagan*. Rather, Figure 6.42 shows that Area A is more dominant than the Areas B and C combined. This may indicate that the people from *Saqacengalj* were merging into the social activities already present in Area A rather than establishing their own social system.

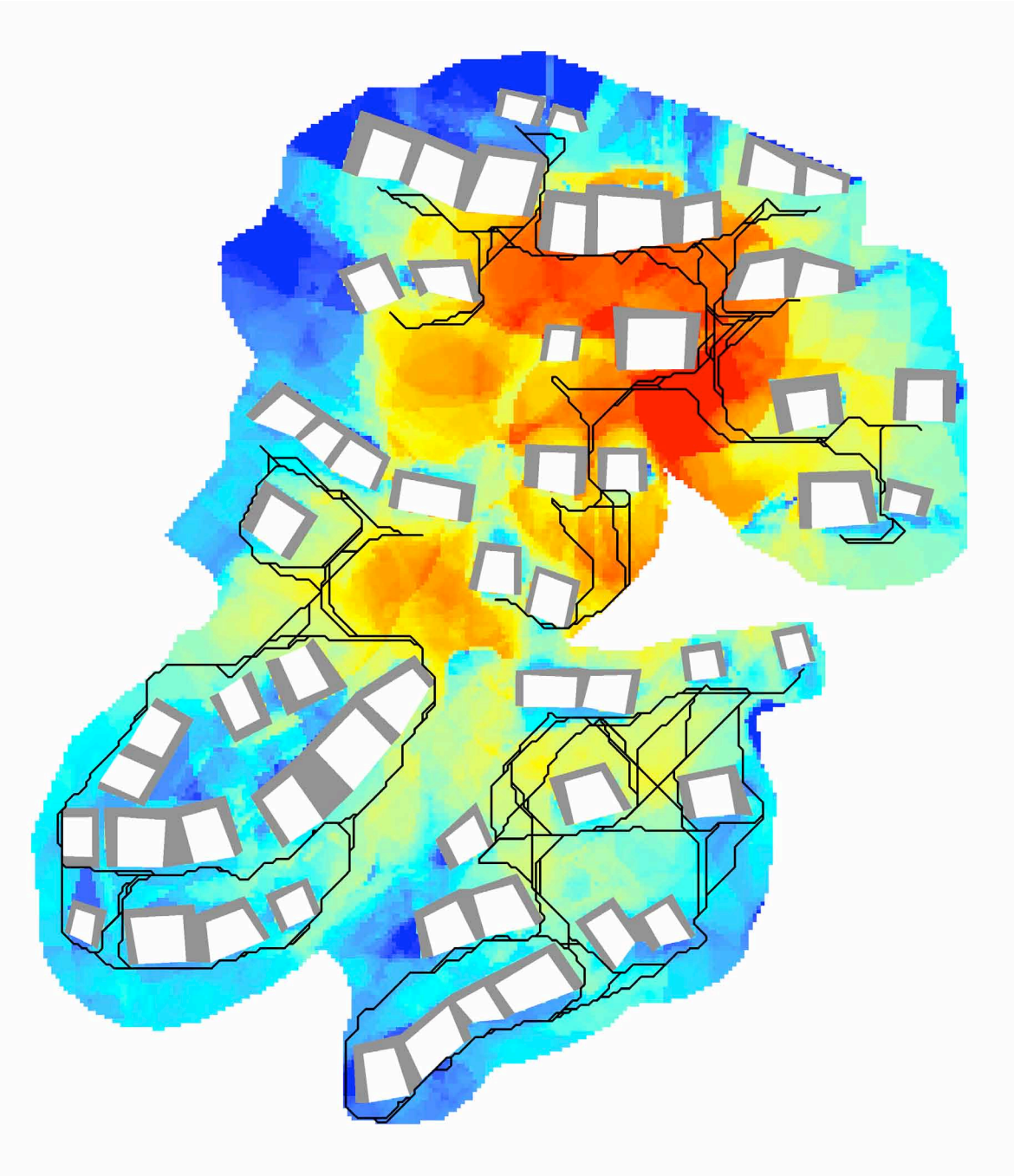

Figure 6. 37 Meshwork heat map of individual neighbourhoods in stage 3 of *Aumagan.*

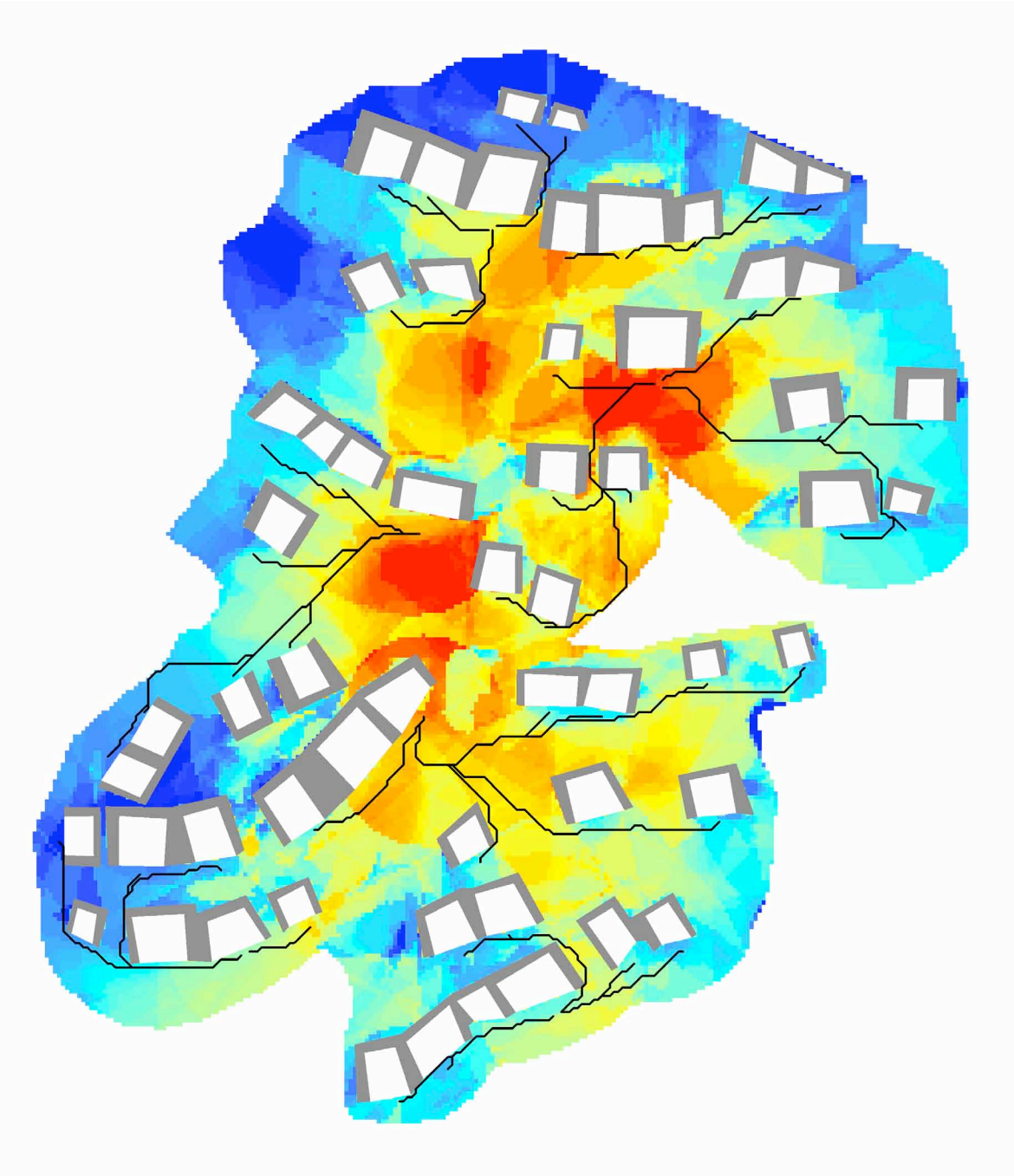

Figure 6. 38 Meshwork heat map of individual lineages in stage 3 of *Aumagan.*

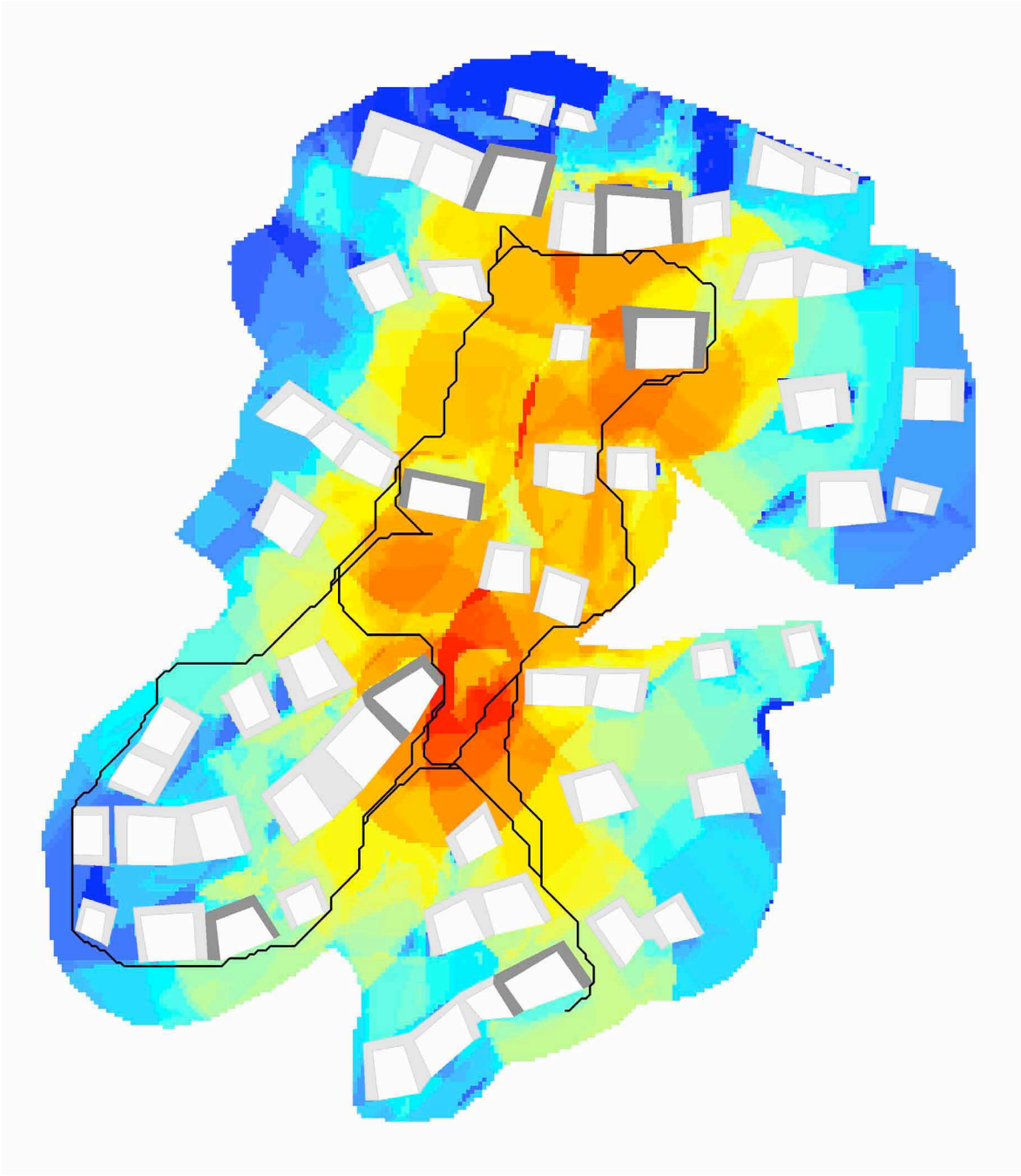

Figure 6. 39 Meshwork heat map of the head families in stage 3 of *Aumagan.*

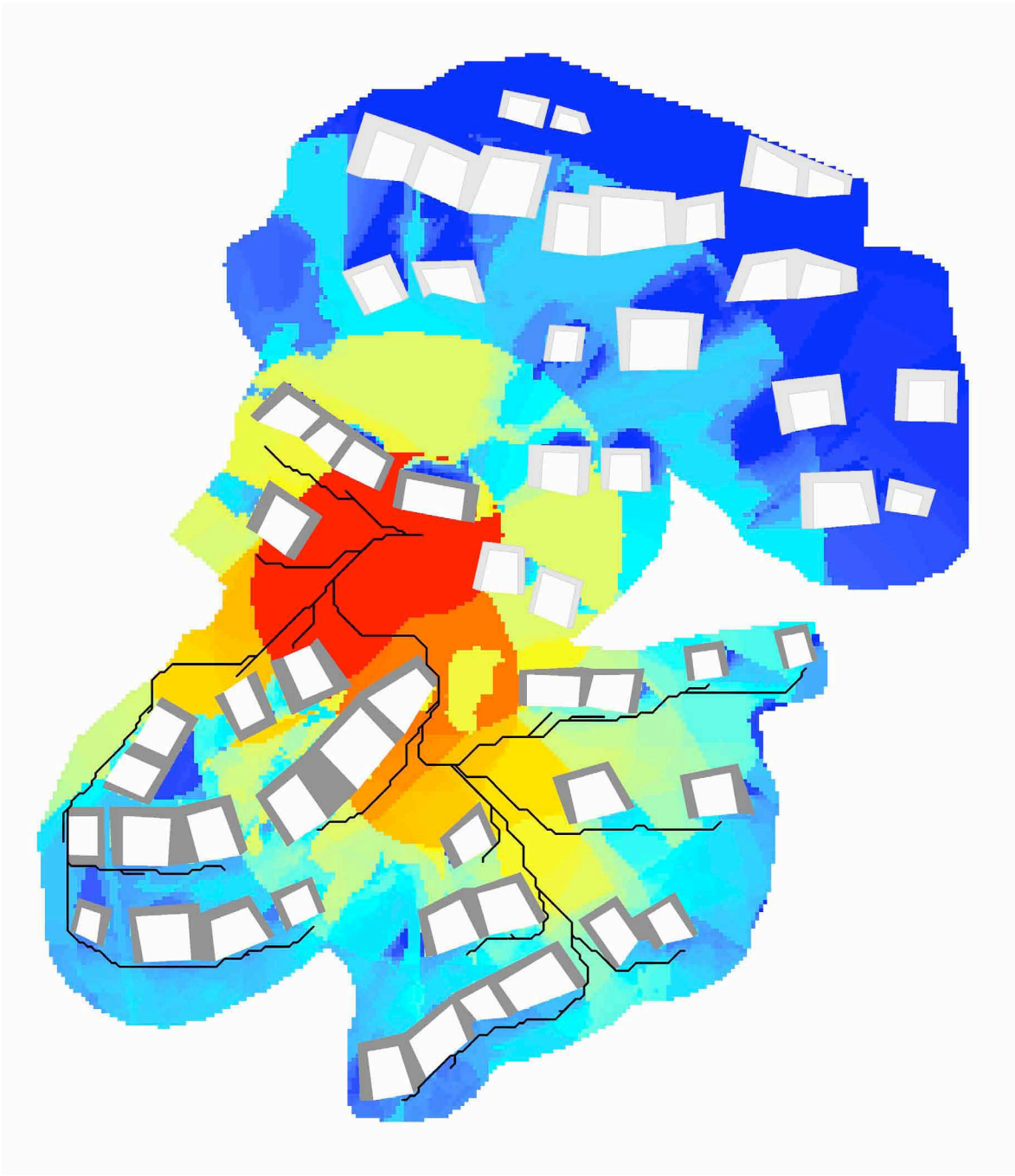

Figure 6. 40 Meshwork heat map of the Headman's relations in stage 3 of *Aumagan.*

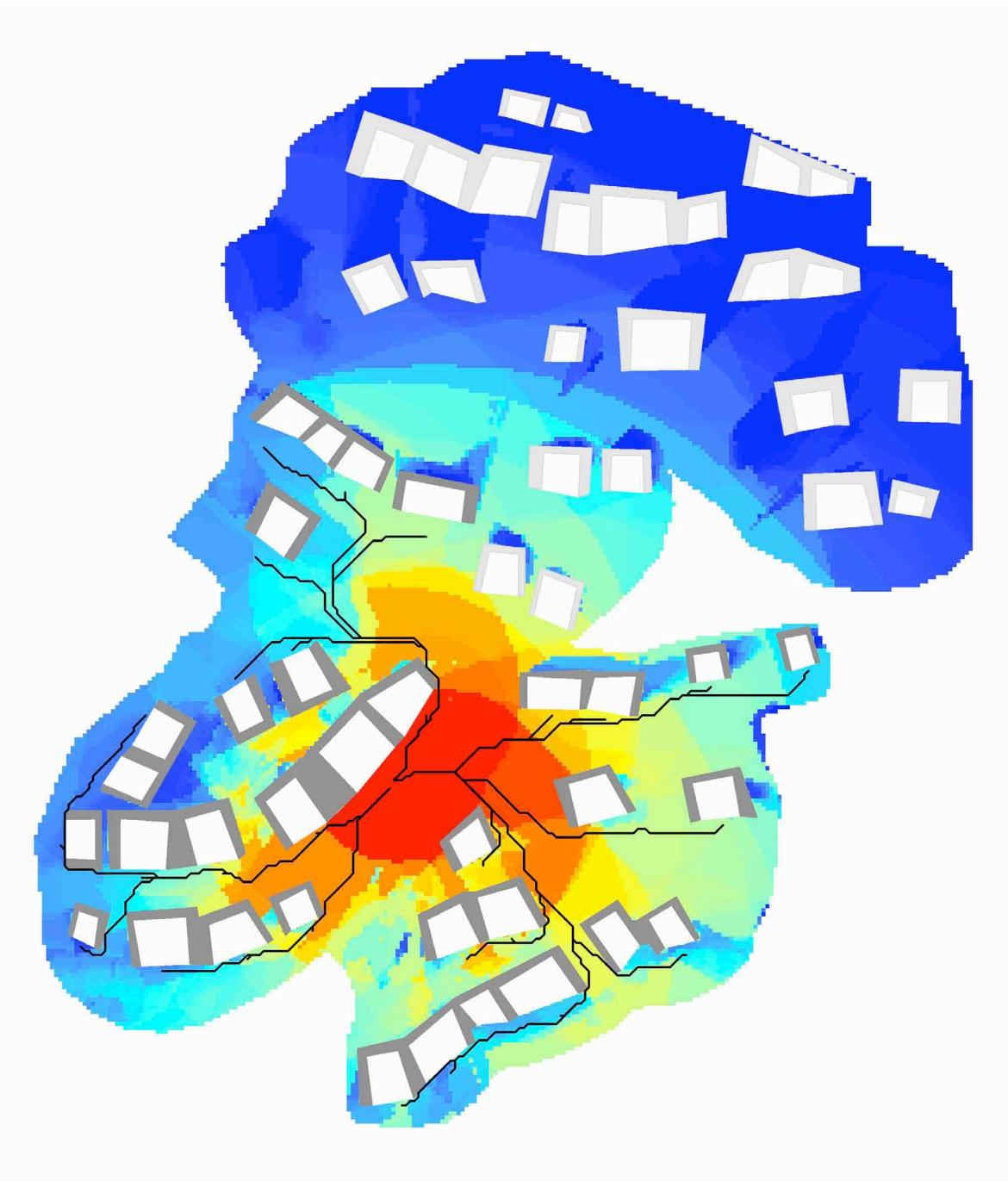

Figure 6. 41 Meshwork heat map of the Men's House's relations in stage 3 of *Aumagan.*

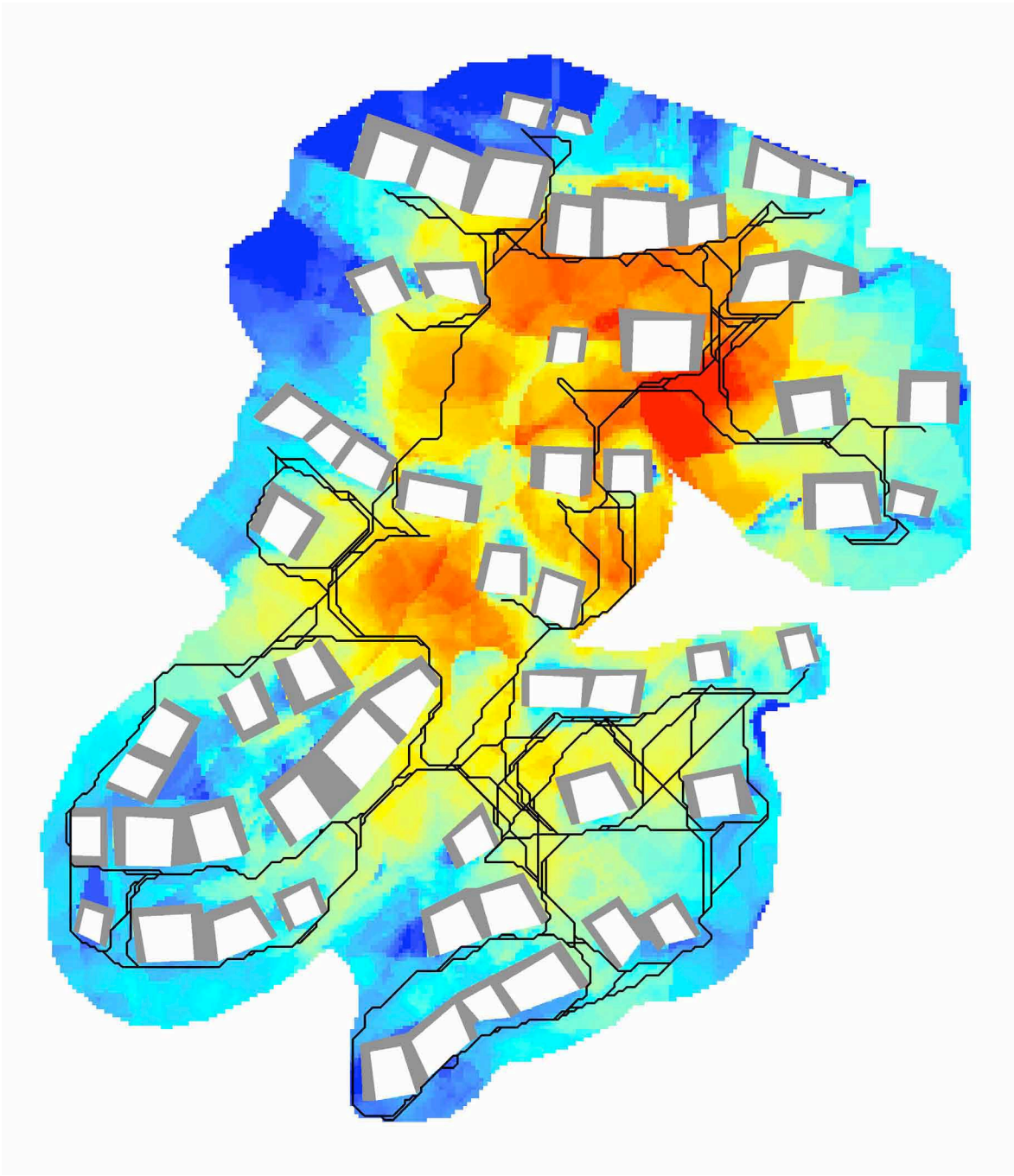

Figure 6. 42 Meshwork heat map of the overall social relations in stage 3 of *Aumagan.*

In addition to the merge of two settlements, the Headman was facing the shift of social power amongst *Kaushi* people. As previously mentioned, the social power was shifting away from central authority already in the last stage of the development of *Saqacengalj*. This social phenomenon was not solved at that stage since the people had abandoned the settlement. However, this social phenomenon was again opposed in the form of the Men's House in *Aumagan*. After the inhabitants of *Saqacengalj* had moved into Areas B and C of *Aumagan* the Men's House was built right in the centre of the main area of their activity. Located at the connection point between Areas B and C, the Men's House occupied the most dominant position aimed to integrate the communities from *Saqacengalj*. This put the authority of the Headman at the heart of village life and reinforced the social structure and hierarchy. In addition, Figure 6.38 suggests a strong lineage relation amongst the people from *Saqacengalj*. This is also indicating the strengthening of the existing social order amongst their people. In this case, the Headman from *Saqacengalj* is still relatively dominant within their original social circle.

The difference between the local (Figure 6.38, 6.40 and 6.41) and the settlement (Figure 6.42) highlights the contrast of the Headman's social power in the two levels. This contrast may suggest the negotiation process between the Headman and the leader of Area A. It is possible that the Headman gave up his Headman status in exchange for retaining a social hierarchy within a smaller region, where he can still dominate. Therefore, there is no Headman structure in front of 0W1, but the Headman from *Saqacengalj* is able to negotiate a social dominant location for his house. In addition, he is able to set up the Men's House to oppose the social power shift, and to retain its former social hierarchy and order.

6.2.3 The Social Transformation of Early *Kaushi*

In the early stages of *Kaushi* history, there was a constant reinforcement of central authority. Through the investigation of individual stages in the development of the two *Kaushi*'s settlements, this research investigated the social relation and composition in each phase, as well as the transformation between different stages. This investigation has revealed two occasions of conflicts between the delegated and allocated social power in *Kaushi* history

In the period when *Kaushi* people settled in *Saqacengalj*, the neighbourhood community was the place from where allocated social power was mostly derived. In both the second and fourth stages of *Saqacengalj*, the allocated social power derived from the local interaction caused the shift of social power away from the central authority. However, both occasions were opposed from the established hierarchy through the building of the Men's House.

Utilising the Men's House as a symbol of Headman's authority, the Headman reinforced the social structure and integration on both occasions. As mentioned earlier, the Men's House was the place to organise labour force and to distribute it to the designated communal tasks. In addition, the Men's House also served to educate youngsters in hunting and battle skills, as well as to reinforce social structure and regulate cultural behaviours. After the first shift of social power, the Men's House was built at the heart of the old part of *Saqacengalj*. In the second instance, the Men's House was built right in the centre of the Areas B and C in *Aumagan*. In both cases, the Headman used the impact of the Men's House and its position at the heart of the community life to integrate and unify the people under his rule.

One noteworthy process that occurred during the social transformation of the *Kaushi* people was the strengthening of relation amongst individual lineages.

The second social power shift during the fourth stage of *Saqacengalj* was fuelled by the kinship relation of S1W7 and S2E5. Both kinship meshworks highlighted the peripheral areas of *Saqacengalj* rather than the neighbourhood of the Headman. It is interesting that the kinship relation in *Aumagan* also suggests a dispersal of social power amongst the head families (Figure 6.38). In a sense, the social power derived from local interaction shifted from the 'neighbourhood' community to the 'kinship' community. This suggests the strengthening of the identity of individual lineages and more involvement of their members in kinship activities. While community work was more focused on the neighbourhood level in *Saqacengalj*, the collaboration of households was more centralised in the kinship community in *Aumagan*. This may also indicate that the efforts of the Headman to enforce social order and structure in the Men's House were successful. The reinforcement of social order moulded the commoners to look up to their kinship leader instead of the leaders of local communities. Given that this kinship leader was part of the social hierarchy and structure, the strengthening of this relation was also a reinforcement of central authority and the idea that the Headman was the direct descendant of their common ancestors.

However, the merging process of the two settlements, did not result only in gain for the Headman of *Saqacengalj*. Despite positioning himself in the most dominant location of *Aumagan* and establishing a good relation with the nobility, the Headman from *Saqacengalj* most likely lost parts of his delegated power in order to secure his socio-political position in his original social circle. It is most likely that he no longer possessed the absolute authority when the two settlements merged. Nonetheless, the negotiation between the two village leaders still provided a stable socio-political environment, on which social order and structure

were maintained after an earth-shattering catastrophe that led to their abandonment of *Saqacengalj*.

6.3 Conclusions

In this Chapter, the discourse between delegated and allocated social power was applied to gain a better understanding of social transformation. After identifying individual stages in the development of the two settlements, each of these stages was investigated individually revealing the social phenomena specific for each period. Furthermore, through the comparison of different stages, it was possible to identify the reactions from the social hierarchy and to understand the changes and transformations of the *Kaushi* society.

In the investigation of the social transformation of *Kaushi*, this research identified two occasions of social conflicts. Both events involved the social power shifting away from the central authority of the Headman towards the allocated power of local communities. However, both occasions were suppressed in the form of construction of the Men's House to oppose social change. With the presence of the Men's House, the Headman integrated the commoners under his rule and reinforced the established social structure and hierarchy. This reinforcement also resulted in the strengthening of kinship relations. There is no knowing what exactly happened in the negotiation process between the two village leaders. However, although the arrangement saw a decline in the Headman's delegated power amongst the whole settlement, the Headman from *Saqacengalj* still retained a relatively good position within the local social hierarchy and managed to maintain the social order after the shocking suicide event that eventually led them to abandon their original settlement.

In this chapter this research also showcased how the results of both fragmentation and wayfaring analyses can provide crucial insights into the social relation amongst people. It is worth noting that the social meshworks discussed above were constructed only for the relations identified in the previous research. Thus, the final meshwork of each stage does not refer to social relation of any particular type. As shown in Chapter 5, although it is very difficult to recognise social relations on the basis of the spatial structure of the settlement, once certain relations become evident in the material remains, the social meshwork of these relations can be added to the final meshwork, and the result will provide an increasingly comprehensive view. The strength of the wayfaring approach lies in heuristic value of the modelling process and analysis of individual social relations. It is the investigation of these specific relations that provides the most insightful information.

This feature of the wayfaring approach is also apparent in the analysis of *Aumagan*. Due to the lack of material remains such as water containers or distinctive stone features, it was not possible to investigate certain relations amongst the site. For example, the Headman relation in Area A can only be sketched out due to lack of Headman stone allowing us to identify the Headman's house with a high degree of certainty. Equally, this research was unable to investigate the social relation amongst wealthy people in *Aumagan* because of the lack of water containers marking the location of their houses. However, these omissions can be added to the analysis once future research provides more evidence.

In interpreting the wayfaring results, this research profited immensely from the sedentary nature of the *Paiwan* community. As mentioned in Chapter 2, the house of the head family is inherited through a primogeniture system. Furthermore,

it is the house rather than the family that carries social status. The house is the vessel of social significance as well as prestige (Lévi-Strauss 1987). It is precisely this feature that enables this research to focus on the characteristics of the house and to identify links between different periods and settlements. The wayfaring results would probably need significant modification in interpretation if used in case studies concerned with other societies. Especially in complex societies with members specialising in various professions, or in modern societies where people commonly exchange houses, this approach may not be suitable since there is little stability between the social concept of family and its house.

Chapter 7

Conclusion and Future Prospects:

Applying Spatial Analysis to Elucidate Human Agency

This research extended the application of spatial analysis to explore human agency in social relations. Current approaches in the application of GIS and spatial technologies in archaeology are criticised for being environmentally deterministic and too statistical, and mostly used for quantitative research (Conolly and Lake 2006; Wheatley and Gillings 2002). However, Llobera's (1996, 2000, 2003, 2005, 2007b) research framework has shown that GIS has great potential for exploring the social and cultural aspects of landscape archaeology. This research builds on Llobera's work and stretches the limits of GIS and spatial technologies to reveal the qualitative social component at a settlement scale.

Through the adaptation of wayfaring theory (Ingold 2011) and the application of GIS, this research has developed an analytical approach to model social interaction in the form of social meshworks. This social meshwork is focussed on an individual agent's behaviour both in terms of local movement and interaction based on social proxemics. The modelling approach highlights the intimate interaction component in social relations by building such relations from the ground-up, rather than from the fixed social hierarchy in a top-down direction. However, it does not reject the notion of different social identities. It is complementary rather than contradictory. Social identities are also incorporated to produce different social meshworks. It is this specific relation inquiry ability that

distinguishes the modelling of wayfaring. Through this modelling approach, researchers become able to explore and understand the qualitative social relations and social structure of a given settlement.

The greatest strength of modelling meshworks lies in the ability to scrutinise specific relations. This approach is effective in investigating the social relations between one-to-one, one-to-many, and many-to-many entities. With the use of distinct households as positive indicators, it enables researchers to identify strong relations between households, as well as providing the preferred social attitude for socio-cultural interpretation. The modelling approach empowers a subject specific inquiry and situates direct agency relation at the centre of analysis. Furthermore, these specific social meshworks highly benefit the understanding of individual relations. Therefore, different kind of relations, as long as they are recognisable from material remains, can be modelled independently. This function grants researchers the ability to perform more in-depth analysis and investigate specific subjects in detail.

Other than the final social meshwork of a settlement, the modelling approach also serves as a heuristic tool; a ‘tool to think with’. Instead of hiding people behind vague numbers derived from traditional quantitative approaches, the modelling of wayfaring is completely based on the involvement of an agent’s movement and interaction. It provides specific inquiry whereby social relations are broken down into individual social meshworks. It forces researchers to think about the people involved in certain relations before performing the model. The process of producing individual meshworks, which are later accumulated for generating the final social meshwork, actually provides insights that are as important as the final meshwork. The modelling of individual social meshworks reveals the nature and composition of the overall social relation of a site and bestows a more

comprehensive understanding of the different aspects and scales of social structure. In order to showcase this modelling approach's strength, this research stance was applied to two *Kaushi* settlements, and further investigated the social transformation that occurred at these two sites.

Throughout this research, the modelling of wayfaring has proved instrumental in the understanding of social relations and the investigation of social transformation. In Chapter 4, the modelling of wayfaring establishes the habitus of head families and provides the platform for later comparison. It is, indeed, the strength of scrutinising individual relations that facilitates this research to establish relations amongst different neighbourhoods. Coupled with fragmentation analysis, these neighbourhood relations form the foundation for identifying different stages of settlement growth. Furthermore, the results of wayfaring analysis are the basis for understanding the social dominance of the Headman and the integral nature of the Men's House. Last, but not the least, the ability to investigate individual relations enabled the comparison between delegated and allocated social power, and provided information of the Headman's social power contrast in the regional settlement and local neighbourhood level. This contrast between the delegated and the allocated social power facilitates the understanding of power negotiation. None of these insights can be identified without the application of the wayfaring model. It is the key to understanding 'social relations'.

Through the examination of the discourse between delegated and allocated social power, this research has elucidated the social transformation of the early *Kaushi*. In the investigation of social transformation this research has identified two shifts of social power. In both cases, there were signs where the allocated social power was shifting away from the delegated social power. This conflict between the allocated and the delegated social power acted as a social phenomenon that

threatened the central authority. However, on both occasions, the social phenomena were managed by building the 'Men's House' to strengthen the Headman's central authority and integrate the villagers under his rule. The presence of the Men's House acted as the core of village lives and reinforced the social order and hierarchy.

In both cases, the Headman utilised the Men's House to reinforce his dominant position amongst the settlement. However, the strengthening of social order also gave rise to a knock-on effect. The shift from community-based interaction to a more kinship-based interaction shows that the strengthening of social order also promoted the social status of local kinship leaders, the head families. The wayfaring results suggest the Headman from *Saqacengalj* no longer possessed absolute authority. There is no knowing what exactly happed in the negotiation process between the two village leaders. However, their arrangements ultimately saw the Headman's social power decline at a settlement level. Nonetheless, the Headman still retained his dominant position amongst the local area and the people of *Kaushi* also kept its social order after the unfortunate event in *Saqacengalj* that had forced them to abandon their village.

In addition to understanding the social transformation of the early *Kaushi*, the identification of the Men's House in an ancient South-*Paiwan* settlement is also an important discovery of this research. Previously, the *Cakalj* was thought to exist only amongst the East-*Paiwan* people (Jen 1956; Lusausatj 2012; Wu 1993). It was considered an influence from the *Puyuma* people. The *Cakalj* was identified as a foreign social system that was brought into the East-*Paiwan* region. However, the presence of '*Cakalj*-like' structures in two more ancient settlements in South-*Paiwan* definitely inspires alternative ideas. On the one hand, this may also suggest that the *Puyuma* influence on the *Paiwan* culture is much earlier and

widespread than previously thought. On the other hand, Chen has pointed out that given the dating of *Saqacengalj*, it is possible that the *Paiwan* culture originated from the south rather from the north (Chen 2008: 237). Following Chen's suggestion of this southern origin, the social system of the Men's House would undoubtedly be of native origin of *Paiwan* culture.

It is also noteworthy that these social insights cannot be achieved with the wayfaring model alone. As mentioned in Chapter 5, the results of wayfaring can only be understood in its context. In this case, it is the material remains and the fragmentation analysis that provide crucial information. The social identity of households and the composition of neighbourhoods are instrumental factors in understanding what the results of wayfaring mean. Without them, the results of wayfaring are just interaction phenomena of people in space. As a result, this research showcases how the combination of space syntax and wayfaring theory can potentially broaden the understanding of social relations in a given spatial layout.

However, the notion above also highlights some limitations of the wayfaring model. First and foremost, the interpretation of meshworks highly depends on its 'context'. That is, the relation meshworks are only significant when their social contexts are identified. This is highlighted through the absence of the social meshwork of wealthy households in *Aumagan*. Without the social context, there is no modelling of that social meshwork. In this case, the richness of material remains decides the degree of detail in the modelling of wayfaring.

This dependence on material remains is also apparent in the exploration of neighbourhood relations. As mentioned in Chapter 5, the results of social attitude can be extremely difficult to understand and interpret. Therefore, a clear patterning

in the results highly benefits the identification of a socio-cultural phenomenon. However, it is more difficult to find a clear patterning in a simple community. Table 5.5 (see page 201) is a perfect example to highlight this lack of sample diversity. Compared with Table 5.4, Table 5.5 shows that, because there are fewer neighbourhoods involved, it is difficult to know if there is a patterning in the result. There is no telling whether a wide interaction range is more significant, or a concentrated interaction rate is more significant in Table 5.5 due to the lack of samples. This showcases that the identification of clear patterning is dependent on the complexity of the community relation.

Nonetheless, this preference in complex communities does not mean a preference in complex societies. The complex in community mentioned above is the diverse relations and combinations amongst different neighbourhoods. The complex society here is the complexity in the social composition and structure, as well as in the diverse professions and trades in a more modern society. In a complex society, there are too many variables that effect social relations. The modelling approach of social meshworks in this research is not suited for complex variables. As mentioned earlier, this research is based on the sedentary nature of households. The continuous link of social status and identity of the households between different periods would not exist without this sedentary nature of households. In this case, there would be no platform or foundation for the comparison of different periods and for the ensuing discussion on changes and transformations. The social relation modelling approach of wayfaring is tailored to suit this specific research. The modelling of wayfaring needs to be modified if applied in other studies and subjects. As mentioned earlier, it is about finding the right mould for the desired shape of pie.

In terms of future application of this wayfaring model, this research suggests a possible 'activity' approach. Since this research is focussed on social relations, the wayfaring model is designed to investigate the 'relation aspect' amongst different social identities. In this case, social proxemics is modelled along the path linking two households in order to understand their social relations. However, the wayfaring model can also be applied to investigate the density of 'activity areas' of specific social identities or professions. That is, the social proxemics can be modelled according to the routines one takes during his/her daily activities. Take a sculptor as an example: social proxemics can be modelled by following its trail from his/her home to his/her workshop for work, from the workshop to the marketplace for trade, from the marketplace to a friend's house for casual visit, etc. In this case, in accordance with an individual's activities, the modelling of wayfaring can potentially provide very different insights and interaction density map.

In addition, it is suggested here that the modelling of wayfaring has great potential at a higher landscape scale. Since most settlements are sedentary and are usually inhabited by people from specific socio-cultural backgrounds, the social relation approach of wayfaring can also be applied to the investigation of settlement relations and power dominance in a wider region. In fact, the application of the wayfaring model does not stop at sedentary settlements at a landscape scale. It is also applicable to nomad societies. Through the modelling of wayfaring along their trails in the landscape, researchers are able to investigate the perception of the landscape of nomad societies.

On the other hand, there are still other potentials of the wayfaring approach in the study of social relations within a single settlement. As mentioned earlier (section 5.2.2.3), the final social meshwork can serve as a friction surface for

modelling movement. This provides the ground for the ‘what if’ scenario in investigating how people move within the settlement if they want to avoid social interaction. Furthermore, the results can then be compared with material remains to examine who in the settlement preferred to move in this certain way and why. This, again, provides very unusual insights into the human mind that traditional methods are unable to reveal. In addition, the shape of high interaction areas for a household or a neighbourhood can potentially be very interesting. As discussed in Chapter 4, the external neighbourhood relation of Area C3 is very concentrated along the central axis pathway in the bottom of the settlement in a linear shape. On the other hand, Area B has shown a more rounded layout of high interaction area. The shape and location can suggest the dependency or independency of a given neighbourhood.

It is stressed here that the modelling of wayfaring still has a lot of potential to offer beyond this research, and future studies on wayfaring could provide very fruitful results. This research has showcased how the modelling of wayfaring can further the understanding of social relations within a given space and provide the human intimacy that is lacking in space syntax. It is also the belief of this research that future studies of wayfaring could prove vital in the overall understanding of social relations of past societies.

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Appendices

Appendix 1: Step-Depth Methodology Developed by Wu (2010)

The section adumbrates the previous methodology developed to investigate the segmentation nature of *Paiwan* settlements by Wu (2010). Wu's research applies space syntax approach with the aim to understand the spatial structure of the settlement *Saqacengalj*. By breaking the settlement into inter-connected space units, he utilises the spatial structure of these units to examine the area division of the site and identifies five neighbourhoods within the settlement. This methodological approach has proven useful in that it recognises area division in a tightly packed community. Furthermore, these individual neighbourhoods may inform researchers of the social composition, possibly kinship relations, of the *Paiwan* settlements.

Ethnographic documents (Tan 2003, Chou 2011) and Chang's (1958) research have both stated that Paiwan settlements are segmented villages. In his previous research (Wu 2007), Wu has also found this nature of area division in another *Paiwan* settlement *Aumagan* based on topographic separation. However, the site *Saqacengalj* is located on a relatively gentle slope and the households are tightly clustered together. Therefore, the division between areas is not as apparent as that in *Aumagan*. Therefore, Wu applies the space syntax approach to analyse the spatial structure of *Saqacengalj* and to detect the area division.

Wu first utilises the Least-Cost Path (LCP) analysis amongst all households to determine the activity area of the settlement. Since *Paiwan* settlements are located on mid-mountain slopes, they suffer from land slippage. Without extensive

excavation, there is no knowing where the roads were located and the traces of human activity area have been lost. Therefore, Wu identifies the reconstruction of activity area as his top priority. That is, he first investigates where human activities, such as walking, standing and other daily behaviours, can be carried out. In order to achieve this, Wu utilises the results of the LCP analysis to determine the possible activity areas. The LCP analysis is performed with ArcGIS v9.3, using the 'hiker's equation' as friction surface with the following equation applied to the slope map of *Saqacengalj*.

*6.0 * exp (-3.5 * abs ([dh / dx] + 0.05))*

In addition, the analysis is performed in respect to actual on-site experience. The LCP analysis considers steep slopes as 'less effective' to pass. However, on-site experience suggests that some slopes between terraces are simply too difficult to climb and should not be involved in the analysis. After several tests, Wu concludes that areas with slope above 25 degrees in the slope map are not suitable for travel. Therefore, the final LCP analysis (Figure 1) is performed with slope above 25 degrees set as 'no data' so as to factor in on-site experience.

Once the activity area of the site has been determined, Wu starts to categorise the settlement into individual spatial units. This category procedure is performed with 'UCL DepthMap' following specific spatial activities. Wu argues that once different activities are identified in the *Paiwan* daily life, it is possible to categorise the settlement into individual spatial units based on their spatial characteristics (Table 1). These spatial units are then connected with each other based on the accessibility between units shown in the results of the LCP analysis. The final results of this process showcase the convex map (Figure 2) and the spatial diagram (Figure 3) of *Saqacengalj.*

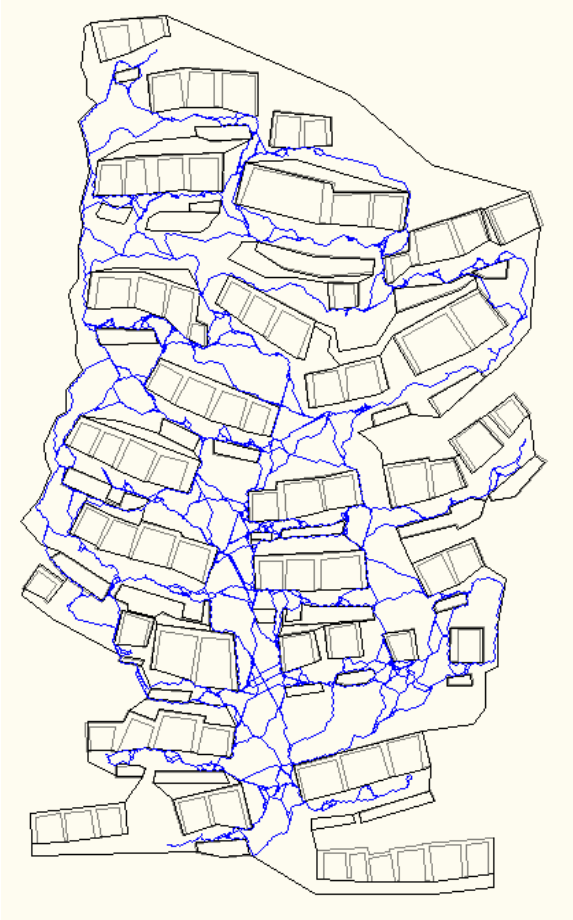

Figure 1 LCP analysis defining activity area (taken from Wu 2010: 46).

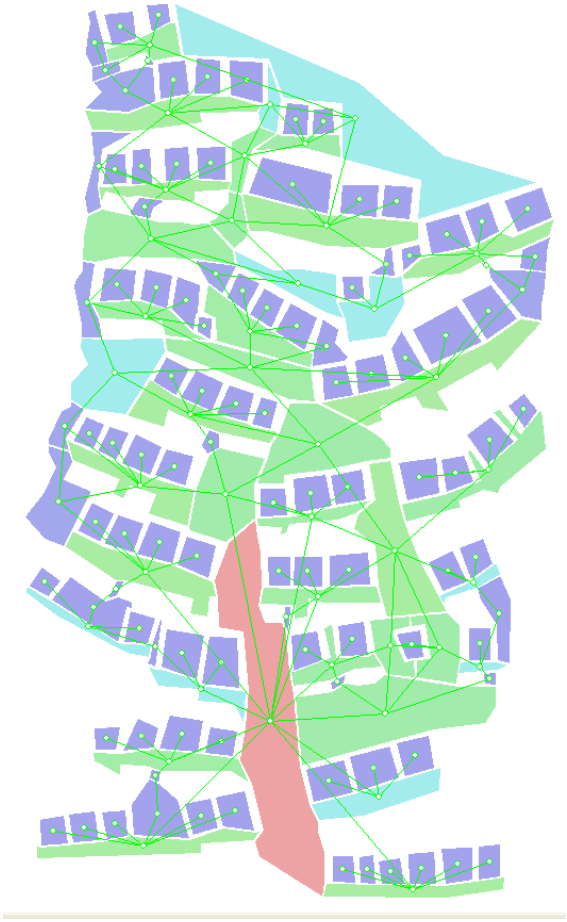

Figure 2 Convex connection of *Saqacengalj* (taken from Wu 2010: 50).

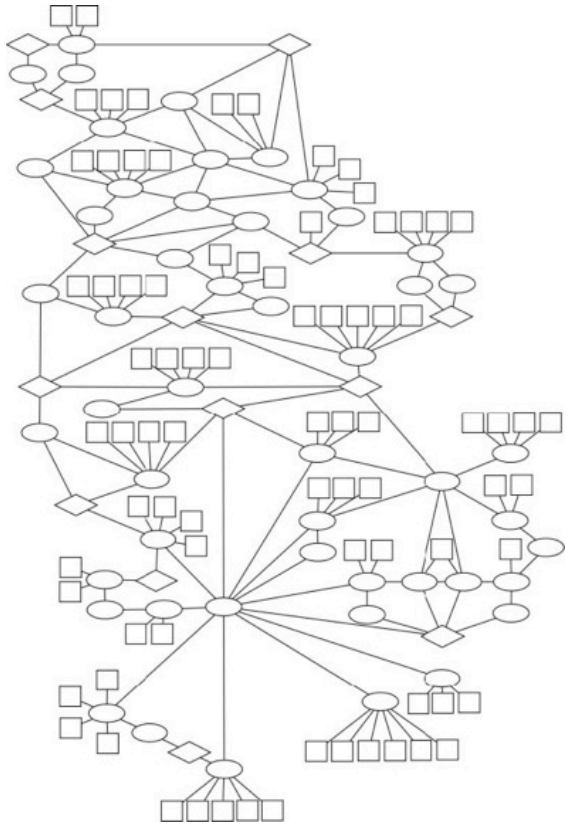

Figure 3 Spatial diagram of *Saqacengalj* (taken from Wu 2010: 50).

Spatial Unit	Function	Location	Size
Main Road	Pedestrian Area	Any	Wide
Open Space	Gathering Area	Flat (slope<12.5)	>Households
Stairway	Connecting Terraces	Slope (slope>12.5)	Narrow

Table 1 Spatial unit definition.

The ‘main road’ defined in Table 1 mainly consists of a series of front yards linked together. In addition, there are also wide roads connecting terraces that provide major transportation routes. The ‘stairways’ are another form of terrace connecting paths; they are usually so narrow as to allow only one person to pass at a time (Chiang 2003b: 212). The ‘open spaces’ are usually flat and spacious enough to serve as venues for gatherings, recreations and sometimes for ritual purposes (Chiang 2003b: 212).

Once this spatial arrangement of the site has been in place, Wu continues to investigate the area division with the step-depth analysis. He arguesd that since the households in *Saqacengalj* are tightly clustered, traditional cluster analysis using ‘distance buffer’ approach is unable to provide useful results. Therefore, Wu suggests that individual spatial units defined above could serve as an alternative ‘equal interval’ to the traditional metric measurements. That is, instead of using metric measurements as ‘distance buffer’, he proposes using spatial units as ‘spatial buffer’. The ‘distance’ between two households is not measured by the physical distance in between, but by the number of activity areas one must pass to arrive at the destination household: step-depth.

In order to perform this step-depth analysis, Wu investigates the spatial connection amongst households. He counts, for each household, the activity areas between one household and all the other households respectively. The step-depth data is then analysed with Pajek to investigate the network connectivity. Since

every household has a count of steps to all the other households, the results of the network connection show a spherical ball where anyone has a relation with everyone else (Figure 4). It is, however, the strength of Pajek to investigate this network by modifying certain relations. Wu's strategy of examining neighbourhood cluster is to remove high step-depth counts in turn until separations appear. The concept behind this looks like traditional 'distance buffer'. If the distance buffer for all households is high, the result will show a single polygon covering all households. However, if the distance buffer is low enough, gaps between households further apart will start to appear and eventually show area divisions. Wu's strategy applies the same concept but, instead of metric distance, step-depth is treated as equal intervals of distance measure. By removing high step-depth counts in turn, he is in fact applying the same traditional buffer analysis concept to investigate area division.

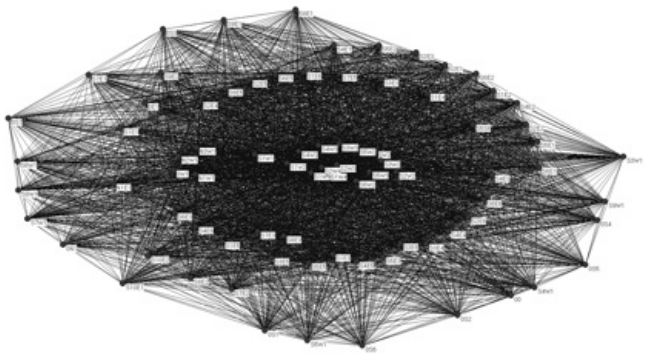

Figure 4 The spherical ball where every household has connection with all other households (taken from Wu 2010: 57).

In this process, once step-depth counts above 4 are removed, clear separation appears (Figure 5). Based on this analysis, *Saqacengalj* is first divided into Areas A, B and C. Wu further divides Area C into Areas C1, C2 and C2 based on the central axis principle (Figure 6) he observed and the spatial distribution pattern (Figure 7). In consequence, *Saqacengalj* is divided into 5 areas, each of which consists of a number of households and open spaces (Table 2).

Neighbourhood	Households	Main Roads	Open Spaces
A	19	15	5
B	15	6	4
C1	16	14	2
C2	12	6	3
C3	18	6	1

Table 2 Number of households and open space in each neighbourhood.

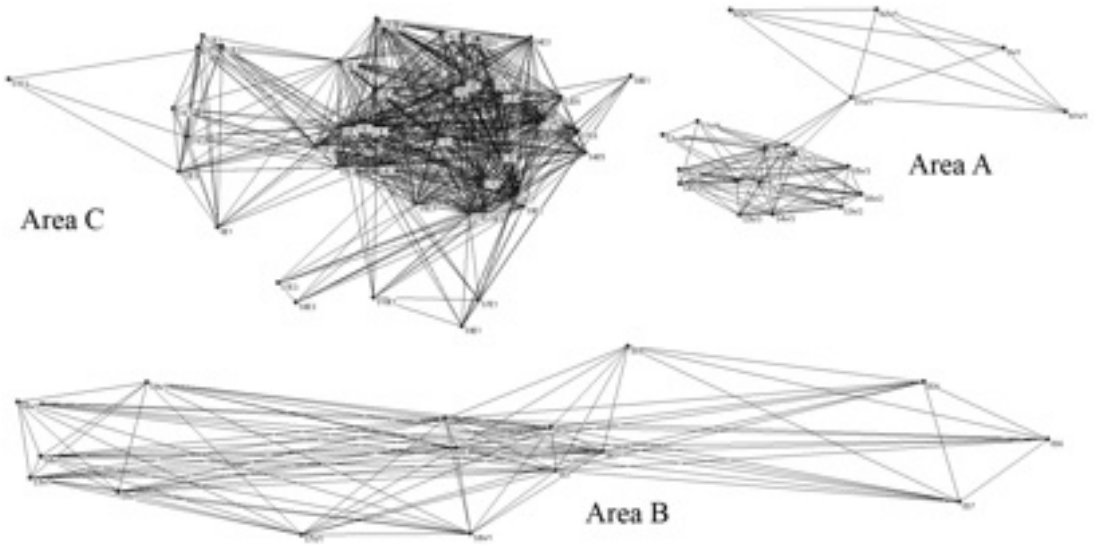

Figure 5 Area Separation when steps above 4 are removed. (Taken from Wu 2010: 58)

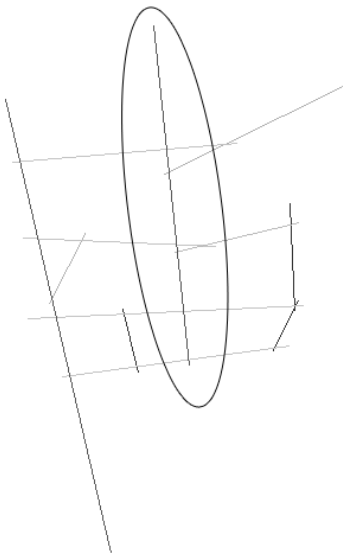

Figure 5 Central axis principle in Area C1 (Taken from Wu 2010: 61).

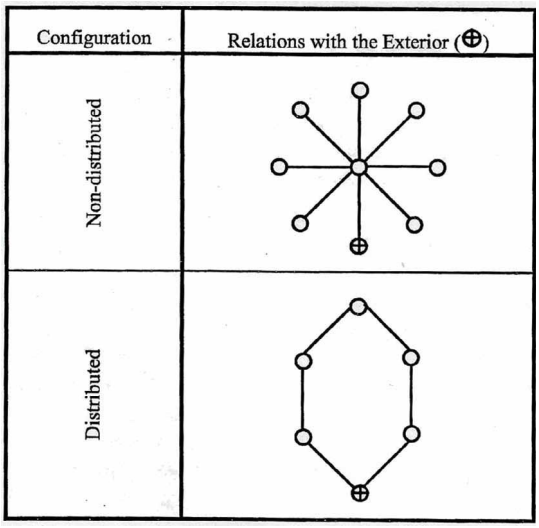

Figure 6 The spatial distribution principle that separates Areas C2 and C3 (Taken from Wu 2010: 61).

Appendix 2: House Attributes of *Saqacengalj*

House No	House ID	Size	Platform	Hearth	Water Container	Area
1	S6W1	5.95	N	NA	N	B
2	S2E3	9.61	N	R	N	C1
3	0W1	9.73	Y	L	N	A
4	0W2	9.92	N	L	Y	A
5	S4E4	9.94	N	NA	N	C3
6	S1W1	10.08	N	R	N	A
7	S1W4	10.11	N	R	N	A
8	S5E6	10.33	N	NA	N	C3
9	N1E1	10.35	N	R	N	C1
10	S6E2	10.40	Y	R	N	C1
11	S1W3	10.67	N	NA	Y	A
12	S1E2	11.17	N	NA	N	C1
13	S8E5	11.25	N	R	N	C3
14	S4E6	11.58	N	R	N	C3
15	S6E5	11.64	N	R	N	C3
16	S7E3	12.27	Y	L	N	C2
17	0S4	12.42	Y	R	N	B
18	S5E5	12.81	Y	L	N	C3
19	S3E6	13.01	N	L	N	C3
20	S6E6	13.01	N	L	N	C3
21	S7E5	13.14	N	L	N	C3
22	S9E1	13.65	Y	R	N	C2
23	S5W1	14.11	N	NA	N	B
24	S6E1	14.11	Y	R	N	C1
25	S8E3	14.47	N	R	N	C2
26	S5E2	14.50	Y	NA	N	C1
27	S4E5	14.56	Y	R	N	C3
28	S4W1	14.56	N	NA	N	B
29	S5W2	14.81	N	R	N	A
30	0S7	14.88	N	L	N	B
31	S10E1	15.26	Y	L	N	C2
32	S2W3	15.33	N	L	N	A
33	S3E4	15.58	Y	R	N	C3
34	S6W2	15.62	N	L	N	A
35	S10E2	15.70	Y	L	N	C2
36	S1E6	15.90	N	L	N	C3
37	S3E3	15.93	Y	L	N	C1
38	S1E3	16.35	Y	R	N	C1
39	S1E4	16.36	Y	R	N	C3
40	0S3	16.56	N	L	Y	B
41	S4W2	16.56	N	L	N	A
42	S8E1	17.79	Y	L	N	C2
43	S3W2	18.20	Y	R	N	A
44	0S2	18.49	Y	L	N	B
45	N2W1	18.61	Y	R	N	A
46	S1E1	18.61	Y	R	Y	C1
47	S4E3	18.61	Y	L	N	C1
48	S9E2	18.61	Y	R	N	C2
49	S9W1	18.61	Y	L	N	B
50	S4W3	18.65	Y	L	N	A
51	S7W1	19.02	N	L	Y	B
52	S2E2	19.20	Y	L	N	C1
53	0S5	19.35	Y	L	N	B
54	S4E1	19.43	Y	R	N	C1
55	S2E6	19.64	N	R	N	C3
56	S2W4	19.71	Y	L	N	A
57	S8W1	20.15	Y	R	Y	B
58	S1E5	20.20	Y	NA	N	C3
59	S7E1	20.20	N	R	N	C2
60	S7E2	20.70	Y	R	N	C2
61	S5E3	21.11	N	L	N	C2
62	S3W3	21.19	Y	R	N	A
63	S5E1	21.52	Y	L	Y	C1
64	0S6	21.95	Y	R	N	B
65	S5W3	22.29	N	R	N	A
66	S8E2	22.37	Y	L	Y	C2
67	S6E3	22.96	Y	R	N	C2
68	S2E1	23.16	Y	L	Y	C1
69	S2E4	23.16	Y	L	Y	C3

70	S3E5	23.98	Y	L	N	C3
71	S3W1	24.10	N	NA	N	B
72	0E1	24.55	Y	L	N	C1
73	0N1	24.99	N	R	N	B
74	S4E2	25.15	Y	NA	N	C1
75	N1W1	31.23	Y	R	Y	A
76	S2E5	32.16	Y	L	Y	C3
77	S1W2	32.21	Y	R	N	A
78	N3W1	33.98	N	R	N	A
79	00	40.63	Y	L	Y	B
80	S2W2	72.44	Y	L	Y	A

Appendix 3: House Attributes of *Aumagan*

House No	House ID	Size	Hearth	Area
1	S3W6	7.30	R	A
2	N6E3	9.36	R	B
3	N6W10	10.52	NA	C
4	S1W5	10.90	R	A
5	S3W5	11.33	L	A
6	N4W11	12.27	L	A
7	S2W10	12.46	R	A
8	N6W1	14.72	L	B
9	S1W10	16.13	NA	A
10	N9W5	16.60	R	C
11	0E1	16.81	NA	B
12	N9W4	17.41	L	C
13	0W7	17.75	NA	D
14	N6W8	18.18	NA	C
15	N5W5	19.33	NA	D
16	N5E2	20.16	L	B
17	N4E2	20.35	R	B
18	S1W4	20.67	R	A
19	N5W6	20.86	L	D
20	S2W8	20.87	NA	A
21	N3E2	20.95	L	B
22	0W10	22.66	NA	A
23	N2E1	22.98	R	B
24	0W6	23.06	R	D
25	0E2	23.47	L	B
26	N7W3	23.71	R	C
27	N9W2	23.78	L	C
28	00	24.03	R	B
29	N8W2	24.58	L	C
30	N2W1	25.28	L	B
31	N6W6	25.32	NA	C
32	N8W7	25.47	NA	C
33	S2W4	26.33	R	A
34	S2W3	27.31	L	A
35	S1W2	28.38	L	A
36	N7W5	29.05	R	C
37	N9W1	29.18	R	C
38	S2W6	29.19	R	A
39	S2W9	29.87	L	A
40	S1W9	29.88	L	A
41	0N5	30.01	R	B
42	N4W10	30.37	NA	A
43	N6W7	31.13	NA	C
44	0N9	33.20	L	C
45	0W9	33.29	R	A
46	N8W3	34.14	R	C
47	N1E1	34.67	L	B
48	N5E1	35.35	L	B
49	N5W2	35.98	R	B
50	N6E1	37.71	L	B
51	S2W5	41.05	L	A
52	0N6	42.84	L	B
53	S1W7	43.96	L	A
54	0W1	49.07	L	B
55	N9W3	49.91	L	C
56	N5W4	52.20	R	B
57	S2W7	54.41	L	A
58	N5W3	54.45	L	B

Appendix 4: The wayfaring statistic result of *Saqacengalj* with social attitude set as 102030755025

House number 1-20

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
1	00	1354.50	418.50	80.00	344.50	93.25	122.75	47.75	81.00	355.50	73.50	282.00	87.50	38.50	63.00	600.50	321.50	57.50	265.00	24.00	36.00	106.00	0.00	106.00	0.00	175.50	0.00	175.50	177.50	440.50	202.00	1156.50	754.00	327.50	440.50
2	0E1	1012.00	208.25	0.00	208.25	38.50	111.00	22.00	45.00	164.75	27.00	150.00	79.50	14.00	27.00	643.00	411.50	101.00	314.00	52.50	72.00	87.50	0.00	87.50	0.00	144.00	0.00	144.00	346.50	298.50	116.00	901.00	372.25	104.00	298.50
3	0E6	540.50	66.50	0.00	66.50	0.00	0.00	0.00	66.50	52.50	0.00	52.50	0.00	0.00	52.50	421.50	56.00	0.00	56.00	0.00	56.00	42.00	0.00	42.00	42.00	323.50	106.50	217.00	302.50	119.00	106.50	434.00	119.00	0.00	119.00
4	0N1	1085.50	385.25	80.00	305.25	82.75	107.00	41.75	76.50	248.25	52.00	196.25	55.25	24.00	36.00	465.00	248.00	41.50	206.50	18.00	27.00	82.00	0.00	82.00	0.00	139.50	0.00	139.50	131.50	337.50	166.50	919.00	632.00	297.50	337.50
5	0S2	1877.75	449.25	72.00	427.75	85.50	171.50	52.25	135.00	489.75	91.50	398.25	139.25	70.25	121.50	962.00	485.75	77.50	408.25	39.00	58.50	161.50	0.00	161.50	0.00	314.75	0.00	314.75	272.50	689.50	217.50	1708.75	933.25	321.50	689.75
6	0S3	2420.00	602.50	29.00	573.50	117.25	197.25	61.00	198.00	657.75	122.00	535.75	158.50	93.50	166.50	1175.75	521.50	59.50	464.50	59.25	49.50	227.25	6.50	220.75	13.50	427.00	0.00	427.00	308.00	874.25	210.00	2213.00	1256.75	383.00	874.75
7	0S4	2770.25	641.00	9.00	640.50	93.00	205.50	98.25	256.50	688.25	115.00	573.25	168.00	116.75	202.50	1454.25	536.50	43.00	502.00	72.75	58.50	358.75	24.50	336.75	49.50	563.50	0.00	563.50	420.00	1046.75	182.00	2595.75	1317.25	302.00	1047.50
8	0S5	2743.75	636.25	0.00	636.25	88.25	205.50	101.75	256.50	675.00	114.00	563.50	168.00	120.50	202.50	1443.75	527.25	37.50	502.00	72.75	55.75	362.00	24.50	344.50	49.50	563.50	0.00	563.50	393.50	1054.00	171.00	2609.25	1310.75	288.00	1054.75
9	0S6	2380.75	633.75	0.00	633.75	115.00	164.25	125.00	229.50	616.00	104.00	532.50	140.00	115.00	171.00	1203.25	398.50	9.50	390.50	67.25	22.50	348.00	19.00	340.00	54.00	471.75	0.00	471.75	295.50	935.50	121.00	2266.75	1249.75	313.50	936.25
10	0S7	2227.75	611.00	0.00	611.00	128.75	141.75	127.75	229.50	600.00	93.50	516.50	125.75	115.00	166.50	1026.25	326.50	11.00	322.00	43.75	10.75	293.75	13.50	283.75	0.00	406.00	0.00	406.00	123.50	902.75	107.00	2133.75	1211.00	343.50	903.50
11	0W1	1106.75	521.50	147.00	374.50	111.25	98.25	66.00	99.00	235.75	38.00	197.75	34.50	22.00	33.50	349.50	132.00	0.00	132.00	0.00	0.00	88.00	0.00	88.00	0.00	130.25	0.00	130.25	0.00	349.50	185.00	921.75	757.25	407.50	349.75
12	0W2	952.50	539.25	170.50	372.25	110.25	99.25	66.50	99.00	140.50	13.00	127.50	9.25	9.75	9.00	279.75	107.25	0.00	107.25	0.00	0.00	73.50	0.00	73.50	0.00	103.00	0.00	103.00	0.00	279.75	180.00	778.50	673.75	394.50	280.25
13	N1E1	822.00	198.00	10.50	195.50	38.75	90.00	22.00	45.00	153.75	27.00	126.75	57.25	12.00	19.00	472.75	296.00	70.00	226.00	31.25	47.50	65.25	0.00	65.25	0.00	111.50	0.00	111.50	227.50	245.25	97.00	725.00	349.25	104.00	245.25
14	N1W1	925.00	416.25	116.50	299.75	86.75	93.75	45.00	77.50	210.00	37.50	172.50	33.50	18.00	35.00	298.75	127.00	0.00	127.00	0.00	0.00	61.00	0.00	61.00	0.00	112.25	0.00	112.25	0.00	298.75	154.00	771.00	626.25	327.50	298.75
15	N2W1	754.00	385.00	108.50	279.50	82.50	85.00	40.00	72.00	137.50	20.50	117.00	12.00	9.00	13.50	231.50	97.00	0.00	97.00	0.00	0.00	49.00	0.00	49.00	0.00	85.50	0.00	85.50	0.00	231.50	126.00	628.00	522.50	291.00	231.50
16	N3W1	741.00	374.50	97.50	277.00	80.50	85.00	39.50	72.00	135.50	20.50	115.00	12.00	9.00	13.50	231.00	97.00	0.00	97.00	0.00	0.00	48.50	0.00	48.50	0.00	85.50	0.00	85.50	0.00	231.00	118.00	623.00	510.00	279.00	231.00
17	S10E1	1747.50	418.75	0.00	418.75	50.00	76.50	148.25	144.00	317.00	13.50	303.50	52.75	101.75	99.00	1011.75	209.75	3.00	206.75	66.75	10.75	467.75	70.00	397.75	81.00	334.25	0.00	334.25	390.00	621.75	86.50	1661.00	735.75	113.50	622.25
18	S10E2	1335.75	270.75	0.00	270.75	12.50	36.75	136.00	85.50	179.75	0.00	179.75	20.50	86.75	67.50	886.50	149.00	4.50	144.50	87.25	10.75	481.00	82.50	401.00	99.00	262.50	0.00	262.50	479.00	425.25	85.00	1253.75	450.50	25.00	425.50
19	S1E1	1358.00	239.50	0.00	239.50	32.75	138.00	22.75	49.50	237.00	37.50	199.50	107.75	24.00	45.00	881.50	562.25	132.50	430.25	76.50	108.00	121.25	0.00	121.25	0.00	202.50	0.00	202.50	501.50	380.50	169.50	1188.50	476.50	96.00	380.50
20	S1E2	825.50	105.00	0.00	105.00	0.00	105.00	0.00	0.00	81.25	0.00	81.25	81.25	0.00	0.00	639.25	473.50	121.50	352.00	64.00	106.25	64.00	0.00	64.00	0.00	106.25	0.00	106.25	453.00	186.25	121.50	704.00	186.25	0.00	186.25

House number 21-50

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
21	S1E3	1047.00	142.00	0.00	142.00	0.00	85.00	0.00	57.00	111.75	0.00	111.75	66.75	0.00	45.00	793.25	446.75	110.50	336.25	56.75	129.50	82.00	0.00	82.00	27.00	264.50	10.00	258.50	539.50	253.75	116.50	930.50	253.75	0.00	253.75
22	S1E4	2036.75	295.00	0.00	295.00	0.00	28.50	20.75	256.50	232.00	0.00	232.00	22.00	14.75	202.50	1509.75	330.00	34.25	297.50	47.00	193.50	224.25	24.50	224.25	162.00	958.75	153.50	813.75	981.25	530.50	180.00	1862.50	527.00	0.00	527.00
23	S1E5	899.00	116.75	0.00	116.75	0.00	31.25	0.00	114.00	91.75	0.00	91.75	24.25	0.00	90.00	690.75	217.25	47.00	170.75	18.00	114.00	72.00	0.00	72.00	70.00	506.50	123.00	388.00	486.50	208.50	145.50	776.00	208.50	0.00	208.50
24	S1W1	1565.25	550.00	126.50	450.00	125.00	137.75	63.25	126.00	440.50	86.00	375.00	82.25	59.50	112.50	574.75	221.25	1.00	221.25	1.75	0.00	122.75	0.00	122.75	0.00	238.25	0.00	238.25	3.50	574.75	199.00	1399.75	990.50	444.00	575.00
25	S1W2	1252.00	578.75	171.00	414.75	126.50	106.75	76.50	112.50	268.25	34.00	244.75	37.00	33.75	54.00	405.00	143.75	0.00	143.75	0.00	0.00	110.25	0.00	110.25	0.00	166.00	0.00	166.00	0.00	405.00	201.50	1064.00	847.00	442.00	405.50
26	S1W3	513.25	332.25	150.50	181.75	52.50	46.75	33.00	49.50	52.50	0.00	52.50	0.00	0.00	0.00	128.50	46.75	0.00	46.75	0.00	0.00	33.00	0.00	33.00	0.00	48.75	0.00	48.75	0.00	128.50	150.50	362.75	384.75	255.50	129.25
27	S1W4	480.00	269.25	60.50	210.75	43.50	54.75	45.00	67.50	43.50	0.00	43.50	0.00	0.00	0.00	167.25	54.75	0.00	54.75	0.00	0.00	45.00	0.00	45.00	0.00	67.50	0.00	67.50	0.00	167.25	60.50	421.50	312.75	145.50	167.25
28	S2E1	1848.25	339.50	0.00	339.50	31.75	177.00	22.75	108.00	336.00	49.50	286.50	139.25	30.00	85.50	1180.75	686.75	148.50	539.25	92.50	130.50	158.75	0.00	158.75	13.50	337.25	0.00	337.25	621.50	562.25	196.00	1654.25	675.50	113.00	562.50
29	S2E2	962.00	106.25	0.00	106.25	0.00	106.25	0.00	0.00	83.25	0.00	83.25	83.25	0.00	0.00	772.50	549.75	137.50	412.25	84.75	138.00	84.75	0.00	84.75	0.00	138.00	0.00	138.00	583.00	189.50	137.50	824.50	189.50	0.00	189.50
30	S2E3	1514.75	213.50	0.00	213.50	0.00	96.00	1.50	137.75	175.25	0.00	175.25	71.50	3.75	108.75	1126.00	500.75	118.00	384.75	72.75	171.50	145.00	2.50	142.50	64.50	490.25	8.00	482.25	737.50	388.50	128.50	1394.75	388.75	0.00	388.75
31	S2E4	1718.75	241.00	0.00	241.00	0.00	8.00	28.75	204.25	191.50	0.00	191.50	6.50	23.75	161.25	1286.25	223.75	6.50	217.75	34.25	169.00	243.50	30.00	218.50	140.00	826.75	155.00	673.75	854.50	431.75	185.50	1534.25	432.50	0.00	432.50
32	S2E5	1056.75	140.00	0.00	140.00	0.00	2.25	0.00	137.75	110.75	0.00	110.75	2.00	0.00	108.75	806.00	134.25	4.00	130.25	0.00	129.00	87.00	0.00	87.00	87.00	590.75	137.50	453.25	561.00	250.50	141.50	915.25	250.75	0.00	250.75
33	S2E6	626.00	76.00	0.00	76.00	0.00	0.00	0.00	76.00	60.00	0.00	60.00	0.00	0.00	60.00	490.00	67.00	0.00	67.00	0.00	67.00	48.00	0.00	48.00	48.00	375.00	124.00	251.00	354.00	136.00	124.00	502.00	136.00	0.00	136.00
34	S2W2	1506.75	704.00	188.00	516.00	153.75	121.25	105.50	144.00	339.50	63.50	277.75	43.00	39.00	58.50	477.25	161.50	0.00	161.50	0.00	0.00	133.00	0.00	133.00	0.00	183.75	0.00	183.75	0.00	477.25	247.00	1259.75	1029.50	551.50	478.00
35	S2W3	824.25	486.00	158.00	339.00	80.50	81.50	73.50	103.50	80.50	0.00	80.50	0.00	0.00	0.00	257.75	81.50	0.00	81.50	0.00	0.00	73.50	0.00	73.50	0.00	102.75	0.00	102.75	0.00	257.75	158.00	677.25	566.50	308.00	258.50
36	S2W4	477.50	279.25	81.00	203.25	39.50	47.50	58.75	58.50	39.50	0.00	39.50	0.00	0.00	0.00	164.75	47.50	0.00	47.50	0.00	0.00	58.75	0.00	58.75	0.00	58.50	0.00	58.50	0.00	164.75	81.00	406.50	318.75	160.00	164.75
37	S3E3	2369.50	375.75	0.00	375.75	0.00	132.25	20.25	223.25	305.75	0.00	305.75	104.25	25.25	176.25	1688.50	662.50	129.00	533.50	100.75	196.75	280.50	18.00	262.50	116.25	745.50	33.50	712.00	1008.00	681.00	180.50	2189.00	681.50	0.00	681.50
38	S3E4	1302.25	182.75	0.00	182.75	0.00	0.00	26.00	156.75	139.75	0.00	139.75	0.00	16.00	123.75	979.75	142.75	0.00	142.75	15.75	129.00	190.75	27.00	163.75	111.00	655.25	135.50	519.75	658.00	321.75	158.50	1145.75	322.50	0.00	322.50
39	S3E5	1694.50	231.00	0.00	231.00	0.00	3.00	4.75	223.25	180.00	0.00	180.00	2.00	3.75	176.25	1286.50	207.25	4.00	207.25	14.75	191.00	169.75	5.50	164.25	141.00	912.00	181.00	731.00	879.00	410.50	186.50	1509.00	411.00	0.00	411.00
40	S3E6	699.00	85.50	0.00	85.50	0.00	0.00	0.00	85.50	67.50	0.00	67.50	0.00	0.00	67.50	546.00	75.00	0.00	75.00	0.00	75.00	54.00	0.00	54.00	54.00	417.00	135.00	282.00	393.00	153.00	135.00	564.00	153.00	0.00	153.00
41	S3W1	2082.00	597.50	80.00	548.50	141.75	165.50	84.00	198.00	598.00	123.00	504.00	125.50	97.50	166.50	893.25	335.75	19.00	316.75	19.00	13.50	180.00	2.50	180.00	0.00	377.50	0.00	377.50	84.00	809.25	211.50	1913.00	1188.75	455.00	809.75
42	S3W2	1471.25	723.00	183.50	546.75	146.75	127.25	115.25	157.50	271.50	41.00	230.50	32.00	24.00	36.00	482.00	155.25	0.00	155.25	0.00	0.00	138.50	0.00	138.50	0.00	188.25	0.00	188.25	0.00	482.00	219.50	1258.25	989.25	506.50	482.75
43	S3W3	978.75	578.25	178.00	401.25	100.25	93.75	80.50	135.00	100.25	0.00	100.25	0.00	0.00	0.00	300.25	93.75	0.00	93.75	0.00	0.00	80.50	0.00	80.50	0.00	134.25	0.00	134.25	0.00	300.25	178.00	801.75	678.50	377.50	301.00
44	S4E1	2242.50	401.25	0.00	401.25	31.00	197.25	33.00	171.00	386.00	49.00	346.75	155.75	56.00	135.00	1494.50	745.00	149.50	601.00	108.50	144.00	261.50	14.50	247.00	49.50	494.50	0.00	494.50	747.50	747.50	203.00	2090.50	751.25	111.00	748.00
45	S4E2	2401.00	392.75	0.00	392.75	5.00	183.75	41.25	171.00	340.00	11.00	336.00	145.25	53.50	135.00	1668.25	781.75	156.50	627.75	127.50	174.75	335.75	23.50	312.25	90.00	570.25	0.00	570.25	948.00	720.25	181.50	2226.50	732.75	21.00	720.75
46	S4E3	2422.00	383.50	0.00	383.50	0.00	136.75	25.75	256.50	309.25	0.00	309.25	107.75	29.75	202.50	1729.25	668.75	126.00	542.75	101.50	202.00	312.00	21.00	296.00	150.75	876.50	65.50	811.00	1048.50	692.25	180.50	2241.50	692.75	0.00	692.75
47	S4E4	1018.25	142.50	0.00	142.50	0.00	0.00	30.25	142.50	112.50	0.00	112.50	0.00	20.50	112.50	767.50	103.25	0.00	103.25	23.25	94.50	196.00	31.50	164.50	101.00	567.75	118.00	449.75	539.00	254.25	149.50	900.25	255.00	0.00	255.00
48	S4E5	1727.50	233.75	0.00	233.75	0.00	8.00	2.50	223.25	188.50	0.00	188.50	6.50	5.75	176.25	1305.25	228.50	8.50	220.00	14.50	191.00	166.25	3.50	163.75	141.00	910.50	183.00	731.00	883.50	421.75	192.00	1537.00	422.25	0.00	422.25
49	S4E6	740.00	90.25	0.00	90.25	0.00	0.00	0.00	90.25	71.25	0.00	71.25	0.00	0.00	71.25	578.50	79.00	0.00	79.00	0.00	79.00	57.00	0.00	57.00	57.00	442.50	145.00	297.50	417.00	161.50	145.00	595.00	161.50	0.00	161.50
50	S4W1	1886.50	601.00	91.00	556.50	144.50	145.25	91.25	175.50	587.75	120.00	484.75	110.50	93.00	139.50	717.75	257.75	4.00	253.75	3.00	0.00	173.50	2.50	173.50	0.00	292.00	0.00	292.00	12.50	717.75	194.00	1725.00	1168.75	481.50	718.25

House number 51-80

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
51	S4W2	1506.25	723.25	176.50	553.00	146.75	127.25	118.25	162.00	290.75	51.00	239.75	33.00	24.50	36.00	492.25	160.25	0.00	160.25	0.00	0.00	139.75	0.00	139.75	0.00	192.75	0.00	192.75	0.00	492.25	227.50	1278.75	1014.00	521.00	493.00
52	S4W3	741.25	441.50	146.00	302.50	75.25	83.25	57.00	97.50	75.25	0.00	75.25	0.00	0.00	0.00	233.00	83.25	0.00	83.25	0.00	0.00	57.00	0.00	57.00	0.00	96.75	0.00	96.75	0.00	233.00	146.00	604.25	516.75	296.50	233.75
53	S5E1	2723.75	530.00	0.00	530.00	25.50	207.00	53.50	256.50	508.00	47.00	461.50	166.25	79.00	202.50	1688.75	766.00	149.00	619.25	111.75	144.00	337.00	21.00	316.00	72.00	647.25	0.00	647.25	779.00	940.25	216.00	2529.75	1038.00	97.50	941.00
54	S5E2	2519.25	441.25	0.00	441.25	0.00	160.50	42.50	256.50	363.50	0.00	363.50	126.75	53.50	202.50	1745.75	718.50	139.50	579.00	131.75	171.25	377.50	33.00	344.50	135.00	745.00	0.00	745.00	973.00	804.00	163.00	2360.75	804.75	0.00	804.75
55	S5E3	2445.25	378.75	0.00	378.75	0.00	78.25	47.00	256.50	307.75	0.00	307.75	63.00	42.25	202.50	1759.50	502.50	73.00	429.50	102.75	185.50	390.00	48.50	351.00	162.00	880.25	78.50	805.75	1077.00	685.75	182.00	2268.25	686.50	0.00	686.50
56	S5E5	1331.25	175.75	0.00	175.75	0.00	0.00	0.00	175.75	140.50	0.00	140.50	0.00	1.75	138.75	1015.00	154.00	0.00	154.00	2.00	152.00	117.50	3.50	114.00	112.00	745.25	180.00	577.75	699.50	315.50	180.00	1160.25	316.25	0.00	316.25
57	S5E6	798.75	99.75	0.00	99.75	0.00	0.00	0.00	99.75	78.75	0.00	78.75	0.00	0.00	78.75	620.25	87.00	0.00	87.00	0.00	87.00	63.00	0.00	63.00	63.00	470.25	151.50	328.25	442.00	178.25	151.50	656.75	178.50	0.00	178.50
58	S5W1	1805.50	618.75	99.50	533.75	150.50	140.00	93.25	153.00	550.50	119.00	431.50	103.00	79.50	103.50	659.75	240.75	0.00	240.75	0.00	0.00	163.00	0.00	163.00	0.00	256.00	0.00	256.00	0.00	659.75	194.50	1611.00	1148.00	490.00	660.25
59	S5W2	1562.25	749.00	142.00	612.75	152.00	143.00	133.25	184.50	277.00	44.00	233.00	28.00	21.50	31.50	541.00	171.00	0.00	171.00	0.00	0.00	154.75	0.00	154.75	0.00	215.25	0.00	215.25	0.00	541.00	185.50	1386.75	1021.25	479.50	541.75
60	S5W3	798.50	483.50	168.00	315.50	85.75	75.50	66.25	90.00	85.75	0.00	85.75	0.00	0.00	0.00	229.25	75.50	0.00	75.50	0.00	0.00	66.25	0.00	66.25	0.00	89.50	0.00	89.50	0.00	229.25	168.00	630.50	569.25	339.50	229.75
61	S6E1	2887.75	562.25	0.00	562.25	29.00	191.25	85.50	256.50	521.25	39.50	482.25	152.25	98.50	202.50	1816.25	706.00	124.50	586.00	129.75	117.00	446.75	36.50	411.25	103.50	671.50	0.00	671.50	838.00	985.75	193.00	2700.75	1082.00	97.00	986.50
62	S6E2	2841.25	486.75	0.00	486.75	8.75	159.00	73.25	256.50	420.00	14.00	410.00	125.50	86.00	202.50	1934.50	703.75	129.50	577.75	137.75	157.25	473.25	46.00	432.00	144.00	779.50	20.00	759.50	1062.50	881.00	198.00	2646.75	906.75	31.50	881.75
63	S6E3	1822.75	287.25	0.00	287.25	0.00	41.50	55.00	204.25	226.25	0.00	226.25	37.25	51.50	161.25	1309.25	307.25	39.00	271.25	84.25	131.00	374.50	57.00	326.00	153.75	683.50	81.00	649.50	807.50	512.75	157.00	1716.75	513.50	0.00	513.50
64	S6E5	1063.25	141.00	0.00	141.00	0.00	0.00	8.00	133.00	110.50	0.00	110.50	0.00	5.50	105.00	811.75	115.00	0.00	115.00	3.00	112.00	114.00	10.00	104.00	87.50	582.75	146.00	436.75	561.00	250.75	156.00	907.25	251.50	0.00	251.50
65	S6E6	1258.75	166.25	0.00	166.25	0.00	0.00	0.00	166.25	131.25	0.00	131.25	0.00	0.00	131.25	961.25	143.00	0.00	143.00	0.00	143.00	105.00	0.00	105.00	105.00	713.25	168.00	545.25	664.00	297.25	168.00	1090.75	297.50	0.00	297.50
66	S6W1	1900.25	632.25	40.00	627.25	149.25	152.25	114.75	211.50	553.75	122.00	432.25	102.00	77.50	103.50	738.25	239.75	0.00	239.75	0.00	0.00	188.75	0.00	188.75	0.00	314.25	0.00	314.25	0.00	738.25	161.50	1774.75	1162.00	460.00	739.00
67	S6W2	1553.25	755.25	141.00	615.75	155.00	143.00	133.25	184.50	266.50	40.50	226.50	25.00	19.50	27.00	531.50	168.00	0.00	168.00	0.00	0.00	152.75	0.00	152.75	0.00	210.75	0.00	210.75	0.00	531.50	179.50	1373.75	1021.75	489.50	532.25
68	S7E1	2764.75	602.50	0.00	602.50	70.00	171.25	131.50	256.50	585.50	69.50	516.00	142.25	118.25	202.50	1576.75	501.00	42.50	459.50	113.50	44.75	500.50	67.00	436.50	90.00	588.50	0.00	588.50	594.00	1009.25	175.00	2590.75	1188.00	185.50	1010.00
69	S7E2	2701.75	486.75	0.00	486.75	8.75	131.75	112.00	256.50	421.25	15.00	406.25	107.75	87.25	202.50	1795.00	553.25	80.50	472.75	132.75	104.50	519.50	80.50	453.00	144.00	726.75	20.00	706.75	920.00	876.00	181.50	2521.25	907.25	32.50	876.75
70	S7E3	1803.50	315.75	0.00	315.75	0.00	45.75	99.00	171.00	242.75	0.00	242.75	37.75	70.00	135.00	1245.00	264.00	28.00	236.00	91.25	70.50	453.50	72.50	381.00	121.50	546.50	49.50	497.50	687.00	558.00	145.50	1658.00	558.50	0.00	558.50
71	S7E5	497.25	57.00	0.00	57.00	0.00	0.00	0.00	57.00	45.00	0.00	45.00	0.00	0.00	45.00	395.25	48.00	0.00	48.00	0.00	48.00	40.50	0.00	40.50	40.50	307.50	120.50	189.75	294.00	101.25	120.50	380.25	102.00	0.00	102.00
72	S7W1	1892.25	631.50	17.75	616.50	140.25	152.25	114.75	211.50	520.00	117.50	402.50	87.25	78.75	103.50	745.75	235.25	0.00	235.25	4.00	0.00	198.50	10.00	193.50	0.00	314.25	0.00	314.25	18.00	740.75	140.25	1756.75	1148.75	409.50	741.50
73	S8E1	2053.25	472.00	0.00	472.00	0.00	111.00	156.25	229.50	363.00	0.00	363.00	87.50	111.00	166.50	1218.25	324.50	22.00	302.50	82.50	21.50	447.75	59.00	390.75	54.00	466.25	0.00	466.25	384.00	834.25	77.00	1976.25	835.00	0.00	835.00
74	S8E2	2044.50	387.50	0.00	387.50	10.50	78.00	128.50	171.00	284.25	0.00	284.25	52.50	91.25	135.00	1383.25	334.50	41.00	293.50	112.75	54.25	540.25	84.00	456.25	130.50	512.75	22.50	490.25	741.50	649.25	146.50	1898.50	670.75	21.00	649.75
75	S8E3	548.50	81.00	0.00	81.00	0.00	0.00	81.00	0.00	46.75	0.00	46.75	0.00	46.75	0.00	430.75	49.25	0.00	49.25	49.25	0.00	302.75	62.00	240.75	73.75	78.75	5.00	73.75	313.00	120.50	67.00	481.50	120.50	0.00	120.50
76	S8E5	452.75	52.25	0.00	52.25	0.00	0.00	0.00	52.25	41.25	0.00	41.25	0.00	0.00	41.25	359.25	44.00	0.00	44.00	0.00	44.00	34.75	0.00	34.75	34.75	280.50	109.00	171.50	266.50	92.75	109.00	343.75	93.50	0.00	93.50
77	S8W1	1831.25	643.50	44.00	613.25	143.75	150.00	141.00	211.50	500.50	113.50	391.00	78.75	76.50	99.00	722.50	223.00	0.00	223.00	4.00	0.00	223.50	10.00	217.50	0.00	305.25	0.00	305.25	18.00	717.50	153.00	1709.75	1127.25	434.50	718.25
78	S9E1	1756.00	418.75	0.00	418.75	50.00	76.50	156.25	144.00	323.50	18.00	305.50	54.75	111.00	99.00	1013.75	212.00	9.50	208.75	69.50	10.75	467.75	70.00	397.75	81.00	334.25	0.00	334.25	390.00	630.00	91.00	1665.00	742.25	118.00	630.50
79	S9E2	1996.00	409.00	0.00	409.00	19.00	77.50	141.50	171.00	319.50	11.00	308.50	46.25	110.25	135.00	1272.25	264.75	17.50	257.75	93.50	43.00	543.25	82.00	462.25	117.00	464.50	0.00	464.50	601.00	681.00	102.00	1898.50	726.50	46.00	681.50
80	S9W1	1875.25	666.75	66.00	600.75	145.00	131.25	141.00	184.50	510.00	109.00	401.00	82.50	76.75	99.00	728.25	217.75	0.00	217.75	7.50	0.00	230.75	12.00	222.25	4.50	282.75	0.00	282.75	35.00	714.25	179.50	1722.75	1154.25	460.50	715.00

Appendix 5: The wayfaring statistic result of *Saqacengalj* with social attitude set as 102030804020

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
1	00	1252.40	395.40	64.00	337.60	90.00	120.40	47.00	82.80	340.60	74.40	266.20	79.60	38.00	61.20	547.80	285.80	46.00	240.60	19.20	28.80	98.40	0.00	98.40	0.00	165.60	0.00	165.60	142.00	429.00	172.40	1083.20	710.60	300.40	429.00
2	0E1	903.20	178.00	0.00	178.00	30.80	100.20	17.60	36.00	140.20	21.60	129.00	72.60	11.20	21.60	587.60	384.40	97.60	289.60	49.20	68.40	77.20	0.00	77.20	0.00	126.00	0.00	126.00	330.00	259.20	108.80	797.60	318.20	83.20	259.20
3	0E6	525.60	64.20	0.00	64.20	0.00	0.00	0.00	64.20	51.00	0.00	51.00	0.00	0.00	51.00	410.40	54.40	0.00	54.40	0.00	54.40	40.80	0.00	40.80	40.80	315.20	104.40	210.80	294.80	115.60	104.40	421.20	115.20	0.00	115.20
4	0N1	1044.80	372.60	64.00	308.60	81.60	107.80	42.20	79.20	243.20	52.40	190.80	50.60	24.00	36.00	439.40	227.00	33.20	193.80	14.40	21.60	79.20	0.00	79.20	0.00	136.80	0.00	136.80	105.20	337.40	144.00	900.80	614.60	279.60	337.40
5	0S2	1768.40	432.40	57.60	415.20	81.40	172.00	50.60	125.80	473.20	92.80	380.40	137.60	65.80	111.60	881.40	449.60	62.00	387.60	31.20	46.80	147.60	0.00	147.60	0.00	284.20	0.00	284.20	218.00	663.40	189.20	1613.60	901.00	298.80	663.40
6	0S3	2256.40	560.80	23.20	537.60	105.80	194.00	58.20	179.60	630.80	120.40	510.40	157.60	88.60	158.40	1077.60	484.20	47.60	438.60	47.40	39.60	205.00	5.20	199.80	10.80	388.40	0.00	388.40	246.40	836.40	190.80	2068.00	1188.80	353.20	836.40
7	0S4	2744.40	648.20	7.20	647.80	87.20	207.20	93.80	272.80	707.00	117.60	589.40	172.80	119.40	216.00	1407.60	510.40	34.40	482.80	58.20	46.80	327.80	19.60	310.20	39.60	573.00	0.00	573.00	336.00	1082.00	171.20	2584.00	1348.60	292.80	1082.00
8	0S5	2733.20	647.60	0.00	647.60	83.60	207.20	96.60	272.80	694.80	114.80	582.00	172.80	122.40	216.00	1399.60	503.00	30.00	482.80	58.20	44.60	330.80	19.60	316.80	39.60	573.00	0.00	573.00	314.80	1087.80	160.40	2602.00	1342.20	280.00	1087.80
9	0S6	2260.00	604.40	0.00	604.40	106.80	159.20	108.80	229.60	594.00	104.40	508.40	137.60	112.00	165.60	1114.80	369.40	7.60	363.00	53.80	18.00	306.20	15.20	297.00	43.20	452.80	0.00	452.80	236.40	899.20	118.00	2144.00	1198.40	299.20	899.20
10	0S7	2124.40	584.00	0.00	584.00	115.60	141.20	120.00	229.60	572.80	89.60	493.60	122.00	112.00	158.40	970.80	310.40	8.80	306.80	35.00	8.60	263.80	11.20	255.80	0.00	396.60	0.00	396.60	98.80	872.00	99.60	2033.60	1154.00	313.60	872.00
11	0W1	1050.60	517.20	152.40	364.80	108.20	94.60	64.80	97.20	207.80	30.40	177.40	27.60	17.60	26.80	325.60	121.00	0.00	121.00	0.00	0.00	82.40	0.00	82.40	0.00	122.20	0.00	122.20	0.00	325.60	182.80	867.80	725.00	399.20	325.80
12	0W2	888.00	512.20	176.00	343.00	103.60	92.60	60.80	90.00	131.60	10.40	121.20	7.40	7.80	7.20	255.40	99.00	0.00	99.00	0.00	0.00	66.40	0.00	66.40	0.00	93.20	0.00	93.20	0.00	255.40	180.80	713.20	635.20	384.00	255.80
13	N1E1	720.40	166.00	8.40	164.00	31.00	79.60	17.60	36.00	129.00	21.60	107.40	51.80	9.60	15.20	427.40	274.00	67.60	206.40	29.80	45.20	57.00	0.00	57.00	0.00	96.40	0.00	96.40	217.60	209.80	89.20	631.20	293.00	83.20	209.80
14	N1W1	880.40	417.80	122.40	295.40	85.60	92.20	43.60	76.40	184.20	30.00	154.20	26.80	14.40	28.00	278.40	118.80	0.00	118.80	0.00	0.00	56.80	0.00	56.80	0.00	104.20	0.00	104.20	0.00	278.40	152.40	728.00	602.00	323.60	278.40
15	N2W1	760.40	396.80	109.60	292.00	85.00	90.20	41.20	75.60	129.00	16.40	112.60	9.60	7.20	10.80	234.60	99.80	0.00	99.80	0.00	0.00	48.40	0.00	48.40	0.00	86.40	0.00	86.40	0.00	234.60	121.20	639.20	525.80	291.20	234.60
16	N3W1	739.60	380.00	92.00	288.00	81.80	90.20	40.40	75.60	125.80	16.40	109.40	9.60	7.20	10.80	233.80	99.80	0.00	99.80	0.00	0.00	47.60	0.00	47.60	0.00	86.40	0.00	86.40	0.00	233.80	108.40	631.20	505.80	272.00	233.80
17	S10E1	1551.20	367.00	0.00	367.00	40.00	61.20	151.00	114.80	270.60	10.80	259.80	42.20	98.40	79.20	913.60	177.40	2.40	175.00	63.00	8.60	458.00	70.00	388.00	75.60	278.20	0.00	278.20	366.80	546.80	83.20	1468.00	637.60	90.80	546.80
18	S10E2	1218.40	240.80	0.00	240.80	10.00	29.40	133.20	68.20	159.00	0.00	159.00	16.40	84.60	54.00	819.60	134.00	3.60	130.40	84.60	8.60	469.00	84.40	386.60	93.60	224.40	0.00	224.40	460.40	379.80	86.80	1134.40	399.80	20.00	379.80
19	S1E1	1210.00	206.80	0.00	206.80	26.20	125.60	18.20	39.60	201.60	30.00	171.60	98.20	19.20	36.00	801.60	522.20	127.20	395.40	70.80	100.80	106.60	0.00	106.60	0.00	176.40	0.00	176.40	470.40	331.60	156.80	1053.20	408.40	76.80	331.60
20	S1E2	732.80	93.40	0.00	93.40	0.00	93.40	0.00	0.00	72.60	0.00	72.60	72.60	0.00	0.00	566.80	422.20	111.60	310.60	56.00	92.20	56.00	0.00	56.00	0.00	92.20	0.00	92.20	400.80	166.00	111.60	621.20	166.00	0.00	166.00
21	S1E3	915.80	121.00	0.00	121.00	0.00	75.60	0.00	45.40	95.40	0.00	95.40	59.40	0.00	36.00	699.40	403.00	101.20	301.80	50.20	118.00	70.40	0.00	70.40	21.60	226.00	8.00	221.20	482.80	216.60	106.00	809.80	216.40	0.00	216.40
22	S1E4	2059.60	303.60	0.00	303.60	0.00	22.80	16.60	272.80	239.60	0.00	239.60	17.60	11.80	216.00	1516.40	303.60	27.40	277.60	37.60	194.40	222.60	19.60	222.60	172.80	992.80	145.20	856.00	971.40	546.60	166.40	1899.40	543.20	0.00	543.20
23	S1E5	797.20	100.00	0.00	100.00	0.00	25.00	0.00	98.40	78.00	0.00	78.00	19.40	0.00	78.00	620.80	177.00	37.60	139.80	14.40	107.20	62.40	0.00	62.40	60.80	452.80	111.60	344.80	444.00	178.20	129.60	689.20	176.60	0.00	176.60
24	S1W1	1382.80	481.00	126.80	393.20	114.00	122.80	54.80	104.20	398.00	78.00	338.00	75.40	51.80	100.80	504.40	199.20	0.80	199.20	1.40	0.00	106.20	0.00	106.20	0.00	205.00	0.00	205.00	2.80	504.40	175.60	1235.60	878.40	399.60	504.40
25	S1W2	1132.00	542.40	175.20	377.20	117.80	95.00	72.00	104.40	231.20	27.20	214.00	29.60	27.00	43.20	359.20	124.60	0.00	124.60	0.00	0.00	99.00	0.00	99.00	0.00	147.20	0.00	147.20	0.00	359.20	196.80	946.00	772.80	422.40	359.60
26	S1W3	504.40	329.80	154.40	175.40	52.20	45.20	31.20	46.80	52.20	0.00	52.20	0.00	0.00	0.00	122.40	45.20	0.00	45.20	0.00	0.00	31.20	0.00	31.20	0.00	46.00	0.00	46.00	0.00	122.40	154.40	350.00	382.00	258.80	123.20
27	S1W4	511.20	286.40	62.40	224.00	46.40	58.40	48.00	71.20	46.40	0.00	46.40	0.00	0.00	0.00	178.40	58.40	0.00	58.40	0.00	0.00	48.00	0.00	48.00	0.00	72.00	0.00	72.00	0.00	178.40	62.40	448.80	332.80	155.20	177.60
28	S2E1	1688.00	305.00	0.00	305.00	25.40	175.20	18.20	86.20	295.20	39.60	255.60	137.80	24.00	68.40	1094.20	669.00	148.40	521.40	86.00	122.40	139.00	0.00	139.00	10.80	287.80	0.00	287.80	586.80	509.80	186.40	1503.20	600.20	90.40	509.80
29	S2E2	906.00	101.40	0.00	101.40	0.00	101.40	0.00	0.00	79.40	0.00	79.40	79.40	0.00	0.00	725.20	520.40	134.80	385.60	76.20	128.60	76.20	0.00	76.20	0.00	128.60	0.00	128.60	544.40	180.80	134.80	771.20	180.80	0.00	180.80
30	S2E3	1343.80	181.80	0.00	181.80	0.00	85.60	1.20	109.80	149.20	0.00	149.20	64.00	3.00	87.00	1012.80	468.40	112.40	361.60	65.40	166.20	123.20	2.00	121.20	51.60	421.20	6.40	414.80	681.60	331.20	120.80	1228.60	331.00	0.00	331.00

House number 31-60

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
31	S2E4	1572.40	219.00	0.00	219.00	0.00	6.40	23.00	189.60	174.20	0.00	174.20	5.20	19.00	150.00	1179.20	199.00	5.20	194.20	27.40	155.20	213.80	24.00	193.80	137.60	776.80	148.00	632.00	786.40	392.80	172.80	1400.00	393.20	0.00	393.20
32	S2E5	947.00	123.00	0.00	123.00	0.00	1.80	0.00	121.20	97.60	0.00	97.60	1.60	0.00	96.00	733.20	131.20	3.20	131.20	0.00	131.20	76.80	0.00	76.80	76.80	534.20	129.20	405.40	524.40	220.80	132.40	815.00	220.60	0.00	220.60
33	S2E6	624.00	75.20	0.00	75.20	0.00	0.00	0.00	75.20	60.00	0.00	60.00	0.00	0.00	60.00	488.80	66.40	0.00	66.40	0.00	66.40	48.00	0.00	48.00	48.00	374.40	124.00	250.40	352.80	136.00	124.00	500.00	135.20	0.00	135.20
34	S2W2	1415.80	686.20	186.00	500.20	153.40	115.00	102.00	136.60	302.00	50.80	252.60	34.40	31.20	46.80	438.80	147.20	0.00	147.20	0.00	0.00	124.00	0.00	124.00	0.00	168.40	0.00	168.40	0.00	438.80	233.20	1182.60	977.00	537.60	439.40
35	S2W3	773.40	463.80	162.40	310.20	76.00	74.80	66.00	93.40	76.00	0.00	76.00	0.00	0.00	0.00	233.60	74.80	0.00	74.80	0.00	0.00	66.00	0.00	66.00	0.00	92.80	0.00	92.80	0.00	233.60	162.40	619.80	539.80	305.60	234.20
36	S2W4	444.00	261.00	78.80	186.20	37.60	44.40	51.80	53.20	37.60	0.00	37.60	0.00	0.00	0.00	150.20	44.40	0.00	44.40	0.00	0.00	51.80	0.00	51.80	0.00	54.00	0.00	54.00	0.00	150.20	78.80	373.20	298.60	154.00	149.40
37	S3E3	2259.20	357.40	0.00	357.40	0.00	121.60	16.20	219.60	290.00	0.00	290.00	95.80	20.20	174.00	1611.80	642.40	126.40	516.00	99.00	199.60	249.40	14.40	235.00	99.60	720.00	26.80	693.20	964.00	647.80	167.60	2091.60	647.40	0.00	647.40
38	S3E4	1210.60	168.80	0.00	168.80	0.00	0.00	20.80	148.00	129.80	0.00	129.80	0.00	12.80	117.00	912.00	131.00	0.00	131.00	12.60	120.00	167.00	21.60	147.00	105.60	618.80	128.80	490.00	614.00	298.00	147.20	1063.40	298.60	0.00	298.60
39	S3E5	1674.40	225.80	0.00	225.80	0.00	2.40	3.80	219.60	177.00	0.00	177.00	1.60	3.00	174.00	1274.00	203.40	3.20	203.40	11.80	190.40	162.20	4.40	157.80	139.20	910.40	186.80	723.60	873.20	403.20	191.20	1484.00	402.80	0.00	402.80
40	S3E6	712.40	86.60	0.00	86.60	0.00	0.00	0.00	86.60	69.00	0.00	69.00	0.00	0.00	69.00	556.80	76.00	0.00	76.00	0.00	76.00	55.20	0.00	55.20	55.20	425.60	138.00	287.60	400.40	156.40	138.00	574.40	155.60	0.00	155.60
41	S3W1	1909.20	529.00	64.00	484.20	136.60	143.20	71.00	179.60	564.80	122.00	470.60	117.60	92.20	158.40	817.20	300.80	15.20	285.60	15.20	10.80	167.60	2.00	167.60	0.00	348.80	0.00	348.80	67.20	750.00	192.80	1756.80	1092.00	428.80	750.00
42	S3W2	1385.20	701.20	181.20	524.20	140.60	122.00	110.80	150.80	239.00	32.80	206.80	25.60	19.20	28.80	449.40	144.40	0.00	144.40	0.00	0.00	129.40	0.00	129.40	0.00	175.60	0.00	175.60	0.00	449.40	210.00	1180.40	935.80	486.00	449.80
43	S3W3	933.00	554.40	176.00	379.20	94.40	89.20	75.80	125.80	94.40	0.00	94.40	0.00	0.00	0.00	284.20	89.20	0.00	89.20	0.00	0.00	75.80	0.00	75.80	0.00	125.20	0.00	125.20	0.00	284.20	176.00	757.80	648.80	364.00	284.80
44	S4E1	2024.40	356.80	0.00	356.80	24.80	194.00	26.40	136.40	337.40	39.20	306.00	153.20	44.80	108.00	1361.60	726.00	150.00	581.60	101.20	136.80	223.60	11.60	212.00	39.60	417.20	0.00	417.20	699.20	662.80	191.60	1873.60	665.60	88.80	662.80
45	S4E2	2158.40	341.60	0.00	341.60	4.00	174.80	33.00	136.40	293.80	8.80	290.60	138.00	42.80	108.00	1523.00	761.20	156.80	604.40	127.20	167.20	293.80	18.80	275.00	72.00	483.60	0.00	483.60	897.20	625.80	176.80	1985.20	635.40	16.80	625.80
46	S4E3	2367.20	369.00	0.00	369.00	0.00	123.80	21.80	272.80	302.20	0.00	302.20	97.40	26.80	216.00	1699.00	641.40	120.40	521.00	100.20	208.00	301.00	16.80	286.20	154.80	904.00	52.40	851.60	1030.80	668.40	164.00	2231.60	668.40	0.00	668.40
47	S4E4	949.40	132.80	0.00	132.80	0.00	0.00	24.20	132.80	105.00	0.00	105.00	0.00	16.40	105.00	715.00	96.20	0.00	96.20	18.60	89.20	168.80	25.20	143.60	92.80	529.60	110.40	419.20	498.40	237.20	135.60	839.00	237.80	0.00	237.80
48	S4E5	1699.60	228.00	0.00	228.00	0.00	6.40	2.00	219.60	183.80	0.00	183.80	5.20	4.60	174.00	1287.80	220.40	6.80	213.60	11.60	190.40	159.40	2.80	157.40	139.20	908.00	187.20	723.60	875.60	412.20	194.40	1506.40	411.80	0.00	411.80
49	S4E6	774.40	94.20	0.00	94.20	0.00	0.00	0.00	94.20	75.00	0.00	75.00	0.00	0.00	75.00	605.20	82.40	0.00	82.40	0.00	82.40	60.00	0.00	60.00	60.00	462.80	150.40	312.40	435.20	170.00	150.40	624.00	169.20	0.00	169.20
50	S4W1	1695.20	522.80	72.80	487.20	139.80	127.00	76.80	143.60	547.00	120.80	442.20	101.60	81.60	122.40	630.80	230.20	3.20	227.00	2.40	0.00	152.20	2.00	152.20	0.00	251.60	0.00	251.60	10.00	630.80	178.80	1541.20	1064.40	458.40	630.80
51	S4W2	1414.80	701.40	177.20	539.20	141.40	124.20	115.60	158.00	255.80	40.80	215.00	26.40	19.60	28.80	462.20	148.40	0.00	148.40	0.00	0.00	132.80	0.00	132.80	0.00	182.80	0.00	182.80	0.00	462.20	218.00	1202.80	957.20	499.20	462.60
52	S4W3	739.60	444.80	150.40	299.60	74.40	80.80	57.60	95.60	74.40	0.00	74.40	0.00	0.00	0.00	230.40	80.80	0.00	80.80	0.00	0.00	57.60	0.00	57.60	0.00	95.20	0.00	95.20	0.00	230.40	150.40	598.80	519.20	299.20	230.80
53	S5E1	2650.80	532.60	0.00	532.60	20.40	209.60	49.60	272.80	499.00	37.60	461.80	170.00	74.00	216.00	1621.60	762.00	150.40	614.40	106.00	140.40	302.40	16.80	285.60	57.60	650.80	0.00	650.80	738.40	954.00	204.00	2478.80	1031.60	78.00	954.00
54	S5E2	2511.20	443.80	0.00	443.80	0.00	148.80	35.20	272.80	363.60	0.00	363.60	118.00	42.80	216.00	1728.80	690.80	138.00	552.80	135.60	168.80	354.80	26.40	328.40	136.80	772.00	0.00	772.00	946.40	807.40	156.80	2366.40	807.40	0.00	807.40
55	S5E3	2417.20	380.80	0.00	380.80	0.00	69.00	45.20	272.80	308.40	0.00	308.40	55.60	38.00	216.00	1729.80	460.60	61.20	399.40	93.20	181.60	387.20	47.20	341.80	172.80	902.80	62.80	843.20	1043.60	689.20	152.80	2270.00	689.20	0.00	689.20
56	S5E5	1217.20	159.20	0.00	159.20	0.00	0.00	0.00	159.20	127.40	0.00	127.40	0.00	1.40	126.00	930.60	139.20	0.00	139.20	1.60	137.60	106.00	2.80	103.20	101.60	686.80	182.40	524.00	644.40	286.20	182.40	1051.60	286.60	0.00	286.60
57	S5E6	820.60	101.80	0.00	101.80	0.00	0.00	0.00	101.80	81.00	0.00	81.00	0.00	0.00	81.00	637.80	88.80	0.00	88.80	0.00	88.80	64.80	0.00	64.80	64.80	484.20	154.80	337.00	454.40	183.40	154.80	673.40	182.80	0.00	182.80
58	S5W1	1654.00	539.40	79.60	471.40	147.20	122.80	78.40	125.60	540.40	121.60	418.80	99.20	75.60	100.80	592.80	220.20	0.00	220.20	0.00	0.00	146.20	0.00	146.20	0.00	226.40	0.00	226.40	0.00	592.80	182.00	1472.00	1063.00	472.00	592.80
59	S5W2	1570.00	769.20	140.00	639.80	155.00	151.60	139.60	193.60	255.00	35.20	219.80	22.40	17.20	25.20	549.60	174.00	0.00	174.00	0.00	0.00	156.80	0.00	156.80	0.00	218.80	0.00	218.80	0.00	549.60	174.80	1409.20	1020.40	470.80	549.60
60	S5W3	761.60	463.40	165.20	298.20	79.40	74.60	62.60	86.00	79.40	0.00	79.40	0.00	0.00	0.00	218.80	74.60	0.00	74.60	0.00	0.00	62.60	0.00	62.60	0.00	86.00	0.00	86.00	0.00	218.80	165.20	596.40	542.80	324.00	218.80

House number 61-80

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
61	S6E1	2843.60	560.40	0.00	560.40	23.20	184.40	80.00	272.80	516.20	31.60	485.00	147.60	98.20	216.00	1774.00	674.60	114.80	563.00	133.40	104.40	432.00	32.40	400.40	93.60	678.80	0.00	678.80	783.60	999.00	169.60	2678.80	1075.40	77.60	999.00
62	S6E2	2834.00	487.20	0.00	487.20	7.00	148.00	68.00	272.80	422.40	11.20	414.40	116.80	84.80	216.00	1924.40	670.80	120.80	556.40	143.60	150.80	468.80	40.80	433.20	144.00	799.60	16.00	783.60	1042.00	889.60	176.00	2660.80	909.60	25.20	889.60
63	S6E3	1709.60	263.60	0.00	263.60	0.00	33.20	54.20	189.60	208.00	0.00	208.00	29.80	47.20	150.00	1238.00	254.00	31.20	227.00	74.00	118.80	364.00	55.60	316.80	159.60	644.80	64.80	617.60	766.80	471.20	135.60	1616.40	471.60	0.00	471.60
64	S6E5	945.40	124.00	0.00	124.00	0.00	0.00	6.40	117.60	97.40	0.00	97.40	0.00	4.40	93.00	724.00	101.60	0.00	101.60	2.40	99.20	98.40	8.00	90.40	77.20	524.00	137.60	386.40	503.20	220.80	145.60	799.80	221.40	0.00	221.40
65	S6E6	1187.40	155.00	0.00	155.00	0.00	0.00	0.00	155.00	123.00	0.00	123.00	0.00	0.00	123.00	909.40	133.60	0.00	133.60	0.00	133.60	98.40	0.00	98.40	98.40	677.40	166.80	510.60	630.80	278.60	166.80	1020.60	278.00	0.00	278.00
66	S6W1	1902.00	638.40	32.00	634.40	154.40	160.40	100.80	218.80	542.00	124.00	418.80	97.60	74.40	100.80	733.80	242.80	0.00	242.80	0.00	0.00	171.40	0.00	171.40	0.00	319.60	0.00	319.60	0.00	733.80	155.20	1776.40	1168.20	447.20	733.80
67	S6W2	1562.80	774.20	133.20	642.20	157.40	151.60	139.60	193.60	246.60	32.40	214.60	20.00	15.60	21.60	542.00	171.60	0.00	171.60	0.00	0.00	155.20	0.00	155.20	0.00	215.20	0.00	215.20	0.00	542.00	164.00	1398.80	1020.80	478.80	542.00
68	S7E1	2734.40	604.20	0.00	604.20	56.00	170.40	120.60	272.80	589.40	63.60	525.80	141.20	119.20	216.00	1540.80	474.40	34.00	441.20	112.60	35.80	477.80	62.80	418.20	82.80	603.80	0.00	603.80	548.80	1031.20	156.40	2578.80	1193.60	162.40	1031.20
69	S7E2	2668.80	490.00	0.00	490.00	7.00	126.20	109.20	272.80	423.40	12.00	411.40	102.60	85.80	216.00	1760.60	521.00	68.00	453.00	135.60	92.20	511.20	82.40	446.00	144.00	741.00	16.00	725.00	874.80	888.60	158.00	2518.40	910.00	26.00	888.60
70	S7E3	1520.00	262.40	0.00	262.40	0.00	36.60	89.40	136.40	200.20	0.00	200.20	30.20	62.00	108.00	1057.40	218.00	22.40	195.60	81.20	56.40	406.60	68.00	338.60	108.00	448.00	39.60	408.80	594.80	462.60	126.40	1393.60	462.60	0.00	462.60
71	S7E5	492.80	57.00	0.00	57.00	0.00	0.00	0.00	57.00	45.00	0.00	45.00	0.00	0.00	45.00	390.80	48.00	0.00	48.00	0.00	48.00	39.60	0.00	39.60	39.60	303.80	117.20	188.80	289.60	101.20	117.20	378.40	102.00	0.00	102.00
72	S7W1	1892.40	635.00	14.20	625.80	147.60	160.40	100.80	218.80	523.40	118.80	404.60	82.60	76.20	100.80	739.80	242.80	0.00	242.80	3.20	0.00	181.00	8.00	177.00	0.00	319.60	0.00	319.60	14.40	735.80	137.00	1765.60	1153.20	418.00	735.80
73	S8E1	1983.20	462.20	0.00	462.20	0.00	113.40	161.20	229.60	346.20	0.00	346.20	85.40	108.80	158.40	1174.80	312.40	17.60	294.80	78.80	17.20	456.80	62.40	396.00	57.60	455.60	0.00	455.60	366.40	808.40	73.60	1909.60	808.40	0.00	808.40
74	S8E2	1815.60	332.20	0.00	332.20	8.40	62.40	128.60	136.40	245.60	0.00	245.60	42.00	91.80	108.00	1246.20	285.80	32.80	253.00	114.60	43.40	532.00	87.20	445.60	132.00	431.80	18.00	416.80	692.00	560.20	136.40	1679.60	577.00	16.80	560.20
75	S8E3	498.40	69.20	0.00	69.20	0.00	0.00	69.20	0.00	42.80	0.00	42.80	0.00	42.80	0.00	386.40	42.60	0.00	42.60	42.60	0.00	277.20	60.00	217.20	62.60	66.60	4.00	62.60	274.40	112.00	64.00	434.40	112.00	0.00	112.00
76	S8E5	455.60	53.20	0.00	53.20	0.00	0.00	0.00	53.20	42.00	0.00	42.00	0.00	0.00	42.00	360.40	44.80	0.00	44.80	0.00	44.80	35.00	0.00	35.00	35.00	280.60	106.40	174.20	266.00	94.40	106.40	349.20	95.20	0.00	95.20
77	S8W1	1831.60	651.80	35.20	622.40	144.20	158.60	149.00	218.80	488.80	112.80	377.60	73.80	73.80	93.60	721.40	229.00	0.00	229.00	3.20	0.00	227.60	8.00	222.80	0.00	308.80	0.00	308.80	14.40	716.60	141.20	1711.60	1122.40	420.40	716.60
78	S9E1	1558.00	367.00	0.00	367.00	40.00	61.20	161.20	114.80	275.80	14.40	261.40	43.80	108.80	79.20	915.20	180.80	7.60	176.60	68.40	8.60	458.40	70.00	396.00	75.60	278.20	0.00	278.20	366.80	560.20	86.80	1471.20	642.80	94.40	560.20
79	S9E2	1749.20	348.80	0.00	348.80	15.20	62.00	135.20	136.40	271.80	8.80	263.00	37.00	104.40	108.00	1132.40	226.60	14.00	221.00	89.60	34.40	520.00	85.60	437.20	108.00	386.00	0.00	386.00	557.20	583.00	99.60	1653.20	619.00	36.80	583.00
80	S9W1	1869.20	670.40	52.80	617.60	143.00	132.80	149.00	193.60	489.80	106.00	383.80	76.80	74.00	93.60	731.00	212.80	0.00	212.80	6.00	0.00	233.40	9.60	226.60	3.60	287.20	0.00	287.20	28.00	719.80	162.40	1724.80	1144.00	441.20	719.80

Appendix 6: The wayfaring statistic result of *Saqacengalj* with social attitude set as 102030903010

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
1	00	1166.00	381.70	48.00	342.10	88.90	122.70	47.40	88.20	331.90	78.40	253.50	72.10	38.20	59.40	494.80	248.00	31.40	217.70	13.20	19.80	92.30	0.00	92.30	0.00	156.60	0.00	156.60	97.40	428.00	139.60	1050.80	698.00	285.40	428.00
2	0E1	794.00	148.10	0.00	148.10	23.10	90.60	13.20	27.00	113.60	16.20	105.20	65.30	8.00	14.40	537.30	362.90	95.40	268.10	46.20	66.60	66.40	0.00	66.40	0.00	108.00	0.00	108.00	320.40	218.10	103.80	691.20	261.70	62.40	218.10
3	0E6	527.20	64.60	0.00	64.60	0.00	0.00	0.00	64.60	51.00	0.00	51.00	0.00	0.00	51.00	411.60	54.40	0.00	54.40	0.00	54.40	40.80	0.00	40.80	40.80	316.40	105.60	210.80	296.00	115.60	105.60	421.60	115.60	0.00	115.60
4	0N1	1011.00	368.70	48.00	320.70	82.90	111.60	43.80	84.60	238.60	53.20	185.40	43.90	24.00	36.00	411.40	201.60	22.40	179.20	9.60	14.40	76.60	0.00	76.60	0.00	135.00	0.00	135.00	70.40	342.60	118.00	893.00	606.10	267.00	342.60
5	0S2	1657.30	408.90	41.60	400.30	79.90	176.40	49.20	109.80	462.50	98.40	364.10	139.80	60.40	99.00	794.50	419.20	46.00	373.20	22.80	34.20	132.40	0.00	132.40	0.00	242.90	0.00	242.90	160.00	634.50	160.00	1512.90	866.40	284.00	634.60
6	0S3	2128.90	529.90	13.20	516.70	92.70	199.80	56.80	167.40	621.40	122.40	499.00	164.40	85.30	156.60	984.00	450.90	31.20	420.70	31.30	25.20	178.80	2.60	176.20	5.40	354.30	0.00	354.30	156.60	830.00	165.40	1963.50	1149.70	319.60	830.30
7	0S4	2800.90	688.10	3.60	688.10	84.20	219.60	86.20	307.80	763.30	126.60	636.70	187.20	127.40	243.00	1382.30	492.10	22.40	473.70	40.30	28.80	290.30	13.40	278.10	25.20	601.70	0.00	601.70	218.80	1170.30	159.60	2659.90	1451.40	293.10	1171.20
8	0S5	2814.70	688.50	0.00	688.50	83.50	219.60	89.00	307.80	752.40	121.20	632.60	187.20	130.40	243.00	1380.30	488.20	19.40	473.70	40.30	26.60	294.00	13.40	284.90	25.20	601.70	0.00	601.70	207.20	1176.10	151.60	2681.30	1440.80	280.20	1177.00
9	0S6	2181.30	596.70	0.00	596.70	102.30	156.60	94.80	243.00	596.50	110.00	502.50	139.20	114.00	167.40	1031.50	340.30	4.20	336.10	37.90	10.80	266.90	11.20	257.70	28.80	445.50	0.00	445.50	157.20	893.70	119.40	2080.70	1191.60	297.00	894.60
10	0S7	2096.50	582.60	0.00	582.60	105.60	147.60	115.00	243.00	573.00	96.60	490.20	123.00	114.00	156.60	941.50	300.20	4.40	298.40	23.50	4.30	238.30	8.80	232.30	0.00	403.00	0.00	403.00	63.40	878.10	102.60	2005.90	1155.00	306.00	879.00
11	0W1	992.50	524.90	165.40	359.50	106.10	91.40	64.80	97.20	170.50	20.60	149.90	17.00	11.20	17.00	297.10	107.80	0.00	107.80	0.00	0.00	76.00	0.00	76.00	0.00	113.30	0.00	113.30	0.00	297.10	186.00	806.50	695.40	398.20	297.20
12	0W2	824.20	492.90	190.00	313.10	102.10	86.40	55.20	81.00	117.20	5.20	112.00	3.70	3.90	3.60	228.50	89.60	0.00	89.60	0.00	0.00	58.00	0.00	58.00	0.00	82.50	0.00	82.50	0.00	228.50	190.00	644.10	608.80	393.10	228.80
13	N1E1	614.80	133.50	4.20	132.70	23.10	69.40	13.20	27.00	102.70	16.20	86.50	45.00	7.20	11.20	379.40	250.30	65.40	184.90	28.10	42.40	48.50	0.00	48.50	0.00	80.60	0.00	80.60	206.40	173.00	81.60	533.20	235.40	62.40	173.00
14	N1W1	845.40	436.90	135.60	301.50	87.60	95.20	44.10	82.80	151.50	20.40	131.10	16.60	9.60	17.60	257.10	108.90	0.00	108.90	0.00	0.00	53.30	0.00	53.30	0.00	96.00	0.00	96.00	0.00	257.10	156.00	689.40	588.30	331.20	257.10
15	N2W1	795.20	428.30	116.40	319.10	91.60	100.60	44.10	82.80	121.00	11.00	110.00	6.40	4.80	7.20	245.90	107.00	0.00	107.00	0.00	0.00	48.90	0.00	48.90	0.00	90.00	0.00	90.00	0.00	245.90	120.20	675.00	549.30	303.40	245.90
16	N3W1	764.00	403.10	90.00	313.10	86.80	100.60	42.90	82.80	116.20	11.00	105.20	6.40	4.80	7.20	244.70	107.00	0.00	107.00	0.00	0.00	47.70	0.00	47.70	0.00	90.00	0.00	90.00	0.00	244.70	101.00	663.00	519.30	274.60	244.70
17	S10E1	1328.50	311.90	0.00	311.90	25.80	44.50	160.60	81.00	210.40	6.20	204.20	28.80	97.40	52.20	806.20	138.40	1.20	137.20	59.60	4.30	460.40	72.60	387.80	70.20	207.40	0.00	207.40	342.00	464.20	80.00	1248.50	522.30	57.80	464.50
18	S10E2	1044.90	190.10	0.00	190.10	5.00	14.70	136.20	34.20	122.70	0.00	122.70	8.20	87.00	27.00	741.90	109.70	1.80	107.90	85.00	4.30	476.40	90.80	387.00	91.80	157.20	0.00	157.20	454.60	302.70	92.40	954.70	312.80	10.00	302.80
19	S1E1	1042.40	172.30	0.00	172.30	18.70	114.20	13.50	28.80	155.60	21.60	135.40	88.60	13.20	23.40	714.50	484.60	125.40	359.40	64.80	91.80	89.50	0.00	89.50	0.00	144.00	0.00	144.00	438.60	276.10	145.40	897.00	327.90	51.80	276.10
20	S1E2	639.60	81.90	0.00	81.90	0.00	81.90	0.00	0.00	64.30	0.00	64.30	64.30	0.00	0.00	493.40	372.00	104.40	267.60	47.20	76.00	47.20	0.00	47.20	0.00	76.00	0.00	76.00	347.20	146.20	104.40	535.20	146.20	0.00	146.20
21	S1E3	727.20	87.80	0.00	87.80	0.00	63.10	0.00	24.70	69.10	0.00	69.10	49.60	0.00	19.50	570.30	352.40	93.60	259.20	41.50	105.70	52.80	0.00	52.80	12.00	165.10	4.00	161.90	413.40	156.90	96.40	630.80	156.90	0.00	156.90
22	S1E4	2166.30	327.30	0.00	327.30	0.00	14.60	11.50	307.80	258.00	0.00	258.00	11.40	8.10	243.00	1581.00	273.90	17.10	257.80	24.00	205.20	226.00	13.80	226.00	194.40	1082.10	141.20	949.50	995.10	586.10	155.80	2018.60	585.30	0.00	585.30
23	S1E5	718.60	85.50	0.00	85.50	0.00	16.30	0.00	85.50	67.50	0.00	67.50	12.70	0.00	67.50	565.60	127.40	25.20	104.40	9.60	104.40	52.80	0.00	52.80	52.40	408.80	102.60	309.80	412.60	153.00	112.40	619.60	153.00	0.00	153.00
24	S1W1	1160.30	446.80	132.40	322.80	103.30	105.00	48.60	79.20	349.90	70.00	293.50	67.10	41.90	84.60	413.80	172.60	0.40	172.60	0.70	0.00	86.30	0.00	86.30	0.00	158.30	0.00	158.30	1.40	413.80	163.60	1030.10	746.50	368.20	413.90
25	S1W2	1014.40	528.20	187.20	349.40	110.00	82.70	67.20	95.40	183.80	17.40	173.20	19.60	16.20	27.00	302.40	102.30	0.00	102.30	0.00	0.00	83.40	0.00	83.40	0.00	122.10	0.00	122.10	0.00	302.40	196.30	825.00	712.00	409.30	302.70
26	S1W3	510.50	338.60	165.80	172.80	53.20	44.60	30.00	45.00	53.20	0.00	53.20	0.00	0.00	0.00	118.70	44.60	0.00	44.60	0.00	0.00	30.00	0.00	30.00	0.00	44.10	0.00	44.10	0.00	118.70	165.80	344.70	391.80	272.20	119.60
27	S1W4	576.00	323.10	70.20	252.90	52.20	65.70	54.00	81.00	52.20	0.00	52.20	0.00	0.00	0.00	200.70	65.70	0.00	65.70	0.00	0.00	54.00	0.00	54.00	0.00	81.00	0.00	81.00	0.00	200.70	70.20	505.80	375.30	174.60	200.70
28	S2E1	1497.90	262.60	0.00	262.60	18.50	178.40	13.50	52.20	246.50	29.60	216.90	140.20	16.80	41.40	991.60	665.20	154.40	511.60	79.60	113.40	115.30	0.00	115.30	5.40	212.30	0.00	212.30	551.20	442.40	182.80	1315.10	509.10	66.60	442.50
29	S2E2	855.60	96.90	0.00	96.90	0.00	96.90	0.00	0.00	75.70	0.00	75.70	75.70	0.00	0.00	683.00	496.30	137.00	359.30	66.90	119.80	66.90	0.00	66.90	0.00	119.80	0.00	119.80	510.40	172.60	137.00	718.60	172.60	0.00	172.60
30	S2E3	1144.30	145.30	0.00	145.30	0.00	72.40	0.60	76.00	117.80	0.00	117.80	56.30	1.50	60.00	881.20	455.50	109.80	347.70	56.30	166.40	89.40	1.00	88.40	30.00	336.30	4.00	332.30	618.20	263.00	114.80	1031.50	263.10	0.00	263.10

House number 31-60

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
31	S2E4	1453.50	200.90	0.00	200.90	0.00	3.20	15.50	182.40	159.10	0.00	159.10	2.60	12.50	144.00	1093.50	172.40	2.60	170.00	17.80	146.40	182.20	17.80	169.60	141.60	754.50	146.20	613.50	746.40	359.10	163.60	1291.10	360.00	0.00	360.00
32	S2E5	873.40	105.40	0.00	105.40	0.00	0.90	0.00	104.50	83.30	0.00	83.30	0.80	0.00	82.50	700.00	140.40	1.60	140.40	0.00	140.40	66.00	0.00	66.00	66.00	498.40	124.20	375.00	526.60	188.60	125.80	750.00	188.70	0.00	188.70
33	S2E6	652.80	79.80	0.00	79.80	0.00	0.00	0.00	79.80	63.00	0.00	63.00	0.00	0.00	63.00	510.00	68.40	0.00	68.40	0.00	68.40	50.40	0.00	50.40	50.40	391.20	129.60	261.60	367.20	142.80	129.60	523.20	142.80	0.00	142.80
34	S2W2	1320.70	683.20	191.20	494.40	158.40	107.40	101.00	131.40	260.60	36.00	225.40	22.80	19.20	28.80	390.90	128.40	0.00	128.40	0.00	0.00	114.60	0.00	114.60	0.00	150.30	0.00	150.30	0.00	390.90	224.40	1096.70	929.80	538.80	391.80
35	S2W3	739.30	454.50	175.40	285.70	73.10	68.90	59.10	84.60	73.10	0.00	73.10	0.00	0.00	0.00	211.70	68.90	0.00	68.90	0.00	0.00	59.10	0.00	59.10	0.00	83.70	0.00	83.70	0.00	211.70	175.40	570.50	527.60	315.00	212.60
36	S2W4	416.40	247.80	79.20	170.40	36.80	42.30	41.50	50.40	36.80	0.00	36.80	0.00	0.00	0.00	134.20	42.30	0.00	42.30	0.00	0.00	41.50	0.00	41.50	0.00	50.40	0.00	50.40	0.00	134.20	79.20	340.80	284.60	152.80	134.20
37	S3E3	2191.30	346.60	0.00	346.60	0.00	109.90	8.70	228.00	278.20	0.00	278.20	86.60	11.60	180.00	1566.50	636.50	128.80	507.70	98.20	213.00	211.30	8.20	203.10	84.60	718.70	13.40	705.30	942.00	624.50	150.40	2040.90	624.80	0.00	624.80
38	S3E4	1106.50	152.30	0.00	152.30	0.00	0.00	15.50	136.80	117.40	0.00	117.40	0.00	9.40	108.00	836.80	115.50	0.00	115.50	8.30	108.00	144.40	16.00	130.80	100.80	579.30	126.60	452.70	568.00	268.80	140.20	966.30	269.70	0.00	269.70
39	S3E5	1724.50	231.10	0.00	231.10	0.00	1.20	1.90	228.00	181.50	0.00	181.50	0.80	1.50	180.00	1313.10	206.10	1.60	206.10	6.90	199.20	156.50	2.20	154.30	144.00	952.90	202.00	750.90	902.00	412.30	204.20	1522.70	412.60	0.00	412.60
40	S3E6	758.00	93.10	0.00	93.10	0.00	0.00	0.00	93.10	73.50	0.00	73.50	0.00	0.00	73.50	591.40	79.60	0.00	79.60	0.00	79.60	58.80	0.00	58.80	58.80	453.00	148.00	305.00	424.80	166.60	148.00	610.00	166.60	0.00	166.60
41	S3W1	1760.50	469.60	44.80	443.60	136.10	129.00	57.80	167.40	548.20	127.20	449.30	114.00	89.30	156.60	747.40	263.60	7.60	256.00	7.60	5.40	154.70	1.00	154.70	0.00	329.10	0.00	329.10	33.60	713.80	173.20	1632.70	1013.10	414.20	714.10
42	S3W2	1309.70	708.00	186.00	522.70	139.80	120.70	111.00	151.20	191.40	19.20	173.80	14.40	10.80	16.20	416.00	131.90	0.00	131.90	0.00	0.00	121.20	0.00	121.20	0.00	162.90	0.00	162.90	0.00	416.00	202.00	1112.50	893.70	477.60	416.90
43	S3W3	903.70	543.10	182.40	361.50	88.60	86.30	73.80	118.80	88.60	0.00	88.60	0.00	0.00	0.00	272.00	86.30	0.00	86.30	0.00	0.00	73.80	0.00	73.80	0.00	117.90	0.00	117.90	0.00	272.00	182.40	722.10	631.70	358.80	272.90
44	S4E1	1838.70	321.40	0.00	321.40	18.20	199.80	19.00	102.60	286.00	29.40	271.40	157.80	32.60	81.00	1245.90	732.60	157.00	581.80	96.40	131.40	180.60	7.40	173.20	25.20	336.30	0.00	336.30	653.40	592.50	185.60	1684.10	592.80	65.80	592.80
45	S4E2	1953.10	295.30	0.00	295.30	2.00	172.80	21.20	102.60	249.10	4.40	247.50	136.20	29.40	81.00	1408.70	772.80	167.60	605.20	133.20	165.80	245.60	11.40	234.20	50.40	399.50	0.00	399.50	869.40	539.30	177.80	1775.30	544.40	8.40	539.60
46	S4E3	2444.50	387.80	0.00	387.80	0.00	107.80	15.20	307.80	314.60	0.00	314.60	84.60	21.80	243.00	1745.50	623.40	118.00	505.40	100.00	225.60	294.10	13.60	280.50	167.40	977.10	34.20	942.90	1047.40	700.70	142.00	2336.30	701.60	0.00	701.60
47	S4E4	876.30	117.90	0.00	117.90	0.00	0.00	17.20	117.80	93.00	0.00	93.00	0.00	11.20	93.00	667.70	89.80	0.00	89.80	12.60	83.00	136.50	17.60	118.90	83.20	482.30	106.20	376.10	460.00	209.90	123.80	753.10	210.80	0.00	210.80
48	S4E5	1735.10	232.20	0.00	232.20	0.00	3.20	1.00	228.00	184.90	0.00	184.90	2.60	2.30	180.00	1318.00	214.20	3.40	210.80	5.80	199.20	154.10	1.40	153.10	144.00	949.70	201.20	750.90	901.20	416.80	204.60	1531.90	417.10	0.00	417.10
49	S4E6	848.20	104.50	0.00	104.50	0.00	0.00	0.00	104.50	82.50	0.00	82.50	0.00	0.00	82.50	661.20	89.20	0.00	89.20	0.00	89.20	66.00	0.00	66.00	66.00	506.00	163.80	342.20	474.20	187.00	163.80	684.40	187.00	0.00	187.00
50	S4W1	1524.10	443.40	51.80	419.20	140.60	107.40	57.80	113.40	535.50	127.80	408.50	94.80	70.80	106.20	546.20	202.40	1.60	202.20	1.20	0.00	128.30	1.00	128.30	0.00	215.70	0.00	215.70	5.00	546.20	168.40	1373.90	977.90	449.60	546.50
51	S4W2	1340.30	708.10	185.40	549.40	142.60	126.60	118.20	162.00	209.20	26.60	182.60	16.00	12.20	18.00	442.90	139.40	0.00	139.40	0.00	0.00	128.00	0.00	128.00	0.00	175.50	0.00	175.50	0.00	442.90	211.40	1169.10	916.10	491.00	443.80
52	S4W3	779.70	471.90	163.20	311.40	77.10	81.70	61.20	98.60	77.10	0.00	77.10	0.00	0.00	0.00	238.20	81.70	0.00	81.70	0.00	0.00	61.20	0.00	61.20	0.00	97.70	0.00	97.70	0.00	238.20	163.20	621.90	549.00	317.40	239.10
53	S5E1	2681.10	561.60	0.00	561.60	14.10	223.20	46.00	307.80	511.20	28.20	483.80	183.00	71.40	243.00	1609.90	790.40	158.00	634.60	103.60	138.60	271.40	10.40	261.00	43.20	684.90	0.00	684.90	702.20	1016.50	195.60	2531.10	1072.80	55.80	1017.40
54	S5E2	2622.30	468.60	0.00	468.60	0.00	143.40	26.00	307.80	384.60	0.00	384.60	115.80	31.40	243.00	1782.30	711.00	143.80	567.20	147.00	177.80	337.80	17.20	320.60	144.00	837.60	0.00	837.60	948.00	852.30	154.40	2475.90	853.20	0.00	853.20
55	S5E3	2484.10	401.00	0.00	401.00	0.00	58.30	45.30	307.80	321.90	0.00	321.90	46.80	37.50	243.00	1762.50	423.30	47.20	376.10	85.00	186.00	402.00	47.60	354.80	194.40	968.70	40.80	930.30	1042.60	722.00	117.60	2373.10	722.90	0.00	722.90
56	S5E5	1138.70	148.20	0.00	148.20	0.00	0.00	0.00	148.20	117.70	0.00	117.70	0.00	0.70	117.00	872.80	128.00	0.00	128.00	0.80	127.20	96.40	1.40	95.00	94.20	649.10	194.00	485.70	607.80	265.00	194.00	973.90	265.90	0.00	265.90
57	S5E6	875.00	108.30	0.00	108.30	0.00	0.00	0.00	108.30	85.50	0.00	85.50	0.00	0.00	85.50	681.20	94.80	0.00	94.80	0.00	94.80	68.40	0.00	68.40	68.40	518.80	165.00	356.20	487.40	193.80	165.00	712.40	193.80	0.00	193.80
58	S5W1	1499.90	455.90	57.00	405.40	150.60	103.20	59.40	95.40	545.90	130.80	415.10	96.40	73.10	99.00	516.60	197.80	0.00	197.80	0.00	0.00	124.70	0.00	124.70	0.00	194.10	0.00	194.10	0.00	516.60	173.20	1326.70	985.10	470.00	516.90
59	S5W2	1629.50	831.60	142.60	705.70	166.00	169.50	154.20	216.00	224.80	21.80	203.00	12.80	9.80	14.40	575.80	182.30	0.00	182.30	0.00	0.00	164.00	0.00	164.00	0.00	229.50	0.00	229.50	0.00	575.80	164.00	1484.50	1053.70	477.00	576.70
60	S5W3	747.90	458.10	168.00	303.10	73.40	76.80	61.20	91.80	73.40	0.00	73.40	0.00	0.00	0.00	228.90	76.80	0.00	76.80	0.00	0.00	61.20	0.00	61.20	0.00	91.50	0.00	91.50	0.00	228.90	168.00	605.30	531.50	314.80	229.80

House number 61-80

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
61	S6E1	2899.50	580.50	0.00	580.50	15.60	185.40	72.20	307.80	530.80	22.20	508.60	149.40	100.80	243.00	1794.50	666.20	107.40	562.00	143.80	91.80	422.70	27.80	395.70	82.80	716.10	0.00	716.10	743.00	1057.70	145.60	2757.30	1109.40	53.40	1058.60
62	S6E2	2917.90	504.20	0.00	504.20	3.50	138.40	62.90	307.80	439.90	5.60	435.90	109.20	86.70	243.00	1977.60	659.40	121.40	548.20	157.80	147.00	482.60	35.00	451.40	151.20	856.10	8.00	848.10	1055.40	932.70	148.80	2770.50	943.60	12.60	933.60
63	S6E3	1638.50	248.40	0.00	248.40	0.00	23.10	56.90	182.40	195.80	0.00	195.80	21.00	47.00	144.00	1194.30	212.90	20.20	198.70	68.10	104.00	376.00	58.20	319.60	174.60	620.90	44.40	604.10	751.00	443.30	108.00	1562.30	444.20	0.00	444.20
64	S6E5	786.70	100.10	0.00	100.10	0.00	0.00	3.20	96.90	78.70	0.00	78.70	0.00	2.20	76.50	607.90	82.80	0.00	82.80	1.20	81.60	73.90	4.00	69.90	63.30	451.20	133.80	317.40	430.00	177.90	137.80	648.90	178.80	0.00	178.80
65	S6E6	1119.70	144.40	0.00	144.40	0.00	0.00	0.00	144.40	114.00	0.00	114.00	0.00	0.00	114.00	861.30	124.00	0.00	124.00	0.00	124.00	91.20	0.00	91.20	91.20	646.10	172.60	473.50	603.00	258.30	172.60	947.10	258.40	0.00	258.40
66	S6W1	1969.70	670.40	16.00	668.40	168.90	176.70	87.00	235.80	549.30	132.60	420.30	94.00	72.80	99.00	750.00	261.10	0.00	261.10	0.00	0.00	155.00	0.00	155.00	0.00	333.90	0.00	333.90	0.00	750.00	147.40	1838.70	1219.70	468.80	750.90
67	S6W2	1627.90	834.40	128.40	707.20	167.50	169.50	154.20	216.00	221.10	20.40	201.10	12.00	9.00	12.60	572.40	181.50	0.00	181.50	0.00	0.00	163.20	0.00	163.20	0.00	227.70	0.00	227.70	0.00	572.40	147.20	1480.70	1055.50	482.20	573.30
68	S7E1	2790.70	627.90	0.00	627.90	42.70	173.40	114.20	307.80	615.30	58.20	557.10	144.60	126.80	243.00	1547.50	448.80	20.80	428.40	115.80	22.20	470.60	60.60	413.40	77.40	647.70	0.00	647.70	505.20	1098.70	135.80	2655.70	1243.20	143.60	1099.60
69	S7E2	2724.50	510.90	0.00	510.90	3.50	119.80	110.00	307.80	436.40	6.00	430.40	96.60	88.80	243.00	1786.40	486.20	50.00	436.20	145.80	77.60	551.00	88.60	462.40	151.20	786.70	8.00	778.70	855.60	934.10	125.00	2607.70	944.60	13.00	935.00
70	S7E3	1207.10	204.40	0.00	204.40	0.00	21.50	80.50	102.60	153.70	0.00	153.70	17.70	55.00	81.00	849.00	150.80	11.80	139.00	72.40	39.80	365.30	66.00	299.30	97.20	348.90	28.60	320.30	498.00	357.80	102.40	1104.70	358.10	0.00	358.10
71	S7E5	502.50	58.90	0.00	58.90	0.00	0.00	0.00	58.90	46.50	0.00	46.50	0.00	0.00	46.50	397.10	49.60	0.00	49.60	0.00	49.60	39.00	0.00	39.00	39.00	309.40	117.40	193.10	292.60	104.50	117.40	387.10	105.40	0.00	105.40
72	S7W1	1967.50	664.10	7.10	662.10	163.50	176.70	87.00	235.80	546.60	126.00	420.60	84.40	74.90	99.00	756.80	261.10	0.00	261.10	1.60	0.00	163.90	4.00	161.90	0.00	333.90	0.00	333.90	7.20	754.80	135.10	1837.50	1210.70	455.00	755.70
73	S8E1	1992.90	474.40	0.00	474.40	0.00	121.00	174.60	243.00	342.40	0.00	342.40	86.20	110.80	156.60	1176.10	308.30	10.00	298.30	78.20	12.90	488.60	69.60	420.20	64.80	465.60	0.00	465.60	360.20	815.90	73.40	1922.90	816.80	0.00	816.80
74	S8E2	1597.30	278.20	0.00	278.20	4.20	45.50	134.20	102.60	207.70	0.00	207.70	30.40	96.30	81.00	1136.90	233.20	20.80	212.40	123.60	27.80	552.60	96.60	464.00	142.00	351.60	9.00	351.60	692.20	476.80	122.40	1474.90	485.50	8.40	477.10
75	S8E3	454.40	70.50	0.00	70.50	0.00	0.00	70.50	0.00	40.20	0.00	40.20	0.00	40.20	0.00	343.70	36.00	0.00	36.00	36.00	0.00	256.40	60.40	196.00	49.30	51.30	2.00	49.30	233.00	110.70	62.40	392.00	110.70	0.00	110.70
76	S8E5	465.10	55.10	0.00	55.10	0.00	0.00	0.00	55.10	43.50	0.00	43.50	0.00	0.00	43.50	366.50	46.40	0.00	46.40	0.00	46.40	35.50	0.00	35.50	35.50	284.60	105.00	179.60	268.80	97.70	105.00	360.10	98.60	0.00	98.60
77	S8W1	1922.70	693.80	25.00	689.30	159.70	175.80	165.50	235.80	501.40	116.40	385.80	73.60	72.50	90.00	770.50	246.20	0.00	246.20	1.60	0.00	240.40	4.00	238.00	0.00	319.50	0.00	319.50	7.20	769.10	129.60	1815.70	1161.70	437.00	770.00
78	S9E1	1333.50	311.90	0.00	311.90	25.80	44.50	174.60	81.00	214.20	8.80	205.40	30.00	110.80	52.20	838.00	146.20	3.80	142.40	70.00	4.30	489.80	72.60	420.20	70.20	207.40	0.00	207.40	351.60	486.40	82.60	1251.30	526.10	60.40	486.70
79	S9E2	1512.90	289.90	0.00	289.90	7.60	45.30	135.30	102.60	221.40	4.40	217.10	26.70	102.60	81.00	1002.40	183.80	8.80	180.40	88.80	21.50	515.30	94.20	426.00	104.10	307.40	0.00	307.40	523.00	492.20	100.40	1416.90	510.50	18.40	492.50
80	S9W1	1922.90	703.10	33.80	669.30	146.90	141.30	165.50	216.00	478.60	105.80	372.80	71.20	71.80	88.20	758.70	214.10	0.00	214.10	3.00	0.00	242.50	4.80	239.10	1.80	303.30	0.00	303.30	14.00	753.10	140.20	1793.50	1171.50	430.40	754.00

Appendix 7: The wayfaring statistic result of *Saqacengalj* with social attitude set as 102550755025

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
1	00	2023.00	559.50	86.50	474.75	124.75	149.00	66.00	135.00	491.00	80.50	410.50	110.50	66.00	112.50	1027.75	483.00	84.50	398.50	58.00	85.50	202.75	8.00	198.75	13.50	342.00	0.00	342.00	404.50	635.75	250.00	1777.50	1030.25	406.50	635.75
2	0E1	1642.00	323.25	17.00	312.00	41.50	137.50	27.75	108.00	269.00	27.00	255.00	107.25	28.00	81.00	1057.75	545.50	119.00	428.75	77.00	116.50	173.75	5.00	168.75	36.00	341.50	0.00	341.50	580.00	489.50	147.50	1496.50	591.50	127.00	489.50
3	0E6	611.00	76.00	0.00	76.00	0.00	6.75	0.00	76.00	60.00	0.00	60.00	0.00	0.00	60.00	475.00	64.00	2.00	64.00	0.00	64.00	48.00	0.00	48.00	48.00	363.00	115.00	248.00	339.00	136.00	115.00	496.00	136.00	0.00	136.00
4	0N1	1679.50	498.50	80.00	418.50	90.25	141.50	54.50	135.00	382.00	65.00	317.00	89.00	48.75	90.00	808.25	395.25	72.00	325.25	40.50	58.50	139.75	0.00	139.75	0.00	283.50	0.00	283.50	268.00	553.50	217.00	1469.00	879.00	325.50	553.50
5	0S2	2250.50	517.50	78.00	461.50	87.75	174.50	73.25	135.00	521.25	94.50	426.75	142.50	81.00	126.00	1265.25	585.50	98.00	489.50	69.00	103.50	279.25	20.00	259.25	36.00	400.50	0.00	400.50	533.00	732.25	274.00	2026.50	1018.00	338.50	732.25
6	0S3	2832.00	688.25	65.50	627.50	141.25	197.25	91.00	198.00	696.50	130.50	566.00	158.50	99.75	166.50	1463.50	625.75	99.00	528.25	69.00	103.50	334.50	23.00	311.50	51.75	519.75	0.00	519.75	552.50	911.00	309.50	2549.50	1379.00	468.00	911.00
7	0S4	2921.50	663.25	23.00	663.25	103.50	205.50	105.25	256.50	709.00	115.50	593.50	168.00	120.75	202.50	1574.75	575.25	57.50	540.50	87.50	100.00	394.00	29.50	378.00	67.50	608.50	0.00	608.50	578.00	1058.50	225.50	2736.00	1372.25	345.50	1058.50
8	0S5	2881.00	655.75	5.00	650.75	91.75	205.50	125.25	256.50	688.00	115.50	576.50	168.00	121.00	202.50	1568.00	567.00	41.00	540.50	85.00	82.00	403.75	28.50	387.75	72.00	608.50	0.00	608.50	509.50	1058.50	185.00	2745.00	1343.75	303.00	1058.50
9	0S6	2672.00	685.50	50.00	635.50	116.75	186.75	125.00	229.50	625.75	104.50	533.50	152.00	115.00	171.00	1440.50	497.00	18.00	484.00	76.00	69.25	403.75	19.00	384.75	72.00	541.75	0.00	541.75	464.50	976.00	153.00	2555.50	1297.25	364.50	976.00
10	0S7	2504.50	712.50	60.00	661.50	133.50	164.25	136.25	229.50	630.00	100.00	541.00	134.75	115.00	166.50	1172.75	433.00	40.00	393.00	56.25	42.25	301.50	14.50	291.50	0.00	438.25	0.00	438.25	247.00	935.00	189.00	2315.50	1342.50	414.00	935.00
11	0W1	1562.00	676.50	157.50	519.00	139.00	140.00	96.00	144.00	319.75	48.50	271.25	48.50	41.75	56.00	576.00	239.25	20.00	219.25	11.25	22.75	149.00	0.00	149.00	0.00	213.75	0.00	213.75	87.00	512.25	209.50	1352.50	996.25	484.00	512.25
12	0W2	1315.00	693.00	180.50	517.50	138.75	138.25	96.50	144.00	215.25	26.00	189.25	18.25	25.00	18.00	428.50	156.50	3.50	153.00	1.75	0.00	120.25	0.00	120.25	0.00	153.00	0.00	153.00	7.00	425.00	205.00	1122.00	887.50	467.00	425.00
13	N1E1	993.00	218.50	10.50	208.00	39.75	99.25	22.00	47.00	170.50	27.00	143.50	67.75	12.00	24.00	604.00	377.50	89.00	288.50	44.25	78.75	78.25	0.00	78.25	0.00	148.25	0.00	148.25	332.00	272.00	126.50	866.50	389.00	117.00	272.00
14	N1W1	1169.00	448.25	116.50	332.25	88.50	105.25	51.00	96.50	253.00	41.50	211.50	53.25	26.75	50.75	478.00	224.25	33.50	192.25	12.00	25.25	89.75	0.00	89.75	0.00	170.50	0.00	170.50	108.00	370.00	189.00	984.50	701.25	335.00	370.00
15	N2W1	824.00	396.50	108.50	291.00	84.75	90.75	43.00	76.50	160.75	27.00	133.75	20.75	12.00	18.00	280.25	138.75	15.50	123.25	6.00	9.00	55.00	0.00	55.00	0.00	94.50	0.00	94.50	45.50	250.75	141.50	682.50	549.25	298.50	250.75
16	N3W1	844.50	385.25	97.50	287.75	81.00	92.50	39.50	76.00	162.00	27.00	135.00	24.00	12.00	18.50	301.75	145.50	16.50	129.75	6.00	11.00	57.50	0.00	57.50	0.00	103.00	0.00	103.00	50.50	256.25	140.00	704.50	542.75	286.50	256.25
17	S10E1	2011.50	489.75	25.50	464.25	68.00	100.75	151.50	144.00	350.50	14.00	337.00	62.75	107.25	99.00	1171.25	308.00	37.00	271.00	76.00	31.50	498.75	74.00	424.75	90.00	364.50	0.00	364.50	506.00	665.25	150.00	1861.50	840.25	175.00	665.25
18	S10E2	1883.50	387.50	0.00	387.50	40.75	69.25	136.00	171.00	271.25	0.00	271.25	45.75	90.50	135.00	1252.50	293.75	37.00	256.75	90.00	64.75	489.00	83.00	409.00	99.00	469.75	7.00	469.75	621.50	631.00	117.50	1766.50	631.00	81.50	631.00
19	S1E1	1900.00	328.25	10.50	328.25	38.75	154.00	30.75	108.00	329.50	49.00	280.50	121.25	38.25	85.50	1244.25	634.75	138.00	497.25	91.50	130.50	224.25	16.50	207.75	47.25	386.25	15.00	371.25	708.00	537.75	217.50	1682.50	657.75	120.00	537.75
20	S1E2	1539.50	247.25	0.50	247.25	21.00	122.50	18.25	85.50	224.50	19.50	205.00	93.50	23.00	67.50	1067.75	553.75	127.00	426.75	80.25	130.50	177.25	8.50	168.75	54.00	339.00	6.00	333.00	657.50	410.25	161.00	1378.50	471.75	61.50	410.25
21	S1E3	1492.00	225.00	0.00	225.00	14.50	97.25	21.50	95.00	209.00	24.50	184.50	76.25	25.75	75.00	1058.50	489.50	114.50	377.50	71.50	140.25	180.00	10.50	172.00	60.00	397.75	37.00	370.25	684.50	380.50	175.00	1318.00	434.00	53.50	380.50
22	S1E4	2193.75	326.75	0.00	326.75	0.00	56.50	30.25	256.50	255.00	0.00	255.00	43.25	22.25	202.50	1614.25	414.25	69.25	345.00	52.00	193.50	257.75	33.50	236.50	162.00	965.50	160.00	814.50	1034.75	579.50	220.25	1973.50	579.50	0.00	579.50
23	S1E5	1262.50	188.00	0.00	188.00	0.00	62.25	7.75	122.75	144.50	0.00	144.50	47.00	6.00	93.75	930.00	318.25	66.00	252.25	30.00	115.00	109.75	2.50	109.75	72.00	527.25	129.00	401.25	602.00	332.50	184.00	1083.00	332.50	0.00	332.50
24	S1W1	1791.00	637.25	145.50	493.75	142.25	139.75	88.25	135.00	479.00	92.00	407.75	83.75	70.25	121.50	717.50	249.75	7.00	249.75	36.25	4.50	214.25	12.50	203.75	13.50	261.00	0.00	261.00	110.00	619.50	238.50	1604.00	1107.50	513.00	619.50
25	S1W2	1688.50	711.50	181.50	531.00	143.00	140.00	99.50	148.50	364.50	34.00	338.50	63.00	54.00	81.00	644.25	236.50	4.50	232.00	21.00	17.75	172.50	0.00	172.50	0.00	242.75	0.00	242.75	82.00	563.25	216.50	1483.50	1046.50	493.00	563.25
26	S1W3	637.00	396.00	155.00	241.00	65.75	62.75	45.00	67.50	65.75	0.00	65.75	0.00	0.00	0.00	175.25	62.75	0.00	62.75	0.00	0.00	45.00	0.00	45.00	0.00	67.50	0.00	67.50	0.00	175.25	155.00	482.00	461.75	286.50	175.25
27	S1W4	480.00	269.25	61.50	210.75	43.50	54.75	45.00	67.50	43.50	0.00	43.50	0.00	0.00	0.00	167.25	54.75	0.00	54.75	0.00	0.00	45.00	0.00	45.00	0.00	67.50	0.00	67.50	0.00	167.25	61.50	421.50	312.75	146.50	167.25
28	S2E1	2310.50	433.00	12.50	429.50	75.75	187.75	56.75	112.50	437.50	61.50	376.00	149.00	56.00	103.50	1476.75	745.50	152.00	594.00	104.25	153.00	291.25	26.50	264.75	54.00	440.00	21.50	418.50	822.00	658.25	259.00	2056.50	870.50	216.50	658.25
29	S2E2	1573.00	246.50	0.00	246.50	18.75	124.00	22.25	85.50	204.75	7.00	197.75	90.00	23.25	67.50	1174.25	583.00	141.00	442.00	92.75	148.75	209.75	17.50	192.25	54.00	381.75	26.00	355.75	775.50	406.75	184.50	1389.00	451.25	44.50	406.75
30	S2E3	1903.00	283.00	0.00	283.00	10.25	113.00	30.75	171.00	237.00	13.00	237.00	83.75	35.50	135.00	1396.50	559.75	122.50	439.25	91.25	180.25	260.25	20.00	245.75	92.00	607.75	29.50	578.25	890.00	516.25	178.00	1752.00	516.25	33.50	516.25

House number 31-60

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
31	S2E4	2001.00	289.50	0.00	289.50	0.00	43.25	42.00	204.25	237.50	0.00	237.50	37.00	39.25	161.25	1474.00	348.75	43.00	305.75	56.50	169.00	304.75	38.00	266.75	140.00	828.00	157.00	674.50	947.00	527.00	238.00	1763.00	527.00	0.00	527.00
32	S2E5	1182.00	159.00	0.00	159.00	0.00	4.50	0.00	156.75	125.75	0.00	125.75	4.00	0.00	123.75	897.25	143.25	8.00	139.25	0.00	135.00	99.00	0.00	99.00	99.00	658.00	146.50	511.50	612.50	284.75	150.50	1031.50	284.75	0.00	284.75
33	S2E6	721.00	90.25	0.00	90.25	0.00	0.00	0.00	90.25	71.25	0.00	71.25	0.00	0.00	71.25	559.50	76.00	0.00	76.00	0.00	76.00	57.00	0.00	57.00	57.00	426.50	132.00	294.50	398.00	161.50	132.00	589.00	161.50	0.00	161.50
34	S2W2	2120.00	824.75	194.50	631.25	167.25	158.50	125.50	180.00	485.00	80.00	405.00	79.00	65.75	95.50	817.50	272.00	12.00	266.50	30.00	31.50	244.00	17.50	226.50	18.00	301.50	0.00	301.50	169.50	700.50	295.50	1829.50	1302.50	602.00	700.50
35	S2W3	829.00	488.50	159.00	340.50	82.00	81.50	73.50	103.50	82.00	0.00	82.00	0.00	0.00	0.00	258.50	81.50	0.00	81.50	0.00	0.00	73.50	0.00	73.50	0.00	103.50	0.00	103.50	0.00	258.50	159.00	681.00	570.50	312.00	258.50
36	S2W4	531.00	300.25	84.00	224.25	41.50	50.50	70.25	63.00	51.25	0.00	51.25	0.00	10.75	0.00	191.75	50.50	0.00	50.50	0.00	0.00	78.25	0.00	78.25	0.00	63.00	0.00	63.00	0.00	191.75	84.00	464.50	349.00	167.00	191.75
37	S3E3	2642.00	418.00	0.00	418.00	12.00	138.25	44.75	223.25	370.50	19.00	351.50	109.25	54.25	176.25	1853.50	694.75	133.00	561.75	118.00	196.75	364.25	31.00	333.25	116.25	794.50	82.00	712.50	1108.00	745.50	265.00	2377.00	788.50	43.00	745.50
38	S3E4	1587.50	229.75	0.00	229.75	0.00	0.00	30.25	199.50	177.00	0.00	177.00	0.00	19.50	157.50	1181.50	175.00	0.00	175.00	15.75	165.00	219.50	30.00	189.50	129.00	792.50	141.50	651.00	775.50	406.75	167.50	1420.00	406.75	0.00	406.75
39	S3E5	1879.50	253.00	0.00	253.00	0.00	13.00	27.50	223.25	205.25	0.00	205.25	2.00	27.00	176.25	1421.25	243.00	4.00	239.00	43.75	191.00	263.75	24.50	239.25	141.00	914.50	183.00	731.50	963.00	458.25	211.50	1668.00	458.25	0.00	458.25
40	S3E6	799.50	99.75	0.00	99.75	0.00	0.00	0.00	99.75	78.75	0.00	78.75	0.00	0.00	78.75	621.00	84.00	0.00	84.00	0.00	84.00	63.00	0.00	63.00	63.00	474.00	148.50	325.50	442.50	178.50	148.50	651.00	178.50	0.00	178.50
41	S3W1	2559.50	710.00	119.50	596.00	145.75	165.50	98.25	198.00	659.25	126.50	532.75	125.50	105.50	166.50	1190.25	429.00	42.00	387.00	44.75	54.00	308.50	25.50	284.50	36.00	454.50	0.00	454.50	335.50	854.75	309.00	2253.00	1369.25	531.00	854.75
42	S3W2	2007.00	796.25	188.50	612.75	154.75	151.75	126.25	180.00	460.50	76.50	384.75	77.75	63.25	91.50	752.50	241.50	0.00	241.50	12.00	0.00	228.50	13.50	215.00	13.50	285.00	0.00	285.00	64.50	688.00	271.00	1736.50	1254.75	567.00	688.00
43	S3W3	1132.00	609.75	178.00	431.75	106.25	101.50	90.50	144.00	165.00	17.00	148.00	8.50	14.25	22.50	362.50	108.50	0.00	108.50	0.00	0.00	102.00	0.00	102.00	0.00	166.50	0.00	166.50	0.00	362.50	195.00	937.00	769.50	407.00	362.50
44	S4E1	2552.00	457.75	0.00	457.75	33.50	197.25	63.25	171.00	437.75	49.00	388.75	155.75	69.75	135.00	1706.00	770.00	152.00	621.00	111.75	157.50	358.25	31.50	328.25	90.00	586.00	38.00	549.00	920.50	792.00	268.00	2284.00	895.50	116.00	792.00
45	S4E2	2589.50	426.75	0.00	426.75	16.50	183.75	67.75	171.00	368.00	19.00	355.00	145.25	68.75	135.00	1816.00	790.75	157.00	634.75	127.50	178.25	402.00	39.50	363.00	99.00	632.25	49.00	583.25	1051.00	765.00	255.00	2339.50	794.75	52.00	765.00
46	S4E3	2711.50	430.00	0.00	430.00	18.00	147.50	52.25	256.50	384.00	25.50	361.50	116.50	56.25	202.50	1897.50	712.50	132.00	580.50	119.75	202.00	379.75	31.00	359.25	150.75	887.75	82.00	811.75	1135.00	762.50	265.00	2447.00	814.00	61.50	762.50
47	S4E4	1404.00	197.25	0.00	197.25	0.00	9.50	52.00	152.00	152.50	0.00	152.50	7.50	35.50	120.00	1054.25	179.75	14.00	165.75	36.75	125.00	264.00	43.50	221.50	105.00	632.00	134.00	502.00	704.50	349.75	188.00	1217.00	349.75	0.00	349.75
48	S4E5	2024.50	276.00	0.00	276.00	0.00	42.75	10.00	223.25	230.25	0.00	230.25	33.75	20.25	176.25	1518.25	370.00	48.00	322.00	54.50	191.00	233.25	7.50	225.75	141.00	915.00	184.50	731.50	1012.00	506.25	239.00	1785.50	506.25	0.00	506.25
49	S4E6	872.00	109.25	0.00	109.25	0.00	0.00	0.00	109.25	86.25	0.00	86.25	0.00	0.00	86.25	676.50	95.00	0.00	95.00	0.00	95.00	68.00	0.00	68.00	68.00	513.50	155.00	358.50	481.00	195.50	155.00	717.00	195.50	0.00	195.50
50	S4W1	2377.00	680.50	96.50	592.00	149.75	165.50	103.75	175.50	618.50	120.00	514.50	119.50	96.75	148.50	1091.50	392.25	29.00	363.25	44.75	45.00	294.25	25.50	268.75	36.00	405.00	0.00	405.00	306.00	785.50	255.00	2122.00	1285.50	511.50	785.50
51	S4W2	2050.50	798.75	185.50	618.75	157.00	152.50	129.25	184.50	471.25	79.00	392.25	80.00	63.50	94.50	783.25	248.50	0.00	248.50	16.00	0.00	242.25	17.50	224.75	18.00	292.50	0.00	292.50	85.50	697.75	282.00	1768.50	1270.00	575.00	697.75
52	S4W3	776.50	444.75	146.00	307.75	75.25	84.50	58.00	101.50	90.75	8.50	82.25	8.50	3.25	8.00	251.00	93.00	0.00	93.00	0.00	0.00	61.25	0.00	61.25	0.00	109.50	0.00	109.50	0.00	251.00	147.50	639.50	528.50	296.50	251.00
53	S5E1	2957.50	571.75	3.50	568.25	33.50	207.00	88.00	256.50	529.25	49.00	480.25	166.25	91.00	202.50	1856.50	787.75	154.00	634.25	115.50	157.50	422.75	41.50	381.25	90.00	720.50	38.00	684.00	951.00	983.50	273.50	2696.50	1101.00	119.50	983.50
54	S5E2	2667.50	464.25	0.00	464.25	0.00	160.50	67.75	256.50	372.75	0.00	372.75	126.75	68.75	202.50	1860.00	734.50	142.00	593.00	131.75	180.00	424.00	44.00	380.00	144.00	795.25	49.00	769.25	1059.00	837.00	227.50	2490.00	837.00	0.00	837.00
55	S5E3	2710.50	435.50	0.00	435.50	13.00	113.00	54.50	256.50	385.00	29.00	356.00	89.00	51.50	202.50	1890.00	585.25	95.00	490.25	102.75	185.50	409.25	52.50	369.25	162.00	906.50	106.50	806.50	1129.50	765.50	261.00	2449.50	820.50	55.00	765.50
56	S5E5	1370.50	180.50	0.00	180.50	0.00	8.00	4.75	175.75	144.25	0.00	144.25	6.50	5.50	138.75	1045.75	183.75	16.50	167.25	6.50	152.00	134.25	8.00	126.25	112.00	755.50	181.50	578.50	721.00	324.75	192.00	1185.50	324.75	0.00	324.75
57	S5E6	944.50	118.75	0.00	118.75	0.00	0.00	0.00	118.75	93.75	0.00	93.75	0.00	0.00	93.75	732.00	103.00	0.00	103.00	0.00	103.00	75.00	0.00	75.00	75.00	554.00	163.50	390.50	519.50	212.50	163.50	781.00	212.50	0.00	212.50
58	S5W1	2030.50	693.75	108.50	592.25	152.75	148.25	118.75	175.50	588.50	119.00	469.50	110.00	87.50	121.50	763.50	255.25	4.50	255.25	0.00	0.00	211.25	7.00	206.25	0.00	297.00	0.00	297.00	9.50	758.50	214.50	1818.00	1267.00	514.75	758.50
59	S5W2	2090.50	820.00	155.00	674.50	161.50	161.75	144.25	207.00	454.00	73.00	381.50	69.75	61.50	90.00	818.50	246.25	0.00	246.25	16.00	0.00	257.25	17.50	239.75	18.00	315.00	0.00	315.00	85.50	733.00	245.50	1857.00	1273.50	541.00	733.00
60	S5W3	848.00	513.25	178.50	334.75	90.50	83.00	66.75	94.50	90.50	0.00	90.50	0.00	0.00	0.00	244.25	83.00	0.00	83.00	0.00	0.00	66.75	0.00	66.75	0.00	94.50	0.00	94.50	0.00	244.25	178.50	669.50	603.75	359.50	244.25

House number 61-80

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
61	S6E1	3061.00	601.75	3.50	599.25	50.25	191.25	101.25	256.50	554.25	45.50	508.75	152.25	103.75	202.50	1911.25	722.75	127.00	601.75	130.50	130.50	471.00	41.50	433.00	103.50	726.75	36.50	690.25	917.00	1007.50	241.50	2819.50	1156.00	149.50	1007.50
62	S6E2	3032.50	529.25	0.00	529.25	25.00	178.00	94.25	256.50	455.75	25.50	442.25	140.50	94.75	202.50	2047.50	742.25	130.00	615.75	137.75	167.25	525.25	54.50	470.75	144.00	818.75	51.50	770.25	1116.50	932.50	248.00	2790.00	985.00	75.00	932.50
63	S6E3	2009.00	318.50	0.00	318.50	9.25	80.00	62.50	204.25	273.75	22.00	262.25	64.75	59.00	161.25	1436.75	425.00	60.50	368.00	88.25	161.50	391.75	60.50	332.25	153.75	720.75	94.50	680.75	898.50	565.25	223.50	1876.00	589.75	40.50	565.25
64	S6E5	1121.00	146.25	0.00	146.25	0.00	0.00	13.25	133.00	115.25	0.00	115.25	0.00	11.50	105.00	859.50	122.75	0.00	122.75	10.75	112.00	140.00	18.50	124.00	89.75	597.25	158.00	439.75	598.00	261.50	173.00	948.00	261.50	0.00	261.50
65	S6E6	1433.00	192.25	0.00	192.25	0.00	17.75	9.50	166.25	151.75	0.00	151.75	13.00	7.50	131.25	1089.00	204.25	2.00	202.25	28.00	147.00	160.00	10.00	150.00	105.00	727.00	177.50	549.50	745.00	344.00	189.50	1243.50	344.00	0.00	344.00
66	S6W1	2019.50	673.75	81.50	650.25	152.75	172.50	118.75	211.50	590.25	122.00	468.75	109.00	85.50	121.50	780.75	265.50	0.00	265.50	0.00	0.00	204.25	0.00	204.25	0.00	319.50	0.00	319.50	0.00	780.75	203.00	1859.00	1264.00	508.50	780.75
67	S6W2	1944.00	798.75	155.50	645.25	164.50	154.75	137.00	189.00	416.75	67.00	349.75	58.50	54.75	72.00	730.50	225.25	0.00	225.25	12.00	0.00	230.75	13.50	217.25	13.50	274.50	0.00	274.50	64.50	666.00	232.00	1712.00	1213.50	547.50	666.00
68	S7E1	3026.50	683.75	45.50	638.25	93.75	172.75	134.50	256.50	620.75	77.00	543.75	143.25	122.00	202.50	1722.00	592.75	84.50	508.25	119.50	98.75	519.00	67.00	454.50	90.00	631.75	0.00	631.75	756.50	1030.00	261.50	2765.00	1304.50	276.00	1030.00
69	S7E2	2908.00	529.50	0.00	529.50	34.00	146.75	120.25	256.50	470.75	33.00	439.25	118.00	89.00	202.50	1912.75	619.25	101.50	517.75	132.75	120.25	531.25	81.50	460.50	144.00	774.75	54.00	723.25	1013.50	903.50	252.00	2657.00	1000.25	99.50	903.50
70	S7E3	2312.50	405.00	0.00	405.00	24.25	102.00	107.75	171.00	331.75	22.00	315.25	80.50	75.50	135.00	1575.75	467.00	66.50	400.50	104.50	113.50	481.75	72.50	409.25	121.50	631.50	91.50	541.00	904.00	671.75	247.00	2065.50	736.75	65.00	671.75
71	S7E5	763.00	95.00	0.00	95.00	0.00	0.00	0.00	95.00	75.00	0.00	75.00	0.00	0.00	75.00	593.00	80.00	0.00	80.00	0.00	80.00	60.00	0.00	60.00	60.00	453.00	143.00	310.00	423.00	170.00	143.00	620.00	170.00	0.00	170.00
72	S7W1	1973.00	660.00	29.50	643.25	141.75	172.50	117.50	211.50	537.25	119.00	418.25	98.00	81.00	108.00	783.00	265.50	0.00	265.50	4.00	0.00	203.50	11.00	198.50	0.00	319.50	0.00	319.50	19.00	780.75	153.50	1839.50	1192.25	416.50	780.75
73	S8E1	2170.50	483.00	5.00	483.00	0.00	122.00	159.25	229.50	369.75	0.00	369.75	101.25	115.00	166.50	1317.75	397.50	51.50	346.00	85.50	44.25	459.25	59.00	402.25	54.00	489.75	0.00	489.75	465.00	852.75	106.50	2064.00	852.75	5.00	852.75
74	S8E2	2430.50	469.75	0.00	469.75	55.00	111.75	133.25	171.00	349.00	0.00	349.00	72.25	95.00	135.00	1627.75	469.75	77.00	393.50	112.75	101.75	553.75	84.00	469.75	135.00	604.25	61.50	542.75	921.50	707.25	222.50	2220.50	817.25	110.00	707.25
75	S8E3	830.50	218.25	0.00	218.25	25.75	34.75	93.25	64.50	95.75	2.00	93.75	4.00	47.50	30.00	605.75	87.50	0.00	87.50	53.75	24.50	315.25	62.50	252.75	86.50	219.00	40.00	179.00	427.00	260.50	101.00	768.50	314.00	53.50	260.50
76	S8E5	719.00	90.25	0.00	90.25	0.00	0.00	0.00	90.25	71.25	0.00	71.25	0.00	0.00	71.25	557.50	76.00	0.00	76.00	0.00	76.00	57.00	0.00	57.00	57.00	424.50	130.00	294.50	396.00	161.50	130.00	589.00	161.50	0.00	161.50
77	S8W1	2162.50	712.50	51.00	661.50	146.75	172.50	149.50	211.50	565.25	118.00	456.75	101.00	89.50	121.50	890.25	289.50	4.50	285.00	15.25	10.75	266.00	15.50	250.50	0.00	334.75	0.00	334.75	72.00	826.25	180.50	1982.00	1272.25	454.00	826.25
78	S9E1	2058.25	526.25	48.00	479.75	83.50	102.00	159.25	171.00	376.25	24.75	354.75	75.00	115.00	135.00	1182.75	321.25	40.00	281.25	76.00	42.25	498.75	74.00	424.75	90.00	402.25	0.00	402.25	506.00	746.50	165.25	1893.00	884.00	219.00	746.50
79	S9E2	2360.00	504.00	0.00	504.00	73.75	117.75	141.50	171.00	405.25	28.50	376.75	72.25	110.25	135.00	1479.25	391.25	48.50	359.75	97.00	78.75	551.75	82.00	470.25	121.50	536.25	30.00	506.25	745.00	743.75	174.00	2196.50	891.75	176.00	743.75
80	S9W1	2278.50	755.25	97.00	666.25	151.50	159.00	149.50	207.00	582.50	114.50	468.50	105.25	92.00	126.00	973.00	303.25	9.50	298.25	29.75	10.75	312.50	31.50	281.00	31.50	357.25	0.00	357.25	185.00	838.75	233.50	2054.00	1320.50	501.50	838.75

Appendix 8: The wayfaring statistic result of *Saqacengalj* with social attitude set as 102550804020

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
1	00	1787.00	508.20	69.20	441.80	112.80	141.40	61.60	126.00	449.00	80.00	369.00	98.00	57.60	100.80	889.40	415.00	67.60	347.40	46.40	68.40	175.80	6.40	172.60	10.80	298.60	0.00	298.60	323.60	585.00	210.80	1579.80	925.60	359.20	585.20
2	0E1	1407.00	270.00	13.60	261.00	33.20	121.40	22.20	86.40	224.20	21.60	213.00	94.80	22.40	64.80	919.20	491.60	112.00	381.40	68.80	104.00	146.20	4.00	142.20	28.80	283.80	0.00	283.80	516.80	411.80	134.80	1273.80	493.60	101.60	412.00
3	0E6	582.40	72.20	0.00	72.20	0.00	5.40	0.00	72.20	57.00	0.00	57.00	0.00	0.00	57.00	453.20	60.80	1.60	60.80	0.00	60.80	45.60	0.00	45.60	45.60	346.80	111.20	235.60	324.00	129.20	111.20	471.20	129.20	0.00	129.20
4	0N1	1519.80	463.20	64.00	399.20	87.60	135.40	52.40	126.00	350.20	62.80	287.40	77.60	43.80	79.20	713.80	344.80	57.60	288.80	32.40	46.80	125.40	0.00	125.40	0.00	251.80	0.00	251.80	214.40	510.00	184.40	1340.60	812.20	302.00	510.20
5	0S2	2066.60	478.00	62.40	442.40	81.40	174.40	67.40	126.00	498.40	95.20	403.20	140.20	74.40	115.20	1123.80	529.40	78.40	452.60	55.20	82.80	241.80	16.00	225.80	28.80	352.60	0.00	352.60	426.40	697.40	234.40	1867.80	969.00	305.20	697.60
6	0S3	2586.00	629.80	52.40	581.20	125.00	194.00	82.20	180.00	661.80	127.20	534.60	157.60	93.60	158.40	1307.40	567.60	79.20	489.60	55.20	82.80	290.80	18.40	272.40	41.40	462.20	0.00	462.20	442.00	865.40	270.40	2337.20	1287.00	421.20	865.80
7	0S4	2865.60	672.60	18.40	672.60	95.60	207.20	99.40	273.60	720.80	118.00	602.80	172.80	122.60	216.00	1503.40	541.40	46.00	513.60	70.00	80.00	356.00	23.60	343.20	54.00	608.40	0.00	608.40	462.40	1090.80	206.00	2696.40	1393.40	327.60	1091.60
8	0S5	2843.20	657.40	4.00	656.80	86.40	207.20	109.20	273.60	702.00	116.00	588.00	172.80	122.80	216.00	1498.40	534.80	32.80	513.60	68.00	65.60	359.60	22.80	350.60	57.60	608.40	0.00	608.40	407.60	1090.80	171.60	2710.80	1358.80	292.00	1091.60
9	0S6	2494.80	645.40	40.00	606.00	107.60	177.20	108.80	230.40	606.40	104.80	509.20	147.20	112.00	165.60	1306.80	451.00	14.40	440.60	60.80	55.40	349.20	15.20	334.00	57.60	508.20	0.00	508.20	371.60	935.20	139.20	2386.80	1230.00	335.60	936.00
10	0S7	2326.80	675.00	48.00	634.20	119.40	159.20	126.80	230.40	587.40	93.60	505.00	129.20	112.00	158.40	1080.00	392.00	32.00	360.00	45.00	33.80	270.00	12.00	262.00	0.00	421.80	0.00	421.80	197.60	897.20	164.80	2162.00	1261.20	370.00	898.00
11	0W1	1414.60	641.20	160.80	480.40	130.40	128.00	88.80	133.20	275.00	38.80	236.20	38.80	33.40	44.80	500.00	206.80	16.00	190.80	9.00	18.20	131.20	0.00	131.20	0.00	181.60	0.00	181.60	69.60	455.60	202.40	1212.20	916.20	460.40	455.80
12	0W2	1177.60	635.20	184.00	459.20	126.40	122.00	84.80	126.00	187.40	20.80	166.60	14.60	20.00	14.40	372.20	136.60	2.80	133.80	1.40	0.00	103.80	0.00	103.80	0.00	132.80	0.00	132.80	5.60	369.40	199.60	987.60	806.20	440.00	369.80
13	N1E1	857.20	182.40	8.40	174.00	31.80	87.00	17.60	37.60	142.40	21.60	120.80	60.20	9.60	19.20	532.40	339.20	82.80	256.40	40.20	70.20	67.40	0.00	67.40	0.00	125.80	0.00	125.80	301.20	231.20	112.80	744.40	324.80	93.60	231.20
14	N1W1	1075.40	443.40	122.40	321.00	87.00	101.40	48.40	91.60	218.60	33.20	185.40	42.60	21.40	40.60	421.40	196.60	26.80	171.00	9.60	20.20	79.40	0.00	79.40	0.00	150.60	0.00	150.60	86.40	335.00	180.40	895.40	662.00	329.60	335.20
15	N2W1	816.40	406.00	109.60	301.20	86.80	94.80	43.60	79.20	147.60	21.60	126.00	16.60	9.60	14.40	273.20	133.20	12.40	120.80	4.80	7.20	53.20	0.00	53.20	0.00	93.60	0.00	93.60	36.40	250.00	133.60	682.80	547.20	297.20	250.00
16	N3W1	822.40	388.60	92.00	296.60	82.20	96.20	40.40	78.80	147.00	21.60	125.40	19.20	9.60	14.80	290.40	138.60	13.20	126.00	4.80	8.80	54.80	0.00	54.80	0.00	100.40	0.00	100.40	40.40	254.00	126.00	696.40	532.00	278.00	254.00
17	S10E1	1762.40	424.20	20.40	403.80	54.40	80.60	153.60	115.20	297.40	11.20	286.60	50.20	102.80	79.20	1040.80	256.00	29.60	226.40	70.40	25.20	482.80	73.20	409.60	82.80	302.00	0.00	302.00	459.60	581.20	134.00	1628.40	721.60	140.00	581.60
18	S10E2	1656.40	332.40	0.00	332.40	32.60	55.40	133.20	136.80	232.20	0.00	232.20	36.60	87.60	108.00	1112.00	246.80	29.60	217.80	86.80	51.80	475.40	84.80	393.00	93.60	389.80	5.60	389.80	568.40	544.00	112.40	1544.40	544.40	65.20	544.40
19	S1E1	1643.40	277.80	8.40	277.80	31.00	138.40	24.60	86.40	275.60	39.20	236.40	109.00	30.60	68.40	1091.60	580.20	131.60	449.00	82.80	118.80	189.00	13.20	175.80	37.80	323.20	12.00	311.20	635.60	457.20	195.20	1448.20	553.40	96.00	457.40
20	S1E2	1303.80	207.20	0.40	207.20	16.80	107.40	14.60	68.40	187.20	15.60	171.60	82.40	18.40	54.00	909.40	486.40	116.00	370.40	69.00	111.60	146.60	6.80	139.80	43.20	278.20	4.80	273.40	564.40	345.00	143.20	1160.60	394.40	49.20	345.20
21	S1E3	1271.80	187.60	0.00	187.60	11.60	85.40	17.20	76.00	173.20	19.60	153.60	67.00	20.60	60.00	911.40	437.20	104.80	334.80	62.00	126.60	148.80	8.40	142.40	48.00	332.40	29.60	310.40	599.20	317.80	152.80	1119.80	360.80	42.80	318.00
22	S1E4	2178.20	327.00	0.00	327.00	0.00	42.40	24.20	273.60	255.60	0.00	255.60	32.00	17.80	216.00	1597.60	371.00	55.40	315.60	41.60	194.40	230.60	26.80	230.60	172.80	997.60	150.40	856.00	1014.20	583.40	197.00	1981.40	580.60	0.00	580.60
23	S1E5	1051.20	155.00	0.00	155.00	0.00	49.80	6.20	105.80	118.60	0.00	118.60	37.60	4.80	80.80	784.20	257.80	52.80	205.00	24.00	107.20	90.20	2.00	90.20	62.40	462.00	116.40	346.40	517.20	272.80	160.40	891.20	272.80	0.00	272.80
24	S1W1	1563.40	570.00	142.00	429.00	127.80	124.40	76.40	118.80	428.80	82.80	364.20	76.60	60.40	108.00	618.40	222.00	5.60	222.00	29.00	3.60	175.20	10.00	166.80	10.80	223.00	0.00	223.00	88.00	540.00	205.60	1399.00	972.20	454.80	540.20
25	S1W2	1474.00	659.60	183.60	479.60	132.00	124.80	89.60	133.20	308.60	27.20	287.80	50.40	43.20	64.80	543.80	198.80	3.60	195.20	16.80	14.20	148.80	0.00	148.80	0.00	208.20	0.00	208.20	65.60	479.00	208.80	1277.20	934.80	463.20	479.40
26	S1W3	602.80	380.80	158.00	222.80	62.80	58.00	40.80	61.20	62.80	0.00	62.80	0.00	0.00	0.00	159.20	58.00	0.00	58.00	0.00	0.00	40.80	0.00	40.80	0.00	60.40	0.00	60.40	0.00	159.20	158.00	444.80	443.60	283.60	160.00
27	S1W4	512.00	287.20	63.20	224.80	46.40	58.40	48.00	72.00	46.40	0.00	46.40	0.00	0.00	0.00	178.40	58.40	0.00	58.40	0.00	0.00	48.00	0.00	48.00	0.00	72.00	0.00	72.00	0.00	178.40	63.20	449.60	333.60	155.20	178.40
28	S2E1	2057.00	380.00	10.00	377.20	60.60	183.80	45.40	90.00	376.40	49.20	327.20	145.60	44.80	82.80	1330.00	715.20	151.20	565.20	95.40	140.40	245.00	21.20	223.80	43.20	369.80	17.20	352.60	746.40	586.40	236.80	1825.00	756.40	173.20	586.60
29	S2E2	1394.60	206.60	0.00	206.60	15.00	108.60	17.80	68.40	171.40	5.60	165.80	83.40	18.60	54.00	1046.40	547.00	137.60	409.40	82.60	137.20	176.20	14.00	162.20	43.20	323.40	20.80	302.60	698.40	348.20	172.40	1222.60	378.00	35.60	348.40
30	S2E3	1654.40	235.20	0.00	235.20	8.20	99.20	24.60	136.80	198.60	10.40	198.60	73.80	28.40	108.00	1228.80	512.00	116.40	397.20	80.20	173.20	215.40	16.00	203.80	73.60	514.80	23.60	491.20	803.60	433.00	160.80	1514.40	433.40	26.80	433.40

House number 31-60

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
31	S2E4	1793.60	258.20	0.00	258.20	0.00	34.60	33.60	190.00	211.00	0.00	211.00	29.60	31.40	150.00	1324.40	299.00	34.40	264.60	45.20	155.20	260.60	30.40	230.20	137.60	777.60	150.40	632.00	856.00	468.40	215.20	1578.40	469.20	0.00	469.20
32	S2E5	1038.80	138.60	0.00	138.60	0.00	3.60	0.00	136.80	109.60	0.00	109.60	3.20	0.00	108.00	790.60	133.00	6.40	131.20	0.00	131.20	86.40	0.00	86.40	86.40	582.40	136.40	446.00	554.80	247.80	139.60	899.20	248.20	0.00	248.20
33	S2E6	700.60	87.40	0.00	87.40	0.00	0.00	0.00	87.40	69.00	0.00	69.00	0.00	0.00	69.00	544.20	73.60	0.00	73.60	0.00	73.60	55.20	0.00	55.20	55.20	415.40	130.40	285.00	388.00	156.20	130.40	570.20	156.40	0.00	156.40
34	S2W2	1906.00	783.00	191.20	592.60	164.20	144.80	118.00	165.60	418.40	64.00	354.40	63.20	52.60	76.40	710.40	235.60	9.60	231.20	24.00	25.20	212.80	14.00	198.80	14.40	262.00	0.00	262.00	135.60	616.80	270.80	1638.00	1195.60	578.00	617.60
35	S2W3	776.80	466.00	163.20	311.60	77.20	74.80	66.00	93.60	77.20	0.00	77.20	0.00	0.00	0.00	233.60	74.80	0.00	74.80	0.00	0.00	66.00	0.00	66.00	0.00	92.80	0.00	92.80	0.00	233.60	163.20	622.40	543.20	308.80	234.40
36	S2W4	487.60	278.60	81.20	203.80	39.20	46.80	61.00	57.60	47.00	0.00	47.00	0.00	8.60	0.00	171.80	46.80	0.00	46.80	0.00	0.00	67.40	0.00	67.40	0.00	57.60	0.00	57.60	0.00	171.80	81.20	420.40	323.60	159.60	171.80
37	S3E3	2477.60	392.20	0.00	392.20	9.60	126.40	35.80	220.40	342.00	15.20	326.80	99.80	43.40	174.00	1743.40	668.20	129.60	538.60	112.80	199.60	316.40	24.80	291.60	99.60	758.80	65.60	693.20	1044.00	699.40	235.20	2242.40	734.20	34.40	699.80
38	S3E4	1438.40	206.60	0.00	206.60	0.00	0.00	24.20	182.40	159.60	0.00	159.60	0.00	15.60	144.00	1072.80	156.80	0.00	156.80	12.60	148.80	190.20	24.00	167.80	120.00	728.00	133.60	594.40	708.00	365.40	154.40	1284.00	366.20	0.00	366.20
39	S3E5	1822.80	244.20	0.00	244.20	0.00	10.40	22.00	220.40	197.20	0.00	197.20	1.60	21.60	174.00	1381.40	232.00	3.20	228.80	35.00	190.40	237.40	19.60	217.80	139.20	912.00	188.40	723.60	940.40	441.00	211.20	1611.60	441.40	0.00	441.40
40	S3E6	793.40	98.80	0.00	98.80	0.00	0.00	0.00	98.80	78.00	0.00	78.00	0.00	0.00	78.00	616.60	83.20	0.00	83.20	0.00	83.20	62.40	0.00	62.40	62.40	471.00	148.80	322.20	440.00	176.60	148.80	644.60	176.80	0.00	176.80
41	S3W1	2301.20	626.60	95.60	535.40	139.00	145.20	88.00	180.00	620.20	124.80	495.40	117.60	98.60	158.40	1054.40	375.40	33.60	341.80	35.80	43.20	270.40	20.40	251.20	28.80	410.00	0.00	410.00	268.40	786.00	272.00	2032.40	1246.80	481.60	786.40
42	S3W2	1815.20	760.20	185.20	577.40	147.00	141.60	119.60	169.20	391.60	61.20	331.00	62.20	50.60	73.20	665.20	213.40	0.00	213.40	9.60	0.00	201.40	10.80	190.60	10.80	252.40	0.00	252.40	51.60	613.60	252.40	1562.80	1150.00	535.60	614.40
43	S3W3	1055.20	579.80	176.00	403.80	99.00	95.40	82.00	133.20	143.60	13.60	130.00	6.80	11.40	18.00	333.40	101.00	0.00	101.00	0.00	0.00	91.20	0.00	91.20	0.00	150.40	0.00	150.40	0.00	333.40	189.60	865.60	721.80	387.60	334.20
44	S4E1	2272.00	402.40	0.00	402.40	26.80	194.00	50.60	136.80	378.80	39.20	339.60	153.20	55.80	108.00	1530.40	746.00	152.00	597.60	103.80	147.60	301.00	25.20	277.00	72.00	490.00	30.40	460.40	837.60	698.00	243.60	2028.40	781.20	92.80	698.40
45	S4E2	2309.20	369.20	0.00	369.20	13.20	174.80	54.20	136.80	316.20	15.20	305.80	138.00	55.00	108.00	1640.80	768.40	158.40	610.00	127.20	170.00	346.80	31.60	315.60	79.20	532.80	39.20	493.60	979.60	661.20	237.60	2075.60	685.40	41.60	661.60
46	S4E3	2592.40	411.60	0.00	411.60	14.40	132.40	43.00	273.60	365.40	20.40	345.80	104.40	48.00	216.00	1815.40	676.40	125.20	551.20	114.80	208.00	350.00	24.80	333.20	154.80	912.40	65.60	851.60	1085.20	733.40	231.20	2387.60	777.00	49.20	734.20
47	S4E4	1257.60	176.80	0.00	176.80	0.00	7.60	41.60	140.60	137.00	0.00	137.00	6.00	28.40	111.00	943.80	150.20	11.20	140.20	29.40	113.60	223.20	34.80	189.20	96.00	580.40	123.20	460.40	630.80	313.00	165.60	1092.00	313.80	0.00	313.80
48	S4E5	1937.60	262.60	0.00	262.60	0.00	34.20	8.00	220.40	217.20	0.00	217.20	27.00	16.20	174.00	1457.80	333.60	38.40	295.20	43.60	190.40	213.00	6.00	207.00	139.20	911.20	188.40	723.60	978.40	479.40	232.00	1705.60	479.80	0.00	479.80
49	S4E6	880.60	110.20	0.00	110.20	0.00	0.00	0.00	110.20	87.00	0.00	87.00	0.00	0.00	87.00	683.40	95.20	0.00	95.20	0.00	95.20	68.80	0.00	68.80	68.80	519.40	158.40	361.00	486.40	197.00	158.40	722.20	197.20	0.00	197.20
50	S4W1	2068.80	586.80	77.20	516.00	144.00	143.20	86.80	144.00	571.60	120.80	466.00	108.80	84.60	129.60	922.20	337.80	23.20	314.60	35.80	36.00	246.40	20.40	226.00	28.80	338.00	0.00	338.00	244.80	677.40	226.40	1842.40	1146.60	482.40	677.80
51	S4W2	1850.00	762.20	184.40	592.20	150.40	144.60	124.40	176.40	400.20	63.20	337.00	64.00	50.80	75.60	698.20	221.40	0.00	221.40	12.80	0.00	214.80	14.00	200.80	14.40	262.00	0.00	262.00	68.40	629.80	261.60	1607.60	1162.40	542.40	630.60
52	S4W3	767.60	445.20	150.40	304.20	74.40	81.80	58.40	99.20	86.40	6.80	79.60	6.80	2.60	6.40	244.20	88.60	0.00	88.60	0.00	0.00	61.00	0.00	61.00	0.00	104.80	0.00	104.80	0.00	244.20	151.60	626.80	525.80	299.20	245.00
53	S5E1	2838.00	566.80	2.80	564.00	26.80	209.60	77.20	273.60	516.00	39.20	476.80	170.00	83.60	216.00	1755.20	777.40	154.40	625.80	109.20	151.20	371.00	33.20	337.80	72.00	708.80	30.40	679.60	876.00	988.00	250.00	2612.40	1082.80	95.60	988.80
54	S5E2	2624.80	463.00	0.00	463.00	0.00	148.80	54.20	273.60	371.00	0.00	371.00	118.00	55.00	216.00	1819.60	703.60	140.00	564.00	135.60	180.00	392.00	35.20	356.80	144.00	811.60	39.20	790.80	1015.20	833.20	208.40	2448.80	834.00	0.00	834.00
55	S5E3	2624.80	427.00	0.00	427.00	10.40	96.80	51.20	273.60	370.20	23.20	347.00	76.40	44.20	216.00	1833.80	526.80	78.80	448.00	93.20	181.60	402.40	50.40	356.40	172.80	923.20	85.20	843.20	1085.60	752.40	216.00	2408.80	797.20	44.00	753.20
56	S5E5	1248.40	163.40	0.00	163.40	0.00	6.40	3.80	159.60	130.40	0.00	130.40	5.20	4.40	126.00	954.60	163.00	13.20	149.80	5.20	137.60	119.40	6.40	113.00	101.60	694.40	183.60	524.00	661.60	293.00	183.60	1071.60	293.80	0.00	293.80
57	S5E6	937.80	117.80	0.00	117.80	0.00	0.00	0.00	117.80	93.00	0.00	93.00	0.00	0.00	93.00	727.00	101.60	0.00	101.60	0.00	101.60	74.40	0.00	74.40	74.40	551.00	164.40	386.60	516.40	210.60	164.40	773.40	210.80	0.00	210.80
58	S5W1	1834.00	599.80	86.80	518.60	148.80	129.40	98.80	144.00	570.80	121.60	449.20	104.80	82.00	115.20	675.40	231.80	3.60	231.80	0.00	0.00	184.80	5.60	180.80	0.00	258.80	0.00	258.80	7.60	671.40	198.00	1637.60	1158.60	486.80	671.80
59	S5W2	1992.80	826.80	150.40	690.00	162.60	166.60	148.40	212.40	396.60	58.40	338.60	55.80	49.20	72.00	771.00	234.20	0.00	234.20	12.80	0.00	238.80	14.00	224.80	14.40	298.00	0.00	298.00	68.40	702.60	222.80	1785.60	1223.00	520.00	703.40
60	S5W3	801.20	487.60	173.60	314.00	83.20	77.80	63.00	90.00	83.20	0.00	83.20	0.00	0.00	0.00	230.40	77.80	0.00	77.80	0.00	0.00	63.00	0.00	63.00	0.00	89.60	0.00	89.60	0.00	230.40	173.60	627.60	570.80	340.00	230.80

House number 61-80

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
61	S6E1	2973.60	592.80	2.80	590.80	40.20	184.40	92.60	273.60	542.60	36.40	506.20	147.60	102.40	216.00	1852.00	688.00	116.80	576.80	134.00	115.20	451.40	34.40	417.80	93.60	722.40	29.20	693.20	846.80	1015.80	208.40	2772.40	1135.40	119.60	1016.60
62	S6E2	2987.20	522.00	0.00	522.00	20.00	163.20	84.80	273.60	451.00	20.40	440.20	128.80	91.80	216.00	2014.20	701.60	122.00	586.80	143.60	158.80	511.80	47.60	464.20	144.00	830.40	41.20	791.60	1085.20	930.20	216.00	2775.60	973.00	60.00	931.00
63	S6E3	1858.40	289.00	0.00	289.00	7.40	64.00	60.20	190.00	230.00	17.60	225.20	51.80	53.20	150.00	1339.40	348.20	48.40	302.60	77.20	143.20	369.40	58.40	321.80	159.60	674.00	75.60	642.00	832.40	507.00	188.80	1743.60	519.00	32.40	507.80
64	S6E5	991.20	128.40	0.00	128.40	0.00	0.00	10.60	117.80	101.20	0.00	101.20	0.00	9.20	93.00	761.60	107.80	0.00	107.80	8.60	99.20	119.20	14.80	106.40	79.00	535.00	147.20	388.20	532.80	228.80	159.20	832.00	229.60	0.00	229.60
65	S6E6	1327.40	176.60	0.00	176.60	0.00	14.20	7.60	155.80	139.40	0.00	139.40	10.40	6.00	123.00	1011.40	182.60	1.60	181.00	22.40	136.80	142.40	8.00	134.40	98.40	688.20	174.40	513.80	695.60	315.80	184.00	1143.40	316.00	0.00	316.00
66	S6W1	1969.60	657.60	65.20	653.60	154.40	176.60	103.00	219.60	571.20	124.00	448.00	103.20	80.80	115.20	767.20	267.00	0.00	267.00	0.00	0.00	179.60	0.00	179.60	0.00	323.20	0.00	323.20	0.00	767.20	188.40	1844.00	1202.40	486.00	768.00
67	S6W2	1875.60	809.80	144.80	666.60	165.00	161.00	142.60	198.00	366.80	53.60	313.20	46.80	43.80	57.60	700.60	217.40	0.00	217.40	9.60	0.00	217.60	10.80	206.80	10.80	265.60	0.00	265.60	51.60	649.00	206.00	1669.60	1175.00	525.20	649.80
68	S7E1	2944.00	670.00	36.40	633.60	75.00	171.60	124.00	273.60	617.60	69.60	548.00	142.00	123.20	216.00	1656.40	538.80	67.60	479.20	117.40	79.00	492.60	62.80	432.60	82.80	637.80	0.00	637.80	678.80	1047.20	225.60	2718.40	1287.60	239.60	1048.00
69	S7E2	2839.60	523.00	0.00	523.00	27.20	138.20	115.80	273.60	463.00	26.40	437.80	110.80	88.20	216.00	1862.80	574.20	84.80	489.40	135.60	104.80	517.60	83.20	452.00	144.00	778.80	43.20	737.60	954.80	909.80	214.40	2628.40	985.20	79.60	910.60
70	S7E3	1927.20	334.20	0.00	334.20	19.40	81.60	96.40	136.80	271.40	17.60	258.20	64.40	66.40	108.00	1321.60	380.40	53.20	327.20	91.60	90.80	429.20	68.00	361.20	108.00	515.60	73.20	443.20	768.40	553.20	207.60	1719.60	605.60	52.00	553.60
71	S7E5	704.80	87.40	0.00	87.40	0.00	0.00	0.00	87.40	69.00	0.00	69.00	0.00	0.00	69.00	548.40	73.60	0.00	73.60	0.00	73.60	55.20	0.00	55.20	55.20	419.60	135.20	284.40	392.80	155.60	135.20	569.60	156.40	0.00	156.40
72	S7W1	1962.00	659.20	23.60	648.00	148.80	176.60	103.00	219.60	537.20	120.00	417.20	91.20	78.00	104.40	770.80	267.00	0.00	267.00	3.20	0.00	185.00	8.80	181.00	0.00	323.20	0.00	323.20	15.20	767.20	146.00	1832.00	1191.20	423.60	768.00
73	S8E1	2077.20	471.80	4.00	471.80	0.00	122.20	163.60	230.40	351.60	0.00	351.60	90.80	112.00	158.40	1253.80	370.80	41.20	329.60	81.20	35.40	466.00	62.40	405.20	57.60	473.80	0.00	473.80	431.20	822.60	99.60	1980.00	823.40	4.00	823.40
74	S8E2	2124.40	398.40	0.00	398.40	44.00	89.40	132.40	136.80	297.40	0.00	297.40	57.80	94.80	108.00	1441.40	394.00	61.60	333.00	115.20	81.40	542.80	87.20	456.40	132.80	504.60	49.20	455.40	836.00	605.40	197.20	1934.40	693.20	88.00	605.80
75	S8E3	695.80	178.40	0.00	178.40	20.60	27.80	78.40	51.60	79.60	1.60	78.00	3.20	42.80	24.00	526.20	73.20	0.00	73.20	46.20	19.60	287.20	60.40	226.80	72.80	178.60	32.00	146.60	360.00	215.00	91.20	641.80	258.00	42.80	215.20
76	S8E5	668.00	83.60	0.00	83.60	0.00	0.00	0.00	83.60	66.00	0.00	66.00	0.00	0.00	66.00	518.40	70.40	0.00	70.40	0.00	70.40	52.80	0.00	52.80	52.80	395.20	123.20	272.00	369.60	148.80	123.20	544.80	149.60	0.00	149.60
77	S8W1	2099.20	707.80	40.80	668.60	145.60	176.60	155.80	219.60	535.80	116.40	430.20	91.60	84.20	111.60	860.00	270.20	3.60	266.60	12.20	8.60	261.60	12.40	249.20	0.00	328.20	0.00	328.20	57.60	808.80	163.20	1936.00	1239.20	436.00	809.60
78	S9E1	1800.80	453.40	38.40	416.20	66.80	81.60	163.60	136.80	319.00	19.80	300.80	60.00	112.00	108.00	1071.60	269.80	32.00	237.80	72.00	33.80	482.80	73.20	409.60	82.80	335.80	0.00	335.80	459.60	653.00	146.20	1654.60	757.40	175.20	653.40
79	S9E2	2040.40	425.20	0.00	425.20	59.00	94.20	135.20	136.80	340.40	22.80	317.60	57.80	104.40	108.00	1297.60	327.80	38.80	302.60	92.40	63.00	526.80	85.60	443.60	111.60	443.00	24.00	419.00	672.40	632.80	157.20	1891.60	751.60	140.80	633.20
80	S9W1	2192.00	739.60	77.60	670.80	148.20	155.00	155.80	212.40	547.80	110.40	437.80	95.00	86.20	115.20	914.20	280.80	7.60	277.20	23.80	8.60	290.80	25.20	273.60	25.20	346.20	0.00	346.20	148.00	818.80	198.40	1993.60	1277.80	474.00	819.60

Appendix 9: The wayfaring statistic result of *Saqacengalj* with social attitude set as 102550903010

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
1	00	1461.70	444.10	50.60	396.90	101.10	133.20	55.60	109.80	399.20	82.80	316.40	83.60	50.10	84.60	684.20	320.80	44.60	276.20	28.00	41.40	133.10	3.20	131.50	5.40	230.30	0.00	230.30	196.40	516.80	162.80	1301.50	819.70	314.60	516.90
2	0E1	1076.70	197.30	6.80	193.10	24.30	102.40	15.50	52.20	163.00	16.20	154.60	79.80	14.00	37.80	719.50	427.10	107.00	321.60	57.20	86.20	103.10	2.00	101.10	14.40	190.50	0.00	190.50	423.40	301.60	121.20	956.90	360.30	71.60	301.70
3	0E6	570.60	70.30	0.00	70.30	0.00	2.70	0.00	70.30	55.50	0.00	55.50	0.00	0.00	55.50	444.80	59.20	0.80	59.20	0.00	59.20	44.40	0.00	44.40	44.40	341.20	111.80	229.40	319.00	125.80	111.80	458.80	125.80	0.00	125.80
4	0N1	1288.30	421.10	48.00	373.10	87.70	127.20	50.40	109.80	302.60	60.80	241.80	60.00	35.10	59.40	564.60	269.80	37.20	233.40	19.80	28.80	102.50	0.00	102.50	0.00	197.90	0.00	197.90	133.60	439.40	146.00	1144.90	723.70	284.20	439.50
5	0S2	1825.10	443.70	45.00	418.30	79.90	178.80	57.60	109.80	484.30	100.80	383.50	142.40	66.30	102.60	928.60	465.60	54.80	411.20	36.00	54.00	182.30	8.00	174.30	14.40	280.70	0.00	280.70	271.20	657.40	191.40	1661.90	919.30	285.80	657.50
6	0S3	2334.50	575.60	33.40	544.50	108.50	199.80	68.80	167.40	647.90	129.00	518.90	164.40	89.40	156.60	1124.30	509.40	56.00	454.20	36.00	54.00	224.10	9.20	214.90	20.70	398.40	0.00	398.40	278.20	846.10	223.20	2128.10	1220.60	374.20	846.40
7	0S4	2875.10	705.20	12.80	705.20	89.20	219.60	91.80	307.80	772.90	126.80	646.10	187.20	130.60	243.00	1436.50	509.90	33.80	493.80	50.80	52.60	311.90	15.40	302.40	32.40	620.50	0.00	620.50	305.60	1179.10	188.80	2728.50	1478.10	318.00	1180.00
8	0S5	2883.50	695.60	2.00	695.30	89.10	219.60	95.40	307.80	757.70	122.40	636.90	187.20	130.80	243.00	1436.30	506.20	21.80	493.80	48.80	38.20	315.40	15.40	310.20	36.00	621.90	0.00	621.90	257.20	1179.10	158.60	2750.10	1453.00	291.00	1180.00
9	0S6	2375.50	614.40	20.00	600.30	102.70	174.60	94.80	243.00	613.50	110.40	512.70	148.80	114.00	167.40	1170.50	404.00	10.40	397.00	41.60	32.00	289.80	11.20	278.60	36.00	477.50	0.00	477.50	236.60	933.90	124.60	2263.10	1215.80	308.00	934.80
10	0S7	2188.70	648.50	24.00	628.10	107.50	156.60	121.80	243.00	576.80	96.60	494.00	126.60	114.00	156.60	1000.90	345.50	19.80	325.70	32.10	21.20	241.80	9.60	235.40	0.00	419.90	0.00	419.90	132.40	890.70	129.20	2059.50	1207.60	324.40	891.60
11	0W1	1233.30	601.50	171.80	429.70	121.10	113.60	78.00	117.00	226.00	29.00	197.00	28.20	22.50	31.80	405.80	160.60	8.00	152.60	4.50	9.10	105.00	0.00	105.00	0.00	149.40	0.00	149.40	34.80	384.40	202.20	1031.10	827.50	443.00	384.50
12	0W2	1016.50	571.70	194.80	388.90	114.00	103.00	69.60	102.60	156.00	15.60	140.40	10.80	12.60	10.80	301.50	113.10	1.40	111.70	0.70	0.00	81.10	0.00	81.10	0.00	107.70	0.00	107.70	2.80	300.10	199.80	823.90	716.30	421.70	300.40
13	N1E1	708.00	144.10	4.20	139.90	23.60	75.30	13.20	27.80	112.00	16.20	95.80	51.80	7.20	13.20	451.90	297.30	77.00	220.30	35.70	58.10	56.10	0.00	56.10	0.00	98.50	0.00	98.50	263.40	188.50	97.40	610.60	256.10	67.60	188.50
14	N1W1	949.70	450.30	135.60	314.70	89.00	97.00	46.50	86.40	172.80	23.40	149.40	25.80	13.10	24.60	329.20	149.10	13.40	136.30	4.80	10.10	64.40	0.00	64.40	0.00	119.90	0.00	119.90	43.20	286.00	171.40	778.30	623.10	337.00	286.10
15	N2W1	835.40	437.70	116.40	328.50	93.60	102.90	46.50	86.40	137.70	16.20	121.50	11.50	7.20	10.80	267.80	124.00	6.20	117.80	2.40	3.60	52.50	0.00	52.50	0.00	95.40	0.00	95.40	18.20	258.20	129.00	706.40	567.60	309.40	258.20
16	N3W1	817.60	407.40	90.00	317.40	87.20	103.60	42.90	84.40	134.20	16.20	118.00	12.80	7.20	10.80	277.60	127.90	6.60	121.70	2.40	4.40	52.50	0.00	52.50	0.00	97.40	0.00	97.40	20.20	259.40	112.40	705.20	540.00	280.60	259.40
17	S10E1	1455.50	341.60	10.20	331.40	37.40	54.20	163.20	81.00	226.00	8.40	219.80	32.80	101.80	52.20	887.90	180.60	14.80	165.80	66.20	12.60	484.40	75.80	408.60	77.40	222.90	0.00	222.90	403.00	484.90	107.00	1348.50	567.60	90.60	485.20
18	S10E2	1438.70	269.60	0.00	269.60	16.30	36.10	136.20	102.60	197.50	0.00	197.50	26.50	90.00	81.00	974.10	190.00	16.00	174.80	86.40	30.20	482.40	91.20	393.00	91.80	305.30	2.80	305.30	519.00	465.30	105.80	1333.30	465.60	32.60	465.60
19	S1E1	1305.50	212.90	4.20	212.90	23.00	123.20	16.70	52.20	208.70	29.40	179.30	97.00	20.10	41.40	884.30	526.80	130.00	397.80	73.20	104.40	135.50	6.60	128.90	18.90	222.80	6.00	216.80	534.80	350.50	170.80	1134.70	421.60	71.00	350.60
20	S1E2	955.30	142.80	0.20	142.80	8.40	92.90	7.30	34.20	124.40	7.80	116.60	72.00	9.20	27.00	688.10	420.00	108.20	311.80	56.90	90.00	95.70	3.40	92.30	21.60	172.40	2.40	170.00	445.60	242.50	121.80	833.50	267.20	24.60	242.60
21	S1E3	920.30	122.90	0.00	122.90	5.80	68.00	8.60	41.80	109.50	9.80	99.70	53.40	10.30	33.00	688.30	372.80	96.00	278.30	48.60	112.20	93.20	4.20	90.00	26.40	225.90	18.00	213.30	479.80	210.90	121.00	800.10	232.40	21.40	211.00
22	S1E4	2233.20	339.60	0.00	339.60	0.00	25.00	17.20	307.80	266.00	0.00	266.00	19.00	12.60	243.00	1628.20	311.50	33.50	278.00	26.10	205.20	230.00	19.00	230.00	194.40	1086.90	146.40	949.50	1022.30	605.90	173.20	2062.30	605.00	0.00	605.00
23	S1E5	830.60	116.90	0.00	116.90	0.00	29.30	3.10	89.00	86.40	0.00	86.40	22.20	2.40	68.90	627.30	174.10	34.60	139.50	14.40	104.40	67.90	1.00	67.90	54.00	416.80	105.80	311.40	424.00	203.30	133.60	697.00	203.30	0.00	203.30
24	S1W1	1273.70	497.70	140.40	360.90	113.30	106.60	59.40	95.40	372.80	74.20	316.40	68.30	48.00	91.80	479.00	186.30	2.80	186.30	14.50	1.80	121.80	5.00	116.80	5.40	170.90	0.00	170.90	44.00	439.80	174.00	1134.50	810.90	394.40	439.90
25	S1W2	1196.60	605.70	194.00	418.90	121.50	107.20	76.80	113.40	223.70	17.40	210.90	30.00	25.20	37.80	398.50	140.30	1.80	138.50	8.40	7.10	110.40	0.00	110.40	0.00	154.40	0.00	154.40	32.80	365.70	204.90	997.80	798.10	438.80	366.00
26	S1W3	576.10	373.00	169.00	204.00	61.00	53.00	36.00	54.00	61.00	0.00	61.00	0.00	0.00	0.00	142.10	53.00	0.00	53.00	0.00	0.00	36.00	0.00	36.00	0.00	53.10	0.00	53.10	0.00	142.10	169.00	407.10	434.00	291.00	143.00
27	S1W4	576.00	323.10	70.20	252.90	52.20	65.70	54.00	81.00	52.20	0.00	52.20	0.00	0.00	0.00	200.70	65.70	0.00	65.70	0.00	0.00	54.00	0.00	54.00	0.00	81.00	0.00	81.00	0.00	200.70	70.20	505.80	375.30	174.60	200.70
28	S2E1	1732.90	305.30	5.00	303.90	36.30	187.00	27.40	55.80	300.70	35.00	265.90	148.00	29.90	55.80	1150.00	708.20	157.20	552.80	88.20	129.60	174.10	10.60	163.50	21.60	267.70	8.60	259.10	653.40	499.10	209.80	1524.90	606.00	109.00	499.20
29	S2E2	1119.90	144.80	0.00	144.80	7.50	101.70	8.90	34.20	116.00	2.80	116.00	79.70	9.30	27.00	859.20	520.30	139.80	380.50	72.50	126.60	119.30	7.00	112.30	21.60	219.70	10.40	209.30	598.60	260.70	157.20	962.90	260.80	17.80	260.80
30	S2E3	1394.90	185.50	0.00	185.50	4.10	85.40	12.90	102.60	154.20	5.20	154.20	64.40	15.00	81.00	1058.10	487.80	114.20	374.60	69.00	173.40	152.70	8.00	146.90	52.00	422.10	13.40	408.70	721.60	339.40	138.00	1263.90	339.70	13.40	339.70

House number 31-60

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
31	S2E4	1582.90	225.40	0.00	225.40	0.00	20.50	22.50	182.40	181.60	0.00	181.60	17.40	20.20	144.00	1175.90	232.10	18.60	213.50	29.20	146.40	208.10	21.00	187.10	141.60	755.70	148.60	613.50	770.00	406.10	188.20	1394.70	407.00	0.00	407.00
32	S2E5	929.90	120.60	0.00	120.60	0.00	2.70	0.00	119.70	95.30	0.00	95.30	2.40	0.00	94.50	724.20	140.40	4.80	140.40	0.00	140.40	75.60	0.00	75.60	75.60	527.50	129.40	398.10	528.60	215.60	130.40	799.90	215.90	0.00	215.90
33	S2E6	691.30	85.50	0.00	85.50	0.00	0.00	0.00	85.50	67.50	0.00	67.50	0.00	0.00	67.50	538.30	72.00	0.00	72.00	0.00	72.00	54.00	0.00	54.00	54.00	412.30	133.60	278.90	385.40	152.90	133.60	557.90	153.00	0.00	153.00
34	S2W2	1661.10	762.10	196.40	565.90	167.70	132.40	112.80	153.00	341.20	46.80	294.40	42.40	34.70	50.80	566.30	187.40	4.80	185.20	12.00	12.60	167.70	7.00	160.70	7.20	211.50	0.00	211.50	67.80	519.50	248.20	1412.90	1094.80	574.40	520.40
35	S2W3	742.50	456.50	176.20	286.90	74.30	68.90	59.10	84.60	74.30	0.00	74.30	0.00	0.00	0.00	211.70	68.90	0.00	68.90	0.00	0.00	59.10	0.00	59.10	0.00	83.70	0.00	83.70	0.00	211.70	176.20	572.90	530.80	318.20	212.60
36	S2W4	457.80	266.10	81.60	189.30	38.40	44.70	52.80	54.00	42.10	0.00	42.10	0.00	4.30	0.00	152.70	44.70	0.00	44.70	0.00	0.00	54.00	0.00	54.00	0.00	54.00	0.00	54.00	0.00	152.70	81.60	381.00	305.10	158.40	152.70
37	S3E3	2363.70	371.40	0.00	371.40	4.80	114.70	23.90	228.00	312.70	7.60	305.10	90.60	29.70	180.00	1679.60	662.30	132.00	530.30	112.00	213.00	265.80	15.60	250.20	84.60	751.50	46.20	705.30	1013.00	666.60	201.40	2162.30	684.10	17.20	666.90
38	S3E4	1324.90	188.20	0.00	188.20	0.00	0.00	17.20	171.00	145.80	0.00	145.80	0.00	10.80	135.00	991.20	142.10	0.00	142.10	8.30	136.80	164.10	16.80	148.50	115.20	686.10	129.00	557.10	658.40	333.10	143.80	1181.10	334.00	0.00	334.00
39	S3E5	1812.90	240.80	0.00	240.80	0.00	5.90	12.80	228.00	193.10	0.00	193.10	0.80	12.30	180.00	1379.30	224.70	1.60	223.10	22.20	199.20	202.80	11.60	191.20	144.00	953.70	202.80	750.90	946.00	433.30	215.20	1597.70	433.60	0.00	433.60
40	S3E6	798.90	98.80	0.00	98.80	0.00	0.00	0.00	98.80	78.00	0.00	78.00	0.00	0.00	78.00	622.10	83.20	0.00	83.20	0.00	83.20	62.40	0.00	62.40	62.40	476.50	154.20	322.30	445.40	176.70	154.20	644.70	176.80	0.00	176.80
41	S3W1	2020.30	546.50	66.60	482.10	138.50	131.40	74.60	167.40	601.50	130.40	472.70	114.00	94.80	156.60	872.30	302.70	17.80	284.90	17.90	21.60	211.30	10.20	201.70	14.40	359.70	0.00	359.70	135.20	737.10	223.00	1799.70	1148.00	445.20	737.40
42	S3W2	1594.30	740.30	190.00	550.30	143.30	131.40	115.40	160.20	306.20	43.20	263.00	40.70	32.70	47.40	551.60	176.90	0.00	176.90	4.80	0.00	163.70	5.40	158.30	5.40	212.10	0.00	212.10	25.80	525.80	236.60	1359.50	1043.60	517.80	526.70
43	S3W3	989.50	568.30	182.40	385.90	93.20	92.50	74.60	126.00	114.70	6.80	107.90	3.40	5.70	9.00	306.50	95.30	0.00	95.30	0.00	0.00	78.60	0.00	78.60	0.00	134.10	0.00	134.10	0.00	306.50	189.20	800.30	683.00	375.60	307.40
44	S4E1	1995.10	350.00	0.00	350.00	19.20	199.80	32.70	102.60	323.80	29.40	294.40	157.80	40.10	81.00	1363.50	750.80	159.00	596.00	99.00	140.40	233.20	14.20	219.60	50.40	385.30	15.20	370.50	752.40	613.70	213.80	1794.90	673.80	67.80	614.00
45	S4E2	2045.90	308.90	0.00	308.90	6.60	172.80	34.20	102.60	260.30	7.60	255.10	136.20	37.20	81.00	1485.80	780.00	169.20	610.80	133.20	168.60	282.20	20.20	262.20	57.60	429.10	19.60	409.50	926.00	559.80	212.20	1838.70	569.20	20.80	560.10
46	S4E3	2604.70	415.20	0.00	415.20	7.20	116.40	30.50	307.80	355.50	10.20	345.70	91.60	38.00	243.00	1834.00	658.40	122.80	535.60	114.60	225.60	334.70	16.40	319.10	167.40	985.50	46.20	942.90	1085.60	748.40	191.20	2440.10	770.70	24.60	749.30
47	S4E4	1057.10	146.70	0.00	146.70	0.00	3.80	25.90	125.40	114.20	0.00	114.20	3.00	17.90	99.00	796.20	118.00	5.60	113.80	18.40	98.40	167.70	23.40	144.70	86.40	520.50	113.80	408.30	536.20	260.00	141.00	916.10	260.90	0.00	260.90
48	S4E5	1867.90	249.70	0.00	249.70	0.00	17.10	4.60	228.00	203.10	0.00	203.10	13.50	9.60	180.00	1415.10	274.60	19.20	255.40	25.60	199.20	187.80	4.00	183.80	144.00	952.70	202.40	750.90	962.60	452.50	225.00	1642.90	452.80	0.00	452.80
49	S4E6	914.90	114.00	0.00	114.00	0.00	0.00	0.00	114.00	90.00	0.00	90.00	0.00	0.00	90.00	710.90	98.40	0.00	98.40	0.00	98.40	71.20	0.00	71.20	71.20	541.30	167.80	373.50	507.00	203.90	167.80	747.10	204.00	0.00	204.00
50	S4W1	1724.90	499.40	54.40	447.60	144.10	123.60	67.80	113.40	548.80	127.80	429.90	102.00	73.80	113.40	698.60	265.60	11.60	254.00	17.90	18.00	174.10	10.20	163.90	14.40	258.90	0.00	258.90	122.40	581.40	189.00	1535.90	1045.10	466.40	581.70
51	S4W2	1615.30	741.30	190.80	575.70	148.10	136.80	122.60	171.00	311.10	45.00	266.10	41.40	32.80	48.60	579.90	183.20	0.00	183.20	6.40	0.00	174.40	7.00	167.40	7.20	222.30	0.00	222.30	34.20	545.70	242.80	1409.70	1052.40	522.80	546.60
52	S4W3	789.30	471.90	163.20	314.10	77.10	82.40	61.60	100.60	82.10	3.40	78.70	3.40	1.30	3.20	245.70	85.80	0.00	85.80	0.00	0.00	62.90	0.00	62.90	0.00	102.90	0.00	102.90	0.00	245.70	163.20	636.90	549.00	317.40	246.60
53	S5E1	2784.30	580.40	1.40	579.00	19.40	223.20	61.20	307.80	522.80	29.40	493.40	183.00	76.40	243.00	1681.30	801.40	162.00	641.80	106.80	147.60	311.60	22.60	289.00	50.40	715.70	15.20	701.10	802.60	1033.50	222.40	2602.30	1103.20	69.60	1034.40
54	S5E2	2694.90	480.30	0.00	480.30	0.00	143.40	36.60	307.80	386.10	0.00	386.10	115.80	37.20	243.00	1849.20	723.80	145.40	578.40	147.00	189.00	366.20	24.20	342.00	151.20	866.80	19.60	856.40	1004.40	864.50	183.00	2543.50	865.40	0.00	865.40
55	S5E3	2602.10	424.30	0.00	424.30	5.20	72.80	48.30	307.80	353.20	11.60	341.60	57.60	40.20	243.00	1828.70	459.40	58.00	401.40	85.00	186.00	409.80	49.40	360.40	194.40	989.10	62.40	930.30	1077.80	754.60	162.60	2443.50	777.50	22.00	755.50
56	S5E5	1156.90	150.10	0.00	150.10	0.00	3.20	1.90	148.20	119.20	0.00	119.20	2.60	2.20	117.00	887.60	139.90	6.60	133.30	2.60	127.20	103.10	3.20	99.90	94.20	655.70	195.20	485.70	619.20	268.40	195.20	983.70	269.30	0.00	269.30
57	S5E6	957.50	119.70	0.00	119.70	0.00	0.00	0.00	119.70	94.50	0.00	94.50	0.00	0.00	94.50	743.30	103.20	0.00	103.20	0.00	103.20	75.60	0.00	75.60	75.60	564.50	171.60	392.90	529.20	214.10	171.60	785.90	214.20	0.00	214.20
58	S5W1	1676.50	509.40	62.00	452.40	151.00	109.80	79.80	113.40	576.30	130.80	445.50	102.00	79.50	113.40	597.20	209.40	1.80	209.40	0.00	0.00	161.30	2.80	159.30	0.00	226.50	0.00	226.50	3.80	595.20	186.20	1491.90	1079.30	483.80	595.50
59	S5W2	1885.30	862.00	150.80	730.80	170.20	177.00	158.60	225.00	320.40	40.20	280.80	34.90	31.20	45.00	704.50	217.80	0.00	217.80	6.40	0.00	210.40	7.00	203.40	7.20	276.30	0.00	276.30	34.20	670.30	198.00	1709.10	1182.20	511.20	671.20
60	S5W3	769.70	471.80	173.60	305.70	75.70	78.60	61.20	91.80	75.70	0.00	75.70	0.00	0.00	0.00	230.70	78.60	0.00	78.60	0.00	0.00	61.20	0.00	61.20	0.00	91.50	0.00	91.50	0.00	230.70	173.60	610.50	547.50	325.00	231.60

Houese number 61-80

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
61	S6E1	2977.90	601.70	1.40	600.70	26.10	185.40	81.40	307.80	548.30	26.00	522.30	149.40	103.80	243.00	1837.50	673.80	109.00	569.80	144.40	97.20	436.40	29.60	407.60	82.80	737.90	14.60	723.30	775.80	1069.90	168.00	2814.50	1150.00	79.60	1070.80
62	S6E2	3031.70	528.30	0.00	528.30	11.60	153.60	74.30	307.80	462.30	13.40	451.40	121.20	91.50	243.00	2046.60	684.60	122.40	578.60	157.80	155.90	515.50	40.80	474.70	151.20	876.40	20.60	857.00	1084.60	963.20	175.00	2861.30	987.70	35.20	964.10
63	S6E3	1738.90	260.90	0.00	260.90	3.70	38.60	59.80	182.40	206.80	8.80	204.40	32.00	48.10	144.00	1271.20	255.30	31.40	235.70	68.30	128.40	376.40	58.80	321.50	174.60	647.70	49.80	628.50	810.00	461.20	139.60	1650.10	467.70	16.20	462.10
64	S6E5	811.30	102.20	0.00	102.20	0.00	0.00	5.30	96.90	80.60	0.00	80.60	0.00	4.60	76.50	628.50	85.90	0.00	85.90	4.30	81.60	85.20	7.40	78.80	65.10	457.60	138.60	319.20	446.60	181.90	144.60	666.70	182.80	0.00	182.80
65	S6E6	1193.90	154.80	0.00	154.80	0.00	7.10	3.80	144.40	122.20	0.00	122.20	5.20	3.00	114.00	916.90	150.10	0.80	149.30	11.20	127.20	113.20	4.00	109.20	91.20	654.50	177.80	476.70	640.00	276.90	182.60	1011.30	277.00	0.00	277.00
66	S6W1	2013.10	680.70	44.80	678.70	168.90	184.80	89.20	235.80	574.60	132.60	443.20	99.60	79.20	113.40	771.70	273.60	0.00	273.60	0.00	0.00	160.60	0.00	160.60	0.00	337.50	0.00	337.50	0.00	771.70	176.20	1882.10	1241.40	478.20	772.60
67	S6W2	1818.90	854.40	135.60	719.60	171.90	174.20	155.70	217.80	300.50	35.60	264.90	28.80	28.20	36.00	665.60	207.80	0.00	207.80	4.80	0.00	199.50	5.40	194.10	5.40	258.30	0.00	258.30	25.80	639.80	174.20	1644.70	1153.30	512.60	640.70
68	S7E1	2930.30	669.90	18.20	651.70	55.30	174.60	117.60	307.80	638.10	63.60	574.50	145.40	130.80	243.00	1622.30	488.40	44.80	450.40	120.30	52.00	485.10	60.60	427.50	77.40	666.50	0.00	666.50	598.20	1114.70	177.40	2752.90	1308.00	192.40	1115.60
69	S7E2	2837.70	530.00	0.00	530.00	13.60	128.60	115.30	307.80	460.30	15.00	445.30	103.20	90.90	243.00	1859.40	526.80	64.60	462.20	145.80	84.60	557.40	89.40	468.00	151.20	806.30	21.60	785.70	908.60	952.00	160.00	2679.70	984.30	39.80	952.90
70	S7E3	1473.30	247.30	0.00	247.30	9.70	51.20	83.80	102.60	194.90	8.80	188.30	40.40	57.20	81.00	1031.10	262.80	31.20	231.60	81.00	62.00	382.20	66.00	316.20	97.20	389.90	48.00	342.50	615.20	415.90	151.80	1321.50	442.20	26.00	416.20
71	S7E5	624.90	76.00	0.00	76.00	0.00	0.00	0.00	76.00	60.00	0.00	60.00	0.00	0.00	60.00	488.90	64.00	0.00	64.00	0.00	64.00	48.00	0.00	48.00	48.00	376.90	129.80	247.10	353.80	135.10	129.80	495.10	136.00	0.00	136.00
72	S7W1	2008.70	678.50	17.20	674.50	164.70	184.80	89.20	235.80	555.60	127.20	428.40	88.80	76.70	102.60	774.60	273.60	0.00	273.60	1.60	0.00	167.90	4.40	165.90	0.00	337.50	0.00	337.50	7.60	772.60	142.40	1875.50	1234.10	460.60	773.50
73	S8E1	2042.70	478.80	2.00	478.80	0.00	125.40	177.00	243.00	345.40	0.00	345.40	89.20	114.00	156.60	1218.50	340.40	24.40	316.00	79.40	22.00	497.00	69.60	428.60	64.80	474.70	0.00	474.70	407.20	823.30	90.00	1958.30	824.20	2.00	824.20
74	S8E2	1782.30	313.10	0.00	313.10	22.00	59.40	138.00	102.60	234.30	0.00	234.30	38.30	99.30	81.00	1241.80	296.00	39.20	257.20	124.20	53.20	559.80	96.60	470.40	142.80	390.70	24.60	377.10	762.00	501.70	157.40	1628.70	546.00	44.00	502.00
75	S8E3	558.90	113.20	0.00	113.20	10.30	13.90	70.50	25.80	54.00	0.80	53.20	1.60	40.20	12.00	421.00	48.10	0.00	48.10	38.00	9.80	265.20	60.80	204.40	57.80	110.70	16.00	94.70	283.20	145.70	76.20	482.70	167.20	21.40	145.80
76	S8E5	587.50	72.20	0.00	72.20	0.00	0.00	0.00	72.20	57.00	0.00	57.00	0.00	0.00	57.00	458.30	60.80	0.00	60.80	0.00	60.80	45.60	0.00	45.60	45.60	351.90	117.20	234.70	330.00	128.30	117.20	470.30	129.20	0.00	129.20
77	S8W1	2059.90	724.80	30.60	713.70	161.10	184.80	169.20	235.80	520.20	120.00	408.10	83.20	79.70	100.80	827.00	265.40	1.80	265.40	6.10	4.30	257.40	7.20	251.20	0.00	326.70	0.00	326.70	28.80	818.70	145.40	1917.30	1232.90	447.00	819.60
78	S9E1	1541.30	361.90	19.20	343.30	44.90	54.70	177.00	102.60	244.40	13.60	238.00	43.00	114.00	81.00	971.10	204.80	17.20	187.60	72.80	21.20	497.60	75.80	428.60	77.40	269.30	0.00	269.30	403.20	568.90	116.00	1453.70	599.40	112.40	569.20
79	S9E2	1667.50	334.90	0.00	334.90	34.10	63.80	136.50	102.60	256.30	13.00	244.90	37.60	102.60	81.00	1095.80	238.50	21.20	223.80	91.00	35.80	521.80	94.20	432.40	104.70	335.50	12.00	323.50	581.20	518.50	128.20	1544.70	587.00	81.20	518.80
80	S9W1	2109.70	742.50	49.00	696.30	150.30	152.40	169.20	225.00	519.80	110.20	409.60	83.00	80.80	102.60	854.50	252.00	3.80	250.20	14.00	4.30	272.00	16.00	263.40	14.40	334.60	0.00	334.60	84.20	812.10	165.20	1944.50	1255.20	455.40	813.00

Appendix 10: The wayfaring statistic result of *Saqacengalj* with social attitude set as 173450755025

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
1	00	2069.75	592.75	98.00	495.25	136.00	153.50	68.25	139.50	503.25	80.50	422.75	114.75	64.25	112.50	1030.00	492.50	91.00	402.25	57.50	76.50	197.00	4.00	193.75	13.50	341.75	0.00	341.75	388.00	649.25	263.00	1811.75	1094.75	450.50	649.50
2	0E1	1648.25	328.00	17.00	317.50	51.50	147.50	33.00	108.00	277.50	27.00	263.50	115.75	25.00	85.50	1049.75	582.75	129.00	464.00	85.50	117.00	143.75	0.00	143.75	13.50	323.75	0.00	323.75	553.50	503.25	156.00	1503.25	605.50	129.00	503.50
3	0E6	620.50	85.50	0.00	85.50	0.00	5.50	0.00	80.00	60.00	0.00	60.00	0.00	0.00	60.00	484.50	69.25	2.00	67.25	0.00	65.50	48.00	0.00	48.00	48.00	371.00	121.50	249.50	348.50	141.75	121.50	499.00	141.75	0.00	141.75
4	0N1	1521.25	464.00	95.50	368.75	94.50	130.25	50.50	94.50	355.50	70.50	285.00	90.50	40.00	63.00	724.00	395.75	80.00	316.25	37.00	58.50	124.00	0.00	124.00	0.00	211.25	0.00	211.25	270.00	464.50	230.50	1293.75	815.25	350.50	464.75
5	0S2	2591.50	597.75	83.50	552.25	100.75	197.25	76.00	198.00	606.50	98.50	508.00	158.50	99.50	166.50	1397.25	615.25	100.00	517.75	67.50	94.50	290.75	14.50	277.25	36.00	494.50	0.00	494.50	507.00	895.25	289.00	2336.50	1204.25	375.00	895.75
6	0S3	2938.50	715.25	68.00	647.25	156.25	197.25	95.75	198.00	736.00	139.50	596.50	160.75	108.50	171.00	1505.75	632.50	99.00	545.25	88.25	99.00	362.00	26.50	335.50	49.50	517.00	0.00	517.00	581.50	930.75	324.50	2633.00	1445.25	517.00	931.25
7	0S4	3209.25	719.75	19.00	703.00	111.00	228.00	133.00	256.50	735.75	121.00	614.75	180.00	123.00	202.50	1771.75	670.50	61.00	611.50	101.75	108.00	466.50	34.00	447.25	90.00	656.25	0.00	656.25	679.00	1096.00	233.50	2995.25	1455.50	362.00	1096.75
8	0S5	3148.75	706.25	5.00	701.25	106.25	205.50	136.25	256.50	723.00	122.00	601.00	171.00	132.75	202.50	1739.50	616.75	54.00	583.25	106.50	108.00	494.75	34.00	468.25	103.50	660.75	0.00	660.75	650.50	1100.75	208.50	3000.25	1429.25	339.50	1101.50
9	0S6	3054.75	702.25	43.00	695.75	127.25	205.50	139.75	256.50	705.00	111.50	597.50	168.00	133.00	202.50	1649.50	552.25	20.00	540.25	103.75	63.00	485.00	24.00	471.00	94.50	615.75	0.00	615.75	548.50	1104.50	163.00	2912.25	1405.25	378.00	1105.25
10	0S7	2619.75	757.00	53.00	706.00	150.75	165.75	162.50	229.50	680.00	108.00	573.75	139.75	121.50	166.50	1241.50	459.75	41.00	418.75	71.00	42.25	344.25	20.00	329.25	0.00	437.50	0.00	437.50	282.50	982.50	203.50	2416.25	1433.50	457.00	983.25
11	0W1	1601.00	691.00	154.50	536.50	147.50	148.00	92.50	157.50	334.00	49.00	285.00	53.00	42.50	57.00	614.75	247.25	20.00	227.25	9.50	21.75	144.00	0.00	144.00	0.00	235.75	0.00	235.75	82.50	544.25	211.50	1394.00	1025.00	498.50	544.75
12	0W2	1408.00	743.25	187.00	557.25	153.75	148.50	97.50	157.50	230.75	26.00	204.75	18.75	27.50	18.00	452.50	163.75	2.50	161.25	1.25	0.00	122.75	0.00	122.75	0.00	166.00	0.00	166.00	5.00	447.50	213.00	1205.50	955.50	507.50	448.00
13	N1E1	993.00	286.00	21.00	265.00	58.75	109.25	33.00	67.50	176.00	27.00	149.00	76.00	12.00	24.00	599.75	383.50	93.00	290.50	42.25	77.75	76.25	0.00	76.25	0.00	144.25	0.00	144.25	323.50	288.50	130.50	865.00	434.75	159.50	288.50
14	N1W1	1285.25	474.00	120.00	354.00	101.50	118.00	53.25	93.00	307.00	55.50	251.50	65.50	28.25	60.00	504.25	246.25	29.50	216.75	12.00	21.50	90.25	0.00	90.25	0.00	171.75	0.00	171.75	96.50	407.75	205.00	1080.25	781.00	373.00	408.00
15	N2W1	847.50	416.25	120.00	296.75	88.75	92.50	44.25	76.50	163.50	27.00	136.50	20.75	12.00	18.00	289.50	140.00	15.00	125.00	6.00	9.00	58.00	0.00	58.00	0.00	99.00	0.00	99.00	45.00	260.00	141.00	706.50	564.00	309.50	260.00
16	N3W1	881.00	404.00	105.50	298.50	85.75	94.25	43.00	77.00	166.75	27.00	139.75	24.00	12.00	19.00	311.00	146.50	15.50	131.50	6.00	10.00	61.00	0.00	61.00	0.00	103.50	0.00	103.50	47.50	266.00	147.50	733.50	570.00	304.00	266.00
17	S10E1	2268.00	526.75	18.50	526.75	88.00	113.50	162.50	229.50	439.25	23.00	416.25	82.00	118.50	157.50	1302.00	324.25	23.50	300.75	85.25	31.25	543.50	78.50	465.00	103.50	471.50	0.00	471.50	535.50	862.75	124.00	2144.00	966.00	199.00	863.50
18	S10E2	2003.00	455.50	0.00	455.50	50.00	84.75	151.00	171.00	296.75	0.00	296.75	42.75	99.75	135.00	1267.00	272.75	31.50	243.75	99.50	46.75	547.50	88.50	459.00	117.00	468.25	7.00	467.25	636.50	661.50	119.00	1904.50	749.75	100.00	662.00
19	S1E1	2109.25	361.00	10.50	361.00	42.00	183.25	27.75	112.50	373.00	49.00	324.00	145.75	41.25	99.00	1375.25	753.25	159.50	594.25	105.00	160.25	214.50	5.00	209.50	36.00	407.50	0.00	407.50	767.00	609.25	213.50	1896.25	734.00	125.00	609.50
20	S1E2	1685.25	262.00	0.00	262.00	21.00	141.25	15.00	85.50	238.25	19.50	218.75	107.25	23.00	67.50	1185.00	652.00	151.50	502.50	97.25	164.75	178.50	5.00	173.50	38.25	361.75	6.00	355.75	746.50	438.50	180.00	1505.25	500.25	61.50	438.75
21	S1E3	1851.25	282.25	0.00	282.25	0.00	133.25	11.75	137.75	226.50	0.00	226.50	104.50	15.25	108.75	1344.00	630.25	140.00	492.00	90.50	170.50	194.50	5.50	189.00	78.00	521.75	36.00	494.75	841.50	508.50	180.50	1679.25	508.75	0.00	508.75
22	S1E4	2369.75	333.75	0.00	333.75	0.00	60.50	38.25	256.50	261.50	0.00	261.50	46.25	27.75	202.50	1774.50	492.25	78.00	417.25	81.50	216.00	290.00	43.00	268.50	162.00	1023.75	188.50	836.25	1172.00	603.00	257.50	2117.25	595.25	0.00	595.25
23	S1E5	1376.00	193.00	0.00	193.00	0.00	69.00	1.25	128.25	148.75	0.00	148.75	52.75	2.25	101.25	1034.25	372.25	78.50	293.75	39.00	141.25	113.00	2.50	113.00	81.00	608.00	145.50	462.50	692.50	341.75	204.50	1171.50	341.75	0.00	341.75
24	S1W1	2344.50	827.00	165.00	672.00	172.25	194.00	112.50	202.50	615.50	115.00	500.50	114.00	92.50	153.00	909.50	328.00	8.00	328.00	27.25	4.50	241.50	9.00	232.50	13.50	355.00	0.00	355.00	90.50	826.00	287.00	2061.50	1439.50	613.00	826.50
25	S1W2	1900.50	771.75	193.00	584.75	157.00	153.00	113.00	166.50	445.00	49.00	405.00	76.00	72.00	108.00	686.75	232.00	2.50	231.50	5.25	1.75	186.50	0.00	186.50	0.00	275.75	0.00	275.75	10.50	676.75	235.75	1676.00	1213.75	543.50	677.25
26	S1W3	667.75	415.75	163.00	252.75	67.75	65.00	48.00	72.00	67.75	0.00	67.75	0.00	0.00	0.00	184.25	65.00	0.00	65.00	0.00	0.00	48.00	0.00	48.00	0.00	71.25	0.00	71.25	0.00	184.25	163.00	504.75	483.50	298.50	185.00
27	S1W4	508.00	286.75	65.50	221.25	51.75	57.00	45.00	67.50	51.75	0.00	51.75	0.00	0.00	0.00	169.50	57.00	0.00	57.00	0.00	0.00	45.00	0.00	45.00	0.00	67.50	0.00	67.50	0.00	169.50	65.50	442.50	338.50	169.00	169.50
28	S2E1	2566.00	481.25	10.50	478.75	73.00	199.25	42.75	171.00	470.00	61.50	408.50	156.75	54.75	135.00	1651.25	806.00	164.00	642.00	119.50	171.00	299.25	20.50	278.75	67.50	547.00	7.50	539.50	899.00	753.25	252.50	2314.50	951.25	210.00	753.75
29	S2E2	1743.25	271.00	0.00	271.00	18.75	151.75	16.25	85.50	226.00	7.00	219.00	111.50	21.25	67.50	1302.25	685.50	159.50	529.50	114.50	178.25	215.25	10.50	204.75	54.00	411.00	26.00	385.00	888.00	452.25	194.50	1569.25	497.00	44.50	452.50
30	S2E3	2084.00	336.25	0.00	336.25	10.25	135.25	23.00	171.00	273.75	13.00	260.75	99.25	29.50	135.00	1504.00	643.25	138.00	505.25	104.25	191.75	280.00	18.00	264.75	108.00	635.25	30.00	605.25	978.00	576.00	186.50	1897.50	610.00	33.50	576.50

House number 31-60

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
31	S2E4	2125.75	294.25	0.00	294.25	0.00	32.50	53.00	213.75	240.75	0.00	240.75	29.50	43.50	168.75	1590.75	344.50	34.00	310.50	68.50	180.00	351.00	48.00	303.00	144.00	895.25	189.50	705.75	1056.50	534.25	271.50	1854.25	535.00	0.00	535.00
32	S2E5	1477.50	199.25	0.00	199.25	0.00	4.50	0.00	194.75	157.75	0.00	157.75	4.00	0.00	153.75	1120.50	184.50	8.00	176.50	0.00	168.00	121.00	0.00	121.00	121.00	815.00	178.00	637.00	764.00	356.50	186.00	1291.50	357.00	0.00	357.00
33	S2E6	758.25	95.00	0.00	95.00	0.00	0.00	0.00	95.00	75.00	0.00	75.00	0.00	0.00	75.00	588.25	80.00	0.00	80.00	0.00	80.00	60.00	0.00	60.00	60.00	448.25	138.50	309.75	418.50	169.75	138.50	619.75	170.00	0.00	170.00
34	S2W2	2105.25	865.25	211.50	657.75	173.50	164.75	131.50	189.00	515.50	87.00	429.50	87.00	75.00	112.50	743.00	251.75	0.50	251.75	3.00	1.75	199.50	0.00	199.50	0.00	291.75	0.00	291.75	10.00	743.00	284.50	1826.75	1364.50	623.50	743.75
35	S2W3	990.75	571.25	167.50	420.25	95.75	100.25	93.75	130.50	95.75	0.00	95.75	0.00	0.00	0.00	323.75	100.25	0.00	100.25	0.00	0.00	93.75	0.00	93.75	0.00	129.75	0.00	129.75	0.00	323.75	167.50	839.75	667.00	342.50	324.50
36	S2W4	633.50	361.25	94.50	278.50	49.00	60.75	93.75	76.50	51.75	0.00	51.75	0.00	4.00	0.00	235.00	60.75	0.00	60.75	0.00	0.00	97.75	0.00	97.75	0.00	76.50	0.00	76.50	0.00	235.00	94.50	565.00	413.00	192.50	235.00
37	S3E3	3017.25	487.25	0.00	487.25	12.00	171.75	50.00	256.50	422.75	19.00	404.75	135.50	57.75	202.50	2107.25	793.50	150.00	646.50	123.25	216.00	413.50	38.50	375.00	144.00	900.25	83.00	818.25	1234.00	873.25	285.50	2731.75	910.00	43.00	874.00
38	S3E4	1716.25	243.00	0.00	243.00	0.00	0.00	38.75	204.25	185.50	0.00	185.50	0.00	24.25	161.25	1287.75	192.50	0.00	192.50	21.50	172.00	259.75	38.50	221.25	140.00	835.50	161.00	674.50	860.00	427.75	199.50	1516.75	428.50	0.00	428.50
39	S3E5	2015.25	276.00	0.00	276.00	0.00	13.25	27.25	256.50	218.50	0.00	218.50	4.00	26.75	202.50	1520.75	252.50	8.00	248.50	46.25	216.00	266.25	25.00	241.25	162.00	1026.25	191.50	836.25	1027.00	493.75	220.50	1804.75	494.50	0.00	494.50
40	S3E6	869.25	109.25	0.00	109.25	0.00	0.00	0.00	109.25	86.25	0.00	86.25	0.00	0.00	86.25	673.75	95.00	0.00	95.00	0.00	95.00	69.00	0.00	69.00	69.00	509.75	150.50	359.25	478.50	195.25	150.50	718.75	195.50	0.00	195.50
41	S3W1	2780.50	776.00	129.50	647.25	169.50	185.25	122.00	198.00	713.00	134.00	579.00	136.75	110.00	171.00	1297.75	501.75	57.50	444.25	63.75	58.50	333.00	21.50	311.50	36.00	463.00	0.00	463.00	395.50	902.25	336.50	2445.00	1484.25	581.50	902.75
42	S3W2	2095.25	882.75	210.50	686.75	177.25	164.00	143.00	202.50	487.00	78.50	408.50	75.00	65.75	95.50	734.50	235.00	0.00	235.00	0.00	0.00	206.25	0.00	206.25	0.00	293.25	0.00	293.25	0.00	734.50	280.00	1824.25	1360.75	627.50	735.25
43	S3W3	1275.25	693.50	197.50	497.25	128.75	108.25	108.75	162.00	180.75	17.00	163.75	8.00	12.50	18.00	406.75	114.75	0.00	114.75	0.00	0.00	118.75	0.00	118.75	0.00	179.25	0.00	179.25	0.00	406.75	214.50	1067.75	873.25	472.00	407.50
44	S4E1	2825.00	504.25	0.00	504.25	35.50	218.50	68.25	198.00	473.25	49.00	427.50	174.75	81.75	171.00	1912.75	865.75	164.00	706.75	133.50	180.00	408.50	35.50	373.50	90.00	638.50	0.00	638.50	1005.00	911.75	245.00	2631.00	977.50	120.00	912.25
45	S4E2	3169.25	540.75	0.00	540.75	16.25	204.25	72.50	256.50	475.25	25.00	453.75	161.25	77.00	202.50	2156.75	873.75	171.00	704.75	144.00	198.00	464.00	46.50	422.50	144.00	826.75	49.00	786.75	1189.00	967.75	284.50	2884.75	1012.50	57.00	968.50
46	S4E3	3090.25	504.50	0.00	504.50	15.00	183.00	55.50	256.50	446.00	24.50	421.50	144.25	59.75	202.50	2139.75	819.00	150.00	669.00	125.75	216.00	425.25	41.00	396.50	162.00	927.25	91.00	836.25	1255.50	895.25	297.50	2792.75	950.50	54.50	896.00
47	S4E4	1558.00	214.00	0.00	214.00	0.00	8.00	49.25	199.50	167.50	0.00	167.50	6.50	37.25	157.50	1180.25	197.00	8.00	189.00	42.50	145.50	294.00	47.50	247.50	135.00	773.75	159.00	633.75	804.25	380.75	214.50	1347.25	381.50	0.00	381.50
48	S4E5	2247.25	308.75	0.00	308.75	0.00	41.25	11.00	256.50	257.50	0.00	257.50	32.75	22.25	202.50	1681.00	393.50	48.00	345.50	55.50	216.00	258.25	8.00	250.75	162.00	1029.25	193.00	836.25	1115.50	565.50	248.50	1998.75	566.25	0.00	566.25
49	S4E6	876.25	109.25	0.00	109.25	0.00	0.00	0.00	109.25	86.25	0.00	86.25	0.00	0.00	86.25	680.75	95.00	0.00	95.00	0.00	95.00	69.00	0.00	69.00	69.00	516.75	157.50	359.25	485.50	195.25	157.50	718.75	195.50	0.00	195.50
50	S4W1	2402.00	721.75	118.50	625.00	162.00	165.50	122.00	175.50	638.25	131.00	531.25	122.00	102.00	153.00	1054.50	386.50	28.50	358.00	40.25	40.50	281.50	17.50	264.00	18.00	386.50	0.00	386.50	243.50	811.00	271.50	2130.50	1355.00	550.50	811.50
51	S4W2	2124.25	886.25	198.00	705.25	179.00	165.75	149.00	211.50	493.75	81.50	412.25	76.25	66.00	99.00	756.00	238.25	0.00	238.25	0.00	0.00	212.50	0.00	212.50	0.00	305.25	0.00	305.25	0.00	756.00	277.50	1865.25	1371.25	631.50	756.75
52	S4W3	798.25	474.00	151.50	325.00	81.75	86.00	63.00	105.50	91.25	8.50	82.75	8.00	2.00	7.00	254.75	94.00	0.00	94.00	0.00	0.00	63.00	0.00	63.00	0.00	111.75	0.00	111.75	0.00	254.75	152.50	649.75	555.75	312.50	255.50
53	S5E1	3340.75	623.00	2.50	620.50	38.00	228.00	98.00	256.50	581.25	57.00	524.25	180.00	103.75	202.50	2136.50	897.00	167.50	731.00	138.50	184.50	491.25	47.50	443.75	103.50	766.25	20.00	746.25	1080.50	1068.00	293.00	3047.75	1204.25	135.50	1068.75
54	S5E2	3081.75	519.50	0.00	519.50	0.00	190.50	75.75	256.50	429.50	0.00	429.50	150.00	77.00	202.50	2150.25	842.00	161.25	682.50	144.00	198.00	491.25	55.50	438.25	144.00	849.25	49.00	800.25	1219.50	948.25	254.00	2834.25	949.00	0.00	949.00
55	S5E3	2862.25	448.25	0.00	448.25	7.50	126.75	57.50	256.50	381.75	15.00	366.75	101.50	55.25	202.50	2041.50	663.25	109.00	554.75	110.50	216.00	430.75	54.00	385.25	162.00	959.25	133.50	836.25	1251.00	799.25	292.50	2573.25	830.00	30.00	800.00
56	S5E5	1492.25	199.50	0.00	199.50	0.00	8.00	0.50	199.50	157.50	0.00	157.50	6.50	4.50	157.50	1135.25	197.00	10.00	193.50	8.50	177.00	136.25	8.50	127.75	126.00	841.25	200.50	650.25	786.50	356.25	209.00	1301.25	357.00	0.00	357.00
57	S5E6	950.25	118.75	0.00	118.75	0.00	0.00	0.00	118.75	93.75	0.00	93.75	0.00	0.00	93.75	737.75	103.00	0.00	103.00	0.00	103.00	75.00	0.00	75.00	75.00	559.75	169.50	390.25	525.50	212.25	169.50	780.75	212.50	0.00	212.50
58	S5W1	2122.50	753.75	127.00	626.75	161.25	165.50	127.00	184.50	613.50	121.00	492.50	122.00	90.50	126.00	802.75	287.50	4.50	287.50	0.00	0.00	214.25	6.50	209.25	0.00	301.00	0.00	301.00	9.50	797.75	223.00	1904.00	1319.75	545.50	798.25
59	S5W2	1939.75	825.25	173.00	653.25	162.50	161.00	137.00	193.50	436.50	78.50	358.00	67.50	55.25	76.50	696.25	227.25	0.00	227.25	4.00	0.00	200.75	5.50	195.25	4.50	269.25	0.00	269.25	22.50	682.50	256.00	1690.75	1257.25	574.50	683.25
60	S5W3	1020.75	613.25	205.00	408.25	115.50	97.50	82.75	112.50	115.50	0.00	115.50	0.00	0.00	0.00	292.00	97.50	0.00	97.50	0.00	0.00	82.75	0.00	82.75	0.00	111.75	0.00	111.75	0.00	292.00	205.00	815.75	728.75	436.00	292.75

House number 61-80

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
61	S6E1	3351.25	649.00	0.50	648.50	60.50	228.00	124.50	256.50	611.25	60.50	550.75	180.00	118.75	202.50	2134.50	882.50	160.50	722.00	138.50	175.50	546.25	46.50	502.75	121.50	761.75	20.00	741.75	1060.00	1077.50	265.00	3095.75	1260.25	182.00	1078.25
62	S6E2	3257.75	570.25	0.00	570.25	27.25	192.75	100.00	256.50	500.00	31.50	476.50	153.25	97.75	202.50	2187.50	818.25	150.50	669.75	144.00	191.25	544.25	60.00	484.25	144.00	853.50	71.50	793.50	1210.00	998.00	299.00	2966.25	1070.25	86.00	998.75
63	S6E3	2548.25	413.25	0.00	413.25	4.75	88.25	68.00	256.50	350.00	11.50	338.50	71.50	63.25	202.50	1785.50	489.25	70.00	423.75	101.25	182.75	441.75	63.00	379.25	162.00	882.25	136.00	803.00	1085.00	741.50	277.00	2345.25	763.25	21.00	742.25
64	S6E5	1551.25	211.25	0.00	211.25	0.00	0.00	21.25	190.00	165.75	0.00	165.75	0.00	16.25	150.00	1174.25	173.75	0.00	173.75	13.75	160.00	199.75	26.50	174.25	123.50	800.75	178.00	622.75	798.00	376.25	204.00	1347.75	377.00	0.00	377.00
65	S6E6	1789.50	246.00	0.00	246.00	0.00	13.25	9.50	223.25	194.00	0.00	194.00	10.25	7.50	176.25	1349.50	235.00	1.50	233.50	19.00	191.00	187.00	10.00	177.00	141.00	927.50	196.50	731.00	910.00	439.50	208.00	1581.50	440.00	0.00	440.00
66	S6W1	2390.75	823.00	91.00	732.00	172.00	200.25	125.75	234.00	656.25	132.00	524.25	129.25	94.75	130.50	911.50	329.50	0.00	329.50	0.00	0.00	220.50	0.00	220.50	0.00	363.75	0.00	363.75	0.00	911.50	223.00	2167.75	1479.25	567.00	912.25
67	S6W2	1881.25	808.50	174.00	634.50	165.50	150.75	133.75	184.50	415.50	77.00	342.00	60.00	49.00	67.50	667.25	214.75	0.00	214.75	4.00	0.00	196.75	5.50	191.25	4.50	255.75	0.00	255.75	22.50	644.75	247.50	1636.25	1224.00	578.50	645.50
68	S7E1	3295.25	726.25	9.00	717.25	126.50	193.75	165.25	256.50	683.50	86.00	610.50	157.25	131.25	202.50	1918.00	678.50	98.00	580.50	133.00	100.75	575.00	73.50	510.50	108.00	664.50	0.00	664.50	847.50	1077.75	260.00	3035.25	1409.75	335.00	1078.50
69	S7E2	3285.75	588.00	0.00	588.00	38.25	181.75	130.25	256.50	527.50	46.50	481.00	147.25	97.50	202.50	2170.25	760.50	129.50	632.25	143.00	161.25	597.25	87.00	512.00	151.50	839.50	71.50	768.00	1176.00	994.25	319.00	2966.75	1115.50	123.00	995.00
70	S7E3	2530.00	430.75	0.00	430.75	19.00	105.75	135.00	171.00	342.50	8.00	336.50	87.25	95.25	135.00	1756.75	514.50	80.00	434.50	128.00	113.50	587.75	85.50	502.25	148.50	658.00	91.50	567.50	1028.00	728.75	263.00	2267.00	773.25	44.00	729.25
71	S7E5	767.25	95.00	0.00	95.00	0.00	0.00	0.00	95.00	75.00	0.00	75.00	0.00	0.00	75.00	597.25	80.00	0.00	80.00	0.00	80.00	61.75	0.00	61.75	61.75	455.50	144.50	311.00	428.00	169.25	144.50	622.75	170.00	0.00	170.00
72	S7W1	2215.25	724.00	35.50	714.00	144.75	180.00	160.50	234.00	602.25	126.00	476.25	115.00	95.00	126.00	902.50	295.00	0.00	295.00	8.00	0.00	265.50	21.00	255.50	0.00	359.25	0.00	359.25	37.00	892.50	171.50	2069.25	1312.75	449.50	893.25
73	S8E1	2437.75	561.25	0.00	561.25	0.00	165.75	166.00	229.50	425.25	0.00	425.25	131.25	127.50	166.50	1451.25	474.25	60.50	420.25	86.00	42.25	485.50	60.00	428.50	54.00	491.50	0.00	491.50	484.00	985.75	119.50	2326.75	986.50	0.00	986.50
74	S8E2	3000.25	572.75	0.00	572.75	47.25	136.00	141.75	256.50	437.00	0.00	437.00	98.25	99.25	202.50	1990.50	570.00	88.50	481.50	128.50	120.25	611.00	88.50	522.50	153.00	809.50	78.00	731.50	1058.50	932.00	255.00	2745.25	1009.75	94.50	932.75
75	S8E3	935.75	233.50	0.00	233.50	12.50	34.75	121.75	64.50	92.00	2.00	92.00	4.00	62.00	30.00	722.25	89.75	0.00	89.75	67.75	22.00	394.00	74.00	320.00	106.75	238.50	42.00	196.50	509.00	295.75	116.00	827.75	323.00	27.00	296.00
76	S8E5	759.75	95.00	0.00	95.00	0.00	0.00	0.00	95.00	75.00	0.00	75.00	0.00	0.00	75.00	589.75	80.00	0.00	80.00	0.00	80.00	61.75	0.00	61.75	61.75	448.00	137.00	311.00	420.50	169.25	137.00	622.75	170.00	0.00	170.00
77	S8W1	2305.25	753.25	51.00	712.25	167.00	177.75	160.50	234.00	621.75	127.00	498.75	111.50	98.25	130.50	936.75	310.00	4.00	307.00	14.50	10.75	279.25	21.00	260.75	0.00	354.75	0.00	354.75	72.00	882.00	190.50	2114.75	1368.50	503.00	882.75
78	S9E1	2550.25	646.25	11.50	637.25	102.75	142.50	164.25	229.50	486.25	29.50	470.25	94.25	124.50	166.50	1427.25	380.75	46.50	350.00	85.25	42.25	543.50	78.50	465.00	103.50	512.00	0.00	512.00	544.50	903.25	134.00	2425.25	1132.50	230.50	904.00
79	S9E2	2571.50	527.75	0.00	527.75	78.25	117.75	160.75	171.00	448.25	39.50	408.75	76.50	125.75	135.00	1615.75	429.25	57.50	390.25	112.75	98.00	635.25	87.50	547.75	148.50	555.75	12.00	547.75	845.00	786.25	175.50	2405.00	969.25	188.00	786.75
80	S9W1	2408.75	810.75	105.00	706.75	172.50	172.50	152.75	211.50	654.25	126.00	528.25	118.00	102.75	139.50	983.50	328.00	8.00	323.50	29.00	10.75	328.75	31.50	297.75	22.50	365.50	0.00	365.50	130.50	896.25	253.50	2195.25	1434.25	570.00	897.00

Appendix 11: The wayfaring statistic result of *Saqacengalj* with social attitude set as 173450804020

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
1	00	1882.60	555.80	88.80	470.20	132.80	145.00	64.80	129.60	468.80	80.00	388.80	101.40	58.60	100.80	900.60	425.80	72.80	353.60	46.00	61.20	173.60	3.20	171.00	10.80	302.20	0.00	302.20	310.40	597.20	231.20	1651.40	1024.60	431.20	597.40
2	0E1	1442.60	279.80	13.60	276.60	52.40	133.20	35.20	86.40	234.00	22.40	222.80	104.60	20.00	68.40	936.60	539.00	124.80	422.40	78.00	108.00	124.60	0.00	124.60	10.80	273.40	0.00	273.40	512.40	429.80	144.40	1305.00	511.60	131.20	430.00
3	0E6	620.40	79.80	0.00	79.80	0.00	4.40	0.00	76.00	60.00	0.00	60.00	0.00	0.00	60.00	484.40	65.20	1.60	65.20	0.00	65.20	48.00	0.00	48.00	48.00	371.20	122.00	249.20	348.40	136.00	122.00	498.40	136.00	0.00	136.00
4	0N1	1416.00	451.40	88.80	362.60	93.40	128.60	49.60	93.60	331.60	67.20	264.40	81.40	36.80	57.60	669.40	362.00	70.00	292.40	32.00	50.40	114.20	0.00	114.20	0.00	194.40	0.00	194.40	234.00	439.40	205.20	1216.40	780.00	340.40	439.60
5	0S2	2400.00	560.80	72.80	524.40	103.20	194.00	73.20	180.00	592.80	101.60	491.20	157.60	93.80	158.40	1254.80	558.80	80.00	481.20	54.00	75.60	257.60	11.60	247.40	28.80	442.40	0.00	442.40	405.60	855.80	251.20	2173.20	1153.60	370.40	856.20
6	0S3	2704.80	657.20	54.40	602.80	142.80	194.00	86.00	180.00	712.60	139.60	573.00	161.20	103.40	165.60	1349.80	574.80	79.20	505.00	70.60	79.20	315.60	21.20	294.40	39.60	464.00	0.00	464.00	465.20	889.80	287.60	2432.40	1365.00	477.20	890.20
7	0S4	3185.20	739.00	15.20	724.60	107.60	243.20	121.60	273.60	765.80	126.80	639.00	192.00	124.80	216.00	1694.80	647.60	48.80	600.40	88.60	90.00	419.00	27.20	406.20	72.00	650.80	0.00	650.80	548.00	1149.00	216.80	2984.00	1504.80	357.20	1149.80
8	0S5	3131.60	710.80	4.00	706.80	104.40	207.20	126.80	273.60	748.80	128.80	620.00	177.60	140.40	216.00	1688.00	579.40	43.20	558.60	98.00	90.00	473.80	27.20	448.20	93.60	661.60	0.00	661.60	570.80	1136.00	196.00	2978.40	1459.60	341.60	1136.80
9	0S6	3069.20	710.80	34.40	706.80	125.60	207.20	132.40	273.60	733.20	116.00	623.20	172.80	140.80	216.00	1625.60	535.80	16.00	526.20	95.80	50.40	469.80	22.40	455.40	86.40	625.60	0.00	625.60	489.20	1142.00	155.20	2930.00	1443.60	365.20	1142.80
10	0S7	2518.80	746.20	42.40	706.40	149.60	160.40	168.80	230.40	668.40	111.20	559.00	134.20	122.40	158.40	1180.20	426.80	32.80	394.00	65.60	33.80	342.40	20.80	332.80	0.00	421.80	0.00	421.80	247.60	972.00	187.20	2346.00	1412.80	448.40	972.80
11	0W1	1446.00	652.80	158.40	496.40	137.20	137.60	88.40	147.60	286.40	39.20	247.20	42.40	34.00	45.60	547.00	216.20	16.00	200.20	7.60	17.40	127.20	0.00	127.20	0.00	210.20	0.00	210.20	66.00	490.60	204.80	1261.20	939.20	472.00	491.00
12	0W2	1307.20	704.80	189.20	516.40	145.80	136.60	90.00	144.00	204.80	20.80	184.00	15.00	22.00	14.40	409.80	148.80	2.00	146.80	1.00	0.00	110.20	0.00	110.20	0.00	150.80	0.00	150.80	4.00	405.80	210.00	1105.60	897.40	491.20	406.20
13	N1E1	991.20	297.20	16.80	280.40	62.00	116.20	35.20	72.00	158.00	22.40	135.60	69.80	9.60	19.20	556.00	362.00	91.20	270.80	38.60	73.00	74.40	0.00	74.40	0.00	142.60	0.00	142.60	304.40	304.00	121.20	884.40	451.60	163.20	304.00
14	N1W1	1229.80	490.20	128.00	362.20	105.60	116.80	53.60	92.40	282.60	50.00	232.60	55.60	25.00	51.60	463.20	222.40	23.60	198.80	9.60	17.20	85.60	0.00	85.60	0.00	159.00	0.00	159.00	77.20	386.00	201.60	1028.20	766.60	380.40	386.20
15	N2W1	836.00	437.60	128.00	309.60	93.20	96.20	45.60	79.20	150.60	22.40	128.20	17.40	9.60	14.40	281.00	134.20	12.00	122.20	4.80	7.20	55.60	0.00	55.60	0.00	97.20	0.00	97.20	36.00	258.20	141.60	702.00	575.20	322.40	258.20
16	N3W1	862.00	412.00	104.80	307.20	87.60	97.60	43.60	79.60	152.40	21.60	130.80	19.20	9.60	15.20	298.20	139.40	12.40	127.40	4.80	8.00	58.00	0.00	58.00	0.00	100.80	0.00	100.80	38.00	262.20	138.40	723.60	563.80	301.60	262.20
17	S10E1	2094.80	518.60	14.80	514.60	70.40	115.40	168.80	230.40	372.40	18.40	354.00	76.40	117.60	144.00	1242.20	307.60	18.80	288.80	82.80	25.00	542.40	80.00	462.40	100.80	456.20	0.00	456.20	510.80	851.80	116.40	2013.60	856.60	159.20	852.60
18	S10E2	1830.80	398.60	0.00	398.60	40.00	67.80	156.00	136.80	259.80	0.00	259.80	34.20	102.40	108.00	1180.20	238.60	25.20	214.80	100.00	37.40	563.60	93.60	470.00	122.40	402.60	5.60	402.60	622.00	587.00	116.80	1729.20	653.80	80.00	587.40
19	S1E1	1914.20	321.40	8.40	321.40	33.60	179.20	22.20	90.00	323.80	39.20	284.60	142.00	33.00	79.20	1269.00	733.20	162.00	571.60	98.40	152.00	186.00	4.00	182.00	28.80	349.80	0.00	349.80	724.40	545.40	205.20	1709.40	645.20	100.00	545.60
20	S1E2	1545.80	232.40	0.00	232.40	16.80	140.80	12.00	68.40	208.60	15.60	193.00	104.60	18.40	54.00	1104.80	643.20	157.60	485.60	94.60	159.20	159.60	4.00	155.60	30.60	316.80	4.80	312.00	713.20	391.60	176.00	1369.80	441.00	49.20	391.80
21	S1E3	1636.20	242.20	0.00	242.20	0.00	123.00	9.40	110.20	194.00	0.00	194.00	96.40	12.20	87.00	1201.20	595.20	138.40	457.80	82.00	161.80	165.20	4.40	160.80	62.40	442.80	28.80	421.20	770.00	436.00	170.80	1471.80	436.20	0.00	436.20
22	S1E4	2402.40	336.40	0.00	336.40	0.00	48.40	37.00	273.60	263.80	0.00	263.80	37.00	26.60	216.00	1802.20	457.60	62.40	398.20	72.00	230.40	285.00	42.40	266.40	172.80	1087.20	196.00	892.00	1196.00	606.20	249.60	2156.80	600.20	0.00	600.20
23	S1E5	1203.20	164.00	0.00	164.00	0.00	57.20	1.00	121.60	126.40	0.00	126.40	43.60	1.80	96.00	912.80	325.20	65.20	260.00	33.60	140.40	97.60	2.00	97.60	76.80	580.00	140.80	439.20	626.80	290.40	179.20	1024.00	290.40	0.00	290.40
24	S1W1	2207.60	797.20	158.80	642.40	168.80	188.80	106.80	187.20	590.00	114.00	476.00	110.80	86.20	136.80	841.00	315.00	6.40	315.00	21.80	3.60	222.20	7.20	215.00	10.80	327.20	0.00	327.20	72.40	777.00	277.60	1930.40	1368.60	591.20	777.40
25	S1W2	1694.00	743.60	198.40	545.60	150.60	143.00	105.80	151.20	376.00	39.20	344.00	60.80	57.60	86.40	595.80	201.60	2.00	201.20	4.20	1.40	161.60	0.00	161.60	0.00	238.60	0.00	238.60	8.40	587.80	231.20	1473.60	1101.00	523.20	588.20
26	S1W3	652.00	411.20	169.60	241.60	66.00	61.60	45.60	68.40	66.00	0.00	66.00	0.00	0.00	0.00	174.80	61.60	0.00	61.60	0.00	0.00	45.60	0.00	45.60	0.00	67.60	0.00	67.60	0.00	174.80	169.60	482.40	477.20	301.60	175.60
27	S1W4	537.20	303.00	68.80	234.20	54.00	60.20	48.00	72.00	54.00	0.00	54.00	0.00	0.00	0.00	180.20	60.20	0.00	60.20	0.00	0.00	48.00	0.00	48.00	0.00	72.00	0.00	72.00	0.00	180.20	68.80	468.40	357.00	176.80	180.20
28	S2E1	2308.00	418.60	8.40	416.60	58.40	197.20	34.20	136.80	402.40	49.20	353.20	154.80	43.80	108.00	1509.00	790.80	168.00	622.80	116.00	162.00	259.80	16.40	243.40	54.00	459.20	6.00	453.20	840.00	669.80	238.00	2070.00	821.00	168.00	670.20
29	S2E2	1619.80	244.60	0.00	244.60	15.00	149.20	13.00	68.40	202.60	5.60	197.00	111.00	17.00	54.00	1209.40	678.80	164.80	518.40	110.80	173.60	191.40	8.40	183.00	43.20	359.80	20.80	339.00	846.80	411.40	191.60	1445.00	447.20	35.60	411.60
30	S2E3	1845.20	288.00	0.00	288.00	8.20	127.20	18.40	136.80	234.00	10.40	223.60	94.40	23.60	108.00	1373.60	617.60	138.40	479.20	99.40	191.60	238.20	14.40	227.80	86.40	546.40	24.00	522.40	921.20	494.80	177.20	1668.00	522.00	26.80	495.20

House number 31-60

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
31	S2E4	2034.80	277.20	0.00	277.20	0.00	26.00	50.00	205.20	225.60	0.00	225.60	23.60	40.80	162.00	1532.00	312.60	27.20	285.40	63.00	172.80	339.40	46.40	293.00	144.00	880.00	196.80	683.20	1030.00	502.00	270.40	1764.40	502.80	0.00	502.80
32	S2E5	1498.80	201.20	0.00	201.20	0.00	3.60	0.00	197.60	159.20	0.00	159.20	3.20	0.00	156.00	1138.40	186.00	6.40	179.60	0.00	172.80	121.60	0.00	121.60	121.60	830.80	183.20	647.60	778.40	360.00	189.60	1309.20	360.40	0.00	360.40
33	S2E6	760.60	95.00	0.00	95.00	0.00	0.00	0.00	95.00	75.00	0.00	75.00	0.00	0.00	75.00	590.60	80.00	0.00	80.00	0.00	80.00	60.00	0.00	60.00	60.00	450.60	140.80	309.80	420.80	169.80	140.80	619.80	170.00	0.00	170.00
34	S2W2	1938.80	835.40	215.20	625.00	172.60	151.60	127.60	180.00	459.00	75.20	384.60	72.80	60.00	90.00	668.40	224.40	0.40	224.40	2.40	1.40	182.00	0.00	182.00	0.00	262.00	0.00	262.00	8.00	668.40	273.60	1673.20	1272.20	610.80	669.20
35	S2W3	991.20	575.20	176.00	416.80	95.20	98.40	93.60	129.60	95.20	0.00	95.20	0.00	0.00	0.00	320.80	98.40	0.00	98.40	0.00	0.00	93.60	0.00	93.60	0.00	128.80	0.00	128.80	0.00	320.80	176.00	832.80	670.40	348.80	321.60
36	S2W4	641.20	366.80	96.80	279.00	51.20	63.20	87.00	79.20	53.40	0.00	53.40	0.00	3.20	0.00	232.60	63.20	0.00	63.20	0.00	0.00	90.20	0.00	90.20	0.00	79.20	0.00	79.20	0.00	232.60	96.80	564.40	420.20	199.20	232.60
37	S3E3	2984.00	480.40	0.00	480.40	9.60	158.40	41.20	273.60	410.20	15.20	395.80	124.80	47.80	216.00	2093.40	780.40	155.20	634.00	120.40	230.40	384.20	30.80	353.40	144.00	928.80	66.40	863.20	1232.40	861.00	258.80	2726.80	890.60	34.40	861.80
38	S3E4	1628.00	227.40	0.00	227.40	0.00	0.00	37.40	190.00	172.40	0.00	172.40	0.00	22.40	150.00	1228.20	178.80	0.00	178.80	18.80	160.00	249.40	36.80	212.60	137.60	800.00	166.80	633.20	829.20	399.00	203.60	1424.40	399.80	0.00	399.80
39	S3E5	2102.80	289.20	0.00	289.20	0.00	10.60	21.80	273.60	228.80	0.00	228.80	3.20	21.40	216.00	1584.80	254.60	6.40	254.60	37.00	230.40	241.80	20.00	225.40	172.80	1088.40	197.60	892.00	1067.60	517.20	220.80	1890.00	518.00	0.00	518.00
40	S3E6	879.00	110.20	0.00	110.20	0.00	0.00	0.00	110.20	87.00	0.00	87.00	0.00	0.00	87.00	681.80	95.20	0.00	95.20	0.00	95.20	69.60	0.00	69.60	69.60	517.00	155.20	361.80	484.80	197.00	155.20	723.80	197.20	0.00	197.20
41	S3W1	2594.40	722.40	110.80	612.40	168.80	181.20	104.00	180.00	699.00	136.80	563.00	135.60	108.80	165.60	1177.80	460.60	46.00	414.60	51.00	46.80	296.40	17.20	279.60	28.80	420.80	0.00	420.80	316.40	861.40	304.40	2290.00	1417.80	556.00	861.80
42	S3W2	2015.60	897.80	218.40	697.40	182.40	163.40	146.40	205.20	427.80	62.80	365.00	60.00	52.60	76.40	694.80	220.20	0.00	220.20	0.00	0.00	197.00	0.00	197.00	0.00	277.60	0.00	277.60	0.00	694.80	274.00	1755.20	1320.80	625.20	695.60
43	S3W3	1242.80	690.20	207.20	484.60	123.20	104.80	107.40	158.40	164.80	13.60	151.20	6.40	10.00	14.40	391.80	110.00	0.00	110.00	0.00	0.00	115.40	0.00	115.40	0.00	172.00	0.00	172.00	0.00	391.80	220.80	1027.60	854.20	467.20	392.60
44	S4E1	2750.40	474.80	0.00	474.80	28.40	228.00	61.40	180.00	430.40	39.20	424.80	183.60	75.60	165.60	1856.60	889.60	168.80	724.80	136.80	176.40	373.40	28.40	345.40	72.00	593.60	0.00	593.60	967.60	893.40	233.60	2557.60	905.20	96.00	893.80
45	S4E2	3172.40	546.60	0.00	546.60	13.00	205.20	59.20	273.60	468.20	20.00	451.60	162.40	63.20	216.00	2157.60	898.80	180.00	722.80	153.60	201.60	439.00	37.20	405.80	144.00	846.80	39.20	820.00	1184.80	978.80	270.40	2902.00	1014.80	45.60	979.60
46	S4E3	3064.40	498.00	0.00	498.00	12.00	171.20	48.20	273.60	433.20	19.60	413.60	134.80	50.80	216.00	2133.20	809.20	148.40	660.80	124.40	230.40	410.60	34.80	389.00	172.80	964.80	72.80	892.00	1280.40	886.80	268.40	2796.00	931.20	43.60	887.60
47	S4E4	1430.40	194.00	0.00	194.00	0.00	6.40	39.40	182.40	152.00	0.00	152.00	5.20	29.80	144.00	1087.40	176.80	6.40	170.40	34.00	135.60	252.00	38.00	214.80	129.60	729.20	160.80	586.00	746.80	345.20	205.20	1230.40	346.00	0.00	346.00
48	S4E5	2292.00	315.40	0.00	315.40	0.00	33.00	8.80	273.60	260.00	0.00	260.00	26.20	17.80	216.00	1716.60	372.40	38.40	334.00	44.40	230.40	249.80	6.40	243.80	172.80	1094.40	202.40	892.00	1142.00	574.60	246.80	2045.20	575.40	0.00	575.40
49	S4E6	884.60	110.20	0.00	110.20	0.00	0.00	0.00	110.20	87.00	0.00	87.00	0.00	0.00	87.00	687.40	95.20	0.00	95.20	0.00	95.20	69.60	0.00	69.60	69.60	522.60	160.80	361.80	490.40	197.00	160.80	723.80	197.20	0.00	197.20
50	S4W1	2120.40	632.00	102.00	555.60	164.40	143.20	104.00	144.00	633.60	138.40	495.20	116.80	92.80	136.80	902.00	336.20	22.80	313.40	32.20	32.40	238.60	14.00	224.60	14.40	327.20	0.00	327.20	194.80	721.60	249.20	1871.20	1265.60	543.60	722.00
51	S4W2	2075.20	916.00	202.00	733.20	186.40	171.20	156.00	219.60	431.00	65.20	368.60	61.00	52.80	79.20	730.40	229.20	0.00	229.20	0.00	0.00	206.80	0.00	206.80	0.00	294.40	0.00	294.40	0.00	730.40	264.40	1830.00	1347.00	630.00	731.20
52	S4W3	838.40	497.20	159.20	342.00	84.80	89.20	67.20	105.60	90.00	6.80	84.80	6.40	1.60	5.60	256.40	90.40	0.00	90.40	0.00	0.00	67.20	0.00	67.20	0.00	110.40	0.00	110.40	0.00	256.40	159.60	683.20	582.00	324.80	257.20
53	S5E1	3416.40	642.80	2.00	640.80	33.60	243.20	90.40	273.60	596.80	52.00	544.80	192.00	103.20	216.00	2176.80	935.60	173.60	763.60	144.80	183.60	473.20	41.20	432.00	93.60	782.00	16.00	766.00	1065.20	1117.60	283.60	3132.80	1239.60	121.20	1118.40
54	S5E2	3136.00	529.60	0.00	529.60	0.00	196.80	70.00	273.60	434.40	0.00	434.40	155.20	75.60	216.00	2186.00	875.20	170.40	707.20	153.60	201.60	489.60	48.40	443.20	144.00	873.60	39.20	834.40	1236.80	963.20	244.80	2897.60	964.00	0.00	964.00
55	S5E3	2840.80	441.00	0.00	441.00	6.00	107.80	53.60	273.60	370.60	12.00	358.60	86.40	50.20	216.00	2036.60	618.20	94.00	524.60	100.00	230.40	421.40	54.80	376.60	172.80	1006.40	124.00	892.00	1256.80	786.80	265.20	2578.40	811.60	24.00	787.60
56	S5E5	1586.40	212.80	0.00	212.80	0.00	6.40	0.40	212.80	168.00	0.00	168.00	5.20	3.60	168.00	1205.60	198.40	8.00	195.60	6.80	182.40	134.40	6.80	134.40	134.40	892.00	206.00	693.60	825.60	380.00	212.80	1388.00	380.80	0.00	380.80
57	S5E6	945.40	117.80	0.00	117.80	0.00	0.00	0.00	117.80	93.00	0.00	93.00	0.00	0.00	93.00	734.60	101.60	0.00	101.60	0.00	101.60	74.40	0.00	74.40	74.40	558.60	172.00	386.60	524.00	210.60	172.00	773.40	210.80	0.00	210.80
58	S5W1	1932.00	682.60	114.40	568.20	161.60	143.20	112.00	158.40	603.60	124.80	478.80	116.80	86.80	122.40	715.60	260.00	3.60	260.00	0.00	0.00	189.60	5.20	185.60	0.00	266.00	0.00	266.00	7.60	711.60	213.60	1729.20	1216.40	536.80	712.00
59	S5W2	1891.20	849.00	177.20	673.40	163.80	166.00	142.60	201.60	383.00	62.80	320.20	54.00	44.20	61.20	673.80	219.00	0.00	219.00	3.20	0.00	193.60	4.40	189.20	3.60	262.00	0.00	262.00	18.00	662.80	242.80	1654.00	1228.40	565.60	663.60
60	S5W3	1049.20	630.20	210.40	419.80	114.60	99.20	87.20	118.80	114.60	0.00	114.60	0.00	0.00	0.00	304.40	99.20	0.00	99.20	0.00	0.00	87.20	0.00	87.20	0.00	118.00	0.00	118.00	0.00	304.40	210.40	838.80	744.80	439.60	305.20

House number 61-80

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
61	S6E1	3374.00	651.00	0.40	650.60	52.60	243.20	114.80	273.60	620.60	57.20	563.40	192.00	120.40	216.00	2171.40	922.00	165.60	756.40	144.80	176.40	525.60	40.40	487.60	108.00	778.40	16.00	762.40	1050.00	1125.40	257.20	3118.80	1271.60	162.80	1126.20
62	S6E2	3225.20	565.40	0.00	565.40	21.80	186.80	89.40	273.60	495.80	25.20	477.00	149.20	94.20	216.00	2173.20	810.40	154.00	662.00	153.60	194.40	534.80	54.80	480.00	144.00	866.00	57.20	827.20	1223.60	1003.20	269.20	2963.20	1061.20	68.80	1004.00
63	S6E3	2514.40	413.60	0.00	413.60	3.80	74.20	65.80	273.60	343.00	9.20	334.20	59.40	66.00	216.00	1768.60	440.00	56.00	384.00	102.40	177.20	451.20	65.60	385.60	172.80	904.00	125.20	838.80	1036.40	740.60	250.00	2334.80	754.20	16.80	741.40
64	S6E5	1424.40	191.80	0.00	191.80	0.00	0.00	17.00	174.80	150.60	0.00	150.60	0.00	13.00	138.00	1082.00	158.20	0.00	158.20	11.00	147.20	174.20	21.20	153.80	113.20	749.60	181.20	572.40	740.40	341.60	202.40	1226.80	342.40	0.00	342.40
65	S6E6	1755.20	238.60	0.00	238.60	0.00	10.60	7.60	220.40	188.20	0.00	188.20	8.20	6.00	174.00	1328.40	225.60	1.20	224.40	15.20	190.40	176.00	8.00	168.00	139.20	926.80	203.20	723.60	902.00	426.40	212.40	1542.80	426.80	0.00	426.80
66	S6W1	2363.20	798.40	72.80	725.60	179.20	198.80	110.00	237.60	669.20	140.00	529.20	128.40	95.60	129.60	895.60	327.20	0.00	327.20	0.00	0.00	205.60	0.00	205.60	0.00	366.40	0.00	366.40	0.00	895.60	212.80	2150.40	1467.60	571.20	896.40
67	S6W2	1832.80	829.20	170.40	658.80	166.60	157.80	140.00	194.40	366.60	61.60	307.80	48.00	39.20	54.00	650.60	209.00	0.00	209.00	3.20	0.00	190.40	4.40	186.00	3.60	251.20	0.00	251.20	18.00	632.60	229.20	1610.40	1195.80	562.40	633.40
68	S7E1	3288.80	714.20	7.20	707.00	111.40	188.40	173.20	273.60	677.00	83.20	609.80	155.60	138.00	216.00	1924.40	652.20	86.00	566.20	137.80	89.20	587.60	74.40	526.00	115.20	691.20	0.00	691.20	836.80	1102.80	240.40	3048.40	1391.20	297.20	1103.60
69	S7E2	3266.40	586.80	0.00	586.80	30.60	175.60	128.00	273.60	518.40	37.20	481.20	142.80	98.80	216.00	2161.20	737.60	116.80	622.80	152.00	154.00	612.00	91.20	522.00	157.20	851.20	57.20	794.00	1153.20	1014.80	279.20	2987.20	1105.20	98.40	1015.60
70	S7E3	2240.40	368.40	0.00	368.40	15.20	84.60	131.80	136.80	293.80	6.40	289.00	69.80	96.00	108.00	1578.20	437.20	64.00	373.20	128.00	90.80	588.60	88.80	499.80	151.20	558.80	73.20	486.40	951.60	626.60	230.80	2009.60	662.20	35.20	627.00
71	S7E5	711.60	87.40	0.00	87.40	0.00	0.00	0.00	87.40	69.00	0.00	69.00	0.00	0.00	69.00	555.20	73.60	0.00	73.60	0.00	73.60	56.60	0.00	56.60	56.60	425.00	139.20	285.80	399.60	155.60	139.20	572.40	156.40	0.00	156.40
72	S7W1	2244.80	741.60	28.40	733.60	152.40	182.60	165.60	237.60	608.40	131.20	477.20	112.80	94.00	122.40	906.80	295.40	0.00	295.40	6.40	0.00	267.60	16.80	259.60	0.00	359.20	0.00	359.20	29.60	898.80	167.60	2097.60	1338.00	463.20	899.60
73	S8E1	2409.20	565.20	0.00	565.20	0.00	160.40	174.40	230.40	413.20	0.00	413.20	122.80	132.00	158.40	1430.80	443.40	48.40	400.20	83.20	33.80	508.00	64.00	447.20	57.60	479.40	0.00	479.40	456.80	977.60	110.80	2305.20	978.40	0.00	978.40
74	S8E2	2994.80	574.40	0.00	574.40	37.80	129.60	140.40	273.60	442.20	0.00	442.20	95.00	101.60	216.00	1978.20	536.20	74.40	461.80	133.60	104.80	627.60	93.60	534.00	158.40	814.40	62.40	752.00	1024.00	954.20	230.40	2764.40	1016.60	75.60	955.00
75	S8E3	886.60	208.20	0.00	208.20	10.00	27.80	118.80	51.60	86.80	1.60	86.80	3.20	62.80	24.00	681.40	83.60	0.00	83.60	66.00	17.60	392.60	76.00	316.60	99.80	205.20	33.60	171.60	476.40	266.20	109.60	777.00	288.00	21.60	266.40
76	S8E5	702.00	87.40	0.00	87.40	0.00	0.00	0.00	87.40	69.00	0.00	69.00	0.00	0.00	69.00	545.60	73.60	0.00	73.60	0.00	73.60	56.60	0.00	56.60	56.60	415.40	129.60	285.80	390.00	155.60	129.60	572.40	156.40	0.00	156.40
77	S8W1	2281.20	770.40	40.80	731.60	175.60	180.80	165.60	237.60	612.80	129.60	489.60	105.20	95.20	122.40	914.80	299.40	3.20	297.00	11.60	8.60	272.80	16.80	258.00	0.00	352.00	0.00	352.00	57.60	882.00	174.40	2106.80	1366.40	508.40	882.80
78	S9E1	2474.80	642.00	9.20	634.80	93.80	141.80	171.60	230.40	454.60	23.60	440.20	90.80	127.20	158.40	1391.40	358.80	37.20	334.00	82.80	33.80	543.20	80.00	465.60	100.80	492.20	0.00	492.20	518.00	895.40	124.40	2356.40	1096.60	209.20	896.20
79	S9E2	2327.60	459.60	0.00	459.60	62.60	94.20	166.00	136.80	387.20	31.60	355.60	61.20	129.20	108.00	1497.00	368.80	46.00	337.60	115.60	78.40	654.80	92.80	562.00	151.20	479.60	9.60	473.20	821.60	695.00	163.20	2171.60	841.40	150.40	695.40
80	S9W1	2366.00	816.40	84.00	733.20	180.00	176.60	159.40	219.60	641.20	125.60	515.60	110.40	98.80	129.60	962.80	317.00	6.40	313.40	23.20	8.60	315.20	25.20	290.40	18.00	357.00	0.00	357.00	104.40	893.60	224.80	2194.40	1419.00	562.00	894.40

Appendix 12: The wayfaring statistic result of *Saqacengalj* with social attitude set as 173450903010

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
1	00	1650.70	514.80	85.20	440.40	131.00	136.80	61.20	113.40	432.50	82.80	349.70	87.00	50.80	84.60	725.50	344.20	59.20	292.40	29.00	43.20	140.20	1.60	138.60	5.40	242.90	0.00	242.90	200.40	531.80	203.00	1447.70	947.30	419.20	531.90
2	0E1	1173.50	308.90	6.80	307.50	56.10	133.50	39.60	81.00	178.40	25.20	170.00	92.60	13.60	41.40	787.10	493.30	124.60	373.30	68.40	95.40	99.70	0.00	99.70	5.40	194.30	0.00	194.30	459.80	344.70	137.20	1040.50	476.70	139.40	344.70
3	0E6	650.60	79.80	0.00	79.80	0.00	2.20	0.00	79.80	63.00	0.00	63.00	0.00	0.00	63.00	507.80	67.80	0.80	67.80	0.00	67.80	50.40	0.00	50.40	50.40	389.60	128.60	261.00	365.00	142.80	128.60	522.00	142.80	0.00	142.80
4	0N1	1326.20	454.40	85.20	369.20	97.60	131.20	50.40	95.40	309.40	65.20	244.70	71.80	32.80	50.40	610.50	325.80	57.80	268.20	25.60	39.60	105.30	0.00	105.30	0.00	180.00	0.00	180.00	187.80	423.10	185.20	1156.00	763.10	344.40	423.10
5	0S2	2240.30	543.30	65.40	516.30	111.30	199.80	72.00	167.40	604.10	110.40	493.70	164.40	90.30	156.60	1100.10	504.20	56.60	450.00	35.40	50.40	214.70	5.80	210.10	14.40	388.50	0.00	388.50	261.00	849.00	215.00	2043.10	1146.60	386.40	849.30
6	0S3	2509.10	609.10	37.20	571.90	132.10	199.80	72.60	167.40	717.90	146.60	571.30	169.80	102.00	167.40	1195.90	523.00	56.00	475.00	51.40	54.00	259.20	13.20	246.00	25.20	413.70	0.00	413.70	322.40	878.70	248.20	2271.10	1323.40	446.20	879.00
7	0S4	3282.70	791.60	11.20	780.40	107.20	273.60	114.00	307.80	838.00	140.00	698.00	216.00	133.20	243.00	1663.90	647.80	36.40	612.80	76.60	70.20	382.60	19.80	373.00	50.40	670.50	0.00	670.50	415.40	1264.90	205.60	3088.70	1629.60	365.60	1265.80
8	0S5	3252.70	750.80	2.00	748.80	107.40	219.60	121.80	307.80	817.20	143.40	677.40	194.40	156.60	243.00	1693.90	567.40	32.20	554.20	91.60	70.20	468.00	27.60	446.40	82.80	688.50	0.00	688.50	487.00	1235.10	189.60	3086.30	1568.00	360.20	1236.00
9	0S6	3221.10	757.40	17.20	755.40	129.70	219.60	130.20	307.80	803.70	127.20	685.20	187.20	157.20	243.00	1660.70	535.60	11.80	528.60	89.40	32.40	471.60	21.60	456.00	79.20	661.50	0.00	661.50	424.60	1244.10	151.80	3079.50	1560.80	369.20	1245.00
10	0S7	2556.70	756.40	21.20	737.40	155.40	157.80	184.80	243.00	685.20	120.60	566.30	132.60	129.60	156.60	1146.10	394.00	20.80	373.20	61.60	21.20	364.80	22.80	354.00	0.00	419.90	0.00	419.90	204.40	1001.70	164.20	2397.10	1441.60	450.40	1002.60
11	0W1	1289.30	618.70	170.60	466.80	128.30	126.40	85.00	135.00	238.10	29.40	208.70	31.80	23.40	32.60	458.90	176.30	8.00	168.30	3.80	8.70	106.60	0.00	106.60	0.00	176.00	0.00	176.00	33.00	430.70	202.60	1115.50	856.80	456.60	431.00
12	0W2	1208.10	674.10	200.00	474.50	140.50	124.00	82.20	127.80	179.00	15.60	165.20	11.20	14.90	10.80	360.40	132.40	1.00	131.40	0.50	0.00	95.10	0.00	95.10	0.00	132.90	0.00	132.90	2.00	358.40	215.20	999.10	847.70	489.00	358.70
13	N1E1	1078.00	325.50	12.60	312.90	69.00	130.20	39.60	81.00	171.00	25.20	145.80	65.50	10.80	16.20	601.40	363.90	92.20	279.50	36.00	68.10	83.40	0.00	83.40	0.00	154.10	0.00	154.10	300.40	337.20	112.60	966.40	493.80	175.80	337.20
14	N1W1	1193.50	539.40	144.00	395.40	115.80	123.00	59.40	97.20	264.20	45.80	218.40	44.40	21.90	43.40	411.90	189.00	11.80	177.20	4.80	8.60	79.20	0.00	79.20	0.00	145.30	0.00	145.30	38.60	373.30	201.60	991.90	781.60	408.20	373.40
15	N2W1	911.40	485.10	144.00	341.10	103.20	104.30	49.50	86.40	165.60	25.20	140.40	16.90	10.80	16.20	289.40	126.50	6.00	123.10	2.40	3.60	59.70	0.00	59.70	0.00	104.40	0.00	104.40	18.00	280.00	156.00	755.40	632.70	354.00	280.00
16	N3W1	867.80	440.70	109.20	331.50	94.20	105.00	46.50	86.40	141.20	16.20	125.00	12.80	7.20	11.20	286.00	129.10	6.20	123.10	2.40	4.00	56.10	0.00	56.10	0.00	100.80	0.00	100.80	19.00	268.00	131.40	736.40	581.80	313.80	268.00
17	S10E1	2147.30	551.80	7.40	549.80	49.40	122.00	184.80	243.00	329.80	13.80	329.80	72.40	122.40	135.00	1267.70	294.60	10.60	284.00	83.60	16.80	567.80	85.80	482.00	102.60	458.70	0.00	458.70	499.80	878.70	109.80	2067.10	881.60	112.60	879.60
18	S10E2	1694.30	342.90	0.00	342.90	25.00	48.50	169.80	102.60	225.50	0.00	225.50	25.30	110.70	81.00	1127.80	199.20	14.40	184.80	105.20	23.00	610.60	104.40	506.20	135.00	340.50	2.80	340.50	619.60	524.60	114.80	1585.30	566.50	50.00	524.90
19	S1E1	1702.10	275.60	4.20	275.60	25.20	181.40	15.80	55.80	270.70	29.40	241.30	143.40	22.90	52.20	1155.80	738.00	172.80	565.40	93.60	147.00	148.50	2.00	146.50	14.40	269.30	0.00	269.30	684.80	471.40	204.20	1498.10	546.30	75.00	471.50
20	S1E2	1366.90	191.30	0.00	191.30	8.40	145.80	6.00	34.20	156.20	7.80	149.10	110.20	9.20	27.00	1021.10	672.50	172.60	499.90	94.50	157.80	127.00	2.00	125.00	15.30	236.60	2.40	234.20	694.40	326.70	181.40	1185.50	345.80	24.60	326.80
21	S1E3	1395.70	194.90	0.00	194.90	0.00	114.40	4.70	76.00	154.90	0.00	154.90	89.60	6.10	60.00	1048.10	575.80	143.60	432.70	73.40	158.40	125.00	2.20	122.80	40.80	347.50	18.40	335.10	700.80	349.70	162.60	1237.50	349.80	0.00	349.80
22	S1E4	2539.50	352.50	0.00	352.50	0.00	32.40	36.40	307.80	276.70	0.00	276.70	24.70	25.80	243.00	1910.30	425.70	41.50	387.30	63.20	259.20	290.20	43.00	276.20	194.40	1217.70	214.80	1003.50	1276.90	633.40	261.40	2296.20	629.20	0.00	629.20
23	S1E5	1021.60	130.80	0.00	130.80	0.00	41.30	0.50	119.70	101.20	0.00	101.20	31.30	0.90	94.50	790.50	270.40	49.80	220.60	26.40	145.00	81.20	1.00	81.20	75.60	574.60	141.40	433.20	578.00	236.70	153.60	868.00	232.00	0.00	232.00
24	S1W1	2121.10	790.50	162.80	631.30	171.30	192.00	100.80	178.20	585.80	118.20	467.60	112.50	81.80	124.20	782.40	311.50	3.60	311.50	10.90	1.80	195.00	3.60	191.40	5.40	307.50	0.00	307.50	36.20	750.40	275.60	1846.90	1338.70	588.00	750.70
25	S1W2	1479.20	725.50	213.60	512.30	147.70	133.60	98.90	138.60	294.80	29.40	270.50	40.40	39.60	59.40	486.20	165.40	1.00	165.40	2.10	0.70	132.00	0.00	132.00	0.00	194.80	0.00	194.80	4.20	482.40	236.10	1243.10	993.00	523.00	482.70
26	S1W3	649.30	418.00	185.80	232.20	65.80	58.40	43.20	64.80	65.80	0.00	65.80	0.00	0.00	0.00	165.50	58.40	0.00	58.40	0.00	0.00	43.20	0.00	43.20	0.00	63.90	0.00	63.90	0.00	165.50	185.80	463.50	483.80	317.40	166.40
27	S1W4	597.60	336.80	76.00	260.80	59.20	66.60	54.00	81.00	59.20	0.00	59.20	0.00	0.00	0.00	201.60	66.60	0.00	66.60	0.00	0.00	54.00	0.00	54.00	0.00	81.00	0.00	81.00	0.00	201.60	76.00	521.60	396.00	194.40	201.60
28	S2E1	2070.50	359.40	4.20	355.20	37.10	204.60	21.80	102.60	330.50	35.00	297.80	160.20	29.90	81.00	1383.90	810.80	181.20	629.60	117.20	158.40	207.20	8.20	199.00	32.40	366.30	3.00	363.30	786.80	597.50	226.00	1844.50	686.60	110.20	597.80
29	S2E2	1435.30	199.10	0.00	199.10	7.50	151.40	6.50	34.20	160.20	2.80	157.40	114.40	8.50	27.00	1100.20	700.20	179.40	527.20	111.50	175.80	151.80	4.20	147.60	21.60	268.90	10.40	258.50	809.40	341.40	191.60	1256.50	359.30	17.80	341.50
30	S2E3	1649.50	238.80	0.00	238.80	4.10	123.60	9.80	102.60	190.80	5.20	185.60	93.20	13.30	81.00	1271.20	618.80	147.20	473.00	98.00	201.00	192.10	8.20	185.90	64.80	463.50	14.40	449.10	893.20	415.90	168.00	1483.10	429.60	13.40	416.20

House number 31-60

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
31	S2E4	1990.50	265.30	0.00	265.30	0.00	16.20	47.90	205.20	212.90	0.00	212.90	14.40	38.90	162.00	1512.30	274.80	16.20	258.60	55.20	172.80	332.40	45.60	288.20	151.20	905.70	215.40	690.30	1035.00	477.30	276.60	1713.90	478.20	0.00	478.20
32	S2E5	1598.10	213.60	0.00	213.60	0.00	2.70	0.00	210.90	168.90	0.00	168.90	2.40	0.00	166.50	1215.60	197.10	4.80	192.30	0.00	187.20	128.40	0.00	128.40	128.40	890.10	197.40	692.70	833.40	382.20	202.20	1395.90	382.50	0.00	382.50
33	S2E6	781.90	96.90	0.00	96.90	0.00	0.00	0.00	96.90	76.50	0.00	76.50	0.00	0.00	76.50	608.50	82.80	0.00	82.80	0.00	82.80	61.20	0.00	61.20	61.20	465.70	149.60	316.10	435.20	173.30	149.60	632.30	173.40	0.00	173.40
34	S2W2	1785.50	847.60	232.80	615.70	179.30	141.00	127.20	174.60	394.70	63.60	331.70	54.00	42.00	63.00	588.10	195.00	0.20	195.00	1.20	0.70	163.60	0.00	163.60	0.00	229.50	0.00	229.50	4.00	588.10	274.20	1522.50	1198.50	630.00	589.00
35	S2W3	1041.30	608.70	195.00	433.50	99.30	101.10	98.10	135.00	99.30	0.00	99.30	0.00	0.00	0.00	333.30	101.10	0.00	101.10	0.00	0.00	98.10	0.00	98.10	0.00	134.10	0.00	134.10	0.00	333.30	195.00	866.10	708.00	373.80	334.20
36	S2W4	680.60	391.40	104.40	292.90	56.40	69.30	82.60	86.40	57.50	0.00	57.50	0.00	1.60	0.00	239.90	69.30	0.00	69.30	0.00	0.00	84.20	0.00	84.20	0.00	86.40	0.00	86.40	0.00	239.90	104.40	589.00	448.90	217.20	239.90
37	S3E3	3072.10	492.20	0.00	492.20	4.80	150.30	30.50	307.80	407.70	7.60	400.50	118.20	35.70	243.00	2172.20	803.70	169.00	650.70	123.00	259.20	362.00	21.60	340.40	151.20	1006.50	46.60	960.30	1287.60	884.60	237.40	2844.10	899.90	17.20	885.50
38	S3E4	1598.10	219.20	0.00	219.20	0.00	0.00	36.80	182.40	164.60	0.00	164.60	0.00	20.60	144.00	1214.30	171.30	0.00	171.30	17.70	153.60	246.90	35.60	211.30	141.60	796.10	180.80	615.30	831.40	382.90	216.40	1381.70	383.80	0.00	383.80
39	S3E5	2301.30	317.50	0.00	317.50	0.00	6.50	12.80	307.80	250.90	0.00	250.90	2.40	12.20	243.00	1732.90	276.20	4.80	276.20	24.20	259.20	239.40	12.20	229.00	194.40	1217.30	214.40	1003.50	1165.40	567.50	228.20	2077.10	568.40	0.00	568.40
40	S3E6	915.90	114.00	0.00	114.00	0.00	0.00	0.00	114.00	90.00	0.00	90.00	0.00	0.00	90.00	711.90	98.40	0.00	98.40	0.00	98.40	72.00	0.00	72.00	72.00	541.50	167.20	374.30	508.00	203.90	167.20	748.70	204.00	0.00	204.00
41	S3W1	2438.70	683.20	89.00	595.10	176.30	185.40	90.20	167.40	716.10	151.80	570.90	141.00	112.80	167.40	1041.30	418.90	30.60	388.30	33.10	28.80	245.70	8.60	239.10	14.40	377.70	0.00	377.70	191.80	849.50	270.60	2168.10	1398.00	558.80	849.80
42	S3W2	1960.70	948.90	238.80	733.70	196.30	167.60	155.60	214.20	361.00	45.60	317.00	41.20	34.70	50.80	654.60	205.60	0.00	205.60	0.00	0.00	188.30	0.00	188.30	0.00	260.70	0.00	260.70	0.00	654.60	279.80	1702.70	1306.10	656.80	655.50
43	S3W3	1246.90	720.50	229.20	493.20	122.70	105.90	110.80	162.00	143.10	6.80	136.30	3.20	5.00	7.20	385.60	108.50	0.00	108.50	0.00	0.00	114.80	0.00	114.80	0.00	168.30	0.00	168.30	0.00	385.60	236.00	1015.10	863.60	481.40	386.50
44	S4E1	2775.70	469.90	0.00	469.90	20.80	250.80	51.70	167.40	442.40	29.40	442.40	203.40	71.60	167.40	1863.70	961.80	184.80	781.80	147.60	180.00	339.00	18.00	321.00	50.40	564.90	0.00	564.90	958.40	911.70	227.20	2579.70	912.00	71.00	912.00
45	S4E2	3311.90	578.00	0.00	578.00	8.10	222.30	43.80	307.80	483.10	14.00	471.70	174.60	48.20	243.00	2250.80	980.10	199.80	783.90	172.80	216.00	427.00	26.00	403.80	151.20	914.30	19.60	900.90	1254.00	1037.00	253.20	3058.70	1061.10	30.20	1037.90
46	S4E3	3161.30	509.90	0.00	509.90	6.00	165.60	39.50	307.80	429.00	9.80	419.20	130.20	40.00	243.00	2222.40	837.60	153.60	684.00	129.00	259.20	417.70	27.60	394.90	194.40	1058.10	54.60	1003.50	1374.00	916.20	237.20	2924.10	938.90	21.80	917.10
47	S4E4	1276.30	171.00	0.00	171.00	0.00	3.20	26.70	171.00	135.00	0.00	135.00	2.60	20.10	135.00	980.60	147.20	3.20	144.00	23.00	126.00	204.30	26.60	178.10	129.60	706.50	169.00	553.50	691.40	305.10	198.80	1107.90	306.00	0.00	306.00
48	S4E5	2418.30	332.90	0.00	332.90	0.00	19.70	5.40	307.80	269.90	0.00	269.90	15.70	11.20	243.00	1815.50	345.20	22.60	322.60	28.00	259.20	243.00	4.60	239.00	194.40	1227.30	223.80	1003.50	1213.60	601.90	250.40	2167.90	602.80	0.00	602.80
49	S4E6	919.70	114.00	0.00	114.00	0.00	0.00	0.00	114.00	90.00	0.00	90.00	0.00	0.00	90.00	715.70	98.40	0.00	98.40	0.00	98.40	72.00	0.00	72.00	72.00	545.30	171.60	374.30	511.80	203.90	171.60	748.70	204.00	0.00	204.00
50	S4W1	1916.90	556.10	86.40	500.10	175.50	123.60	87.60	113.40	664.20	154.20	510.00	116.40	95.70	124.20	712.40	270.80	11.40	259.40	16.10	16.20	193.30	7.00	189.30	7.20	260.70	0.00	260.70	97.40	658.80	225.20	1691.70	1220.30	561.20	659.10
51	S4W2	2058.10	984.80	216.00	791.80	203.00	183.00	170.00	235.80	366.50	47.40	321.90	41.70	34.80	52.20	707.90	221.60	0.00	221.60	0.00	0.00	202.80	0.00	202.80	0.00	283.50	0.00	283.50	0.00	707.90	260.60	1820.50	1351.30	653.60	708.80
52	S4W3	928.50	549.90	176.40	379.50	92.70	97.80	75.60	113.40	92.70	3.40	92.70	3.20	0.80	2.80	285.90	97.80	0.00	97.80	0.00	0.00	75.60	0.00	75.60	0.00	112.50	0.00	112.50	0.00	285.90	176.40	758.10	642.60	355.80	286.80
53	S5E1	3640.30	691.50	1.00	690.50	29.50	273.60	79.60	307.80	642.50	48.60	594.40	216.00	106.50	243.00	2306.30	1027.80	189.60	840.00	159.60	190.80	460.80	33.40	427.40	82.80	831.50	8.00	823.50	1084.80	1224.50	279.40	3360.90	1334.00	108.60	1225.40
54	S5E2	3344.30	565.80	0.00	565.80	0.00	214.20	64.20	307.80	460.40	0.00	460.40	169.20	79.60	243.00	2325.80	958.80	190.20	772.20	172.80	216.00	507.40	41.40	467.80	151.20	936.70	19.60	917.10	1308.20	1025.30	234.80	3116.10	1026.20	0.00	1026.20
55	S5E3	2920.70	444.50	0.00	444.50	3.00	83.80	53.60	307.80	364.40	6.00	358.40	67.60	44.80	243.00	2115.70	580.20	77.40	503.00	92.40	259.20	427.10	58.40	381.50	194.40	1113.30	120.00	1003.50	1323.40	796.00	240.80	2683.30	808.90	12.00	796.90
56	S5E5	1778.70	239.40	0.00	239.40	0.00	3.20	0.20	239.40	189.00	0.00	189.00	2.60	2.50	189.00	1350.30	206.00	4.00	204.60	4.20	201.60	151.20	4.80	151.20	151.20	997.50	222.40	780.30	922.80	427.50	227.20	1561.50	428.40	0.00	428.40
57	S5E6	968.10	119.70	0.00	119.70	0.00	0.00	0.00	119.70	94.50	0.00	94.50	0.00	0.00	94.50	753.90	103.20	0.00	103.20	0.00	103.20	75.60	0.00	75.60	75.60	575.10	182.20	392.90	539.80	214.10	182.20	785.90	214.20	0.00	214.20
58	S5W1	1798.50	628.10	104.60	523.50	170.10	123.60	99.60	135.00	621.90	135.60	486.30	116.40	86.70	124.20	645.80	240.00	1.80	240.00	0.00	0.00	168.50	2.60	166.50	0.00	237.30	0.00	237.30	3.80	643.80	212.60	1605.90	1152.70	552.80	644.10
59	S5W2	1889.90	912.30	190.00	724.70	172.10	177.60	155.70	219.60	322.70	44.80	277.90	36.60	29.50	41.40	661.10	213.70	0.00	213.70	1.60	0.00	188.60	2.20	186.40	1.80	260.10	0.00	260.10	9.00	656.50	234.60	1658.10	1233.40	578.00	657.40
60	S5W3	1127.10	677.00	226.00	451.00	118.50	104.30	96.80	131.40	118.50	0.00	118.50	0.00	0.00	0.00	331.60	104.30	0.00	104.30	0.00	0.00	96.80	0.00	96.80	0.00	130.50	0.00	130.50	0.00	331.60	226.00	901.10	795.50	463.00	332.50

House number 61-80

No	ID	Overall	A	A In	A Out	A-B	A-C1	A-C2	A-C3	B	B In	B Out	B-C1	B-C2	B-C3	C	C1	C1 In	C1 Out	C1-C2	C1-C3	C2	C2 In	C2 Out	C2-C3	C3	C3 In	C3 Out	C In	C Out	In	Out	Top	Top In	Top Out
61	S6E1	3604.30	685.00	0.20	685.00	42.80	273.60	107.20	307.80	658.80	55.60	603.20	216.00	127.80	243.00	2301.10	1012.60	179.80	832.80	159.60	183.60	524.60	33.20	491.40	97.20	827.90	8.00	819.90	1074.40	1233.50	254.40	3355.70	1340.00	141.40	1234.40
62	S6E2	3350.10	583.50	0.00	583.50	14.40	189.00	78.90	307.80	512.20	18.20	498.80	151.80	93.80	243.00	2266.50	841.40	169.40	685.80	172.80	207.90	546.30	50.80	495.50	151.20	930.40	36.60	909.00	1290.40	1057.10	248.20	3121.10	1095.70	47.00	1058.00
63	S6E3	2600.70	433.00	0.00	433.00	1.90	60.20	69.00	307.80	350.80	4.60	347.60	48.60	72.60	243.00	1823.00	394.40	41.40	353.00	111.00	179.40	490.20	72.00	418.20	194.40	976.50	115.80	923.70	1052.60	776.50	219.40	2434.30	783.80	8.40	777.40
64	S6E5	1332.90	177.00	0.00	177.00	0.00	0.00	11.70	165.30	139.00	0.00	139.00	0.00	8.70	130.50	1016.90	145.90	0.00	145.90	6.70	139.20	150.90	14.60	136.30	109.20	723.40	193.00	540.60	708.20	315.10	207.60	1135.90	316.00	0.00	316.00
65	S6E6	1774.50	237.10	0.00	237.10	0.00	5.30	3.80	228.00	187.10	0.00	187.10	4.10	3.00	180.00	1350.30	216.80	0.60	216.20	7.60	199.20	162.40	4.00	158.40	144.00	971.10	220.20	750.90	926.40	423.90	224.80	1549.70	424.20	0.00	424.20
66	S6W1	2445.30	806.20	52.40	753.80	196.40	207.00	96.60	253.80	717.80	156.60	561.20	133.80	101.40	135.00	921.30	340.80	0.00	340.80	0.00	0.00	198.00	0.00	198.00	0.00	387.90	0.00	387.90	0.00	921.30	209.00	2236.30	1524.00	601.80	922.20
67	S6W2	1837.70	890.80	172.80	718.00	175.00	172.60	154.40	216.00	310.60	43.20	269.20	32.00	26.20	36.00	645.30	206.20	0.00	206.20	1.60	0.00	186.20	2.20	184.00	1.80	252.90	0.00	252.90	9.00	636.30	214.20	1627.50	1201.40	564.20	637.20
68	S7E1	3420.50	731.30	3.60	727.70	96.50	191.40	191.40	307.80	707.20	83.80	637.10	161.40	153.00	243.00	2015.70	644.70	71.40	573.30	150.30	75.40	642.50	79.20	574.10	129.60	753.90	0.00	753.90	853.20	1198.10	222.40	3198.10	1431.80	260.00	1199.00
69	S7E2	3376.70	613.10	0.00	613.10	18.80	175.40	131.70	307.80	525.10	24.60	500.50	143.80	105.30	243.00	2243.00	740.80	106.40	637.40	170.40	150.20	660.30	100.80	560.10	171.90	898.70	36.60	862.10	1170.80	1090.20	235.00	3141.70	1133.70	62.20	1091.10
70	S7E3	1943.90	300.40	0.00	300.40	7.60	57.40	132.80	102.60	239.00	3.20	236.60	47.40	100.60	81.00	1404.50	343.80	42.60	301.20	134.40	62.00	616.20	97.20	519.00	162.00	454.70	48.00	407.30	886.40	521.50	190.20	1753.70	539.40	17.60	521.80
71	S7E5	635.30	76.00	0.00	76.00	0.00	0.00	0.00	76.00	60.00	0.00	60.00	0.00	0.00	60.00	499.30	64.00	0.00	64.00	0.00	64.00	50.40	0.00	50.40	50.40	385.90	137.40	248.50	364.20	135.10	137.40	497.90	136.00	0.00	136.00
72	S7W1	2378.70	795.30	21.30	789.30	169.20	190.80	180.00	253.80	644.40	144.00	500.40	114.00	97.50	124.20	950.40	304.80	0.00	304.80	4.80	0.00	283.50	12.40	277.50	0.00	377.10	0.00	377.10	22.00	944.40	171.30	2222.70	1428.30	502.80	945.30
73	S8E1	2469.50	594.00	0.00	594.00	0.00	157.80	193.20	243.00	417.20	0.00	417.20	116.60	144.00	156.60	1458.30	413.60	31.80	385.20	89.60	21.20	560.00	72.00	491.60	64.80	484.70	0.00	484.70	448.00	1010.30	101.40	2372.70	1011.20	0.00	1011.20
74	S8E2	3085.70	595.10	0.00	595.10	23.10	122.30	145.80	307.80	462.40	0.00	462.40	91.90	109.50	243.00	2028.20	501.20	56.60	444.60	146.40	85.20	678.90	104.40	574.50	172.80	848.10	40.20	807.90	1010.00	1018.20	201.20	2884.50	1057.50	46.20	1019.10
75	S8E3	824.90	165.90	0.00	165.90	5.00	13.90	121.20	25.80	78.50	0.80	78.50	1.60	66.50	12.00	633.70	75.20	0.00	75.20	66.40	8.80	408.20	82.20	326.00	95.60	150.30	18.80	131.50	442.60	219.70	101.00	723.90	230.60	10.80	219.80
76	S8E5	623.30	76.00	0.00	76.00	0.00	0.00	0.00	76.00	60.00	0.00	60.00	0.00	0.00	60.00	487.30	64.00	0.00	64.00	0.00	64.00	49.40	0.00	49.40	49.40	373.90	125.40	248.50	352.20	135.10	125.40	497.90	136.00	0.00	136.00
77	S8W1	2337.90	817.40	30.60	786.90	194.40	189.00	180.00	253.80	630.90	139.20	497.10	102.40	94.70	115.20	925.20	292.00	1.60	292.00	6.40	4.30	281.20	12.40	272.70	0.00	366.30	0.00	366.30	32.40	919.20	161.60	2185.90	1425.40	539.40	920.10
78	S9E1	2477.70	658.90	4.60	655.30	84.30	143.20	189.00	243.00	433.90	17.40	420.70	89.20	136.80	156.60	1402.70	335.20	22.40	322.30	83.60	21.20	576.50	85.80	492.50	102.60	491.10	0.00	491.10	503.40	932.50	114.80	2366.30	1092.80	185.40	933.40
79	S9E2	2094.10	385.90	0.00	385.90	38.90	63.80	180.60	102.60	317.40	20.20	297.20	41.00	139.80	81.00	1403.40	295.70	28.40	275.00	125.70	51.70	711.00	103.80	607.20	165.30	403.50	4.80	400.30	814.40	608.50	146.20	1952.50	699.80	93.60	608.80
80	S9W1	2417.30	849.30	61.00	790.60	197.10	184.80	173.80	235.80	649.20	131.40	517.80	103.60	97.40	120.60	955.30	305.00	3.20	303.20	14.60	4.30	303.50	17.20	286.70	10.80	359.80	0.00	359.80	66.20	915.10	199.20	2253.10	1462.00	576.60	916.00

Appendix 13: The wayfaring statistic result of *Aumagan* with social attitude set as 102030755025

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
1	00	878.45	318.43	35.12	282.82	222.31	60.50	428.99	136.26	292.74	70.42	131.02	0.00	130.93	171.38	706.48
2	0E1	633.67	210.05	23.90	186.21	174.60	11.61	353.00	119.41	233.59	58.99	70.63	0.00	70.60	143.30	490.39
3	0E2	532.62	169.64	17.35	152.04	143.44	8.59	302.55	107.45	195.10	51.66	60.44	0.00	60.25	124.80	407.38
4	0N5	660.69	146.13	0.00	145.07	141.84	3.23	384.27	117.50	266.77	124.93	130.29	2.21	128.16	119.71	539.99
5	0N6	565.67	122.97	0.00	120.73	101.35	19.37	303.16	103.65	199.51	98.16	139.53	21.91	117.53	125.55	437.77
6	0N9	331.15	71.33	0.00	69.75	15.75	54.00	91.79	19.00	72.79	57.04	168.03	58.30	111.04	77.30	253.58
7	0W1	1304.13	512.73	86.31	426.38	260.91	165.48	504.84	133.93	370.91	110.00	286.56	10.84	275.48	231.08	1072.78
8	0W10	470.33	315.89	162.84	154.29	75.32	78.98	75.41	0.00	75.41	0.09	79.03	0.05	79.07	162.90	308.77
9	0W6	1336.21	669.07	157.27	511.90	255.30	256.61	347.95	49.25	298.70	43.40	319.20	18.80	300.00	225.32	1110.60
10	0W7	1226.34	658.35	189.81	469.82	215.64	254.18	260.19	15.04	245.15	29.50	307.80	24.23	283.68	229.08	998.65
11	0W9	783.58	504.98	237.43	267.99	117.35	150.64	121.17	0.00	121.17	3.82	157.43	3.64	154.46	241.07	543.62
12	N1E1	667.97	188.87	4.16	184.42	176.32	8.10	395.39	143.83	251.56	75.23	83.71	0.00	83.33	147.99	519.31
13	N2E1	681.91	195.56	0.00	194.65	189.15	5.50	411.46	154.51	256.95	67.80	74.89	0.00	73.30	154.51	524.90
14	N2W1	871.56	284.90	9.62	274.94	209.06	65.88	440.52	151.97	288.54	79.49	146.14	0.00	145.37	161.59	708.85
15	N3E2	476.25	125.28	0.00	125.08	123.29	1.80	308.68	145.04	163.64	40.35	42.30	0.00	42.15	145.04	330.87
16	N4E2	410.04	114.42	0.00	112.17	112.17	0.00	272.18	136.72	135.46	23.29	23.44	0.00	23.29	136.72	270.92
17	N4W10	545.03	321.83	143.99	177.76	78.38	99.38	92.69	0.00	92.69	14.30	130.51	16.93	113.68	160.92	384.12
18	N4W11	330.17	201.82	103.64	96.75	47.95	48.80	58.11	0.00	58.11	10.17	70.24	12.65	58.97	116.28	213.83
19	N5E1	525.36	108.84	0.00	108.37	108.37	0.00	324.32	124.44	199.87	91.51	92.20	0.00	91.51	124.44	399.75
20	N5E2	368.24	81.89	0.00	80.96	80.96	0.00	249.39	131.47	117.92	36.96	36.96	0.00	36.96	131.47	235.84
21	N5W2	1072.78	284.98	0.00	283.85	188.90	94.95	470.48	100.63	369.85	180.95	317.32	41.09	275.90	141.72	929.59
22	N5W3	1352.42	394.22	15.05	378.62	206.44	172.18	517.77	100.71	417.06	210.62	440.43	57.62	382.81	173.38	1178.49
23	N5W4	1528.69	502.34	40.04	462.17	228.08	234.10	525.78	83.96	441.83	213.75	500.57	52.73	447.85	176.72	1351.85
24	N5W5	1554.85	612.45	98.64	513.22	244.32	268.90	484.11	92.45	391.66	147.34	458.29	42.06	416.24	233.15	1321.11
25	N5W6	1399.24	561.42	76.06	485.00	217.75	267.25	418.00	69.90	348.10	130.35	419.82	22.91	397.60	168.88	1230.69
26	N6E1	436.82	89.13	0.00	87.79	86.59	1.19	270.22	110.76	159.46	72.87	77.48	3.07	74.06	113.82	321.30
27	N6E3	352.08	71.31	0.00	69.62	69.62	0.00	232.89	116.91	115.98	46.36	47.88	0.00	46.36	116.91	231.96
28	N6W1	778.89	182.91	0.00	180.79	129.41	51.38	366.85	100.80	266.06	136.65	229.13	41.02	188.02	141.82	634.86
29	N6W10	488.70	211.76	51.35	158.86	55.22	103.64	92.11	0.00	92.11	36.89	184.82	46.62	140.53	97.97	391.50
30	N6W6	1394.27	465.98	34.66	431.13	162.89	268.24	391.04	47.75	343.29	180.40	537.25	88.61	448.64	171.02	1223.06

House number 31-58

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
31	N6W7	1142.18	378.85	47.85	330.50	112.41	218.09	298.82	24.32	274.50	162.09	464.51	84.57	380.18	156.75	985.18
32	N6W8	864.72	341.48	57.45	284.32	101.12	183.20	184.11	0.00	184.11	82.99	339.14	73.63	266.19	131.07	734.61
33	N7W3	1151.49	321.53	4.89	316.09	101.39	214.70	333.77	43.65	290.12	188.73	496.20	92.88	403.43	141.41	1009.64
34	N7W5	1044.60	292.26	14.89	276.51	66.07	210.44	253.31	17.08	236.23	170.17	499.04	118.41	380.61	150.38	893.35
35	N8W2	744.26	178.62	0.00	177.73	54.91	122.82	223.44	42.02	181.43	126.51	342.20	93.41	249.33	135.43	608.49
36	N8W3	881.93	222.83	0.00	221.70	46.06	175.64	220.34	24.52	195.81	149.75	438.77	113.96	325.39	138.49	742.90
37	N8W7	559.53	129.91	1.25	127.35	8.89	118.46	114.86	0.00	114.86	105.97	314.76	91.47	224.43	92.71	466.63
38	N9W1	395.92	84.41	0.00	82.94	13.08	69.86	98.54	13.32	85.22	72.14	212.97	71.76	142.00	85.07	310.16
39	N9W2	528.70	117.84	0.00	117.18	12.90	104.27	119.20	11.71	107.49	94.58	291.66	93.30	198.86	105.01	423.52
40	N9W3	560.53	129.04	0.00	128.97	2.13	126.83	100.95	1.52	99.44	97.30	330.54	106.48	224.14	108.00	452.54
41	N9W4	666.35	153.05	0.00	152.90	0.00	152.90	121.42	0.00	121.42	121.42	391.87	117.91	274.32	117.91	548.64
42	N9W5	568.00	130.20	0.00	129.45	0.00	129.45	103.37	0.00	103.37	103.37	334.43	102.33	232.82	102.33	465.65
43	S1W10	796.28	523.25	251.43	273.03	126.52	146.51	126.52	0.00	126.52	0.00	146.51	0.00	146.51	251.43	546.06
44	S1W2	907.09	513.01	186.32	327.90	220.96	106.94	271.33	34.71	236.62	15.66	122.74	0.00	122.60	221.04	687.12
45	S1W4	1024.30	595.22	229.24	366.65	235.58	131.07	283.00	32.42	250.58	15.00	146.07	0.00	146.07	261.66	763.31
46	S1W5	1246.32	756.44	291.04	466.32	246.30	220.02	260.39	4.61	255.78	9.47	229.49	0.00	229.49	295.65	951.58
47	S1W7	1228.62	778.56	330.59	449.67	219.85	229.82	220.10	0.19	219.91	0.06	229.96	0.00	229.88	330.78	899.45
48	S1W9	1057.87	693.47	329.62	364.40	170.46	193.94	170.46	0.00	170.46	0.00	193.94	0.00	193.94	329.62	728.79
49	S2W10	606.06	407.12	209.80	198.94	97.40	101.54	97.40	0.00	97.40	0.00	101.54	0.00	101.54	209.80	397.88
50	S2W3	517.82	336.82	157.54	181.00	126.74	54.26	126.74	0.00	126.74	0.00	54.26	0.00	54.26	157.54	362.00
51	S2W4	681.35	442.30	205.67	239.02	160.72	78.30	160.73	0.01	160.73	0.01	78.32	0.00	78.31	205.68	478.05
52	S2W5	955.75	616.72	279.11	339.03	205.93	133.10	205.93	0.00	205.93	0.00	133.10	0.00	133.10	279.11	678.07
53	S2W6	1181.30	756.94	334.94	424.36	242.54	181.83	242.54	0.00	242.54	0.00	181.83	0.00	181.83	334.94	848.73
54	S2W7	1144.18	741.92	342.00	402.26	217.87	184.39	217.87	0.00	217.87	0.00	184.39	0.00	184.39	342.00	804.52
55	S2W8	1091.05	714.47	339.21	376.58	193.49	183.08	193.49	0.00	193.49	0.00	183.08	0.00	183.08	339.21	753.16
56	S2W9	729.77	484.94	240.52	244.83	121.09	123.75	121.09	0.00	121.09	0.00	123.75	0.00	123.75	240.52	489.67
57	S3W5	322.79	206.37	90.15	116.41	89.45	26.96	89.45	0.00	89.45	0.00	26.96	0.00	26.96	90.15	232.82
58	S3W6	489.02	323.48	158.43	165.54	106.20	59.34	106.20	0.00	106.20	0.00	59.34	0.00	59.34	158.43	331.08

Appendix 14: The wayfaring statistic result of *Aumagan* with social attitude set as 102030804020

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
1	00	855.91	304.61	28.10	275.74	225.14	50.60	431.35	136.94	294.41	69.27	119.95	0.00	119.87	165.04	690.87
2	0E1	617.06	203.34	19.12	184.26	173.68	10.57	346.64	116.50	230.14	56.45	67.08	0.00	67.03	135.62	481.44
3	0E2	475.22	146.31	13.88	131.89	125.01	6.88	273.93	101.12	172.81	47.80	54.97	0.00	54.67	115.00	360.22
4	0N5	641.14	140.12	0.00	138.96	136.38	2.58	375.23	117.49	257.74	121.37	125.79	1.77	123.95	119.26	521.88
5	0N6	522.40	113.11	0.00	111.13	95.63	15.50	286.42	101.10	185.33	89.70	122.87	17.52	105.20	118.62	403.78
6	0N9	301.83	65.01	0.00	63.43	12.60	50.83	79.72	15.20	64.52	51.92	157.09	55.63	102.76	70.83	230.99
7	0W1	1178.15	453.55	70.89	382.98	247.90	135.07	479.48	130.40	349.08	101.18	245.12	8.67	236.25	209.96	968.19
8	0W10	440.77	297.29	155.37	143.37	71.40	71.98	71.47	0.00	71.47	0.07	72.02	0.04	72.05	155.42	285.36
9	0W6	1296.81	665.98	159.53	506.64	238.77	267.86	312.89	39.40	273.49	34.72	317.94	15.04	302.58	213.97	1082.84
10	0W7	1214.50	660.39	185.84	475.58	208.47	267.11	244.11	12.03	232.07	23.60	310.01	19.38	290.71	217.26	997.24
11	0W9	715.10	465.02	223.78	241.60	109.08	132.51	112.13	0.00	112.13	3.05	137.95	2.91	135.57	226.69	488.41
12	N1E1	646.15	180.90	3.33	177.35	169.58	7.77	384.21	141.65	242.55	72.97	81.04	0.00	80.74	144.99	501.17
13	N2E1	640.68	182.43	0.00	181.44	177.04	4.40	392.31	155.57	236.74	59.69	65.93	0.00	64.09	155.57	485.10
14	N2W1	843.73	264.21	7.69	256.25	201.80	54.45	442.51	158.76	283.74	81.94	137.01	0.00	136.39	166.46	677.27
15	N3E2	468.60	121.02	0.00	120.87	119.43	1.44	307.74	150.03	157.71	38.28	39.84	0.00	39.72	150.03	318.57
16	N4E2	414.07	112.14	0.00	109.75	109.75	0.00	277.14	142.76	134.38	24.63	24.79	0.00	24.63	142.76	271.31
17	N4W10	480.01	288.23	132.72	155.44	70.10	85.34	81.54	0.00	81.54	11.44	110.24	13.55	96.78	146.26	333.75
18	N4W11	309.33	193.05	100.91	91.00	45.96	45.04	54.09	0.00	54.09	8.13	62.19	10.12	53.18	111.03	198.31
19	N5E1	525.71	108.43	0.00	107.77	107.77	0.00	325.82	127.40	198.42	90.66	91.46	0.00	90.66	127.40	398.31
20	N5E2	380.45	83.34	0.00	82.40	82.40	0.00	258.39	137.28	121.11	38.71	38.71	0.00	38.71	137.28	243.17
21	N5W2	1003.54	261.20	0.00	259.69	183.73	75.96	457.16	97.62	359.54	175.81	285.18	32.87	251.77	130.49	873.05
22	N5W3	1303.09	362.82	12.04	350.25	208.74	141.51	529.61	97.88	431.74	223.00	410.67	46.16	364.51	156.08	1147.02
23	N5W4	1529.50	490.55	32.03	458.42	227.86	230.56	538.11	82.25	455.86	228.00	500.84	42.29	458.56	156.57	1372.93
24	N5W5	1522.69	622.90	96.14	526.24	240.00	286.24	449.36	78.84	370.52	130.52	450.43	33.68	416.76	208.66	1314.03
25	N5W6	1371.61	580.14	78.85	501.00	217.40	283.60	381.79	55.92	325.87	108.47	409.68	18.78	392.07	153.55	1218.06
26	N6E1	401.79	81.98	0.00	80.56	79.61	0.96	251.85	108.20	143.65	64.04	67.96	2.45	65.00	110.65	291.14
27	N6E3	337.55	68.39	0.00	66.64	66.64	0.00	225.53	116.90	108.63	42.00	43.62	0.00	42.00	116.90	220.65
28	N6W1	731.36	169.39	0.00	167.58	126.48	41.10	356.86	99.26	257.60	131.12	205.11	32.82	172.22	132.08	599.28
29	N6W10	414.47	174.51	41.08	131.89	44.18	87.71	77.73	0.00	77.73	33.55	162.23	43.06	121.26	84.14	330.33
30	N6W6	1400.83	478.08	27.73	450.20	165.01	285.19	377.85	38.20	339.65	174.64	544.90	85.07	459.83	151.01	1249.82

House number 31-58

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
31	N6W7	1024.48	334.30	38.28	295.21	90.24	204.97	255.40	19.46	235.94	145.69	434.78	84.50	350.66	142.24	882.24
32	N6W8	737.22	282.86	45.96	237.13	80.90	156.23	154.89	0.00	154.89	73.99	299.48	69.80	230.22	115.76	621.46
33	N7W3	1112.77	303.27	3.91	298.91	81.11	217.80	306.53	34.92	271.61	190.50	502.97	94.75	408.31	133.57	979.19
34	N7W5	967.98	266.80	11.91	254.20	52.85	201.34	226.44	13.66	212.77	159.92	474.74	113.46	361.27	139.03	828.94
35	N8W2	688.52	164.07	0.00	162.84	43.93	118.90	195.53	33.61	161.91	117.99	328.92	92.89	236.89	126.51	562.01
36	N8W3	867.93	216.61	0.00	215.57	36.85	178.72	206.74	19.62	187.12	150.27	444.58	116.28	328.98	135.90	732.03
37	N8W7	474.18	108.72	1.00	106.68	7.11	99.57	95.68	0.00	95.68	88.57	269.77	82.53	188.14	83.53	390.65
38	N9W1	377.99	80.74	0.00	79.40	10.46	68.94	89.29	10.65	78.63	68.17	207.97	71.61	137.11	82.27	295.73
39	N9W2	506.09	112.42	0.00	111.46	10.32	101.14	109.93	9.37	100.56	90.24	283.73	93.15	191.38	102.52	403.57
40	N9W3	562.92	129.48	0.00	129.42	1.71	127.71	100.61	1.21	99.39	97.69	332.84	107.50	225.40	108.71	454.21
41	N9W4	660.51	151.24	0.00	151.12	0.00	151.12	119.94	0.00	119.94	119.94	389.33	118.56	271.05	118.56	541.95
42	N9W5	511.54	116.31	0.00	115.56	0.00	115.56	92.31	0.00	92.31	92.31	302.92	95.74	207.88	95.74	415.80
43	S1W10	691.09	455.76	221.70	235.32	110.08	125.24	110.08	0.00	110.08	0.00	125.24	0.00	125.24	221.70	469.38
44	S1W2	846.83	479.72	166.65	314.16	222.68	91.48	262.98	27.77	235.21	12.53	104.13	0.00	104.01	194.42	652.41
45	S1W4	959.19	558.65	208.63	350.60	236.59	114.02	274.52	25.94	248.59	12.00	126.02	0.00	126.02	234.56	724.63
46	S1W5	1211.38	731.72	271.65	460.81	228.71	232.10	239.98	3.69	236.29	7.58	239.68	0.00	239.68	275.34	936.04
47	S1W7	1234.93	781.76	330.26	452.86	212.51	240.35	212.71	0.15	212.56	0.05	240.46	0.00	240.40	330.41	904.52
48	S1W9	1066.70	700.52	334.86	366.18	168.01	198.18	168.01	0.00	168.01	0.00	198.18	0.00	198.18	334.86	731.83
49	S2W10	533.40	359.30	187.02	174.10	86.29	87.81	86.29	0.00	86.29	0.00	87.81	0.00	87.81	187.02	346.38
50	S2W3	455.37	298.06	142.48	157.31	108.37	48.94	108.37	0.00	108.37	0.00	48.94	0.00	48.94	142.48	312.89
51	S2W4	652.71	423.40	196.62	229.28	156.25	73.03	156.26	0.01	156.26	0.01	73.05	0.00	73.04	196.63	456.09
52	S2W5	948.48	613.82	280.65	334.66	208.20	126.47	208.20	0.00	208.20	0.00	126.47	0.00	126.47	280.65	667.83
53	S2W6	1138.33	734.32	332.51	404.01	234.15	169.87	234.15	0.00	234.15	0.00	169.87	0.00	169.87	332.51	805.82
54	S2W7	1101.49	719.77	340.14	381.71	205.10	176.62	205.10	0.00	205.10	0.00	176.62	0.00	176.62	340.14	761.34
55	S2W8	1086.93	715.84	345.99	371.09	187.62	183.47	187.62	0.00	187.62	0.00	183.47	0.00	183.47	345.99	740.93
56	S2W9	646.54	431.43	216.81	215.11	107.19	107.92	107.19	0.00	107.19	0.00	107.92	0.00	107.92	216.81	429.73
57	S3W5	303.43	196.70	90.12	106.73	79.16	27.57	79.16	0.00	79.16	0.00	27.57	0.00	27.57	90.12	213.31
58	S3W6	436.41	290.38	144.74	146.03	92.56	53.47	92.56	0.00	92.56	0.00	53.47	0.00	53.47	144.74	291.67

Appendix 15: The wayfaring statistic result of *Aumagan* with social attitude set as 102030903010

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
1	00	829.03	279.92	14.20	264.65	233.80	30.84	447.25	142.47	304.78	70.98	101.86	0.00	101.82	156.67	672.36
2	0E1	617.00	200.01	10.09	189.92	180.91	9.01	352.68	116.56	236.12	55.21	64.31	0.00	64.23	126.65	490.35
3	0E2	419.61	121.74	7.48	113.31	108.73	4.58	248.85	96.13	152.72	43.99	49.02	0.00	48.57	103.61	316.00
4	0N5	630.43	135.17	0.00	133.95	132.66	1.29	374.27	123.08	251.18	118.52	121.00	0.88	119.81	123.97	506.47
5	0N6	478.69	102.31	0.00	100.78	93.03	7.75	277.54	103.03	174.50	81.47	98.84	9.36	89.22	112.40	366.29
6	0N9	260.47	56.23	0.00	54.46	6.30	48.16	58.73	7.60	51.13	44.83	145.51	54.02	92.99	61.62	198.85
7	0W1	1046.89	393.19	50.43	343.43	241.67	101.77	459.54	130.01	329.53	87.87	194.16	4.34	189.63	184.77	862.12
8	0W10	394.58	269.07	145.36	125.46	65.75	59.71	65.78	0.00	65.78	0.04	59.73	0.02	59.75	145.38	249.20
9	0W6	1279.76	688.32	165.86	522.74	228.23	294.51	270.36	23.28	247.08	18.85	321.08	7.52	313.36	196.66	1083.10
10	0W7	1220.43	684.49	188.84	496.67	201.50	295.18	219.32	6.02	213.30	11.80	316.63	9.69	306.98	204.55	1015.88
11	0W9	654.05	432.51	215.56	217.30	102.44	114.87	103.96	0.00	103.96	1.53	117.58	1.46	116.39	217.02	437.04
12	N1E1	641.03	176.48	1.67	174.70	167.14	7.56	384.28	144.58	239.70	72.56	80.27	0.00	80.12	146.24	494.78
13	N2E1	598.67	163.99	0.00	162.84	159.54	3.30	376.28	163.90	212.38	52.84	58.41	0.00	56.14	163.90	434.77
14	N2W1	802.26	227.27	3.85	223.08	191.28	31.80	454.29	174.58	279.70	88.43	120.71	0.00	120.23	178.43	623.83
15	N3E2	464.76	116.70	0.00	116.53	115.81	0.72	312.26	161.49	150.77	34.96	35.80	0.00	35.68	161.49	303.27
16	N4E2	431.06	111.58	0.00	108.81	108.81	0.00	291.97	155.83	136.14	27.34	27.51	0.00	27.34	155.83	275.23
17	N4W10	381.72	237.88	118.11	119.70	57.38	62.32	65.02	0.00	65.02	7.64	78.82	8.94	69.96	127.05	254.67
18	N4W11	293.00	190.21	102.38	86.97	45.61	41.36	50.74	0.00	50.74	5.13	52.05	6.37	46.49	108.75	184.25
19	N5E1	548.70	112.66	0.00	111.72	111.72	0.00	341.92	137.06	204.86	93.14	94.12	0.00	93.14	137.06	411.64
20	N5E2	412.41	88.53	0.00	87.53	87.53	0.00	281.14	150.87	130.27	42.74	42.74	0.00	42.74	150.87	261.54
21	N5W2	925.85	227.20	0.00	225.10	181.20	43.90	456.81	97.25	359.56	178.35	241.85	18.78	222.26	116.03	809.83
22	N5W3	1280.03	330.96	6.02	324.34	215.06	109.28	559.65	95.60	464.05	248.99	389.41	31.14	358.27	132.76	1147.26
23	N5W4	1587.74	492.68	21.88	470.71	232.88	237.84	571.77	82.39	489.38	256.50	523.29	28.95	494.33	133.22	1454.52
24	N5W5	1541.00	661.47	96.30	564.75	243.39	321.36	420.81	62.75	358.06	114.67	458.73	22.72	436.02	181.77	1359.23
25	N5W6	1375.51	622.75	85.95	536.52	219.12	317.40	339.29	36.02	303.28	84.16	413.46	13.68	401.56	135.65	1239.86
26	N6E1	375.01	76.41	0.00	74.90	74.42	0.48	240.37	110.27	130.10	55.68	58.23	1.30	56.16	111.57	263.44
27	N6E3	335.60	68.11	0.00	66.23	66.23	0.00	227.26	122.63	104.63	38.41	40.23	0.00	38.41	122.63	212.97
28	N6W1	665.92	149.37	0.00	147.63	126.32	21.30	352.71	101.81	250.90	124.58	163.84	17.88	145.88	119.69	546.23
29	N6W10	288.80	109.56	23.93	83.81	23.96	59.85	53.23	0.00	53.23	29.27	126.01	38.80	89.11	62.73	226.08
30	N6W6	1471.46	514.30	19.84	494.39	174.60	319.79	377.22	26.16	351.06	176.46	579.94	83.70	496.24	129.70	1341.76

House number 31-58

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
31	N6W7	927.57	294.75	26.32	267.19	67.73	199.46	212.40	11.46	200.95	133.22	420.41	88.31	332.68	126.09	801.48
32	N6W8	596.23	218.86	30.55	188.52	58.20	130.32	119.20	0.00	119.20	61.00	258.17	67.39	191.32	97.94	498.28
33	N7W3	1109.92	291.89	1.95	289.64	60.41	229.23	286.47	23.91	262.57	202.16	531.56	100.24	431.39	126.10	983.82
34	N7W5	900.62	238.10	5.95	231.50	31.19	200.31	193.65	6.83	186.81	155.62	468.88	112.94	355.93	125.72	774.89
35	N8W2	634.62	148.84	0.00	147.14	27.06	120.08	159.13	20.50	138.63	111.57	326.64	96.29	231.65	116.79	517.82
36	N8W3	860.47	208.00	0.00	207.09	18.99	188.11	185.05	10.03	175.02	156.04	467.42	124.09	344.14	134.12	726.35
37	N8W7	356.99	78.46	0.50	76.99	3.55	73.44	68.16	0.00	68.16	64.60	210.38	73.18	138.04	73.68	283.31
38	N9W1	362.51	77.50	0.00	76.26	5.23	71.03	75.28	5.33	69.95	64.72	209.73	74.76	135.75	80.08	282.43
39	N9W2	490.32	108.25	0.00	106.92	5.16	101.76	97.25	4.68	92.57	87.40	284.82	96.85	189.16	101.53	388.79
40	N9W3	584.92	134.15	0.00	134.13	0.85	133.28	102.86	0.61	102.25	101.40	347.91	113.26	234.68	113.87	471.06
41	N9W4	680.36	154.95	0.00	154.82	0.00	154.82	123.13	0.00	123.13	123.13	402.29	124.58	277.95	124.58	555.79
42	N9W5	462.82	103.91	0.00	103.06	0.00	103.06	82.34	0.00	82.34	82.34	276.58	91.88	185.40	91.88	370.95
43	S1W10	593.21	393.74	195.70	199.47	94.33	105.15	94.33	0.00	94.33	0.00	105.15	0.00	105.15	195.70	397.51
44	S1W2	763.40	438.95	143.26	296.70	228.80	67.91	249.90	14.57	235.33	6.53	74.55	0.00	74.44	157.83	605.58
45	S1W4	883.04	523.02	188.42	335.05	243.36	91.69	262.33	12.97	249.36	6.00	97.69	0.00	97.69	201.38	681.66
46	S1W5	1221.14	735.90	260.57	475.81	217.79	258.02	223.43	1.85	221.58	3.79	261.81	0.00	261.81	262.41	958.73
47	S1W7	1287.97	815.11	343.35	472.70	208.22	264.48	208.32	0.08	208.24	0.02	264.54	0.00	264.51	343.43	944.54
48	S1W9	1120.72	738.05	355.99	382.67	170.39	212.28	170.39	0.00	170.39	0.00	212.28	0.00	212.28	355.99	764.73
49	S2W10	464.95	315.11	167.20	149.85	75.33	74.52	75.33	0.00	75.33	0.00	74.52	0.00	74.52	167.20	297.76
50	S2W3	393.54	259.68	127.59	133.86	90.64	43.22	90.64	0.00	90.64	0.00	43.22	0.00	43.22	127.59	265.95
51	S2W4	641.36	415.47	192.40	225.88	157.39	68.49	157.40	0.00	157.39	0.00	68.50	0.00	68.49	192.40	448.96
52	S2W5	953.46	620.66	289.73	332.79	215.79	117.00	215.79	0.00	215.79	0.00	117.00	0.00	117.00	289.73	663.73
53	S2W6	1135.72	739.19	344.38	396.53	233.92	162.61	233.92	0.00	233.92	0.00	162.61	0.00	162.61	344.38	791.34
54	S2W7	1097.08	724.86	354.31	372.22	197.03	175.19	197.03	0.00	197.03	0.00	175.19	0.00	175.19	354.31	742.77
55	S2W8	1125.80	747.35	370.08	378.45	185.65	192.80	185.65	0.00	185.65	0.00	192.80	0.00	192.80	370.08	755.72
56	S2W9	559.64	377.28	195.53	182.36	91.13	91.23	91.13	0.00	91.13	0.00	91.23	0.00	91.23	195.53	364.11
57	S3W5	289.23	191.17	93.17	98.06	69.06	29.00	69.06	0.00	69.06	0.00	29.00	0.00	29.00	93.17	196.06
58	S3W6	385.01	258.81	132.89	126.20	78.80	47.40	78.80	0.00	78.80	0.00	47.40	0.00	47.40	132.89	252.12

Appendix 16: The wayfaring statistic result of *Aumagan* with social attitude set as 102550755025

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
1	00	1114.09	396.66	63.96	332.61	241.09	91.52	500.80	151.21	349.58	108.50	216.63	16.61	200.02	231.78	882.31
2	0E1	775.95	264.54	37.61	227.07	191.51	35.56	401.55	137.14	264.42	72.91	109.86	1.35	108.47	176.09	599.85
3	0E2	598.52	189.29	29.75	159.79	148.96	10.83	334.99	122.81	212.18	63.22	74.24	0.00	74.05	152.56	445.96
4	0N5	940.15	260.04	9.42	248.83	162.75	86.07	418.40	118.58	299.82	137.06	261.71	38.05	223.13	166.05	774.09
5	0N6	782.57	193.51	0.00	191.21	107.38	83.84	332.54	103.90	228.65	121.27	256.52	51.51	205.10	155.41	627.16
6	0N9	514.18	117.66	0.00	114.52	55.76	58.76	189.66	48.87	140.79	85.03	206.85	63.13	143.79	112.00	402.18
7	0W1	1508.47	604.87	146.15	458.99	275.63	183.36	553.81	151.94	401.87	126.24	349.79	40.16	309.60	338.24	1170.22
8	0W10	693.64	434.77	209.86	226.97	113.75	113.22	123.53	0.00	123.53	9.78	135.35	12.49	123.00	222.35	471.29
9	0W6	1549.44	693.60	171.79	521.94	264.05	257.89	456.39	93.48	362.90	98.85	399.46	43.07	356.74	308.34	1241.10
10	0W7	1453.83	690.67	195.57	494.99	238.91	256.09	380.50	60.32	320.18	81.28	382.66	45.18	337.36	301.07	1152.76
11	0W9	918.54	560.72	247.96	312.77	147.21	165.56	161.82	0.14	161.68	14.47	196.00	16.28	180.03	264.38	654.16
12	N1E1	875.54	304.35	49.91	254.40	194.09	60.32	425.89	151.10	274.79	80.70	145.30	3.81	141.02	204.83	670.72
13	N2E1	961.20	357.51	47.71	309.04	221.88	87.17	446.76	156.53	290.22	68.35	156.94	0.00	155.51	204.24	756.96
14	N2W1	1112.29	429.39	69.64	359.35	265.52	93.83	501.10	153.31	347.79	82.27	181.81	4.98	176.10	227.93	884.36
15	N3E2	715.97	237.91	7.35	230.68	167.82	62.86	367.84	152.67	215.17	47.35	110.21	0.00	110.21	160.03	555.94
16	N4E2	613.51	192.44	0.00	191.39	159.83	31.57	348.64	148.11	200.53	40.71	72.42	0.00	72.27	148.11	465.40
17	N4W10	811.23	437.06	182.02	254.67	122.18	132.49	165.85	3.76	162.09	39.91	208.32	36.39	172.40	222.17	589.06
18	N4W11	688.42	383.74	165.20	218.93	104.41	114.52	133.44	0.00	133.44	29.03	171.24	28.44	143.55	193.64	494.79
19	N5E1	616.78	132.56	0.00	131.92	111.94	19.98	344.02	125.64	218.38	106.44	140.20	13.61	126.43	139.26	477.53
20	N5E2	430.11	100.28	0.00	100.33	98.48	1.86	282.39	138.37	144.02	45.54	47.44	0.00	47.40	138.37	291.74
21	N5W2	1310.94	398.09	27.05	368.61	228.02	140.59	517.47	108.14	409.33	181.31	395.39	73.15	321.90	208.34	1102.60
22	N5W3	1540.29	483.99	47.27	436.37	251.66	184.71	579.05	116.76	462.28	210.62	477.25	81.92	395.33	245.95	1294.34
23	N5W4	1682.23	588.85	89.19	499.60	265.50	234.10	571.41	92.16	479.25	213.75	521.96	74.11	447.85	255.46	1426.76
24	N5W5	1717.24	692.26	156.49	535.45	266.55	268.90	540.20	115.35	424.85	158.31	484.78	57.57	427.21	329.42	1387.82
25	N5W6	1538.38	616.28	105.71	510.58	243.34	267.25	480.70	89.62	391.07	147.74	441.41	27.19	414.99	222.52	1315.86
26	N6E1	654.58	150.78	0.00	149.62	95.17	54.45	307.60	111.45	196.15	100.99	196.21	40.47	155.44	151.92	502.66
27	N6E3	398.53	81.35	0.00	79.34	70.42	8.92	242.79	117.37	125.42	55.00	74.39	8.92	63.92	126.29	272.24
28	N6W1	1033.30	282.84	15.65	265.06	152.77	112.29	410.24	104.57	305.66	152.89	340.23	75.09	265.18	195.32	837.98
29	N6W10	875.87	346.77	86.63	259.44	103.97	155.47	214.95	18.41	196.54	92.57	314.14	66.91	248.04	171.95	703.91
30	N6W6	1545.76	539.82	68.48	471.19	202.95	268.24	463.10	79.75	383.34	180.40	542.84	94.20	448.64	242.43	1303.33

House number 31-58

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
31	N6W7	1320.03	463.21	88.41	373.73	155.61	218.12	390.48	72.33	318.14	162.53	466.34	85.94	380.65	246.68	1073.35
32	N6W8	1129.81	424.52	80.26	344.10	154.93	189.16	313.63	49.47	264.16	109.23	391.65	93.27	298.39	223.00	906.81
33	N7W3	1285.94	390.66	32.76	357.76	127.14	230.63	377.69	61.82	315.86	188.73	517.59	98.35	419.35	192.93	1093.00
34	N7W5	1243.39	386.82	41.07	345.43	134.06	211.38	355.54	51.28	304.25	170.19	501.04	119.46	381.57	211.81	1031.57
35	N8W2	863.81	214.63	0.23	213.48	85.24	128.23	287.58	65.52	222.05	136.81	361.60	97.09	265.05	162.85	700.96
36	N8W3	1059.90	291.05	11.22	278.68	98.42	180.26	310.77	50.86	259.90	161.49	458.08	117.04	341.75	179.12	880.78
37	N8W7	837.54	231.68	20.63	210.44	59.57	150.87	216.71	23.94	192.77	133.20	389.16	105.32	284.07	149.89	687.65
38	N9W1	494.26	110.21	0.00	108.27	36.85	71.42	155.99	35.36	120.62	83.77	228.06	73.34	155.19	108.70	385.56
39	N9W2	657.67	158.01	0.04	157.49	40.63	116.86	182.61	38.52	144.09	103.46	317.05	97.18	220.33	135.74	521.92
40	N9W3	715.91	188.34	9.66	178.62	30.79	147.83	157.66	15.73	141.92	111.13	369.91	111.13	258.96	136.52	579.39
41	N9W4	882.91	239.90	17.10	222.48	46.48	176.01	208.04	23.95	184.09	137.61	434.98	121.75	313.61	162.80	720.11
42	N9W5	765.85	208.99	15.07	193.54	45.94	147.60	186.84	23.27	163.57	117.63	370.02	105.46	265.23	143.80	622.05
43	S1W10	940.34	591.24	266.11	325.70	170.37	155.34	178.09	0.00	178.09	7.72	171.01	8.30	163.05	274.40	665.93
44	S1W2	1140.57	601.52	226.85	375.07	244.44	130.63	366.75	81.72	285.04	40.60	172.29	0.63	171.23	309.19	831.37
45	S1W4	1263.42	701.67	263.80	438.72	268.41	170.31	356.48	55.79	300.69	32.28	205.27	2.14	202.59	321.74	941.68
46	S1W5	1359.46	770.01	297.64	472.16	251.31	220.85	317.49	16.11	301.38	50.07	271.97	0.77	270.91	314.51	1044.94
47	S1W7	1459.14	826.53	341.17	485.41	247.86	237.55	330.40	40.36	290.05	42.19	302.21	22.33	279.74	403.85	1055.29
48	S1W9	1194.28	752.87	340.85	412.65	209.43	203.22	222.19	3.08	219.11	9.68	219.22	6.28	212.90	350.22	844.05
49	S2W10	694.82	458.18	223.41	236.64	132.28	104.36	132.28	0.00	132.28	0.00	104.36	0.00	104.36	223.41	471.40
50	S2W3	646.66	398.55	182.93	217.38	145.65	71.74	170.80	19.89	150.90	5.26	77.31	0.00	77.00	202.82	443.85
51	S2W4	880.21	547.51	245.04	305.18	191.71	113.47	211.04	11.15	199.89	8.18	121.65	0.00	121.65	256.20	624.01
52	S2W5	1116.70	687.98	301.04	388.15	229.53	158.62	255.92	12.20	243.71	14.19	172.81	0.00	172.81	313.24	803.46
53	S2W6	1327.99	797.40	344.36	453.43	259.65	193.78	315.07	33.68	281.39	21.74	215.52	0.00	215.52	378.04	949.95
54	S2W7	1274.37	782.31	346.73	436.25	241.56	194.70	283.04	27.22	255.82	14.26	209.02	0.00	208.95	373.95	900.42
55	S2W8	1175.30	754.66	343.83	413.15	223.33	189.82	229.26	4.53	224.72	1.39	191.38	0.00	191.21	348.37	826.93
56	S2W9	847.43	549.67	252.65	297.76	157.75	140.01	157.75	0.00	157.75	0.00	140.01	0.00	140.01	252.65	594.78
57	S3W5	395.10	242.74	98.18	144.97	113.86	31.11	121.25	7.39	113.86	0.00	31.11	0.00	31.11	105.57	289.52
58	S3W6	558.59	363.00	167.83	195.19	126.89	68.29	127.01	0.02	126.99	0.10	68.57	0.00	68.39	167.85	390.74

Appendix 17: The wayfaring statistic result of *Aumagan* with social attitude set as 102550804020

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
1	00	1044.42	367.19	51.17	315.57	240.15	75.42	488.79	148.91	339.88	99.73	188.43	13.29	175.15	213.36	831.06
2	0E1	730.88	246.93	30.08	216.95	187.21	29.74	385.48	130.69	254.80	67.59	98.46	1.08	97.32	161.85	569.03
3	0E2	527.93	162.03	23.80	138.09	129.43	8.66	299.89	113.41	186.48	57.05	66.01	0.00	65.71	137.21	390.73
4	0N5	864.70	231.25	7.54	221.97	153.11	68.86	402.53	118.35	284.18	131.07	230.92	30.44	199.93	156.33	708.38
5	0N6	695.92	169.53	0.00	167.52	100.45	67.07	309.93	101.30	208.64	108.18	216.46	41.21	175.25	142.51	553.42
6	0N9	448.25	102.08	0.00	99.25	44.61	54.64	158.02	39.10	118.93	74.31	188.15	59.50	128.95	98.59	349.66
7	0W1	1341.62	527.26	118.76	409.07	259.68	149.38	518.65	144.80	373.85	114.17	295.70	32.13	263.55	295.69	1045.93
8	0W10	619.42	392.39	192.99	201.51	102.14	99.37	109.96	0.00	109.96	7.82	117.07	9.99	107.19	202.98	416.45
9	0W6	1467.40	685.61	171.15	514.67	245.78	268.89	399.64	74.79	324.86	79.08	382.14	34.46	347.97	280.39	1187.01
10	0W7	1396.49	686.24	190.45	495.72	227.08	268.63	340.36	48.26	292.10	65.02	369.89	36.14	333.65	274.85	1121.65
11	0W9	823.07	509.61	232.20	277.41	132.97	144.45	144.66	0.11	144.55	11.58	168.80	13.02	156.03	245.34	577.73
12	N1E1	812.22	273.29	39.93	233.33	183.79	49.54	408.61	147.47	261.14	77.35	130.32	3.05	126.89	190.45	621.77
13	N2E1	864.11	311.99	38.17	272.96	203.22	69.73	420.54	157.19	263.36	60.13	131.57	0.00	129.86	195.36	668.75
14	N2W1	1036.32	379.81	55.71	323.77	246.97	76.81	490.97	159.83	331.14	84.17	165.54	3.98	160.98	219.53	816.79
15	N3E2	660.37	211.13	5.88	205.35	155.06	50.29	355.08	156.14	198.94	43.88	94.17	0.00	94.17	162.02	498.35
16	N4E2	576.84	174.56	0.00	173.12	147.87	25.25	338.30	151.87	186.43	38.57	63.98	0.00	63.82	151.87	424.97
17	N4W10	692.97	380.40	163.14	216.97	105.14	111.83	140.07	3.01	137.07	31.93	172.50	29.11	143.76	195.26	497.71
18	N4W11	595.94	338.59	150.16	188.74	91.13	97.61	114.35	0.00	114.35	23.23	142.99	22.76	120.84	172.91	423.03
19	N5E1	598.85	127.40	0.00	126.61	110.62	15.98	341.59	128.35	213.23	102.61	129.87	10.89	118.59	139.25	459.60
20	N5E2	429.95	98.06	0.00	97.90	96.41	1.48	284.79	142.80	141.99	45.58	47.10	0.00	47.06	142.80	287.15
21	N5W2	1194.07	351.68	21.64	327.50	215.03	112.47	494.76	103.63	391.13	176.10	347.63	58.52	288.57	183.79	1010.27
22	N5W3	1453.39	434.63	37.81	396.45	244.92	151.53	578.63	110.72	467.92	223.00	440.12	65.60	374.52	214.13	1239.26
23	N5W4	1652.33	559.76	71.35	488.36	257.80	230.56	574.62	88.82	485.80	228.00	517.95	59.39	458.56	219.56	1432.77
24	N5W5	1652.60	686.75	142.42	544.02	257.78	286.24	494.24	97.17	397.07	139.29	471.61	46.09	425.53	285.68	1366.92
25	N5W6	1482.92	624.02	102.57	521.47	237.87	283.60	431.95	71.70	360.25	122.38	426.95	22.20	405.98	196.47	1286.45
26	N6E1	576.00	131.30	0.00	130.03	86.47	43.56	281.75	108.75	173.00	86.54	162.95	32.38	130.10	141.13	434.87
27	N6E3	374.70	76.43	0.00	74.42	67.28	7.14	233.45	117.26	116.19	48.91	64.83	7.14	56.05	124.40	250.31
28	N6W1	934.89	249.33	12.52	235.00	145.17	89.83	391.57	102.29	289.28	144.11	293.99	60.07	233.95	174.88	760.01
29	N6W10	724.21	282.52	69.31	212.35	83.17	129.17	176.00	14.73	161.28	78.10	265.68	59.29	207.28	143.33	580.88
30	N6W6	1522.02	537.15	54.78	482.25	197.05	285.19	435.49	63.80	371.69	174.64	549.38	89.55	459.83	208.13	1313.89

House number 31-58

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
31	N6W7	1166.76	401.79	70.73	329.79	124.80	204.99	328.72	57.87	270.86	146.05	436.24	85.59	351.04	214.19	952.57
32	N6W8	949.29	349.29	64.21	284.95	123.95	161.00	258.51	39.58	218.93	94.98	341.49	85.51	255.98	189.29	759.99
33	N7W3	1220.32	358.57	26.21	332.25	101.71	230.54	341.67	49.46	292.21	190.50	520.08	99.12	421.05	174.79	1045.53
34	N7W5	1127.01	342.44	32.86	309.34	107.25	202.09	308.22	41.03	267.19	159.94	476.35	114.30	362.03	188.18	938.82
35	N8W2	784.16	192.88	0.19	191.43	68.19	123.24	246.84	52.42	194.42	126.22	344.45	95.84	249.46	148.44	635.71
36	N8W3	1010.30	271.19	8.98	261.15	78.73	182.42	279.08	40.69	238.39	159.66	460.03	118.74	342.08	168.40	841.90
37	N8W7	696.59	190.14	16.50	173.15	47.66	125.50	177.16	19.15	158.01	110.36	329.29	93.62	235.86	129.27	567.32
38	N9W1	456.67	101.38	0.00	99.66	29.48	70.19	135.25	28.29	106.96	77.48	220.04	72.88	147.66	101.17	355.50
39	N9W2	609.26	144.56	0.03	143.71	32.50	111.21	160.66	30.82	129.84	97.34	304.05	96.25	208.56	127.10	482.16
40	N9W3	687.23	176.92	7.72	169.14	24.63	144.51	145.97	12.59	133.38	108.75	364.33	111.22	253.26	131.53	555.69
41	N9W4	833.76	220.72	13.68	206.79	37.18	169.60	189.23	19.16	170.07	132.89	423.81	121.63	302.49	154.47	679.29
42	N9W5	669.82	179.34	12.05	166.83	36.75	130.08	159.09	18.62	140.48	103.72	331.39	98.24	233.80	128.91	540.90
43	S1W10	806.34	510.16	233.45	277.46	145.16	132.30	151.34	0.00	151.34	6.18	144.84	6.64	138.47	240.09	566.25
44	S1W2	1033.61	550.53	199.07	351.89	241.46	110.43	339.31	65.37	273.94	32.48	143.76	0.50	142.91	264.95	768.66
45	S1W4	1150.49	643.81	236.27	408.26	262.85	145.41	333.31	44.63	288.68	25.82	173.37	1.72	171.23	282.62	867.87
46	S1W5	1301.89	742.58	276.93	465.48	232.72	232.76	285.66	12.89	272.77	40.05	273.66	0.61	272.82	290.43	1011.47
47	S1W7	1419.35	820.14	338.72	481.45	234.92	246.53	300.95	32.29	268.67	33.75	298.26	17.86	280.28	388.87	1030.48
48	S1W9	1175.82	748.03	343.85	404.78	199.18	205.60	209.39	2.47	206.92	7.74	218.40	5.03	213.34	351.34	824.48
49	S2W10	604.40	400.15	197.90	204.25	114.19	90.06	114.19	0.00	114.19	0.00	90.06	0.00	90.06	197.90	406.50
50	S2W3	558.45	347.45	162.79	186.42	123.50	62.92	143.62	15.91	127.71	4.21	67.38	0.00	67.13	178.70	379.75
51	S2W4	811.80	507.57	228.12	282.21	181.04	101.17	196.51	8.92	187.59	6.55	107.71	0.00	107.71	237.04	574.75
52	S2W5	1077.24	670.82	298.19	373.96	227.08	146.88	248.19	9.76	238.43	11.35	158.23	0.00	158.23	307.95	769.29
53	S2W6	1255.68	766.69	340.04	427.27	247.84	179.43	292.18	26.95	265.23	17.39	196.82	0.00	196.82	366.99	888.69
54	S2W7	1205.64	752.09	343.93	408.91	224.04	184.86	257.23	21.78	235.45	11.41	196.32	0.00	196.27	365.71	839.93
55	S2W8	1154.33	747.99	349.69	400.34	211.49	188.85	216.23	3.63	212.60	1.11	190.10	0.00	189.97	353.32	801.01
56	S2W9	740.66	483.21	226.51	257.45	136.53	120.92	136.53	0.00	136.53	0.00	120.92	0.00	120.92	226.51	514.15
57	S3W5	361.28	225.79	96.55	129.57	98.69	30.89	104.60	5.91	98.69	0.00	30.89	0.00	30.89	102.46	258.82
58	S3W6	492.07	322.00	152.26	169.75	109.11	60.63	109.21	0.02	109.19	0.08	60.86	0.00	60.71	152.28	339.79

Appendix 18: The wayfaring statistic result of *Aumagan* with social attitude set as 102550903010

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
1	00	937.19	320.82	32.80	287.18	242.40	44.77	478.72	150.09	328.63	86.23	137.65	6.64	131.00	189.54	747.65
2	0E1	686.76	226.75	19.62	207.21	188.21	19.00	377.57	126.55	251.02	62.81	82.44	0.54	81.81	146.70	540.05
3	0E2	455.90	134.05	16.11	117.24	111.37	5.87	265.30	103.69	161.61	50.24	56.56	0.00	56.11	119.80	336.11
4	0N5	753.87	184.92	3.77	179.31	144.86	34.45	393.47	123.95	269.52	124.67	175.47	15.51	159.12	143.23	610.64
5	0N6	574.22	132.84	0.00	130.91	95.71	35.20	291.01	103.24	187.77	92.07	150.37	23.02	127.27	126.26	447.96
6	0N9	362.40	81.20	0.00	78.50	26.61	51.89	111.63	24.32	87.31	60.70	169.58	57.56	112.59	81.88	280.52
7	0W1	1172.33	448.15	79.54	369.52	253.45	116.08	492.47	140.19	352.29	98.84	231.71	16.77	214.92	236.50	935.83
8	0W10	498.63	326.38	169.08	159.48	83.77	75.72	87.68	0.00	87.68	3.91	84.57	5.00	79.63	174.07	324.55
9	0W6	1406.16	706.24	175.79	530.76	235.22	295.53	334.75	48.95	285.80	50.58	365.17	19.34	346.11	244.07	1162.09
10	0W7	1344.42	708.03	191.49	516.46	219.87	296.60	282.23	25.84	256.39	36.52	354.15	20.94	333.12	238.27	1106.14
11	0W9	722.20	463.27	222.51	240.83	116.43	124.40	122.34	0.06	122.28	5.85	136.60	6.53	130.25	229.10	493.11
12	N1E1	729.83	223.48	19.96	203.37	174.92	28.45	400.09	149.29	250.79	75.88	106.26	1.53	104.33	170.78	559.05
13	N2E1	736.38	241.23	19.08	220.95	184.98	35.97	403.77	165.51	238.26	53.28	91.38	0.00	89.24	184.60	551.78
14	N2W1	947.40	308.36	28.30	279.65	236.45	43.20	502.75	175.65	327.10	90.65	136.28	1.99	133.86	205.94	741.46
15	N3E2	571.84	165.92	2.94	162.99	137.83	25.16	342.23	165.86	176.37	38.54	63.70	0.00	63.70	168.80	403.05
16	N4E2	516.95	144.55	0.00	142.55	129.93	12.63	325.29	161.06	164.23	34.30	47.11	0.00	46.93	161.06	355.89
17	N4W10	515.60	297.41	136.41	160.66	78.26	82.40	98.88	1.50	97.37	19.12	119.31	18.18	101.52	156.09	359.51
18	N4W11	441.51	263.86	127.00	137.00	68.20	68.81	81.71	0.00	81.71	13.51	95.94	13.92	82.32	140.92	300.58
19	N5E1	590.89	123.42	0.00	122.48	114.49	7.99	352.91	138.02	214.89	100.41	114.56	5.45	108.40	143.47	447.42
20	N5E2	438.80	96.48	0.00	96.02	95.28	0.74	295.36	153.89	141.48	46.19	46.95	0.00	46.93	153.89	284.91
21	N5W2	1072.71	293.87	10.82	280.17	203.70	76.47	485.01	102.66	382.35	178.65	293.83	37.90	255.12	151.39	921.32
22	N5W3	1397.49	383.53	20.84	362.27	242.98	119.29	599.67	107.70	491.97	248.99	414.29	46.01	368.29	174.55	1222.94
23	N5W4	1679.99	540.53	44.67	495.81	257.97	237.84	603.20	88.73	514.47	256.50	536.26	41.92	494.33	175.33	1504.67
24	N5W5	1636.36	702.36	122.13	579.92	258.56	321.36	459.53	77.53	382.00	123.44	474.47	29.69	444.80	229.35	1407.01
25	N5W6	1466.00	652.49	98.00	554.50	237.10	317.40	382.93	47.76	335.17	98.07	430.58	16.95	415.47	162.71	1303.29
26	N6E1	466.21	101.93	0.00	100.47	78.69	21.78	257.31	110.82	146.49	67.80	106.97	16.63	89.59	127.45	338.76
27	N6E3	356.52	72.54	0.00	70.44	66.87	3.57	232.44	123.00	109.44	42.57	51.55	3.57	46.14	126.56	229.96
28	N6W1	813.57	201.38	6.26	193.22	139.07	54.15	380.86	104.22	276.64	137.57	231.32	39.63	191.72	150.11	663.45
29	N6W10	515.61	199.91	46.06	152.77	54.55	98.22	115.56	7.36	108.20	53.64	200.14	49.41	151.86	102.84	412.77
30	N6W6	1535.05	543.87	33.36	510.43	190.64	319.79	407.39	40.29	367.10	176.46	583.79	87.54	496.24	161.19	1373.86

House number 31-58

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
31	N6W7	1005.62	329.23	42.55	285.21	85.73	199.48	254.52	35.22	219.31	133.58	421.88	89.40	333.06	167.16	838.46
32	N6W8	723.76	260.02	41.96	218.01	83.33	134.68	177.21	19.79	157.42	74.09	286.53	77.77	208.76	139.51	584.25
33	N7W3	1182.81	326.45	13.11	313.24	71.27	241.97	307.84	34.42	273.42	202.16	548.51	104.44	444.13	151.97	1030.84
34	N7W5	1013.81	291.98	16.99	274.82	73.76	201.06	251.35	21.94	229.40	155.64	470.48	113.78	356.70	152.71	861.10
35	N8W2	720.44	174.46	0.09	172.61	50.33	122.28	206.82	36.69	170.14	119.81	339.16	98.36	242.09	135.13	585.31
36	N8W3	979.90	252.10	4.49	246.60	55.86	190.74	246.38	25.09	221.28	165.43	481.42	126.17	356.17	155.75	824.15
37	N8W7	517.49	131.10	8.25	122.41	23.83	98.58	119.23	9.58	109.66	85.83	267.16	82.91	184.41	100.74	416.75
38	N9W1	410.26	89.49	0.00	87.94	15.87	72.07	102.41	15.38	87.03	71.16	218.37	75.71	143.23	91.10	319.17
39	N9W2	549.89	126.02	0.02	124.75	17.28	107.48	125.92	16.24	109.68	92.40	297.94	99.22	199.88	115.48	434.40
40	N9W3	658.97	160.35	3.86	156.45	12.32	144.13	128.48	6.29	122.19	109.87	370.15	116.26	254.00	126.42	532.56
41	N9W4	775.52	192.12	6.84	185.07	18.59	166.48	159.06	9.58	149.48	130.89	424.34	127.24	297.37	143.66	631.86
42	N9W5	546.88	136.55	6.03	129.96	18.38	111.58	116.59	9.31	107.29	88.91	293.73	93.90	200.49	109.23	437.64
43	S1W10	656.57	424.53	203.03	222.69	113.23	109.46	116.32	0.00	116.32	3.09	115.73	3.32	112.54	206.35	450.23
44	S1W2	899.47	490.24	166.76	324.02	241.77	82.25	305.66	43.06	262.60	20.83	103.57	0.25	103.08	210.07	689.40
45	S1W4	1032.99	594.70	210.38	385.08	265.37	119.71	303.59	24.43	279.16	13.79	134.70	0.86	133.50	235.67	797.32
46	S1W5	1272.37	745.00	265.84	479.03	220.39	258.64	247.67	6.72	240.95	20.56	279.70	0.31	279.20	272.86	999.50
47	S1W7	1397.67	844.96	351.17	493.83	225.95	267.87	258.97	16.14	242.83	16.88	293.73	8.93	284.75	376.24	1021.42
48	S1W9	1182.67	766.32	362.22	404.85	187.95	216.89	193.06	1.23	191.82	3.87	223.29	2.51	220.76	365.96	816.71
49	S2W10	505.99	339.00	174.11	166.99	90.42	76.58	90.42	0.00	90.42	0.00	76.58	0.00	76.58	174.11	331.88
50	S2W3	459.34	294.27	143.29	152.77	100.07	52.71	110.13	7.96	102.17	2.10	54.94	0.00	54.81	151.24	308.10
51	S2W4	728.11	462.67	211.26	254.43	170.56	83.87	178.30	4.46	173.84	3.27	87.14	0.00	87.14	215.72	512.39
52	S2W5	1042.15	663.96	303.46	361.96	229.17	132.79	239.72	4.88	234.84	5.67	138.47	0.00	138.47	308.34	733.82
53	S2W6	1202.98	761.23	351.29	410.88	242.36	168.52	264.53	13.47	251.06	8.69	177.21	0.00	177.21	364.76	838.21
54	S2W7	1156.25	745.02	356.98	388.91	209.35	179.56	225.95	10.89	215.06	5.70	185.29	0.00	185.26	367.87	788.38
55	S2W8	1169.58	769.00	373.01	397.59	201.66	195.92	204.03	1.81	202.22	0.56	196.55	0.00	196.48	374.82	794.76
56	S2W9	626.44	414.91	204.28	211.52	110.03	101.50	110.03	0.00	110.03	0.00	101.50	0.00	101.50	204.28	422.16
57	S3W5	320.87	207.19	96.76	110.72	80.07	30.66	83.02	2.96	80.07	0.00	30.66	0.00	30.66	99.72	221.15
58	S3W6	423.15	281.43	139.91	141.56	88.68	52.89	88.72	0.01	88.72	0.04	53.00	0.00	52.93	139.92	283.23

Appendix 19: The wayfaring statistic result of *Aumagan* with social attitude set as 173450755025

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
1	00	1306.52	493.26	79.70	413.21	273.45	139.76	549.28	162.54	386.74	113.29	263.98	10.83	253.06	253.06	1053.46
2	0E1	870.63	302.49	48.74	253.83	213.87	39.96	447.50	153.87	293.63	79.76	120.64	0.81	119.72	203.43	667.21
3	0E2	698.13	226.65	35.24	191.59	177.38	14.22	386.42	138.95	247.47	70.09	85.06	0.00	84.31	174.18	523.95
4	0N5	1032.81	268.22	0.08	266.73	182.37	84.36	478.97	131.14	347.83	165.46	285.61	36.20	249.82	167.42	865.38
5	0N6	921.14	220.40	0.00	217.59	128.45	89.14	398.21	119.86	278.35	149.90	302.52	63.52	239.04	183.38	737.76
6	0N9	568.45	128.00	0.00	126.32	60.62	65.70	211.09	55.95	155.14	94.52	229.35	69.43	160.22	125.39	443.06
7	0W1	1660.64	645.19	168.35	476.75	287.69	189.06	618.43	167.52	450.91	163.22	397.02	44.74	352.28	380.61	1280.03
8	0W10	829.74	522.67	248.13	275.74	129.11	146.63	138.70	0.00	138.70	9.59	168.37	12.29	156.22	260.42	569.33
9	0W6	1663.75	733.37	184.89	549.62	284.67	264.95	498.02	101.59	396.43	111.76	432.36	55.06	376.71	341.54	1322.21
10	0W7	1579.83	731.94	210.60	521.69	263.17	258.52	429.81	65.89	363.92	100.75	418.07	58.90	359.28	335.40	1244.43
11	0W9	950.95	587.28	263.50	323.70	148.11	175.60	160.88	0.00	160.88	12.77	202.79	15.39	188.37	278.89	672.06
12	N1E1	988.00	336.14	47.16	288.05	225.61	62.44	491.85	171.37	320.48	94.87	160.01	2.39	157.31	220.92	767.09
13	N2E1	1055.88	376.57	27.61	348.66	260.23	88.43	508.52	167.13	341.39	81.16	170.79	0.00	169.59	194.74	861.14
14	N2W1	1242.93	486.86	63.83	423.45	271.38	152.07	513.31	156.33	356.99	85.60	242.75	4.35	237.68	224.51	1018.42
15	N3E2	695.56	207.28	0.51	206.19	184.98	21.21	406.67	161.39	245.28	60.30	81.61	0.00	81.51	161.90	533.66
16	N4E2	576.64	170.80	0.00	169.33	166.58	2.75	361.54	153.56	207.98	41.40	44.30	0.00	44.15	153.56	423.08
17	N4W10	968.80	542.77	225.42	317.16	143.46	173.70	179.46	0.00	179.46	36.00	246.57	38.06	209.70	263.48	705.32
18	N4W11	690.37	391.22	171.84	219.64	100.80	118.83	127.00	0.00	127.00	26.19	172.15	28.32	145.03	200.17	490.20
19	N5E1	638.73	132.93	0.00	132.64	120.18	12.45	367.96	133.18	234.78	114.60	137.84	10.73	127.05	143.90	494.83
20	N5E2	437.88	103.62	0.00	103.38	102.32	1.06	288.74	142.01	146.74	44.41	45.52	0.00	45.47	142.01	295.87
21	N5W2	1450.58	436.74	22.50	413.52	241.86	171.66	558.55	118.70	439.85	197.98	455.29	85.40	369.64	226.60	1223.97
22	N5W3	1656.12	530.70	50.40	479.70	259.88	219.82	599.18	125.55	473.63	213.75	526.24	92.67	433.57	268.62	1387.50
23	N5W4	1765.72	615.23	74.44	540.78	270.77	270.00	581.13	96.61	484.52	213.75	569.35	85.61	483.75	256.65	1509.07
24	N5W5	1792.60	690.33	146.86	542.71	272.70	270.00	582.15	131.13	451.02	178.31	520.11	71.65	448.31	349.64	1442.95
25	N5W6	1678.31	642.99	104.46	538.55	269.48	269.07	557.02	113.29	443.72	174.24	478.30	34.99	443.31	252.75	1425.57
26	N6E1	691.60	150.75	0.00	148.71	108.44	40.26	347.66	122.88	224.79	116.34	193.19	36.55	156.61	159.42	532.18
27	N6E3	439.64	89.16	0.00	86.64	83.55	3.09	278.63	130.88	147.75	64.21	71.85	3.18	67.30	134.06	305.59
28	N6W1	1173.35	307.96	0.08	307.08	168.39	138.70	461.18	114.21	346.97	178.59	404.21	86.86	317.28	201.15	972.20
29	N6W10	985.05	400.36	99.34	301.02	117.97	183.05	224.24	4.70	219.54	101.57	360.45	76.94	284.62	180.98	804.07
30	N6W6	1673.57	557.66	69.21	488.14	218.21	269.93	527.61	97.01	430.60	212.39	588.30	105.99	482.31	272.21	1401.36

House Number 31-58

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
31	N6W7	1577.99	580.08	110.37	469.49	202.55	266.95	458.14	73.68	384.46	181.91	539.76	90.91	448.86	274.96	1303.03
32	N6W8	1182.67	439.62	94.62	344.23	136.41	207.82	301.33	28.49	272.85	136.43	441.71	98.44	344.25	221.54	961.12
33	N7W3	1428.87	433.19	26.70	406.06	172.74	233.32	451.88	70.37	381.51	208.76	543.80	101.88	442.09	198.94	1229.93
34	N7W5	1345.93	401.95	45.69	355.57	115.52	240.05	368.42	53.39	315.03	199.51	575.56	136.04	439.55	235.11	1110.83
35	N8W2	948.84	233.07	0.23	232.32	87.12	145.21	311.41	72.28	239.13	152.01	404.36	107.60	297.22	180.11	768.72
36	N8W3	1123.13	306.76	11.22	294.06	93.17	200.89	322.92	60.26	262.67	169.49	493.45	123.51	370.38	195.00	928.14
37	N8W7	915.53	251.46	17.54	233.24	66.34	166.89	234.27	18.96	215.30	148.96	429.80	114.57	315.86	151.08	764.45
38	N9W1	558.91	124.60	0.00	122.80	47.10	75.69	186.92	45.54	141.38	94.28	247.39	78.24	169.97	123.79	435.12
39	N9W2	750.99	179.32	0.00	179.15	50.53	128.62	217.79	47.81	169.98	119.45	353.89	105.81	248.07	153.62	597.37
40	N9W3	757.49	192.38	0.00	192.24	31.85	160.39	166.20	15.38	150.82	118.97	398.91	119.73	279.36	135.10	622.39
41	N9W4	921.86	245.54	12.09	233.45	46.17	187.27	214.54	22.43	192.11	145.94	461.79	128.77	333.21	163.28	758.58
42	N9W5	859.94	230.81	13.05	217.46	44.55	172.91	198.39	15.32	183.07	138.52	430.74	119.93	311.43	148.30	711.64
43	S1W10	1123.77	721.62	328.93	392.26	197.19	195.06	200.57	0.00	200.57	3.38	201.58	3.78	198.45	332.71	791.06
44	S1W2	1324.02	713.19	265.70	448.27	274.44	173.83	395.75	80.06	315.69	41.25	215.08	0.00	215.08	345.76	978.26
45	S1W4	1417.51	783.31	308.27	475.99	282.13	193.86	399.09	75.71	323.38	41.25	235.11	0.00	235.11	383.97	1033.54
46	S1W5	1508.50	870.32	339.61	531.88	308.53	223.35	370.03	17.64	352.39	43.86	268.15	0.76	267.21	358.01	1150.49
47	S1W7	1521.59	877.53	363.89	515.70	272.32	243.38	341.99	32.76	309.23	36.91	302.06	21.88	280.29	418.54	1103.05
48	S1W9	1266.34	808.23	366.27	442.92	227.99	214.92	233.66	0.22	233.44	5.44	224.45	4.52	220.37	371.01	895.33
49	S2W10	754.73	498.65	245.38	256.08	141.37	114.71	141.37	0.00	141.37	0.00	114.71	0.00	114.71	245.38	509.35
50	S2W3	705.97	440.58	202.93	240.11	161.82	78.29	182.66	16.78	165.87	4.05	82.73	0.00	82.34	219.72	486.25
51	S2W4	988.92	619.42	275.90	346.30	217.68	128.62	234.26	10.02	224.24	6.57	135.24	0.00	135.19	285.92	703.00
52	S2W5	1223.95	759.73	329.36	431.35	247.35	184.00	268.94	10.33	258.61	11.27	195.27	0.00	195.27	339.69	884.25
53	S2W6	1374.48	835.07	357.79	481.26	277.11	204.15	320.26	28.15	292.11	15.00	219.15	0.00	219.15	385.93	988.55
54	S2W7	1360.22	851.28	373.94	480.60	265.94	214.66	286.86	13.77	273.09	7.15	222.07	0.00	221.81	387.71	972.51
55	S2W8	1214.20	785.04	357.12	429.16	235.77	193.39	235.77	0.00	235.77	0.00	193.39	0.00	193.39	357.12	857.08
56	S2W9	1068.47	694.82	322.53	373.65	194.12	179.53	194.12	0.00	194.12	0.00	179.53	0.00	179.53	322.53	745.94
57	S3W5	453.16	281.42	110.16	171.74	136.72	35.02	136.72	0.00	136.72	0.00	35.02	0.00	35.02	110.16	343.00
58	S3W6	677.71	440.60	204.65	237.11	153.46	83.65	153.46	0.00	153.46	0.00	83.65	0.00	83.65	204.65	473.06

Appendix 20: The wayfaring statistic result of *Aumagan* with social attitude set as 173450804020

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
1	00	1215.40	448.39	63.76	384.22	270.21	114.01	538.30	162.14	376.16	105.95	228.70	8.66	219.96	234.56	980.84
2	0E1	865.04	295.75	38.99	256.79	222.63	34.17	455.75	154.58	301.17	78.55	113.54	0.65	112.71	194.23	670.82
3	0E2	668.46	215.14	28.19	186.67	174.08	12.58	373.82	133.74	240.08	66.00	79.51	0.00	78.58	161.92	506.54
4	0N5	984.08	248.71	0.07	247.20	179.72	67.49	478.52	138.26	340.26	160.54	256.85	28.96	228.03	167.28	816.79
5	0N6	882.65	207.15	0.00	204.32	133.01	71.31	406.33	126.83	279.49	146.48	269.18	51.34	217.80	178.18	704.47
6	0N9	507.71	113.81	0.00	112.23	48.50	63.73	177.91	44.76	133.14	84.65	215.99	68.04	148.38	112.80	394.91
7	0W1	1522.45	581.67	144.45	437.13	278.63	158.50	595.31	165.49	429.82	151.18	345.47	35.79	309.68	345.73	1176.71
8	0W10	747.56	476.08	231.03	246.41	117.71	128.69	125.39	0.00	125.39	7.67	146.09	9.83	136.37	240.86	506.69
9	0W6	1599.76	736.40	182.89	555.33	275.15	280.19	448.33	83.11	365.22	90.07	415.02	44.05	370.26	310.05	1289.71
10	0W7	1508.52	728.04	209.09	519.52	248.87	270.65	382.18	52.72	329.47	80.60	398.29	47.12	351.25	308.92	1199.59
11	0W9	873.47	546.02	250.48	295.48	136.77	158.71	146.99	0.00	146.99	10.22	180.46	12.31	168.92	262.79	610.68
12	N1E1	965.32	315.66	37.73	276.42	224.27	52.15	498.47	177.32	321.15	96.88	151.18	1.91	149.03	216.96	748.36
13	N2E1	985.42	336.20	22.09	313.75	241.99	71.76	495.47	172.85	322.62	80.63	153.74	0.00	152.38	194.95	790.48
14	N2W1	1153.94	428.49	51.06	377.76	253.90	123.86	508.05	164.66	343.39	89.48	217.40	3.48	213.34	219.20	934.74
15	N3E2	652.79	189.58	0.41	188.16	171.20	16.97	390.92	164.57	226.35	55.16	72.29	0.00	72.13	164.98	487.81
16	N4E2	555.49	160.56	0.00	159.26	157.06	2.20	353.45	157.28	196.18	39.12	41.48	0.00	41.32	157.28	398.22
17	N4W10	856.88	488.32	209.32	278.41	127.97	150.44	157.94	0.00	157.94	29.97	210.62	31.61	180.41	240.93	615.95
18	N4W11	616.55	357.09	161.49	195.86	91.77	104.10	112.72	0.00	112.72	20.95	146.75	22.66	125.05	184.15	432.40
19	N5E1	644.74	133.88	0.00	133.59	123.63	9.96	378.12	140.38	237.74	114.11	132.75	8.58	124.08	148.96	495.79
20	N5E2	446.79	103.54	0.00	103.31	102.46	0.85	296.64	148.46	148.18	45.72	46.61	0.00	46.57	148.46	298.33
21	N5W2	1358.77	392.32	18.00	373.28	234.74	138.54	556.28	118.77	437.51	202.77	410.17	68.46	341.31	205.23	1153.54
22	N5W3	1618.55	501.74	40.32	460.80	253.09	207.71	602.15	121.06	481.09	228.00	514.66	78.95	435.71	240.32	1378.23
23	N5W4	1786.17	610.90	60.86	550.02	262.02	288.00	584.35	94.33	490.02	228.00	590.93	74.93	516.00	230.11	1556.06
24	N5W5	1771.18	692.34	137.02	554.51	266.51	288.00	557.64	119.83	437.81	171.30	521.20	61.66	459.30	318.51	1452.67
25	N5W6	1654.51	648.74	101.98	546.78	260.27	286.51	520.98	95.93	425.05	164.78	484.78	33.49	451.29	231.39	1423.11
26	N6E1	655.88	141.08	0.00	139.11	106.90	32.21	343.27	126.50	216.77	109.88	171.52	29.24	142.09	155.73	500.15
27	N6E3	459.40	93.29	0.00	90.75	88.27	2.47	293.43	138.88	154.55	66.28	72.68	2.54	68.75	141.42	317.98
28	N6W1	1089.48	278.80	0.07	277.89	166.93	110.96	456.58	117.28	339.29	172.36	354.10	70.69	283.32	188.04	901.44
29	N6W10	833.24	329.89	79.47	250.42	94.37	156.04	186.99	3.76	183.23	88.86	316.36	72.35	244.90	155.58	677.66
30	N6W6	1719.84	570.69	63.48	506.97	219.08	287.89	529.37	84.46	444.90	225.82	619.78	106.07	513.70	254.02	1465.82

House number 31-58

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
31	N6W7	1571.77	581.95	98.32	483.46	200.34	283.11	436.35	58.95	377.40	177.06	553.47	93.30	460.17	250.57	1321.20
32	N6W8	1039.33	381.46	77.83	302.54	113.19	189.35	256.11	22.79	233.31	120.12	401.76	93.86	309.47	194.48	844.85
33	N7W3	1452.77	433.11	21.36	411.38	176.52	234.86	459.57	60.49	399.08	222.56	560.09	102.84	457.42	184.69	1268.08
34	N7W5	1314.91	377.56	36.55	340.39	92.42	247.97	341.97	42.71	299.27	206.85	595.38	140.62	454.81	219.88	1095.03
35	N8W2	910.75	221.06	0.19	220.22	70.06	150.16	278.48	57.97	220.51	150.45	411.21	111.33	300.61	169.48	741.26
36	N8W3	1087.62	288.74	8.98	278.55	74.54	204.01	295.15	48.21	246.94	172.40	503.74	127.69	376.41	184.88	902.74
37	N8W7	777.04	209.82	14.03	194.81	53.07	141.74	194.39	15.17	179.22	126.14	372.84	105.79	267.88	135.00	642.05
38	N9W1	525.49	116.26	0.00	114.54	37.68	76.86	163.58	36.43	127.14	89.46	245.65	80.32	166.32	116.75	408.74
39	N9W2	719.73	169.19	0.00	169.09	40.43	128.66	195.95	38.25	157.71	117.28	354.58	108.62	245.94	146.87	572.86
40	N9W3	752.50	187.60	0.00	187.50	25.48	162.02	158.41	12.30	146.11	120.63	406.48	123.97	282.64	136.27	616.22
41	N9W4	894.30	232.21	9.67	222.54	36.94	185.60	199.57	17.94	181.63	144.69	462.52	132.38	330.29	160.00	734.30
42	N9W5	814.18	213.02	10.44	202.29	35.64	166.65	181.49	12.26	169.23	133.59	419.67	119.96	300.24	142.66	671.52
43	S1W10	1109.46	716.56	331.42	384.98	189.55	195.43	192.26	0.00	192.26	2.70	200.64	3.02	198.14	334.44	775.02
44	S1W2	1211.34	662.08	243.68	419.21	268.33	150.88	365.38	64.05	301.33	33.00	183.88	0.00	183.88	307.73	903.61
45	S1W4	1335.94	754.37	300.55	455.00	277.52	177.48	371.08	60.56	310.52	33.00	210.48	0.00	210.48	361.12	974.82
46	S1W5	1541.53	899.42	343.77	557.07	320.47	236.60	369.67	14.11	355.56	35.09	272.44	0.61	271.69	358.49	1183.04
47	S1W7	1504.51	884.77	370.18	517.06	262.67	254.39	318.40	26.21	292.20	29.53	301.34	17.51	283.92	413.90	1090.62
48	S1W9	1290.68	828.85	380.35	449.68	225.38	224.31	229.91	0.18	229.73	4.36	231.93	3.61	228.66	384.14	906.54
49	S2W10	689.71	457.94	229.02	231.77	128.03	103.74	128.03	0.00	128.03	0.00	103.74	0.00	103.74	229.02	460.69
50	S2W3	649.51	408.56	190.49	220.73	149.37	71.37	166.04	13.43	152.61	3.24	74.92	0.00	74.61	203.92	445.59
51	S2W4	968.87	609.07	270.97	341.24	220.42	120.82	233.70	8.02	225.68	5.25	126.11	0.00	126.07	278.99	689.88
52	S2W5	1180.68	739.96	326.60	414.43	244.18	170.25	261.46	8.26	253.20	9.01	179.26	0.00	179.26	334.87	845.81
53	S2W6	1336.49	823.25	360.64	466.71	272.86	193.85	307.38	22.52	284.86	12.00	205.85	0.00	205.85	383.15	953.33
54	S2W7	1360.89	860.90	386.55	477.32	261.19	216.13	277.93	11.02	266.91	5.72	222.06	0.00	221.85	397.57	963.32
55	S2W8	1207.51	787.00	367.73	420.51	225.59	194.91	225.59	0.00	225.59	0.00	194.91	0.00	194.91	367.73	839.78
56	S2W9	1066.34	698.10	331.47	368.24	187.21	181.03	187.21	0.00	187.21	0.00	181.03	0.00	181.03	331.47	734.87
57	S3W5	446.96	278.70	110.80	168.26	133.83	34.43	133.83	0.00	133.83	0.00	34.43	0.00	34.43	110.80	336.16
58	S3W6	668.83	437.42	207.11	231.41	148.78	82.62	148.78	0.00	148.78	0.00	82.62	0.00	82.62	207.11	461.71

Appendix 21: The wayfaring statistic result of *Aumagan* with social attitude set as 173450903010

House number 1-30

No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
1	00	1128.09	406.32	45.78	359.99	276.62	83.37	539.16	167.69	371.46	94.84	182.61	4.33	178.21	217.80	910.28
2	0E1	879.78	294.02	28.52	265.49	241.15	24.33	481.59	161.18	320.41	79.25	104.17	0.32	103.59	190.04	689.75
3	0E2	658.88	210.36	20.50	188.95	177.95	11.00	373.26	132.17	241.09	63.14	75.25	0.00	74.14	152.67	506.21
4	0N5	930.99	220.79	0.03	219.16	184.12	35.03	498.72	153.71	345.02	160.89	211.48	15.37	195.93	169.10	761.88
5	0N6	846.38	190.74	0.00	187.57	144.16	43.41	431.45	141.53	289.92	145.76	224.19	34.90	189.16	176.43	669.95
6	0N9	438.03	96.45	0.00	95.07	30.55	64.52	134.31	29.98	104.32	73.78	207.27	69.61	138.30	99.59	338.44
7	0W1	1415.20	525.61	114.07	411.45	281.70	129.75	594.32	169.34	424.99	143.29	295.27	22.23	273.04	305.64	1109.56
8	0W10	652.00	426.73	215.69	212.68	104.50	108.18	108.37	0.00	108.37	3.87	116.90	4.94	112.06	220.62	431.38
9	0W6	1582.29	776.00	188.79	589.95	277.46	312.48	401.06	61.36	339.71	62.24	405.22	29.54	374.72	279.69	1302.60
10	0W7	1471.07	758.62	216.75	542.71	244.02	298.68	328.50	32.37	296.13	52.10	383.95	33.25	350.78	282.38	1188.69
11	0W9	811.42	518.94	246.65	272.26	126.80	145.46	133.43	0.00	133.43	6.64	159.05	7.61	152.09	254.26	557.16
12	N1E1	949.40	285.55	20.53	262.64	230.67	31.97	527.05	192.78	334.27	103.60	136.80	0.95	135.57	214.26	735.14
13	N2E1	911.30	282.44	11.04	270.83	231.83	39.00	504.23	188.37	315.85	84.02	124.63	0.00	123.02	199.42	711.88
14	N2W1	1084.12	365.48	29.38	336.34	245.63	90.71	527.14	182.90	344.24	98.61	191.50	1.74	189.32	214.01	870.10
15	N3E2	610.52	167.43	0.21	165.63	156.43	9.20	382.91	175.74	207.17	50.74	60.18	0.00	59.94	175.94	434.58
16	N4E2	535.16	149.29	0.00	148.16	147.06	1.10	349.73	167.82	181.92	34.86	36.13	0.00	35.96	167.82	367.34
17	N4W10	734.40	433.48	194.77	237.54	110.51	127.03	131.63	0.00	131.63	21.13	169.28	22.73	148.16	217.50	516.90
18	N4W11	498.33	301.21	145.32	155.86	76.08	79.78	89.55	0.00	89.55	13.48	107.57	15.08	93.26	160.39	337.94
19	N5E1	672.33	139.11	0.00	138.87	133.89	4.98	406.83	156.04	250.79	116.90	126.39	4.29	121.88	160.33	511.99
20	N5E2	470.26	105.72	0.00	105.36	104.93	0.42	315.74	162.45	153.29	48.36	48.80	0.00	48.79	162.45	307.82
21	N5W2	1299.01	349.23	9.00	338.77	235.02	103.75	578.17	124.50	453.67	218.66	371.61	48.60	322.41	182.10	1116.91
22	N5W3	1640.80	484.54	26.18	457.75	254.19	203.56	632.03	121.35	510.69	256.50	524.23	64.17	460.06	211.69	1429.11
23	N5W4	1888.59	629.40	43.20	586.19	262.19	324.00	614.89	96.20	518.69	256.50	644.30	63.80	580.50	203.19	1685.40
24	N5W5	1820.29	720.68	124.64	595.09	271.09	324.00	553.29	110.74	442.55	171.45	546.32	50.51	495.45	285.89	1534.40
25	N5W6	1699.28	681.45	98.70	582.75	260.98	321.77	501.12	78.46	422.66	161.67	516.72	33.28	483.44	210.44	1488.84
26	N6E1	612.26	127.76	0.00	125.85	109.26	16.58	349.07	137.17	211.91	102.64	135.43	15.77	119.23	152.93	459.33
27	N6E3	502.90	102.20	0.00	99.60	98.36	1.24	325.25	155.42	169.83	71.47	75.45	1.27	72.71	156.69	346.21
28	N6W1	1020.03	247.34	0.03	246.30	171.03	75.27	471.09	126.55	344.53	173.51	301.60	52.68	248.78	179.27	840.77
29	N6W10	656.21	254.21	56.89	197.29	67.41	129.88	137.24	1.88	135.36	67.96	264.76	67.81	197.84	126.57	529.63
30	N6W6	1836.65	603.56	55.86	547.50	223.67	323.83	544.88	67.98	476.90	253.23	688.22	111.17	577.05	235.01	1601.64

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No	ID	Overall	A	A In	A Out	A-B	A-C	B	B In	B Out	B-C	C	C In	C Out	In	Out
31	N6W7	1612.29	597.51	81.16	516.28	199.61	316.67	417.17	37.48	379.70	180.09	597.60	100.84	496.76	219.48	1392.81
32	N6W8	892.48	323.93	58.59	263.85	87.42	176.43	201.41	11.40	190.02	102.60	367.14	90.45	279.04	160.43	732.05
33	N7W3	1540.14	447.08	12.63	434.06	185.62	248.44	485.51	49.65	435.86	250.24	607.55	109.06	498.69	171.34	1368.80
34	N7W5	1333.44	362.46	24.23	337.73	67.87	269.87	322.05	28.19	293.86	225.99	648.93	153.16	495.86	205.58	1127.87
35	N8W2	905.74	216.13	0.09	215.19	52.63	162.56	251.11	42.38	208.73	156.10	438.50	120.93	318.65	163.41	742.33
36	N8W3	1091.87	278.00	4.49	272.55	55.13	217.42	273.34	33.69	239.64	184.51	540.54	138.89	401.93	177.08	914.79
37	N8W7	621.52	157.29	7.52	148.34	30.09	118.25	142.47	7.59	134.88	104.79	321.76	99.88	223.03	114.99	506.53
38	N9W1	496.22	107.75	0.00	106.08	24.07	82.01	134.34	23.54	110.79	86.72	254.14	86.69	168.73	110.23	385.99
39	N9W2	696.63	158.39	0.00	158.34	25.37	132.96	168.68	23.81	144.87	119.49	369.56	117.07	252.46	140.88	555.75
40	N9W3	761.75	182.76	0.00	182.70	13.59	169.10	147.71	6.76	140.95	127.35	431.29	134.93	296.45	141.68	620.07
41	N9W4	868.34	212.76	4.83	207.93	18.47	189.46	175.26	8.97	166.29	147.82	480.32	143.15	337.28	156.95	711.39
42	N9W5	765.40	187.81	5.22	182.30	17.82	164.48	155.88	6.13	149.75	131.93	421.71	125.76	296.41	137.10	628.30
43	S1W10	1127.56	736.00	348.81	387.60	183.00	204.61	184.35	0.00	184.35	1.35	207.21	1.51	205.96	350.32	777.24
44	S1W2	1114.49	624.19	225.06	400.08	271.51	128.57	339.23	45.22	294.01	22.50	151.07	0.00	151.07	270.29	844.21
45	S1W4	1287.73	750.74	303.60	448.75	283.73	165.01	349.48	43.25	306.23	22.50	187.51	0.00	187.51	346.85	940.89
46	S1W5	1644.80	978.43	365.95	614.43	350.12	264.31	380.35	8.90	371.45	21.33	286.02	0.30	285.65	375.15	1269.65
47	S1W7	1525.73	933.43	395.91	540.80	261.88	278.93	289.85	13.18	276.67	14.79	302.46	8.75	293.72	417.85	1107.89
48	S1W9	1366.94	887.16	414.89	473.71	227.90	245.81	230.16	0.09	230.08	2.18	249.62	1.81	247.99	416.78	950.16
49	S2W10	633.71	424.82	218.95	208.90	113.21	95.68	113.21	0.00	113.21	0.00	95.68	0.00	95.68	218.95	414.77
50	S2W3	597.18	383.45	182.88	203.62	139.22	64.40	147.55	6.71	140.84	1.62	66.17	0.00	66.02	189.59	407.59
51	S2W4	958.89	609.10	272.30	340.49	229.32	111.18	235.96	4.01	231.95	2.63	113.83	0.00	113.81	276.32	682.58
52	S2W5	1172.29	747.92	337.81	411.22	250.56	160.66	259.20	4.13	255.07	4.51	165.17	0.00	165.17	341.94	830.35
53	S2W6	1337.95	845.92	381.82	468.77	279.13	189.65	296.39	11.26	285.13	6.00	195.65	0.00	195.65	393.08	944.88
54	S2W7	1416.43	911.34	420.46	493.75	266.34	227.41	274.71	5.51	269.20	2.86	230.38	0.00	230.27	425.97	990.46
55	S2W8	1251.26	824.19	398.46	427.07	221.55	205.52	221.55	0.00	221.55	0.00	205.52	0.00	205.52	398.46	852.80
56	S2W9	1105.91	731.16	358.29	374.76	183.83	190.92	183.83	0.00	183.83	0.00	190.92	0.00	190.92	358.29	747.63
57	S3W5	451.73	283.59	115.68	168.14	133.52	34.62	133.52	0.00	133.52	0.00	34.62	0.00	34.62	115.68	336.05
58	S3W6	684.33	451.75	220.20	232.58	147.78	84.80	147.78	0.00	147.78	0.00	84.80	0.00	84.80	220.20	464.13