THE APPLICATION OF ARCHITECTURAL INDICATORS TO COMPARE RESIDENTIAL QUALITY OF LIFE: A CASE STUDY OF ZIMBABWEAN FAMILIES CURRENTLY RESIDING IN SOUTH AFRICA AND THE UK

Mini-dissertation

by

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DECLARATION

I, Tinashe Hope Dube, declare that this research represents original work done by myself, conducted under the supervision of Dr Carin Combrinck. It is hereby submitted in partial fulfilment of the requirements for the degree of Master of Science in Applied Science with a specialisation in Architecture (by Research) in the Department of Architecture, University of Pretoria. The works of other authors have been acknowledged and referenced accordingly in the research.

I declare that I have observed the ethical standards required in terms of the University of Pretoria's Code of ethics for researchers and the Policy guidelines responsible for research.

This work has not been submitted for an additional degree or diploma to any other institution.

Signed at PRETORIA on 25 JANUARY 2018

T.H. Dube

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“Looking unto Jesus, the author and finisher of our faith.”

EXECUTIVE SUMMARY

This research paper sought to make a comparison of the lifestyle choices available to residents of homes in South Africa, the UK and Zimbabwe, seeking to take note of any notable differences in the quality of life of the residents in the selected case study homes in relation to the architectural design of each home as well as the urban amenities within the immediate context of each residence. This study was undertaken as a socio-spatial study, linking the psychological and social findings with the built environment. This study was undertaken to understand how lifestyle may or may not be the same in relation to the urban context and theresidential architectural design in the case study homes within the three selected countries. Homes of Zimbabwean migrants who moved to either South Africa or the UK were selected as the case study homes so as to provide a singular population group in which to make the comparison at a socio-spatial level. It was assumed that there would be differences in the homes and urban areas, giving various and differing socio-spatial benefits for living in each of the country contexts.

The study begins with a literature review, which focused on four main topics linking the socio-spatial urban environment. These four topics were: quality of life studies, urban theory, the relation of these to the non-Western context, and urban identity. These themes were derived from the findings of the literature review, which consisted predominantly of research reports on quality of life studies in the development, economic, anthropology, urban planning and architectural sector.

Findings in the literature review showed that research methods on quality of life studies varied greatly, and considered subjective human experiences of spaces in conjunction with objective facts. In order to define the research method and research indicators for this study, precedent studies were carried out, as discussed in Chapter 3. Research indicators include subjective and objective indicators for the description of spatial quality. A choice of these indicators was derived directly from the South African, UK and Zimbabwean residential building regulations, with Neufert's Architectural Data (2008) standing as a regulatory norm where a national standard was not found. The theory behind each indicator is detailed in Chapter 6. The objective historical facts surrounding the socio-spatial conditions of each of the study countries are detailed in Chapter 4, and the research data is presented in Chapter 7 and discussed in Chapter 8.

It had been assumed that the research study would conclude with a statement defining which country's homes displayed the highest quality of life in relation to the architectural design of homes in that country. However, both positive and negative aspects of the

architectural and urban design of each home and its contexts were discovered. This study concludes with Chapter 9, which states how aspects of architectural design in urban areas must be context specific, taking into consideration the social context as well as available urban amenities within the locality of the home, in order for the design of that home to improve the quality of life of its inhabitants.

KEYWORDS

Socio-spatial, quality of life, urban theory, assessment, residential design

ABBREVIATIONS

HDI	Human Development Index
QoL	Quality of life
RDP	Reconstruction and Development Programme
UK	United Kingdom
UN	United Nations
WC	Water closet
WWI	World War One
WWII	World War Two

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CHAPTER 1 INTRODUCTION (ARG 895 COMPONENT)

1.1 INTRODUCTION TO RESEARCH

Throughout human history, people have migrated from one area to another for many reasons, including searching for better economic, political or other conditions that are assumed to improve the human standard of living (Kotkin 2016:6; United Nations Department of Economic and Social Affairs 2014). Migration to urban areas has increased over the past century, and is only expected to continue doing so. In 2016, 54% of earth's human population lived within urban areas, making it the largest urban population ever to occur on the planet (Brenner & Schmidt 2014:733; United Nations Population Fund 2014). A 2013 study by El Din, Shalaby, Farouh and Elariane states that, with more of the human population residing in urban areas than in the past, studies around human life in urban areas are more significant and necessary for the sake of increasing knowledge bases for the development of sustainable human environments (El Din et al. 2013:87, 88). Architects and urban planners focus on improving the quality of life of the end users of their designs at a contextual level, which in turn is beneficial as a good quality of life is considered to be one of the most important aspects for sustainable urban development (Othman, Aird & Buys 2015:22). Over the past 15 years there has been a knowledge shift towards global parameters for measurement of quality of life that are not uniform or based solely on economic indicators, but rather are developed so that these indicators can be used to measure quality of life at a contextual level in order to supply informative data and results (United Nations Population Fund 2016; Vermuni & Costanza 2006:124). There are contextual differences, similarities and variations for the definition of a good quality of life between the large urban areas in the developed world as well as in countries within the Global South, which contains the majority of the world's Third World countries (Rigg 2007:8-10). With the global continuation of the urbanisation of the human population in different contexts, along with the migration of individuals between different parts of the world, urban planners and architects are challenged to design spaces that provide good quality of life within any urban context for an end user coming from any urban or rural context. This study seeks to investigate the means of assessing quality of life in residential spaces of end users who share similar values in terms of quality of life, but will be studied in three varied urban contexts, namely Zimbabwe, South Africa and the United Kingdom. Zimbabwe, is classified as a Low Income country by the United Nations Department of Economics and Social Affairs (2014), has experienced high levels of migration out of the country over the past 16 years (Humphris 2010), with the highest number of migrations into South Africa, which is classified as an Upper Middle

Income Country, and the United Kingdom, classified as a High Income country (United Nations Department of Economics and Social Affairs 2014). This research paper seeks to measure and compare quality of life in the homes of Zimbabweans in the three contexts mentioned above, in order to gauge what aspects of residential design impact positively or negatively on the end user's quality of life.

1.2 AIMS OF THE RESEARCH

The intent of this research is to deduce the effects of residential design on its end user's quality of life within an urban context and thereafter compare these effects in homes in three counties. This is based on the understanding that architectural design has a long-term effect on the quality of life of its end user (Massumi 1995). The literature review will consider the existing theoretical discourse on urban quality of life in terms of its definition and assessment as it is framed in urban theory specific to the Global South, and will include an overview of the link between quality of life and residential design. The findings of the review will inform the research methodology to be used in measuring the relevance of quality of life in residential design in three different socio-economic conditions. Zimbabwe was chosen as the base country for all comparison as it is the country with the greatest increase in a migration population in the Sub-Saharan Africa region since 2000 (Humphris 2010; Organisation for Economic Cooperation and Development 2016). South Africa and the UK have been selected for the study as these are the two countries to which most Zimbabweans migrate (Humphris 2010:1; Ndlovu 2013). Additionally, these three countries have stark differences in socio-economic conditions, as per their categorisation by countrywide income and annual GDP levels as reported by the United Nations Department of Economic and Social Affairs (2014), which increases the variations and likely findings of comparisons of quality of life relating to the residential spaces and surrounding socio-economic conditions for each country. Each of the South African and British homes selected within the study are within a one-hour driving distance of a major urban area. This is because the growth of urban population is linked to an increase in migrant populations, as economic opportunities increase (United Nations Population Fund 2014) and thus draw in populations in search of economic advancement. South African homes featured in this study are all located in the Gauteng province, and British homes in the study are within two-hours' travelling distance (by car or speed train) from London, as this is where the majority of Zimbabweans and other migrants are located within the UK (Humphris 2010). London and Gauteng are the major economic centres of the UK and South Africa respectively, and thus attract large numbers of migrants. The comparison between homes and countries excludes economic, legal stay, personal factors, etc. of residents; instead, it focuses specifically on the socio-spatial variables of each case

study home and family. The survey population shares a country of origin, namely Zimbabwe, which serves as the control element for the research exercise. The selection of Zimbabwean-born individuals as the study population as the study's constant variable is further enriched by the researcher's tacit knowledge of Zimbabwean culture and lifestyle habits, as the researcher is a Zimbabwean immigrant dwelling in South Africa, who has personally encountered all of the residential homes featured in this study. Leedy and Ormrod describe how it is useful for a researcher to have an existing background understanding of a subject area and / or the participants of his or her study in order to reduce the amount of time required to plan and complete the study (Leedy & Ormrod 2001:113). The researcher acknowledges that this personal link to Zimbabwe and the research homes' inhabitants may offer an opportunity for bias. Therefore, a rigorous amount of theoretical study, including precedent studies along with socio-economic studies of each research country, has been included in this study in an attempt to reduce the effect of the bias. Three varying socio-economic contexts were selected as quality of life studies are considered to be credible when they are context specific but have relevant differing variables (Costanza, Fisher, Ali, Beer, Bond, Boumans, Danigelis, Dickinson, Elliott, Farley & Gayer 2007).

1.3 RATIONALE BEHIND RESEARCH

With an increase of the human population residing in urban areas, the urban environment is becoming more of the default environment in which individuals live out their lives (United Nations Department of Economic and Social Affairs 2014). Quality of life, especially in urban areas, is greatly affected by design intent and decisions made by architects and urban planners who initially created the space in order to control the movement and development of that space in one form or another (Duhl & Sanchez 1999:3). Furthermore, the architectural design of an individual's residential dwelling is deemed to have a great impact on his or her quality of life (El Din et al. 2013). In the urban setting, individuals from different backgrounds and contexts live in close proximity to one another for varying periods of time. Thus, in the urban context, social norms are informally determined by the inhabitants and are fitted into the built environment designed by urban planners and architects; together, these two elements affect urban quality of life (Gutschow 2012; Harris & Parnell 2012). The lifestyle patterns and habitual norms and behaviours of users within the urban environment form part of what is referred to as urban identity (Vambe 2012). In short, the lifestyles, behaviours and movements of urban inhabitants are affected by architectural and urban design, which impacts the users of these designed spaces and their quality of life. This study aims to examine and compare these behaviours in selected case study homes and environments. There are currently several methods and defined parameters on how quality of life should be

measured. The United Nations Development Programme introduced the Human Development Index (HDI) as a measure of the development levels within a country based on average literacy, fertility, life expectancy and Gross Domestic Product measures for that country (United Nations Population Fund 2014). The HDI rankings have been published globally since 1980. However, the UNDP (2016), European Union statistics council (Eurostat 2016), The World Bank (World Bank 2013), and many other scholars and organisations have noted that using only these measures to compute quality of life is not sufficient (Diener & Suh 1997; Eriksson 1993; Kironji 2008; Moller 1997), leading to the continuous development of methods to measure quality of life. While the HDI looks at macro levels of human development and, thus associated average quality of life, in an area, quality of life must be measured at a contextual level in order to aid human development and quality of life in a micro-context (Dickson & Littrell 2003:227). Studies that have been developed to make a contribution to the measurement of quality of life through the use of contextual parameters include: a study by Craglia, Leontidou, Nuvolati, & Schweikart (1999), titled *Evaluating quality of life in European regions and cities: theoretical conceptualisation, classical and innovative indicators (1999)*; a study by Deutsh, Ramos and Silber, titled *Poverty and inequality of standard of living and quality of life in Great Britain*; a study by Dickson & Littrel (2003), titled *Measuring quality of life of apparel workers in Mumbai, India: integrating quantitative and qualitative data on basic minimum needs, living wages, and well-being*; and a study by Moller (2003), titled Quality of *life and positive youth development in Grahamstown, South Africa*. Similarly, this research study seeks to look at context-specific parameters for measuring quality of life by considering the relation of quality of life to physical residential space and design. Due to their shared history as a colonial country (United Kingdom), and colonies (South Africa and Zimbabwe), the three countries selected for study share socio-economic links, as well as similar urban development and architectural design, involving urban planning models that included segregation in the two African countries, and formal construction regulations that stemmed from the British colony and were further adapted to better fit the South African and Zimbabwean planning and construction regulations (Gutschow 2012:394). Three geographical contexts will be used for the study, with each of these falling in a different range on the HDI spectrum for measuring quality of life. The applied standard control, and specific context for this research study, is Zimbabwe. As the study populations' country of origin, Zimbabwe serves as the connecting context to all residential homes considered in this research study.

1.4 UNDERSTANDING KEY ASPECTS OF ANALYSIS

1.4.1 General

The categories stated below allow for comparison within each residence in the research study.

1.4.2 Homes chosen for the study

The residences selected for this study have all been visited and analysed by the researcher, who studied these homes and therefore has first-hand experience of the daily activity in each home. May refers to this form of research as participant observation (May 2011:163). The method and motive behind the selection of homes has previously been stated. The owners of the homes selected for this study will remain anonymous, as the personal details of the respondents are irrelevant to the study. A comparative study will be used to gauge the design parameters that are perceived to improve quality of life in a residential space.

1.4.3 Size and layout of dwelling

From previous observation, the researcher is aware of the general architectural and design characteristics particular to residential design in each of the countries featured in this research study. An example of this is the lowest number of square metres in the home generally occurring within dwellings within Great Britain, and the highest occurring in Zimbabwe, but with the highest number of square metres per user in South Africa. Urban development as it is experienced in the United Kingdom today was initiated in the 19th Century with an increase in the urban population occurring due to growing industry and available jobs in urban areas (Harper 2013:29-31). The majority of urban residents at the time were of the same income level, or received housing from the state due to housing shortages caused by the World War One and World War Two. Thus, due to limited government expenditure, homes in British urban areas were developed at an average size of 98m^2 per residence, with limited space available for expansion due to the typical rowhouse or semi-detached residential size, that were the most common architectural design styles of homes built in the UK at the time (Barrow 2014). By analysing the area and layout of each space along with the related spatial usage, the researcher will be able to make comparisons between perceptions of spatial quality, quality of life and population density within. urban development in South Africa and Zimbabwe happened during the period between 1890 and 1939 (Munzwa & Wellington 2010:122). The urban areas in these countries, much like other urban areas in Africa, were developed predominately with the intention of housing and

providing services to white residents and farmers or miners of colonial lineage, who used the urban areas as central service areas, with their native workers on the urban peripheries (Gutschow 2012:400). This meant that urban amenities were developed to standards of quality depending on the racial group that was intended to use them. Due to their status as previous British colonies, urban areas in South Africa and Zimbabwe were on the British urban development model, but differed from this model due to land availability. Due to the greater availability of land in Africa, residential stands and homes located in urban residential areas previously designated for white inhabitants, are on average 2 to 3 times or more larger than the average British residential home. Only after WWII did the British colonial office formalise urban planning systems that would also cater for native African inhabitants, but even then urban amenities and residences for non-whites were not of the same architectural quality and size as those designated for white urban residences (Harris & Purnell 2012:132). Before natives were formally included in urban residential and planning studies, they created urban residential settlements for themselves with residences made up of a single room approximately 4x3m in size. Settlements where these small, self-made residences occurred are referred to as slums, shanty towns and informal settlements, and continue to exist today (Cecilia, Kimmel and Tiggermann 2014:64). Post-colonial governments have sought to formalise some of these informal settlements through the introduction of state policies. As a result, in South Africa and Zimbabwe, the homes built by the state are an average of 45m^2, slightly larger than the informal homes that the recipients had previously resided in (Greyling 2009:4-6). State-provided homes in Zimbabwe and South Africa are not featured in this research study because there are very few state provided homes in Zimbabwe, as the Zimbabwean government chose to focus on providing opportunities for home ownership after independence in 1980 (Moyo 2014:357). In addition, Zimbabwean migrants are not legally allowed to occupy state-provided homes in South Africa (Greyling 2009:2). State-provided residences in the UK are considered in this research study, as some of the Zimbabwean inhabitants referred to in this study have managed to qualify for state benefits either as a result of their long-term legal stay in the UK or due to reasons related to health and/or disability. In South Africa and Zimbabwe, the size of a residence is dependent on its location. In residential areas previously designated for other races excluding non-native African inhabitants, such as white, Indian or mixed race population groups, as well as in areas created after the abolishment of the Group Areas Act, a small residential home is, on average, 80-140m^2 and will typically be an apartment dwelling, or a semi-detached home. A medium-size home will, on average, be 141-220 m^2 and will typically either be a semi-detached double storey, or standalone home. Large standalone homes are typically 221-400m^2 (BusinessTech 2015). The average population density in London, UK is 5100 people per square kilometre, while it is 2500 people per square kilometre in Johannesburg South

Africa, and 2450 people per square kilometre in Harare, Zimbabwe (Citymayor 2007). Newer residential developments in South Africa tend to have a higher population density and smaller residential lot/stand sizes than older residential developments and areas due to more demand for residential space as result of an increased urban population. It is important to note this historical background when considering this research study in order to make the data and comparisons useful in terms of the context of the study regarding quality of life in the three different areas, as this helps to understand why the size and design of a home, depending where it is geographically situated, have different effects on the lives of its inhabitants and their resultant quality of life.

1.4.4 Lifestyle in each dwelling (usage of space in the residence)

An analysis of the typical activities performed within the different households will inform comparative categories for defining the relevant lifestyles.

1.4.5 Effects on health and psychology

The effects of space on the health and safety of its inhabitants is well accounted for within the legal spectrum of housing and architectural design through the provision of health and safety codes as described in national building, design and construction regulations. This analysis category will indicate any health or safety issues that may have been overlooked by regulations and could be considered towards further improvements for the sake of the end users.

1.5 THE RESEARCH QUESTION

Main research question

The study is centred on the main research question, which is: *How does overall quality of life and lifestyle choices and in selected urban residential homes differ between South Africa, the United Kingdom and Zimbabwe?* Three sub-questions are used to answer the main question. These questions are:

Sub-question 1

How is quality of life defined, and in what ways does it relate to urban planning and residential architectural design?

Sub-question 2

How does one measure quality of life and lifestyle in relation to residential architectural design?

Sub-question 3

How do the three countries differ in terms of quality of life, architectural design and urban context?

1.6 METHODOLOGY OF ANALYSIS

1.6.1 Analysis of existing quality of life studies

A study of the development of indices used to measure quality of life will be undertaken through a literature review. The literature will be used to generate a basic understanding of quality of life definitions and indicators. It will include desk-top studies, reports and theoretical explanations on urban theory, urban development, socio-spatial relations, architecture, urban identity and the relation of these topics to quality of life. These findings will serve as a basis for the theory and research method for the research study exercise.

1.6.2 Summary and establishment of existing national standards

Architectural and building standards set a basis with which any building in an urban area must legally comply in order to be built (South African Council of Planners 2009). Thus, a summary of the relevant national standards will be included in the study. Relevant categories include: a) natural ventilation standards, and b) natural light level standards (day lighting standards). An overall summary for natural ventilation standards and natural light level standards will be done through the use of South African National Standards (SANS)10400 and British Standards (BS) 8206-2 (Day lighting) and BS 5925 (Natural Ventilation). Thereafter, a-country-by country analysis of how all the homes included in the study compare to a) their own country's building standard, and b) other countries' building standards will be included. This part of the study is intended to give an understanding of established building standards and how they relate to the indicators and other aspects of this research paper. It must be noted that Zimbabwean regulation has not been updated since independence, with the existing out-dated standards having been based on British Regulation, with South African National standards also being included in updated standards (Government of Zimbabwe 2008).

1.6.3 Typological analysis

Wang and Groat (2013:300) describe a typological analysis as a study and analysis of a number of various complex variables in order to show links between certain spatial attributes including relationships between building interiors as well as building scales that are alike. A typological analysis of the featured households will be carried out by first drawing the floor plans of the household, and then comparing them. Conclusions from this visual documentation process will constitute the findings of the typological analysis. From this, the

quality of life in different residences and contexts can be compared. The drawings will be prepared using Autocad™ computer software and will comprise of basic floor plans indicating area, furniture layout and designated usage of the space in each home.

A contextual analysis of each of these individual homes will be conducted through a combination of a typological analysis and a mapping exercise. This will be carried out by drawing each individual household within the context of the urban block in which it is situated as well as within the larger context of the neighbourhood. Facilities to be mapped include:

i) Walking distance (in metres) to closest form of public transport/transport node;
ii) Walking distance to closest school and education-related facilities (libraries, universities, internet cafes);
iii) Distance to nearest small, medium and large retail facilities;
iv) Distance to nearest recreational facilities (community centres, sports grounds, laygrounds, parks and public swimming pools);
v) Distance to nearby entertainment facilities (cinemas, taverns/ pubs, theatres);
vi) Distance to nearest religious facility (churches, mosques, etc.); and
vii) Distance to nearest health facility (hospitals, clinics, health centres, etc.).

The mapping of the larger contexts of these homes will be represented in the research paper in the form of Autocad™ drawings, sketches and Photoshop™. For each household featured in this research paper, the following three drawings will be included for the sake of comparison:

i) An Autocad™ drawing showing the floor plan of the at a visible scale;
ii) A Google™ Map base Photoshop™ image containing mapped information as well as any necessary descriptive sketches of the context of the neighbourhood in which the house is located and its amenities (including municipal services, transport services and economic opportunities, etc. in the area); and
iii) Each floor plan drawing will contain a table which states the conditions of comfort and living within the home stated in the analysis categories above, i.e. rooms feasible for use by all members of the household, and levels of natural ventilation and light within the home (See ordinal categories mentioned above).

1.7 PROPOSED RESEARCH APPROACH AND STRATEGY

The principles for research approach and strategy in this paper are based on writings on architectural research methods by Wang & Groat (2013) and May (2011), which informed the sociological research methods of this research paper. These sources advise using literature

as primary and secondary sources for research. Thus, a literature review will be conducted in order to create a theoretical base for this study. The literature review will also inform the study through exposure to research methods of studies of the same nature. Literature sources will include readings from the architectural, urban design and planning, human development and economic and human sciences fields (anthropology, human geography and sociology), looking at the topics: quality of life, urban theory, urban identity and urbanism in the Global South. Wang & Groat (2013:269) advise that studies should include findings and theories from different disciplines in order to make it more holistic. The literature review will focus on the different methods of measuring quality of life and will consider how the indices for measuring life quality were formulated, thereby generating the analysis categories which will be used in the case study research. For the research, a typological analysis and comparison of the different urban homes and their surroundings as well as a mapping exercise of the direct neighbourhood contexts of these homes will take place. The contexts of the different homes will be compared to generate qualitative research findings for this research paper (Wang & Groat 2013:288,300). The floor plans were observed by the researcher through the participant observer research methodology.

1.8 THE RESEARCH DESIGN AND METHODOLOGY

A mixture of research methods, including both qualitative and quantitative approaches, were used for this research study. The combination was selected in order to obtain data that is relevant on a social and spatial level.

Data collection instruments used for this study include:

i) The secondary data on each country detailed in Chapter 4;
ii) Floor plan drawings for each residential home, showing dimensions, windows and doors ;
iii) The information on these drawings is used in conjunction with a table that includes recorded data on the physical aspects of the house, as well as the Likert scales that were used for various indicators to describe certain subjective aspects of the house;
iv) Behaviour maps showing the occupancy of areas in the house during the day, as well as floor plans showing the public and more private areas of the house, serve as the base diagrams; and
v) Locality maps showing the available urban amenities for each house within a walking radius of the home are also given.

1.9 ASSUMPTIONS, RESEARCH SCOPE AND DELINEATIONS

1.9.1 Assumptions

It is assumed that the chosen research population share a historical basis of social interaction and lifestyle choices in the residential space due to their shared home country of Zimbabwe. According to Bakasa (2016), Zimbabwean urban dwellers are assumed to maintain urban-rural ties in urban domestic life. The evidence of these urban-rural ties include:

i) Hierarchy in the home, with elders and males taking preference, resulting in largely communal spaces in the rural home, with privacy reserved within the designated space of the primary couple or independent adults (parents) of the home;
ii) Assumed allocation of household tasks is along more traditional and rural lines, i.e. housekeeping and food responsibilities are allocated to women, resulting in woman inhabiting the related spaces in the urban home; and
iii) A diet in relation to seasonal foods in the rural areas. Where it is possible, urban residents will grow a selection of these foods for consumption.

It is assumed that the inhabitants of the case study homes have a shared history of the above mentioned socio-spatial relation to space and that this gives a shared and implied meaning to how and why these inhabitants may view and relate to quality of life and how they make lifestyle choices in their homes.

The researcher assumed that the UK case study homes featured in the study will show residences in the UK to be:

i) Smaller in total area as the UK has a much higher population density than countries in Africa;
ii) Much lower in subjective perceptions of natural ventilation as the weather in the UK can be extreme in colder months, requiring windows to remain closed to keep cold drafts out of homes; and
iii) Much lower in subjective perceptions of natural light as the latitudinal positioning of the UK in comparison to South Africa is such that the UK has a different angle of incidence from the sun, resulting in sunshine that is not as bright as it is in Africa, as well as shorter daylight hours in winter months, than those in South Africa and Zimbabwe.

1.9.2 Research scope and method

This dissertation will:

i) Review literature regarding the socio-spatial issues relating to the quality of life and lifestyle of urban inhabitants, under theoretically relevant topics relating to human psychology and development with the urban residential context;
ii) Separately review relevant historical happenings for each country. Economic and political occurrences have bearing on their immediate urban and architectural context. Each of the countries in this study has a unique history, but are also linked to one another as former British colonies and through global development. Historical happenings in each and their relation to the socio-spatial environment must be considered in order to give background for the study's findings;
iii) Undertake a precedent study on related research studies. These precedent studies will be used to formulate the measurement categories through which quality of life and lifestyle choices will be measured in this research study;
iv) Give a detailed explanation for the measurement categories (indicators) for quality of life and lifestyle choices used in this research to make observations in the chosen homes;
v) Share the given findings for each of the case study homes through:
    - An urban context map, which locates the available urban amenities within a 2km radius of each home and a behavioural map for each home that will indicate the public and private areas of each home along with the times in which specific areas of the home are used more than others
    - A CAD floor plan of each home showing the rooms in relation to one another as well as each room's dimensions, and window and door locations
    - A table showing the findings for each measurement category for each home
    - A table showing the findings for each case study family living in these homes in relation to one another (i.e., case study families who moved from South Africa to the UK will be compared to one another);
vi) Give a summary of each country's findings, followed by a comparison of the findings in each country of initial and latter residence. Findings will be discussed; and
vii) Share whether or not the study was successful, giving details on the study findings and methods strengths and weaknesses.

1.9.3 Delineations

i) The study does not refer to quality of life within the development studies context. Quality of life indicators such as gender, education, personal household income and micro-

economics do not, therefore, have any direct implication on the definition of quality of life in this study.

ii) The study does not rely on the personal details of the home's occupants. These details include the number of occupants, age, history or income levels. In this way, research findings are limited to the spatial character of a home, thus allowing the study to be more architecturally focused.

iii) The study is compared in the context of the homes in each country only, rather than including comparison categories such as typological comparisons between homes and between rooms. This is due to time limitations for the dissertation.

iv) Quality of life is usually measured within the developmental context. Studies on quality of life are development-centred and typically research on indicators such as education, gender, education, micro-economics, social status and life expectancy (Kironji 2008:58-97). These indicators are not featured as indicators in this study. Studies within the human development sector have noted that there is more to human development and quality of life than the above-mentioned indicators, noting that the larger scope of development is about creating an environment in which people can develop their full potential and lead productive, creative lives in accordance with their needs and interests (United Nations Development Programme 2016). Within this thought paradigm, people are perceived to be the real wealth of nations, thus the emphasis on quality of life and human development is about expanding the human population's choices (Kironji 2008:50). This study focuses on the human residential environment and the elements within residential design that can be used as useful indicators to examine of quality of life within these residences. Micro-indicators that affect the possible choices for living within each unique residential level are studied. After each home is studied, the architectural design features along with spatial characteristics will compared within ordinal categories that all fall under the single quality of life indicator —architectural residential design. Research reports and literature relating to urban theory (urban development, urban planning, the process of urbanisation), quality of life and the relation of these two topics to urban identity and the non-Western context are most relevant to the study. The topics in the literature review touch briefly on the typical quality of life indicators and their relation to the indicators emphasised in the study.

1.10 STRUCTURE OF THE DISSERTATION

The study is structured as follows:

i) Chapter 2 contains a literature review, which seeks to link the socio-spatial theoretical context in which the study was framed and which was used to address the first research

question. Through four main themes, the chapter gives an overview of how urban environments and quality of life have been studied, and the theoretical arguments of these findings on how to measure the quality of life of urban residents.

ii) Chapter 3 gives a detailed summary on the three existing research studies that had the greatest impact on the study. The chapter states the research method and context for each of these studies and explores how these assisted in the development of the indicators through which the research was performed.

iii) Chapter 4 contains detailed secondary data on the three countries considered in the dissertation. This serves as the first comparison between the countries and gives an understanding of each country's history of urban development.

iv) Chapter 5 offers details on the research method of this study, through a justification of the research rationale and a discussion of how this carries into the research data protocols and analysis.

v) Chapter 6 lists the research indicators used for the case studies. The rationale behind each indicator is given. National and international building regulation standards are given where necessary, as well as the dimensions and drawings for each room of the house. These form the objective data inputs for the study. Indicators that are more subjective are measured on Likert scales, which are detailed in this chapter wherever necessary.

vi) Chapter 7 contains the raw research data, giving an urban context map, floor plans, behaviour map and table for each room in the house. The chapter contains findings for each indicator in each room in the house. The summary of conditions in relation to the six case study families is given.

vii) Chapter 8 is a discussion of the findings of each country, indicator by indicator, with a summary of the average score for each indicator used for each country. The countries are then compared and discussed in a concluding table.

viii) Chapter 9 shares how each research sub-question was addressed in the research question and gives a brief summary on how the study managed to meet its objectives, giving recommendations on the points where it did not meet the study objectives.

CHAPTER 2 LITERATURE REVIEW (ARG 895 COMPONENT)

Chapter 1 serves as the introduction and layout for this dissertation. Chapter 2 seeks to give a theoretical underpinning to the context through which quality of life (QoL) in the urban areas should be considered. Further reviews of precedent research studies, history and socio-economic conditions in the countries under consideration are given in Chapter 4 and 5. This chapter seeks to offer an understanding of the theoretical standpoints that need to be defined in order to frame quality of life for the urban residents of the UK, South Africa and Zimbabwe.

2.1 FOUR THEMES

Any research regarding quality of life within the social-spatial discipline requires the researcher to define quality of life within their research context and then explain the parameters in which quality of life should be considered or measured (Othman et al. 2014:13). The precedent study in chapter 4 focuses more on the latter, while this chapter aims to define the context in which quality of life is considered through a literature review. The literature review will look at four specific topics: quality of life studies, urban theory, the relation of these two topics to the non-Western context, and, lastly, urban identity. These topics are discussed within the context of their relation to the social-spatial discipline but are interlinked to the sociological, developmental, historical and economical disciplines. All of these disciplines relate to the study of human quality of life . The literature review is thus structured so that the four main topics form a theoretical underpinning through which the chapters to follow should be considered.

2.1.1 Urban theory

Urban theory refers to the system of ideas and principles surrounding the planning, architecture, geography and policy concerning the human urban environment (Carter 1972:4). There is no standardised set of criteria for what constitutes an urban area due to the varying characteristics of urban areas within different cultural, geographical and economic contexts (Carter 1972:17; Craglia et al. 1999:33). However, traditionally urban areas came into being as a result of their centralised functions which serviced the surrounding areas (Carter 1972:59). These may have included cultural functions, such as religious and cultural centres, such as the ancient cities in the Mediterranean with heritage-based origins (Craglia et al. 1999:17). More modern urban areas usually tend to have more commercial central functions, giving them capital-based origins (Craglia et al. 1999:62). Christaller's *Central Place Theory* (1933) came into being on the basis that most urban areas came into existence due to their centralised services and functions. Christaller's

theory sought to explain how urban areas develop, starting with a single main central business district. As the service area for the central place grows, smaller secondary central service areas develop with their attached periphery areas. The growth of a large urban area continues like this, with one main centre and many smaller centres around it (Carter 1972:106-120). This serves as an accurate theoretical description of how urban development occurs, but development in the physical world is far more organic than this. With other factors contributing to the development of an urban area, the process tends to happen outside of Christaller's theoretical disposition (Carter 1972:112). In order for an urban area to function optimally, urban resources must be made sustainably *available and accessible* to all urban inhabitants (Brenner,Marcuse & Meyer 2011:30; Craglia et al. 1999:18). Christaller's central place theory serves as a loose structure on which to start the process of an urban plan. Ebenezer Howard's 1898 *Garden City Concept* (Harper 2013:39), which is detailed in Chapter 4, is loosely based on Christaller's central place theory. *Access* and *availability* for urban residents introduces two additional major theoretical standpoints concerning urban theory, namely *critical theory* and *the right to the city*. *Critical theory* refers to the study of the disconnection or separation of the actual and the possible through the critique of instrumental reason (Brenner et al. 2011:14). The *right to the city* can be defined as an urban resident's right to: information, use of the multiple urban services and amenities, the right to make use of the urban centre as well as to discover, display and act on ideas and use of both space and time as urban inhabitants (Brenner et al. 2011:30). Additionally, scale in terms of human population and urban population densities are factors that can contribute to or detract from urban dwellers' quality of life in an urban area (Nuvolati 2003:81).

Chapter 4 explains the initiation, influence, and evolution over time of how urban theory and urban development in South Africa, the UK and Zimbabwe were influemved over time. Historical consideration and development standards for different categories affected urban theory in each of the countries.This section of the literature review seeks to offer a basic definition of urban theory and the context in which urban development is framed throughout the dissertation, especially in Chapter 4, where the differences in urban development between each country due to its political, economic and social context are explained in detail.

2.1.2 Quality of life

Quality of life has no static definition (Dickson & Littrel 2003:214; Craglia et al. 1999:18) and is measured using different indicators depending on the context in which quality of life is being studied. These indicators may be objective, relating to standardised and quantitative indicators which tend to be more generic as they exist in many contexts (Dickson & Littrel

2003:216). Indicators used to measure quality of life may also be subjective, referring to the quantitative, context-specific measures of quality of life . Both subjective and objective methods for measuring QoL are useful in the urban socio-spatial context. An objective study of quality of life helps to compare different qualities of life on a macro-level (Dickson & Littrel 2003:216; Szalai & Andrews 1980), which is helpful for any urban area striving to become globally competitive and qualify as a *global city region*, where an urban area serves as a singular part of a larger global singular unit, serving a similar role to a precinct within the greater urban system (Soja 2000). Conversely, a subjective study of quality of life seeks to measure the situational conditions of individuals in context and thus compute quantitative aspects of their daily norms and determine where an individual's life falls on a spectrum in comparison to those in similar socio-economic conditions (Craglia et al. 1999:38, 39). Some quality of life studies opt to create a correlated study of quality of life (Wang & Groat 2013:275), making use of both subjective and objective perceptions, and at times measuring quality of life from more than one professional discipline, in order to gain a more holistic perspective.

Sirgy (2011:1), a well published theorist on the study of life gives six major theoretical concepts through which quality of life indicators can be classified. These theoretical concepts are:

(a) *socio-economic development*;

(b) *personal utility;*

(c) *just society*;

(d) *human development*;

(e) *sustainability*; and

(f) *functioning.*

From the literature reviewed, quality of life studies conducted in the built environment industry tend to focus on measurement indices that quantify quality of life in relation to Sirgy's (2011) categories b) *personal utility* and f) *functioning* Specifically, tending to measure the size and properties of physical space and the manner in which the humans using this space relate to it. Examples of this are the City of Melbourne's (2013) *Quality of housing design* study and Ilesanmi's (2012) study on *Housing, neighbourhood quality and quality of life in public housing in Lagos, Nigeria*. These studies surveyed various physical factors of residential and neighbourhood space, including the size (square metres), number of rooms, the number of individuals using each room, and the acoustic and visual privacy in

various residences' in order to gauge the quality of life of the users of the spaces studied. Both studies had the intended outcome of creating a new standard measure for the creation of a space that would enhance the quality of life of the residents in each context (City of Melbourne 2013, Ilesamni 2012).

In the development sector, quality of life studies focused more on *personal utility*, *human development* and *functioning*, catergories (b), (d) and (f) of Sirgy's theory (2011). An example of this is Mel Prince and Chris Manolis's 2003 study titled *Consumer Income and Beliefs affecting happiness*. Levels of money, happiness, beliefs and income were measured qualitatively and quantitatively. The data was then processed into quantifiable single variables which were computed into economic formulae to create a measure of quality of life. This method of measurement, which involved the creation of an economic formula containing variables representing certain values to generate a numeric figure for the measure of quality of life, is a common method in the development sector (Easterlin 2003; Manolis 2003; Deutsch, Ramos &Silber 2003).

Quality of life studies in the humanities sector focus more on the following categories listed by Sirgy (2011): (a) socio-economic development, (b) personal utility, (c) just society, (d) human development. An example of a study in the humanities sector is Dickson and Littrell's study titled *Measuring quality of life of apparel workers in Mumbai, India: integrating quantitative and qualitative data on basic minimum needs, living wages, and well-being* (2003). This study measured quantitative variables, such as the degree to which household income within the case study homes was able to meet the basic necessities required to run the home (Dickson & Littrell 2003:212). To do this, the study examined financial figures on the expenditure and income of the households surveyed. This survey also measured subjective variables including psychological and social aspects of quality of life that may not be have been considered as quality of life indicators, such as in studies that focus only on HDI indicators (ibid. 2003:230). Workers in this study ultimately reported subjective benefits as a result of earning wages, such as increased levels of authority within their families, the start of meaningful friendships in relation to, or at, their workplaces, and a general overall improved perception of their personal satisfaction with life (ibid. 2003:227). Other studies correlate income, life events, gender and satisfaction with life while using all of Sirgy's measurement indicators. One such study is Richard Easterlin's *Happiness of women and men in later life: Nature, determinants and prospects* (2003).

Wang and Groat (2013), along with Easterlin (2003:215) emphasise the importance of understanding the overall context in which a study occurs before starting the study. Mukherjee (cited in Dickson & Littrell 2003:215) states that, prior to developing strategies to

improve quality of life, it is important to identify what aspects of the study population's lives need to be improved. In other words, it is suggested that, at times, before a research study method is formulated, it is necessary for an observation of the study population to be done in order to assess what is considered important with regards to quality of life in the context of that specific community in order to decide what variables to measure, and how to measure them. Dickson and Littrell's 2003 study included the telling of anecdotal stories by women of the community, which allowed researchers to study aspects of importance in relation to QoL in that specific context, and how to measure it from there.

This portion of the literature review gave an overview of quality of life studies that have been conducted across various sectors, the methods and outcomes deduced as well as the thematic focuses of the studies as per their academic focus area. Chapter 3 offers a more detailed report on precedent studies and how these studies affected the research method for this dissertation.

2.1.3 The non-Western context

With context-specific planned research and observation of quality of life comes the importance of context, as mentioned above (Craglia et al. 1999:18, 39). Context may refer to geography, culture, religion, income, education, age, gender. However, in the social-spatial discipline, geographical and income context are the most commonly considered factors related to quality of life (Abu-Gaueh 1995). This is mostly due to the popularity of the Human Development Index (HDI) study by the United Nations Development Program. The HDI is described as *a composite statistic* derived from the national statistical averages of life expectancy, education, and income per capita, indicators and fertility rate into a single value (United Nations Development Programme 2016). The composite HDI value is derived from calculating all four of these factors and allows countries to be ranked against one another. On this rating system, countries with lower fertility rates, higher GDPs, higher levels of education and higher life expectancy are ranked higher than countries with lower computed values for each category (Vermuni & Costanza 2006:124). The United Nations Human Development Report containing HDI findings are released annually (United Nations Development Programme 2016). However, since the implementation of the HDI study in 1980, there has been a growing acceptance of the fact that monetary measures, such as GDP per capita and the other indices used to measure a country's HDI, are inadequate proxies of development (Kreutzmann 2001:134). This has led to the introduction of additional reports on global rankings of countries that include and exclude some of the indices used in the HDI (Kreutzmann 2001:132; Vermuni & Costanza 2006:120).

With the ongoing enquiry into statistics that can accurately compare countries to one another for the sake of human development, a number of new methods for measuring quality of life have arisen, and continue to be developed. Many of these new measurements of human conditions around the world seek to create methods of statistically valuing the Global South with regards to its development strengths, rather than its weaknesses in comparison to the more developed Western world (Lindsay, Williams & Dair 2010). The development of additional methods to calculate quality of life is due to the fact that the majority of countries that do not have the same cultures, traditions and practices as the Western world have low rankings. This may be due to the fact that, historically, these countries, especially those in the southern hemisphere, are less urbanised and have economies and urban systems that are not as established as those of their Western counterparts (Kpolovie, Ewansiha & Esara 2017:1-21). In his book titled *An everyday heography of the Global South* (2007) Jonathan Rigg gives detailed insight into the similarities of countries in the less developed southern hemisphere, and how life in these countries is different in terms of quality of life advantages and disadvantages in comparison to the countries in the northern hemisphere that tend to follow Western culture (Rigg 2007:47). Many of the less developed southern hemisphere countries were previously colonised by the western countries (Harris & Parnell 2012). The urban areas of the Global South tend to have less reliable state resources available to the people, resulting in lower standards of health care, education, transport services amongst others, than their Western counterparts (Rigg 2007:10). Urban areas in the non-western context were initially developed for the population's minority, due to the institutionalised segregation at the time, which sought to keep races separated and planned varied levels of urban development according to race (Gutschow 2012:395; Harris Parnell 2012:139; Moller 2003:66,67). During these periods of segregation, uncontrolled urban development would occur in the urban areas allocated to the country's native population (Harris & Parnell 2012:132; Kimmel, Tiggermann & Cecília 2014:64). The areas allocated to natives were often poorly developed, with provision made mostly for the accommodation of urban labourers in the form of hostels and barracks, rather than for entire families (Gutschow 2012:400; Vambe 2012:159). However, due to the centralisation of industry and services in urban areas, rural-to-urban migration was a common phenomenon and resulted in uncontrolled urban development and shanty towns, built from necessity on the simplest (and most affordable) standards, often resulting in sewerage and waste problems in what today are termed shantytowns (Kimmel et al. 2014:64, 65; Harris & Parnell 2012:139-142). After World War II, the British colonial office in London opted to accept urban planning for natives in colonial cities within formal state planning, rather than providing for only the permanent urban dwelling and settling of Europeans in these colonial urban areas (Gutschow 2012:150; Kotkin 2016:60). Rather than

the forced daily transit of native Africans in and out of designated European or white-only urban areas (May & Rankin 1991:1352) to the native housing townships we see in Commonwealth countries, planning to include native townships and housing within urban areas was initiated (Harris & Parnell 2012:150). Homes in these urban native townships contained homes with minimal rooms on relatively small stands (Matlock 2013:3, 4). These native townships are often located at a significant distance from the local CBD (Huchzermeyer 2011). With quality of life in urban areas being largely determined by availability of and access to resources (Craglia et al. 1999:18; United Nations Development Programme 2016), these previously disadvantaged settlements, which still house large majorities of urban populations in the Global South, are home to the global urban majority today (Kotkin 2016:64). The individuals living in these areas have a resourceful manner of living, creating systems outside of state provision for the efficient running of their everyday lives on minimal budgets. This includes communal systems, multiple uses for single rooms, outdoor cooking (Gutschow 2012:400; Mathema & Martin 2010), and societies that provide for their social needs and also serve as savings and burial plans (Vambe 2012:164). These self-sufficient or rather non-state driven forms of urban existence offer many lessons to the more formal systems for urban development today (Rigg 2007:34), as they contribute much to the personal autonomy and self-esteem of the individuals living in them (Brenner, Mayer & Marcuse 2011:36). Individuals living in South Africa's townships were reported to have significantly lower levels of satisfaction with life (Moller 2003:66). With regard to Lefebreve's definition of the *right to the city*, according to Peter Marcuse (2011), those individuals who live in informal residential sector of an urban area have more of a *right to the city*, not in the formal urban area, but in their immediate informal locations, as they have more autonomy over their immediate choices than their counterparts with low incomes in the Western (non-Global South) context. This autonomy includes how to build and what materials to use, how to make provision for their immediate needs with regards to many aspects including vegetable gardens, community banks etc., (Gutschow 2012:394, Harris & Parnell 2012:141). Brenner, Mayer & Marcuse (2011:36) further state that a *right to the city* includes the personal meaningful contribution to the urban life cycle of an individual in addition to access to urban amenities.

There are several contexts in which theories regarding quality of life, the built-environment and the urban theory need to be considered outside of the typical perception of the modern and globally-competitive urban metropolis (Rahim 2014:537). In each urban context, sometimes with different urban contexts occurring in a single city due to differences in culture and income, living and quality of life conditions may differ regarding cultural norms in terms of the use of space, colonial influence on urban planning and socio-economic

disadvantages. Therefore, these contextual differences should be considered when designing to improve quality of life (Nuvolati 2003:81).

To conclude this section on cultural context, in the words of Keening (cited in Rubentstein 2015:6), the art of building which we refer to as architecture ispresent in areas rich in culture and tradition and is not limited to areas rich in the economic sense. Additionally, Kotkin (2016:64) states that urbanisation and urban conditions are portrayed as where a higher standard of living and wealth are more easily achieved, however this is not the case for the majority of low-income residences in large cities (Kotkin 2016:64). A consideration of residential homes in various urban contexts in addition to the secondary data on socio-economic conditions of each country is presented in Chapter 4, which gives a brief understanding of the contextual differences between the case study homes.

2.1.4 Urban identity

Discussions around urban identity of the humans inhabiting urban areas and the quality of life that these individuals have as result of architectural and urban planning in their urban neighbourhood are important (Craglia et al 1999:18). There is no standard for how large or dense the human population of an area needs to be in order for the area to be formally defined as urban (United Nations Development Programme 2016). Additionally, the context for what constitutes an urban area, and what the characteristics of urban areas are, vary for each context (Carter 1972:17). One of the recurring characteristics of the urban is that it is a centralised locality made up of a conglomeration of individuals from different backgrounds with various identities (Kimmel et al. 2014:64, 65).

In urban areas, relations of public and private life, and social norms regarding what is and is not acceptable are determined either through communal relations or the state bodies (Vambe 2012:165). Sociologist Elijah Anderson (2006:50-64) explains how during his ethnographic study of a Chicago bar called Jelly's Place, he noted that the members of the survey population for his study characterised themselves according to their method of acquiring income. These individuals would go as far to refer to themselves by their given (and accepted) social standing, and in turn these social ranks and associated labels dictated their behaviours in relation to other patrons at the bar who were either of the same or different social ranking as themselves (Anderson 20006:52). Prince and Manolis (2003:27) mention how income affects the level of personal autonomy, choice, and contribution one can have in an urban area. Linking directly to Anderson's description and the social rankings and urban identities of the patrons at the bar (2006:54), De Certeau, in his writings titled *The practice of everyday life volume 2 - living and cooking* (De Certeau et al. 1998), details much of the habitual patterns of a single household in 1998 in urban France. The household

discussed in the study has a set mannerism for doing things, and De Certeau et al.(1998) explains how much of the lifestyle of the residents within the home is related to their daily ritual as a working class family. Those with less demanding jobs and smaller social circles were noted to spend much of their time in the home, occupying the largest and most private spaces in the residence and creating the backdrop around which the other individuals in the homes lives would revolve (De Certeau et al. 1998:145-205). The main contributor to private household life is most often a matriarch figure. There are differences in urban identity and contexts for the characteristics of an urban matriarch household figure (Othman et al. 2014:20). The woman in the study by De Certeau et al. seems to feel more of a sense of autonomy, along with a good sense of her personal quality of life, in the home than in the outside world, due to her activity in the home (De Certeau et al. 1998:173). The women in Dickson and Littrell's 2003 study titled *Measuring quality of life of apparel workers in Mumbai, India: integrating quantitative and qualitative data on basic minimum needs, living wages, and well-being*, however focus on the effect of income generation by the mothers in the study on their QoL. These women, unlike the woman in De Certeau's (1998) writings, find more satisfaction in their homes as a result of their activity at the workplace, reporting that their jobs give them more life satisfaction and improve their subjective sense of QoL. Reports state that their newly-found monetary income brought them higher self-esteem, respect from their in-laws and more control of what happens in their home (Dickson & Littrell 2003:211-230).

Income and occupation are not the only determining factors for urban individuals' sense of identity. Kimmel et al. (2014) refer to how, with rural urban migration to the *favelas* of Brazil, individuals often established themselves only where someone from their home village was already established thus also, in some sense, migrating a village, its populations and customs from a rural to an urban setting (Kimmel et al. 2014:64, 65). Vambe (2012:165) writes about how the Zimbabwean urban black township dwellers of Mbare, Harare, created an urban identity for themselves by either identifying more with township inhabitants who followed more Westernised practices such as attending Christian church services, or social tea meetings regularly, while the other social group (*mahobo*) had township parties and led a more African-influenced urban life. Moller's (2003) findings from a study on the urban youth of the township located adjacent to the cultural centre of Grahamstown, show that the individuals who came from homes with a more traditional and settled social background (presence of biological parents), and interacted with educated people tended to have a better personal perspective on quality of life, participated more in pro-social and personally developing activities, and were more likely to take advantage of employment and self-benefitting opportunities than those who were not exposed to the same conditions and

people in their urban surroundings. Their contemporaries who came from less traditional family settings, such as being raised by a single grandparent, reported on average not only having a lower personal satisfaction with their quality of life, but also tended to participate in activities that were not helpful to their development and in turn were not able to exploit future advancing activities in the same ways as their afore-mentioned counterparts (Moller 2003:64-66, 74).

Though these examples may seem more of a reference to the sociological and developmental aspects of quality of life, the link between the social environment and the urban environment cannot to be ignored. In the built environment, professionals such as architects and planners create the environments in which the formal sector of urban life, public and private, are played out, alongside the informal urban environment where the users and their needs shape the development of the space (Kotkin 2016:119; Salat et al. 2011:88). Gutschow (2012:396,406) explains how Ernest May, a German planner who worked in colonial Africa in the 1940s, could not transplant the same urban plans he had executed in his native Germany, and later the Soviet Union, to Uganda, because the desired socio-spatial outcomes were not the same in the more European context as they were in the less developed urban areas of Uganda's African context. In colonial Africa, segregation was a strong agenda during initial planning stages for urban areas that still exist today (Gutschow 2012: 395; Harris & Parnell 2012:139). With the initial town planning and architectural designs set to control African inhabitants' levels of comfort, family life and options for urban residence (Vambe 2012:153), the native majority living in these areas today report a lower level of satisfaction with life (Moller 2003:67,68,74) than their more social-spatially advantaged counterparts.

This section of the literature defined how and why lifestyles and quality of life in urban areas of the Global South are different to those in the typical Western definition of an urban area. As such, the contextual differences in quality of life and lifestyle choices in the residential and urban environment should be noted in the context of the findings that are presented in chapter 7 of the dissertation. Chapter 4 offers specific details on the history and outcomes of the contextual differences in the architectural residential and urban design of the three countries featured in this study.

2.2 CONCLUSION

The discussions above show that there is a strong recurring focus on the social aspects of urban population. The urban population is discussed from an urban theory perspective, then from an economic and developmental perspective in the discussion of quality of life, a

historical and sociological perspective in the discussion of the non-Western context, and then a mainly sociological perspective in the review on the literature and the topic of identity. Wang and Groat (2013:269) refer to the importance of co-relational research, utilising knowledge from varying disciplines in order to generate a holistic perspective on the research at hand. This is especially important for studies in the built environment as it is the environment in which all aspects of urban life come together. Urban context affects quality of life of urban residents in terms of *socio-economic development*, *personal utility*, just society, *human development, sustainability* and *functioning* (Sirgy 2011:1) The effect of the differences in socio-spatial contexts of each of the homes, as well as each group of homes in each country, is considered alongside the findings in chapter 6 and chapter 7.

The literature review above is the theoretical basis on which this research paper is constructed. The holistic school of thought evident in this chapter should be considered as the undertone of the answers to Chapter 1's research questions in the following chapters, noting the link between social conditions and the built environment.

CHAPTER 3 PRECEDENTS AND INDICATORS (ARG 895 COMPONENT)

Chapter 2 contained a literature review which provided a theoretical context through which the urban populations affected, referred to within the context of this dissertation as residents, should be considered. This chapter gives a precedent report based on three studies used to formulate the research indicator categories presented in chapter 6, and used to formulate the data findings in chapter 7. The theoretical basis, research method, findings and relevance to this research dissertation are stated for each precedent study.

3.1 BEST PRACTICE AND PRECEDENTS

Precedent research studies were used to inform the research process for this study. Due to the selected pragmatic approach, which involves both qualitative and quantitative research methods, it is useful to look at other examples of research studies in order to gain an understanding of how both qualitative and quantitative research studies can be utilized. As part of the literature review and preparation process for this dissertation, three research studies are explained in the section below as precedent studies.

3.2 PRECEDENT STUDIES

3.2.1 Study 1

In a 2003 study titled *Measuring quality of life of apparel workers in Mumbai, India: integrating quantitative and qualitative data on basic minimum needs, living wages, and well-being* by Dickson and Littrell, both qualitative and quantitative methods were used to deduce the basic needs of a selected study group at a sociological, physiological and economic level. The study emphasised how quality of life can be measured at a national level using macroeconomics, however, at local levels, a more localised, multi-dimensional approach provides more relevant and useful results (Dickson & Littrell 2003:214).

Title of Study: *Measuring quality of life of apparel workers in Mumbai, India: integrating quantitative and qualitative data on basic minimum needs, living wages, and well-being.*

Nature of study: Both quantitative and qualitative with a focus on the qualitative findings within the anthropologic and economic sector.

Main research question/topic: To compare and contrast a variety of quantitative and qualitative measures of quality of life in India.

Findings: Subjective personal measures of well-being by participants in the study showed that high levels of quality of life were not related to high levels of income. Rather, it was

found that sociological aspects such as having the ability to provide for a family, having a say in and contribution towards the family's well-being, as well as having a place in society both in and outside of the home contributed to the levels of satisfaction and quality of life for the women in the study.

Contribution to this study: This approach highlighted the importance of subjective experiences within a research study in order to have holistic understanding of the research topic. Dickson and Littrell (2003) used quantitative methods to perform their study, but also found alternative methods such as anecdotes shared by participants in the study in order to ascertain behaviour patterns and lifestyles of the study participants and how they related with those in their immediate surroundings.

Dickson and Littrell (2003) advise that researchers find a way to research and document subjective experiences of users within their studies, thus contributing to the observation records of the general lifestyle patterns that are recorded in the case study dwellings of this study.

3.2.2 Study 2

A 2012 study by Ilesanmi examines the housing and neighbourhood quality of public housing in Lagos, Nigeria.

Title of Study: *Housing, Neighbourhood quality and quality of life in public housing in Lagos, Nigeria.*

Nature of study: The study generated a quantitative figure for each variablein the study; the variables are separated into four categories, namely:

1. Housing consumption: relating to dwelling size and occupancy rates.
2. Connection to services: levels of main infrastructure, such as water, sanitation, and waste disposal.
3. Neighbourhood/site characteristics: playgrounds, open spaces, and other community facilities.
4. Location characteristics: the relationship trade-off between journey-to-work time and size of units.

Main research question/topic: An examination of the external conditions in relation to housing and neighbourhood quality of public housing in Lagos, Nigeria.

Findings: Ilesanmi's paper (2012) aims to measure housing quality through a number of criteria generated within his study. Housing quality in the study is then determined by putting

the found variables into an equation in order to create a final calculation. Ilesamni's (2012) study assessed a number of homes within eight developments in Nigeria and focused only on the architectural features of the homes that could be assessed from the exterior. Criteria for assessment included (Ilesanmi 2012:235):

1. *External visual quality;*
2. *Material quality;*
3. *Structural quality of buildings;*
4. *Detailing quality of buildings;*
5. *Quality of housing services*;
6. *Quality of neighbourhood roads;*
7. *Quality of landscaping;*
8. *Quality of open spaces;*
9. *Quality of environmental layout; and*
10. *Quality of the location*.

The criteria are placed into two categories; half of them assess the housing blocks while the other half assess the neighbourhoods around these blocks. Technical, functional, and aesthetic qualities are assessed overall (Ilesanmi 2012:236). It was found that housing estates within higher-income developments had better architectural and environmental quality ratings. Ilesanmi's (2012:239) concluding recommendation was that housing developments in Lagos should be provided for mixed-income groups and should have a board in charge of maintenance of development to ensure good quality neighbourhoods and environments for all income groups.

Contribution to this study: Ilesamni's (2012) study provides an African precedent on research similar to that contained in this research dissertation, allowing for a contextually relevant study that takes place both in the same African urban conditions and in the same architectural academic field as this dissertation.

Ilesamni's (2012) study also provides the definition of quality of life that was adopted for this study. It defined quality of life as a the extenxtent to which an individual can exercise and enjoy lifestyle choices as result of the combination of limitations as well as opportunities avalaible to them due to environmental elements at a personal level (Ilesamni 2012:235).

3.2.3 Study 3

The City of Melbourne (2013:5), Australia, conducted a study in 2013 titled *Understanding the quality of housing design* which sought to look at previous, current and future quality of

housing design in Melbourne, as well as in other major cities in the Western world, including Sydney, London, New York, Singapore and Vancouver. The conditions of elements affecting housing developments in the Melbourne studies were dealt with holistically, making sure to state the relation to both market and policy influences on categorical indicator used in the study. The aim of the paper was to deduce the best possible and most effective apartment housing design in order to develop over 40 000 new residential apartments in Melbourne by 2031.

Title of Study: *Understanding the quality of housing design*

Nature of study: The study's emphasis is on quantitative measures in existing developments in Melbourne and developments in other large cities, both in the past and present in order to make predictions for the future. The study covers existing developments in Melbourne, and is considered large scale as it covers 25 case study housing developments.

Main research question/topic: What can be done to ensure that Melbourne maintains its high quality housing into the future with regard to ensuring adaptable and flexible residential design that can meet both current and future needs of Melbourne residents?

The answer to the question must consider how environmental, social and economic value can be added to architectural design to create robust communities and neighbourhoods for both now and the future (City of Melbourne 2013:5).

The twelve indicators used to analyse the research question were derived from twelve existing challenging conditions within Melbourne residential apartments. These twelve challenges are:

1. Small apartment sizes;
2. Lack of apartment choice;
3. Dominance of car parking;
4. Internal conditions - Poor light;
5. Internal conditions - Poor natural ventilation;
6. Internal conditions - Visual privacy;
7. Poor building layout;
8. Poor apartment layout;
9. Limited flexibility and adaptability;
10. Poor environmental performance;
11. Limited communal space and facilities; and

12. Lack of storage and utility spaces.

Findings: The findings of the research create a basis for discussions around quality of housing design, ensuring homes that are designed along policies that allow for flexible and adaptive living throughout a lifetime, making them useful at varying points of their inhabitant's lives. Furthermore, the study defines a principle which states that the quality of housing cannot be soley defined on the perceived external appearnce of the development (City of Melbourne 2013:75), but by a wider set of definitions. These definitions are presented through findings on the twelve criteria used to analyse the homes, and policy on each of these criteria is detailed in the research report. In addition, the Melbourne study made a main point of discovery showed that more and more people are moving into one-bedroom developments, with the total floor area of these developments decreasing by $8m^2$ between the years 2008 and 2010 (City of Melbourne 2013:5). Thus, even with the decreasing apartment size, housing policy must allow for good quality design. The City of Melbourne study concluded with five main points with which to create good quality housing design standards:

1. Developing design standards that are to be implemented at a policy level during the early design stages of a housing development.
2. Creating and making use of a design review panel, made up of a mix of professionals including: architects, community members, government officials and developers – who will evaluate the design of homes in a development within early stages to ensure that the design will improve the quality of life of the residents for which the housing design is created.
3. Create a housing toolkit to serve as non-prescriptive user guide which alludes to the larger goals for housing design. The toolkit can additionally also be used as a rating tool for the design review panel suggested above.
4. Introducing housing design awards as a means of recognising examples of good-quality housing design, creating a platform for recognition and public education of examples of good design. This will promote good-quality residential design in Melbourne, which will create a trend for good-quality design, thus improving the standard of design for housing quality in the city.
5. The findings further recommend that the same criteria be analysed in any future buildings that will be designed along the suggested criteria in order to check if buildings designed along this criteria improve the quality of life their users as they are assumed to.

3.3 CONCLUSION

The relevance of each of these precedent studies has been discussed in this chapter, for the purposes of generating the research indicators used for this paper. The following chapter gives the socio-economic history for each of the countries considered in this study.

CHAPTER 4 SOCIO-ECONOMIC BACKGROUND (ARG 895 COMPONENT)

Chapter 2 of the dissertation contained a literature review that explained the theoretical context in which architectural design and quality of life are considered. Chapter 3 included a precedent study on the formulation of research indicators. This chapter gives insight into significant historical, social and developmental data, especially regarding population, quality of life and development issues in the three study countries, South Africa, the United Kingdom and Zimbabwe.

4.1 COUNTRY BY COUNTRY SECONDARY DATA: DESCRIPTION OF EACH STUDY AREA

Secondary data refers to data collected from a secondary source and used to inform the data collected in the primary phase of research (Leedy & Ormrod 1993:117). Secondary data can include newspaper articles, research reports, television and radio reports and other similar sources (May 2011:73).The secondary data used to inform this section of the study consists primarily of reports and studies used to monitor population demographics in each of the countries and on a global scale.

4.1.1 The United Kingdom

This study will focus on the Great Britain, though the majority of findings found in this study are applicable to England specifically. The Oxford Dictionary defines Great Britain as a territory made up of three countries: England, Scotland and Wales, and states that Great Britain is commonly referred to as the UK, as is the case in this paper. Table 4.1 provides a summary of population and density statistics for the UK.

Surface Area in km^2	243 600 km^2
Population density	271.3 people/km^2
Population size	65 640 000
Percentage of population living in urban areas	82.6%

Table 4.1: **Population and density statistics for the United Kingdom**

(Source: Adapted from The World Bank 2017)

Early historical records on urban development in the UK report that in the early 1900s, in areas such as London, separation between individuals of different classes was commonplace (Pacione 1997:1, 2). Richer and higher classes lived in the city centre, where

they were able to attend social, economic and cultural events including court and church. Individuals who were part of this social class lived in large homes with separate rooms designated for certain amenities, as is common in everyday homes today (Steffel 1979:144, 155). These homes were of a grand scale and contained architectural detailing. In contrast, the poorer working class struggled to afford homes in the urban centres (Whitehand 1967:20). Affordable residential accommodation was available in the form of dormitory houses where tenants would rent out bed spaces rather than actual rooms. These dormitory houses were located atan inconvenient distance from their inhabitants' place of work. The dormitory houses also had low hygiene and security standards, which made it very difficult for normal family life or home conditions to take place as they would for a higher class British family living in a family home in the country, or with a private home or apartment in the urban centre (March 2004:410). Higher classes of society as well as the clergy often deemed these dormitory houses as immoral due to the shared rooms and bed spaces between genders. In addition, the cramped conditions in these dormitory houses were unhygienic and made it easy for diseases to spread between the closely packed individuals (Harper 2013:29-33; Pacione 1997:8).

To date, modern British housing and residential design standards have sought to create solutions to all of these early urban conditions, with the majority of urban planning and architectural legislature ensuring that design provides dignified, healthy, secure, and usable homes for British residents, where all classes of people can live with one another in equality (Hall 2012, cited in Harper 2013:45), leading the socio-spatial setting of urban residential UK today (See *Table 4.1*). A summary of the series of the most influential urban design theoretical discourses that have influenced urban and residential design in the UK to date is discussed below.

The first theoretical school of design thought can be summed up by the *Tudor Walters Report*, written by members of British Parliament in 1918. This report came as a result of the acknowledgement of the poor living conditions of the working class British in urban areas (Clapson 2000:153; Swenarton 2002:268). In an attempt to replace the dormitory houses as housing for the working class, developers and employers created rental tenements commonly referred to as *two-up, two-down* (in the UK) or *walk-ups* (Poulsen & Silverman 2005). These new developments allowed for one or two working class families to share a single room in semi-detached duplex buildings. Lower cost rooms were orientated onto the back court of the home where outhouses were located. These conditions exposed families living in the homes near the outhouses to cholera and other sanitary-related diseases. *Two-up two-down* homes were designed exactly as they were named, two rooms on the top floor joined by a staircase to two rooms on the bottom floor. These homes were crowded, with at

least one family living in a single room. The conditions within these rooms afforded a poor quality of life for their inhabitants. The working class living in these homes suffered in their urban existence both at home and at work, as working conditions along with the urban environment provided little recreational open space, very limited and safe areas for children to play and air clouded with smoke (Harper 2013:31-35).

Ebenezer Howard's book titled *Garden Cities of Tomorrow* was released in 1898. Howard's teachings became the main theoretical standpoint for the UK's urban planning and development scheme in the period between 1890 and 1930 (Harper 2013:26; Swenarton 2002:268). In addition to the suggestion of living spaces in which human beings lived within close and commutable distances to urban amenities, while still having access to nature, Howard introduced the concept of *density ratios* where an ideal number of inhabitants are allocated to a certain area. Howard's theory dictated that the optimum population for a garden city was 32 000 people per hectare. Occupancy above that stipulated number would result in the creation of an additional new central area in order to prevent over-crowding. Once the city reached its maximum capacity of 32 000 people per hectare, as per Howard's definition, a branch of garden city would be made. (Harper 2013:39). Howard's calculations were made to ensure that garden cities had a set maximum ratio of residents per hectare. This theory contributed to the densely populated, yet controlled manner in which the UK is populated today, where all residents have equal access to urban amenities, employment, affordable transportation, a hygienic environment and nature. The most notable of Howard's contributions to residential architecture in the UK is his insistence on garden space for all homes, ensuring that homes would be duplex units with a small garden space at the back for the planting of fruits and vegetables. Howard also ensured that all garden cities were surrounded by a green urban buffer making larger scales of natural environment available to urban residents (Howard 1898, cited in Harper 2013: 39-45).

The influence of Modernism on urban design and residential planning in UK cities followed the Garden City movement (Harper 2013:49). Le Corbusier's popular theories on modernism emphasised concentrated urban vertical densities amidst large spaces of open land in his 1924 proposal for *The contemporary city for three million inhabitants*. Le Corbusier's design worked on three levels of scale, namely: 1) The vertical scale — the scale of his proposed vertical skyscrapers was not comparable to anything in human scale; 2) The horizontal scale of the base of these designed scrapers, stipulated as 190m in width; and; 3) The proposed varieties of unique road sizes namely: 240km of 10m wide private streets, 220km of 30m wide streets and 1640 km of 50m wide roads (Le Corbusier 1924, cited in Salat et al. 2011:88). Le Corbusier insisted on vertical developments in order to free up space and activity on the ground and allow human residential and movement spaces (including

streets), to take place in the proposed mega skyscrapers in order to free urban residents from noisy, dusty and light deprived conditions in the street and up into the skyscrapers where vertical positioning higher up would allow residents to be bathed in light *(*Le Corbusier 1971, cited by Blowers, Hamnett & Sarre 1974:30-41). High rise apartments based on Le Corbusier's theories would contain singular apartment buildings, each with at least one access wall in each apartment for fresh air, natural light and views onto nature for the apartment's inhabitants. These mega apartment buildings would be self-contained units, with amenities such as grocery stores and schools at their bases. Open recreational green spaces would serve as buffers between buildings, and would be accessible to all urban inhabitants (Harper 2013:51). Modernist theorists of the early 19th century agreed with some of Le Corbusier's theories, especially those around concentrated densities, but felt that his scale was not in any way relatable to the human scale of 1 to 2 metres (Salat et al. 2011:87, 88). In 1933, the 4th International Congress of Modern Architecture (CIAM) drew up the Athens Charter, which drew on Le Corbusier's design influence but separated human functions into living, recreation, working and circulation. This included the pedestrian-oriented design where the sidewalk (human), was to be separated from the street (vehicle), with homes set off of the street, allowing for both pedestrian movement and surveillance of the streets and surrounding open areas (Salat et al. 2011:191). As such, this form of modernism did away with the out-of–human scale large open spaces, which were considered unsafe at night due to the lack of surveillance in the large open park and green space (Salat et al. 2011:190).

In the UK, this form of mega-scale residential architecture was alluring as the country was in the process of creating new affordable residential space as part of the British government's efforts to provide quality homes for all UK citizens between and after World War 1 (WW1) and World War Two (WWII) (Elliott 2014). These efforts included the rollout of homes for the returning WW1 soldiers, the prefabricated homes rolled out under the leadership of Winston Churchill after WWII, temporary housing, and the common terraced (or row housing) typology that served as permanent housing stock, rolled out as council housing. Home ownership in the UK increased by 33% between 1948 and 1960 (Kotkin 2016:149). This rollout of homes was also largely due to the need to replace homes and areas that were destroyed during the wars (Salat et al. 2011:191). Modernist apartment buildings provided affordable, quick-to-construct solutions for urban housing, especially in existing urban and industrial areas, which began to be re-populated and improved due to the re-popularisation of urban living by theorists such as Jane Jacobs, resulting in the urban dwelling renaissance in cities such as New York, San Francisco Chicago and Boston (Kotkin 2011:31). Technologies of the time, however, only allowed for a maximum height of

approximately eighteen storeys, a limitation that allowed for a more human-scale building, not as large-scale as Le Corbusier theorists had hoped, but high density nonetheless (Salat et al. 2011:87,88). However in 1986, after the collapse of a high-rise council apartment building, the usage of apartment high rise buildings in the UK was discouraged. An incident referred to as *The Ronan Point Disaster*, where a gas stove explosion caused the collapse of a high-rise apartment building, created distrust in the structural systems of the time and resulted in several high-rise apartment buildings being torn-down in urban UK (Pearson & Delatte 2005).

Concurrently, there was a new-found interest in Howard's *Garden City* concept, with a large number of the post-war housing developments following his model, with preferences for residences on the periphery with access to open space and nature as well accessible transport modes to the city centre taking preference in the form of settlements that came to be referred to as suburbs, which are popular around the world (Kotkin 2011:29), see *Figure 4.1*.

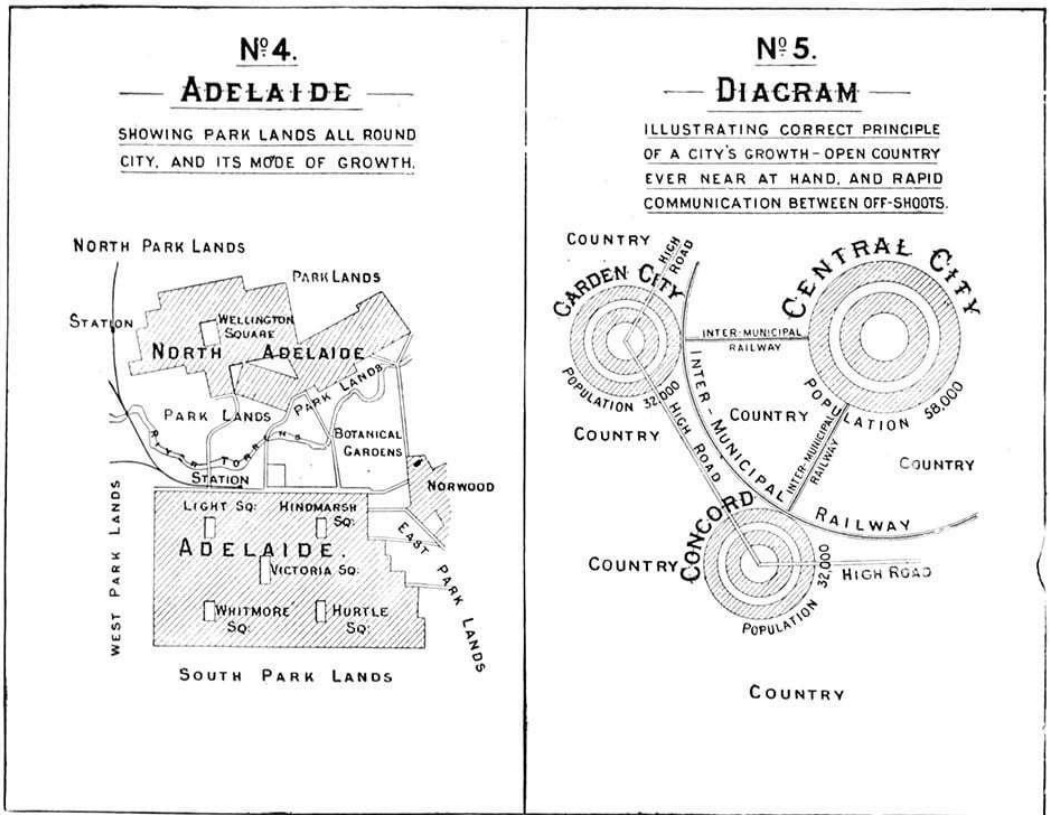


Figure 4.1: **Diagrams showing The Garden City concept**

(Adapted from Howard cited in Blowers, Hamnet and Sarre 1974: 48, 50)

Figure 4.1 Description: (Diagram 1.1 left) Adelaide (Australia), and its extension (after it reached a population of 32 000 people; (Diagram 1.2 right) Theoretical diagram explaining the garden city, its link to additional (concord) cities, and the main city centre.

Density calculations by Raymond Unwin in 1918 (Harper 2013:39), showed that higher densities than those in apartment buildings could be generated through courtyard duplex units. From the late 1980s to the present, several urban planners and theorists have had an influence on major urban development in the UK's residential home design due to the approach on density ratios and urban planning. Influential theorists and bodies of work include: Patrick Abercrombie and John Henry's *London County Plan* (1943) and Rolf Jensen's *High Density Living* (1966) (both cited in Harper 2013:57, 209). A concept was developed to include areas of a much higher density and human population than the original *Garden Cities*, which had a set population of 32 000 people after which a nearby garden city would have to be developed (Blowers, Hamnett & Sarre 1974:47; Harper 2013:119). New urban density strategies included the use of vehicular traffic, but sought to keep vehicle and pedestrian traffic apart, creating separate over- and underpasses for cars and people (Harper 2013:75). Currently, there is a global design movement towards mega-density structures, such as those developed on the concept of Rem Koolhaas' Tower building (Koolhaas 1978), with some of these mega-structures being developed in central London. An example of these mixed-use buildings include *The Shard*, a ninety-five storey building designed by Renzo Piano and completed in 2013.

UK legal recommendation for development of residential architecture and planning began with the minimum spatial requirements stipulated in *The Tudor Walters Agreement* in 1918 (Swenarton 2002:268). It was hoped that this agreement would lead to legal spatial standards for urban housing in the UK that would result in residential design spaces and a resultant better quality of life for urban UK residents (Manoochehri 2010:14; HACT 2006:20). These principles include: similar home designs for all urban classes, shared amenities for all urban classes, homes that provide dignity and healthy conditions for all British urban residents. See *Table 4.2* for the stipulated minimal areas for spaces in each home.

Over the years, changes in sanitation, transportation, manufacturing, construction and technological advancements have occurred since the *Tudor Walters Agreement* was first implemented at the start of the 20th century. However, spaces have become smaller than the legal recommended dimensions in the agreement, even in the most expensive residential spaces in central London (Royal Institute of British Architects 2011:5). This has resulted in people and designers advocating for new legal minimum spatial regulations. The most popular appeal for this is the Royal Institute of British Architects' *A case for space* movement, which includes a video campaign that shows how a vast number of newly-constructed British residential apartments are only as wide as a single tube carriage (Royal Institute of British Architects 2013a).

The public demand for more spacious homes, made popular by the Royal Institute of British Architects, demands that minimum spatial regulations for residential space be legislated in the UK, to ensure that developers do not take the opportunity to create residential spaces of the minimum size in order to accommodate higher densities of urban residences in areas such as London (The Farrel Review Team 2013:77; Royal Institute of British Architects 2013b:24, 25; HACT 2010:9).

House without a parlour	**Area in sqm (m^2)**	**House with a parlour**	**Area in sqm (m^2)**
		Parlour	11
Living Room	17	Living Room	17
Scullery	7.4	Scullery	7.4
Larder	2.2	Larder	2.2
Bedroom No.1	14	Bedroom No.1	15
Bedroom No.2	9.3	Bedroom No.2	11
Bedroom No.3	6.0	Bedroom No.3	10
Total	**79.4m2**		**98m2**

Table 4.2: **Tudor Walters Committee – Minimum Size Recommendations**

Adapted from the Tudor Walters Report (1918:29, cited in Halewood 2016:2)

4.1.2 South Africa

South Africa strikes a balance between the UK and Zimbabwe in this research study in that it shares some characteristics of both countries and thus assists in comparing the two countries. South Africa officially became a democracy in 1994 (Ramutsindela 2001), and from there on, the emphasis of spatial planning has been an attempt to bridge the gap between the spatial inequalities and planning systems of apartheid in urban areas, as well as to develop urban areas to cope with the growing demand for housing and infrastructure brought about by South Africa's status as an economic and prosperity landmark in Africa (Shepard & Murray 2007:10). *Table 4.3* presents the population and density statistics of South Africa.

Area in km^2	1 221 037 km^2
Population density	45.3 people/km^2
Population size	54 979 000
Percentage of population living in urban areas	64.8%

Table 4.3: **Population and density statistics for South Africa**

Adapted from The World Bank (2017)

South Africa was inhabited by native tribes who lived in separate localities based on tribal territories. These territories were later reorganised to make room the arrival of European settlers in South Africa in the mid 1600s (South African History Online 2016). In a bid for authority over South Africa, British and Dutch (later Afrikaans) governments set up administrative capitals and territories for themselves. The Afrikaans economic and administrative headquarters were set up in the Transvaal (now Gauteng) area, as well as in the Orange Free State province, while the British headquarters were set up in modern-day Cape Town, Durban, and Port Elizabeth (Butler 1998:56). The resettlement of native black South Africans was also controlled while the Afrikaans- and English-speaking population fought for power, with the eventual result of the creation of *Bantustans*, defined as long-term settlement areas for Africans which were *territorially segregated areas on an ethnic basis* (Hindson 1985:402). The discovery of gold in South Africa in 1886 caused a great migration of South Africans, both European and native, to the gold fields of the Witwatersrand region (Crush, Jeeves & Yudekman 1991). To date the gold mining industry has been the country's greatest catalyst for economic and urban development in the country. The movement of gold and supplies, as well associated activity with the trade of gold, established links between the colonial points, resulting in the development of roads, railways and towns for refreshment along the way. These refreshment points were the base for the majority of South Africa's major urban centres today (Mabin, Butcher & Blotch 2013:170-174). Throughout these processes, racial segregation between Europeans, natives, Asians and others was maintained. In 1910, the Afrikaans and British colonies agreed to become one state, resulting in the Union of South Africa (Geyer 1990).

Prior to WWII, the vast majority of South African residents, both native and European, lived in rural areas. Even in these rural settings, settlement was predominantly racially segregated (Evans 2012:120). In 1948, the ruling National Party made racial segregation official in the country through the institutionalisation of apartheid. With this followed the

Group Areas Act of 1950. This act ensured that throughout South Africa, economic and urban development would differ based on race (Hindson 1985:402). See *Table 4.4*.

	African Natives	Whites
Population	19 Million	4.5 Million
Land Allocation	13%	87%
Share of National Income	< 20%	75%
Ratio of average earnings	1	14
Maximum taxable income	R300	R750

Table 4.4: **Disproportionate treatment circa 1978**

(Adapted from: Mohoto 2013)

In the design sector, this meant that homes in urban areas designed for Africans would be different in quality and size from their white counterparts (Hindson 1985: 402-407; Mabin et al. 2013:171). Movement of natives would be restricted and controlled within white areas, with non-white people designated to different parts of the urban area. Black people were forcibly resettled in locations that were a great distance from designated white areas, most commonly on the edge of an industrial area, with a clear visible buffer between the black location and the white suburb (See *Figure 4.2*). Indian and mixed race (coloured) people were also allocated separate localities (Evans 2012:117).

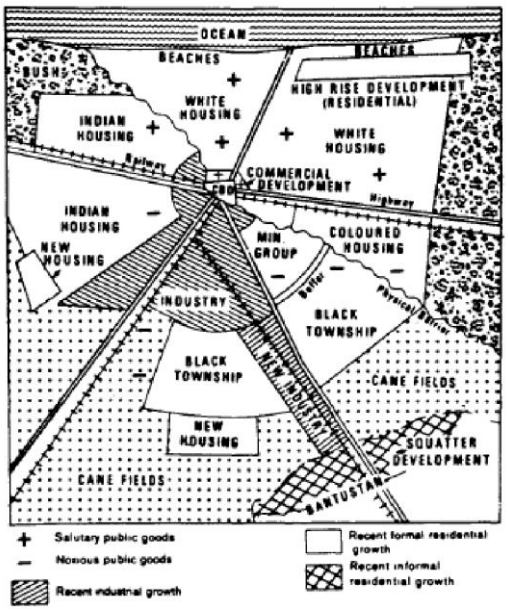


Figure 4.2: **A graphic model of the apartheid city**

(Beavon 1992:242)

In conjunction, on an education and employment scale, there was a difference in the opportunities and expectations for people according to their race (Hindson 1985:405).

Apartheid set limitations to the freedom and development levels of non-white South Africans through legislated segregation and racial discrimination in all areas of life, including the design sphere (South African History Online 2016). The result of this at an urban development level meant that, while political and legislated apartheid were officially abolished in 1994, geographic apartheid remained (Geyer 1990:385), and in some cases even worsened as non-whites flocked to relocate on the edges of Bantustans situated closer to central cities, resulting in continually-expanding informal settlements on the fringes of the urban edge where the built environment was less developed with regards to urban design and access to urban amenities (Geyer 1990:393).

These historical facts on the development of South Africa are presented in order to give the reader an understanding as to why South African urban areas remain predominantly racially separated to the present day, with urban development, architectural design and the quality of life still differing for South Africans based on their race and income level.

The major determinant of urban densities in present-day South Africa is a result of the Native Area Act of 1913, which was further augmented by the Homeland Citizens Act of 1970 and a number of other legislations that sought to control the movement of black people in South Africa (May & Rankin 1991:1351; Todes, Kok, Wentzel, van Zyl, & Cross 2010: 331). These acts resulted in a number of local scale regulations and laws which sought to control the movement of native Africans in South Africa, and were implemented at various points in history, culminating in their formalisation through apartheid and the above mentioned legislature (Hindson 1985:402, 403, 405).

Homelands or Bantustans were areas specifically demarcated for the residence of African natives according to their native tribe (Geyer 1990:383, 393). Bantustans were located more or less in the same locality or province from which the tribe or Bantu originated. The total area of the Bantustans, however, was smaller than the original tribal land (Evans 2012:117); see a map of the Bantustan areas in *Figure 4.3*. Before being legislated as reserves, tribal land was available to black natives on an unlimited basis, governed by a tribal chief. Under the Native Land Act, Bantustans received defined borders, and more often than not were located in the less fertile and more convenient parts of the spread of the land on which the entire tribal land would previously have stood; see *Figure 4.3*. For this reason, Bantustans are considered the biggest injustice of apartheid politics to date (Biko 1978:67), as the loss of freedom of land and movement of native Africans took away the cultural basis on which black South Africans would be building their livelihoods and improving their quality of life today (Ally & Lissoni 2012:3).

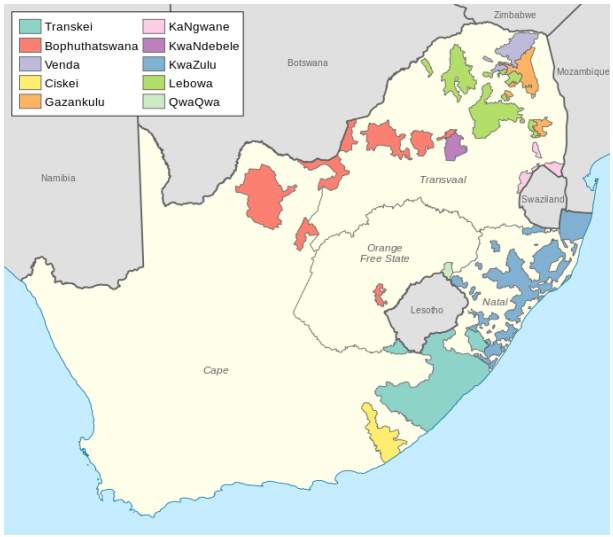


Figure 4.3: **Bantustans / Native area map as per the Native Land Act of 1950**

(South African History Online 2016)

The intention of the Native Land Act (1913) and the Homeland Act of 1972 were to ensure that black people were unable to unite as a political front, through intentional tribal separation both in the Bantustans/Native Homelands and native townships of urban areas. To implement this each black South African was given citizenship by law in an allocated Bantustan according to their tribe (Evans 2012:118; Geyer 1990:383,385). Secondly, the Acts sought to ensure that black people were not allowed to own land, or to farm land at commercial or subsistence level, or to move freely in urban areas, by limiting economic growth potential and land ownership to the homelands. This, together with other apartheid legislation such as Pass Laws, ensured that a black person would never be able to create a permanent home in an urban area, and would only have the legal right to reside in their homeland (Geyer 1990:386; Hindson 1985:402). Thus, all forms of land ownership, both rural and urban were removed from natives. This resulted in forced resettlement nationally and loss of generational wealth and legacy through loss of land. It also rendered multi-generational black urban families transient urban dwellers (South African History Online 2016). The impact of these Acts on present-day urban conditions in large cities such as Johannesburg began after the abolishment of apartheid legislation between 1990 and 1994. This is due to the free movement of black people: the abolishment of the Pass Laws in 1991 caused an influx of black migrants to urban areas across the country. Where previously urban areas were designed to accommodate the minority white population, there was a sudden influx of both local and non-South African black people streamed into areas such as the Johannesburg CBD in pursuit of improved economic opportunities and the benefit of an improved quality of life in the presence of urban amenities, in some instances causing strain on urban infrastructure due to increased population (Pinn 2013). The immediate effects of

the rapidly-multiplying population on the infrastructure were felt, with reports of failed sewerage systems and overcrowded buildings in the Johannesburg city centre (South African History Online 2016; Shepard & Murray 2007:186).

Due to the removal of Bantu education as the standard education for black people (South African History Online 2016), and the implementation of a new national education system for all South Africans, the improved education level of black South Africans resulted in a growing South African middle class (Ndeltanya 2014:5). An increase in the number of educated people in the country and improved economic conditions and opportunities for black South Africans has resulted in a higher demand for housing and related infrastructure than was available 20 years ago (Matlock 2013:1). With an increased demand for middle-class residences, developers opt for maximum-density developments, resulting in middle-class residential properties becoming smaller than they were years ago and getting smaller over time (Bekker & Therborn 2012:195). The design reference for these high-density apartment homes mimics the architectural design of countries such as the UK and Japan, where density is a more serious challenge than it is in South Africa and where spaces are becoming so small they are considered a threat to their residents' quality of life (Royal Institute of British Architects 2013a). The effect of these small homes on the household's cultural lifestyle norms on South Africans is to be explored over time, as the phenomenon has just begun. However, the country is populated such that citizens opt to reside in already well-populated urban and economic centres areas of the (Hindson 1985:404), leaving the vast, undeveloped rural parts of the country sparsely populated (Council for Scientific and Industrial Research 2000).

Urban competitiveness in South African cities has resulted in low quality of life with regards to residential design for many of South Africa's low income urban inhabitants, with a large percentage of populations creating homes in informal settlements attached to the former *bantustan* areas and black townships of major cities (Hindson 1985:408). While new homes continue to be built, they are often constructed by the same firms that constructed the apartheid legacy designed homes, that were built to a lower standard to house non-white South Africans, with similar room dimensions and layouts to those of the apartheid era homes (Matlock 2013:3). The challenge of low quality urban residential homes is further perpetuated by large informal settlements, overcrowding through subletting in high-density apartments, as well as other conditions of reduced quality of life in urban areas due to compromises in residential design and a lack of choices for shelter for lower-middle to low-income urban residents in South Africa (Evans 2012:135).

While some of the challenges relating to racially-discriminative urban planning and architectural design are a result of present conditions, the effect of historical forced settlement patterns in pre-democratic South Africa can be seen in the resultant settlement patterns,related urban densities and challenges in urban areas and low quality of residential architecture in low-income urban South African residential homes today.

4.1.3 Zimbabwe

Zimbabwe is rated a low development country according to the United Nations Human Development Indicators (United Nations Development Programme 2016), and, like South Africa, is a former British country. The data shown in *Table 4.5* below can be used to compare Zimbabwe to South Africa and the UK. Due to changes in rulership over the past 50 years, economic conditions affecting quality of life in Zimbabwe have gone through periods of extremely diverse scenarios. Zimbabwe Monitor (2017) details the timeline and most notable events in Zimbabwe's economy. Prior to democracy, during the colonised Rhodesia era, Zimbabwe was economically successful in that it provided raw minerals and other natural resources for trade and export within the British Commonwealth. When colonial rule was officially ended in Zimbabwe in 1980, the country went through a period of great economic prosperity where, at one point, the exchange rate for the Zimbabwean dollar was on par with the American dollar (Chingono 2017). This rapid increase in economic activity came as a result of trade sanctions that had been lifted from the previously-colonised country. For 15 years, industry in the country was at its most successful, with the newly-appointed African leadership emphasising the rollout of education and healthcare in order to improve the standard of life for the country's previously disadvantaged citizens (Davies 2004:5; Andersson 2001:97). Large amounts of government expenditure were allocated to paying state-employed personnel, resulting first in a decline in the economy and eventually in cash shortages for the country (Chakamwe 2014). In a desperate bid to provide funds, the Zimbabwean government's treasury printed more bank notes of the official currency (Vusani 2015). This sparked a sudden peak in inflation and started the decline of the Zimbabwean dollar. In late 2001, economic conditions in Zimbabwe began to change as a result of record-breaking rates of inflation, resulting in money shortages and a decline in the socio-economic construct of the country (Davies 2004:9).

Area in km^2	390 757 km^2
Population density	41.3 people/km^2
Population size	15 967 000
Percentage of population living in urban areas	32.4%

Table 4.5: **Population and density statistics for Zimbabwe**

(The World Bank 2017)

The democratic government of Zimbabwe implemented new policies that affected urban development within Harare and other urban areas in Zimbabwe. These include the Growth Point Development Scheme (Wekwete 1988:5) adopted after Zimbabwean independence in 1980. However, the effect of urban development policies that were conceived and implemented during the colonial era of Zimbabwe and other previously-colonised countries such as South Africa, is difficult to change or reverse once the policies have been put into effect. This often results in unequally-developed neighbourhoods, differentiated by income group and race as per the development ethos of the colonial era (Munzwa & Wellington 2010:122). During the colonial period, urban areas and their associated housing were designed to comfortably accommodate white persons, with satellite towns associated with lower urban development standards designed to house non-white and native populations (Davies 1992:304, 305). Through the fall of colonialism and its laws of segregation and the legislated control of movement of non-whites in and out of urban centres, movement and relocation of non-whites into areas closer to urban centres became a preferred option. As a result, urban populations began to grow, causing urban sprawl to conjoin cities like Harare with satellite areas such as Ruwa and Epworth (Radoki & Mutizwa-Mangiza 1990:15). With this urban sprawl came a few challenges, the first being to develop new urban infrastructure to accommodate the growing population. The second was the upkeep of existing urban service infrastructure. Colonial systems were set to accommodate only the minority white population, with sufficient water and electrical services limited to benefit only the smallest part of these historically small populations (Kotkin 2016:60). The growing urban population after democracy placed a greater demand on urban infrastructure, and while demand for housing may have been met, Zimbabwean urban areas have become notoriously associated with rural decline (Chibvongodze 2013:11; Vusani 2015). This term is used in reference to the common scenario in which the majority of urban homes in Zimbabwe find

themselves using open fires to cook rather than using electric stoves, along with storing water instead of using water supplied by the municipality, as is common practise in rural areas, since these urban services are often cut due to poor maintenance of the infrastructure used to support them (Wekwete 1988). The third challenge related to the lack of space and increased density between the main urban area and the satellite areas. A country such as Zimbabwe has ample open land available for the development of new towns and areas (Ngena 2012). The challenge with this is financing the infrastructure needed to supply newly-developed areas with urban necessities, like water, sewerage and electricity. Thus, as is the case in informal settlements in urban areas around the world (Kotkin 2016:61), rather than spread out into areas where the infrastructure for such services is not available, urban development is densely developed in whatever spaces remain within reach of existing urban services and amenities such as convenient transportation to and from the urban central commercial and business districts, centralised urban stores for supply of groceries, clothing and other goods, as well as healthcare and education services (Kotkin 2016:63; Vusani 2015). Where this densification happens outside of the law, informal settlements and informal dwellings such as those found in Epworth, Chitungwiza and Mbare of Harare occur (Radoki & Mutizwa-Mangiza 1990:6, 7). This form of urban housing becomes especially problematic in the case of disasters such as the 2009 cholera outbreak in Harare where urban residents, especially those in informal settlements, were vulnerable to cholera due to exposure to unclean water sources while living in very close proximity to sufferers of the waterborne disease (Munzwa & Wellington 2010:141).

Zimbabwe is generally known to have large residential plot sizes consisting of free-standing houses with ample land available, which is commonly used for small scale subsistence farming to some degree whenever possible (Ngena 2012). Additionally, the majority of urban residents in Zimbabwe, as in South Africa, have maintained the tradition of keeping a home in the rural area, while residing on a more permanent basis in an urban area (Davies 1992:305). Urban homes are also used to provide some of the functions typical of a rural home, including small-scale subsistence farming, rearing chickens for eggs and meat, storing water during water cuts, and cooking and heating water on open fires due to electricity cuts (Chibvongodze 2013:13,14). For this reason, the decline in the size of urban residential homes, in order to accommodate a larger urban population in a smaller area, will result in a change in cultural norms and habits within urban homes in Zimbabwe. This may create a change in the quality of life and lifestyles of those living in Zimbabwean homes, as these high density homes will accommodate fewer activities, and fewer people in a residence (Ngena 2012).

4.2 CONCLUSIONS ON COUNTRY-BY-COUNTRY SECONDARY DATA

The secondary data above provided a brief description on the conditions surrounding urban development in the United Kingdom, South Africa and Zimbabwe. All three countries have faced the challenge of discrimination among different classes of residents with regard to living conditions and residential design in urban areas of the region. In the UK, this discrimination and difference was historically recorded to have occurred about 200 years before it did in Africa. The stark differences in living conditions in the UK occurred between urban citizens according to their income and social status. Through the exploration of several theoretical paradigms, the country has, to an extent, managed to provide a more dignified standard of residential living for the majority of its urban residents today. South Africa and Zimbabwe were both previously colonised. With democracies both younger than 50 years old, urban development in these countries is heavily marked by historically legislated racial discrimination that now translates into a differentiation between citizens by levels of income. Urban development in these two countries is heavily marked by the ideals of the countries' urban developers, who worked under the previous colonial masters.

This chapter concludes the information base on which the study is built. The chapters to follow constitute the research study report, beginning with chapter 5, which details the research methodology used to formulate this dissertation.

CHAPTER 5 RESEARCH METHOD (RFS 890 COMPONENT)

Chapter 1 and 2 introduced the theoretical paradigm in which this dissertation is set. This chapter describes the research design method, followed by a detailed description of the data collection method used for the research process. The chapter also alludes to the prioritised ethical points considered in this dissertation along with the validity of this research method and process.

5.1 RESEARCH DESIGN

Research design explains the logic and procedures executed by the researcher in order to collect data and organise theoretical ideas and concepts on which to base the research, as well as the methods with which data for the research study are both collected and analysed (Leedy & Ormrod 1993:85). Research design assists the researcher in communicating the process of the research study (Kumar 2011:396).

5.2 RESEARCH METHODOLOGY

Research methodology refers to the means employed to process selected data into meaningful and comparable results, including definitions for data collection and analysis procedures (Maree 2012:36). Research method selection for a research project is dependent on the form of resources and data required in order to resolve the research question. When defining research data and methodology, there are two main categories, quantitative research and qualitative research. Quantitative research methods focus on the analysis and measurement of variables from a more objective standpoint, while research where the meaning and processes of the study are not examined rigourisly are refered to ss quantitative research(Welman, Kruger & Mitchell 2012:8). Qualitative data methods tend to be more subjective.

This research study seeks to make a typological analysis and comparison of different urban homes, considering how these spaces are used and how the quantitative measurements of these spaces may affect the subjective experiences their users. The contexts of the different homes will be compared to generate qualitative research findings for this dissertation (Wang & Groat 2013:288,300).

Qualitative research involves more than a single method of data collection, requiring researchers to study objects, individuals and circumstances within their natural settings in order to analyse and interpret occurrences in relation to the prospective meanings that people may bring to them (Wang & Groat 2013: 76). The strategy of qualitative research is

one of first-hand encounters within a specific context (Muthambi 2014:75). Though this study has quantitative data inputs, it is classified as a qualitative study as it acknowledges sociological interpretation in the presented data (Wang & Groat 2002:179; Muthambi 2014: 75). For this dissertation the process of participant observation was used to derive data. Research methods defined by Hanington and Martin (2012), including behavioural mapping, territory mapping and usability testing, were used during the process of participant observation. These methods, alongside others, were used to derive semantic differentials (Hanington & Martin 2012:156), or felt meanings of inhabitants that dwell in the residences featured in the case studies.

5.3 THE PRAGMATIC RESEARCH PHILOSOPHY

Mixed-method research that combines both the use of quantitative and qualitative data collection methods is referred to as *pragmatic research* (Ivankova 2015:17). Pragmatic research philosophy is often used to justify mixed-method research in order to ensure that any means that make data collection feasible are used to ensure that data is collected in whatever form necessary for it to be relevant for use and interpretation in the study (Ivankova 2015:17). Pragmatic research is also defined as research with no objective or subjective ontology (Dudovskiy 2017).

The quantitative data collected in this research is supplied by objective data, including physical quantities and dimensions of real world measurements, in order to deduce subjective quantities on how individuals may or may not have their experiences in these spaces improved in order to enhance their quality of life. Ilesanmi (2012) used both quantitative and quantitative research methods in order to undertake research on the architectural design and the occupant experience of a residential home. His example is used as precedent for this dissertation.

5.4 DATA COLLECTION

For this dissertation, three main data collection instruments were used to deduce a typical subjective experience of a user in each home. All together, this data was used to infer which architectural features in a residential home may or may not result in a better quality of life for users. Leedy and Ormrod (2001:142) refer to this mixing of data in order to find a convergence as triangulation, which, as a research method, is underpinned by pragmatic research philosophy.

The three data collection instruments utilised for this research paper are:

i) Case study areas: General location data on each respective country and the typical urban conditions affecting the design of residential homes in that country, including climate, population and urban planning statistics. The three featured countries are the United Kingdom (UK), South Africa and Zimbabwe.
ii) Participant observation and data collection: Through participant observation, the researcher's subjective experience and observation of users in the residential spaces were transcribed and categorised into a form of quantitative measures that can be deduced. An architectural drawing of each house is made, resulting in a summary of number of rooms, sizes and locations. The collected data is organised into comparable categories so that each of the homes and the objective and subjective experiences recorded in each home, can be analysed and summarised for each country. A detailed description of the comparative categories is provided in chapter 6.
iii) Data analysis: A comparison of the household conditions of each home is drawn in order to allow for:
    a) A summary of conditions of the homes and architectural design in each country;
    b) Comparison of the home conditions in each country; and
    c) Summarised analysis of differences in conditions between each resident family's initial and current country of residence.

5.4.1 Data selection

The data was selected through two sets of criteria. The research required homes for the study that both:

i) Housed inhabitants, in family units, that had lived in two of the three study countries (South Africa, Zimbabwe or the UK); and
ii) Were accessible to the researcher at a participant observation level.

May (2011:163) details the procedure of participant observation in order to collect qualitative and subjective data for research purposes. Leedy and Ormrod (2001:113) recommend that a researcher plan their research in a manner that does not make data collection expensive or too time consuming. For this reason, the research was collected in the homes of Zimbabweans who reside and have previously resided in two of the selected research countries. This is because these homes met the criteria required for the data mentioned above. The possibility of bias, due to the researcher's personal relationships with the case study families, is acknowledged by the researcher. In order to minimise bias, personal details of the case study families are limited. The families' identities are kept anonymous, with families being identified by a colour rather than by family name. Additionally, the focus of the study relates more to the architectural layout of the homes than to the families'

personal circumstances. *Table 7.1* in Chapter 7 gives details on the previous and current locations of each family, as well as details as to which case study homes they have resided in. In order to simplify the dissertation, the data is then separated into a detailed country-by-country comparison of case study homes, with summaries in Chapters 7, 8 and 9 on what this data means in relation to each of the case study families. The data collection method is summarised in *Figure 5.1*.

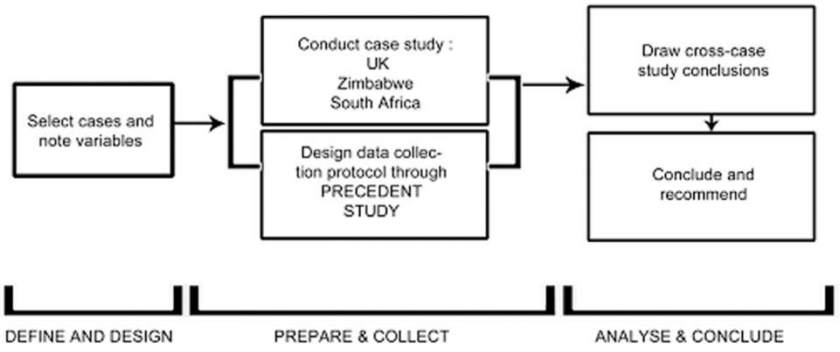


Figure 5.1: **Data Collection: Development of assessment criteria and structure of paper**

5.4.2 Case studies (case study areas)

Case study research will be used as part of mixed-method research approach in this research project. Leedy and Ormrod (2001:100) refer to case studies as a form of qualitative research employed to gather in-depth data on a single object with the intention of gaining more knowledge. More than one case study may be used in a research project in order to make comparisons between cases that differ in specific ways. Wang and Groat (2002:94) support the same point, stating that the use of more than a single case study can lead to a set of verified observations.

Once the case study is made, details of each case are organised, then categorised into meaningful groups, which is useful for the sake of comparison between cases (countries, in this study), after which patterns are identified and studied for any specific meaning. During this process, single instances and unique occurrences in a case study are also scrutinised for any specific denotation that may relate to the research study. Overviews, along with conclusions, are provided for each case study country. Thereafter, a summary of comparisons for each group of case study families – i.e. moved from Zimbabwe to South Africa (two families), moved from Zimbabwe to the UK (two families), moved from South

Africa to the UK (two families), is given. Ultimately, it is intended that all the data be triangulated and converged to make a useful and significant conclusion.

In this dissertation, three countries were selected as case study areas for observations of quality of life of residents in relation to the architectural design features of the homes. The basis on which these countries were selected is stated in Chapter 1. Six families were selected. Two of the case study families each share an initial and a final country of residence, i.e. the families either initially resided in Zimbabwe and moved to the UK, initially resided in Zimbabwe and moved to South Africa, or initially resided in South Africa and moved to the UK. All families in the study originated from Zimbabwe. The significance of this is shared in chapter 1 and chapter 5.

5.4.3 Participant observation and data collection

Participant observation refers to a research process whereby the researcher may participate, document, informally interview and reflect on circumstances within the research environment or case study area in order to observe individuals or research conditions within their natural setting (Willig 2001:27). An observation schedule was prepared to direct and organise the data into comparable categories and ensure that all findings from each residential home in the study are relevant. The observation schedule was prepared by the researcher, and was derived from the observation points, questions and measures used by the researcher as mentioned in chapter 6. The observation schedule, along with architectural floor plans for each home, was prepared in order to standardise the findings of the research. Findings and drawings are presented in chapter 7. The observation schedule allowed for the official recording of both subjective and objective experiences within the residences referred to in the study. Participant observation allows the researcher to have a subjective experience within the researched area through experiencing the research cases first-hand (Wellman, Kruger & Mitchell 2012:195). These findings were collected in order to conduct an analysis of the found data.

5.4.4 Data analysis

Data analysis refers to the process of analysing qualitative and quantitative data from their raw format using existing statistical analysis procedures and applying an analysis that focuses on the goals and research questions of each study research question (Ivankova 2015:245) so that useable conclusions can be drawn and summaries created. The data analysis process for this research study includes:

i) Floor plans showing a drawn analysis of each residence, including stakeholder maps, usability and behavioural mapping and time-aware user journey maps adapted from Hanington and Martin *(*2012);

ii) Summarising the data for each of the four case study houses investigated in each country, making conclusions for each country;
iii) Comparing the data of each country (UK, South Africa, and Zimbabwe) and conducting comparative data analysis between the three countries;
iv) Summarising the data in relation to the six case study families; and
v) Presenting concluding remarks on what contributes to improved quality of life in relation to architectural design in a home, through answering the three research sub-questions mentioned in Chapter 1. These three questions are:
    a) *Sub-question 1:* How is quality of life defined and in what ways does it relate to urban planning and residential architectural design?

    b) *Sub-question 2:* How does one measure quality of life and lifestyle in relation to residential architectural design?

    c) *Sub-question 3:* How do the three countries differ in terms of quality of life, architectural design and urban context?

5.5 ETHICAL CONSIDERATIONS

Leedy and Ormrod's suggestion that no research should result in a sense of self-denigration, embarrassment, or a violation of ethical or moral standards or principles (1993:128), was used as a general guideline in consideration of the ethics of this research dissertation.

Initial proposed versions of this research paper were submitted to the Ethics Committee of the University of Pretoria's Faculty of Engineering, Built Environment and Information Technology, before the final structure of this dissertation was concluded. For the sake of ethical validity required by the University of Pretoria, it was agreed that any data regarding identity, age, legal status, income, or similar information relating to the residents featured in the case study homes of this study would be kept anonymous (EBITethics 2015; see *Appendix A).* This was a feasible consideration as these facts did not add to the study's core areas of comparison, meaning that data necessary for deducing the information needed for the study could be extracted without alluding to these details of the residents living in the homes considered in this study. Omitting personal, demographic and other qualitative information from the study allowed for more focused aspects of comparative data in the study, while still allowing the main research questions in the study to be addressed. The residents of the case study homes thus had their anonymity preserved, making sure that their identities and locations cannot be traced or revealed from any of the information shared

in this study. The residents of the case study homes have been represented by colours (e.g. Pink Family), rather than by name, and details regarding the families are limited to:

i) Each family's initial and latter country of residence;
ii) The gender and age of the inhabitants of each family;
iii) The relation of the family or home's inhabitants to one another; and
iv) Each family's initial and latter home of residence out of the 12 selected case study homes.

The research methods, observation schedules, data mapping of findings (including the drawings and maps featured in chapter 6) were considered, drafted and edited to ensure that the anonymity of the residents of each case study house was assured, as any form of information alluding to the resident's identity would break the ethical viability of the study as per the above-mentioned considerations. Thus, research ethics were considered from the conception phase of the research study through to its initial phases, which is considered as best practise for research ethics (Hesse-Biber and Leavy 2011, cited by Ivankova 2015:110). These ethical considerations are in line with Ivankova's (2015:111) ethical suggestion on beneficence, which refers to the prevention of any harm, and protection of the vulnerable in a case study.

Bias, regarding the researcher's personal links to the case study families, has been acknowledged as per the ethical outlines set out by Leedy and Ormrod (2001:113).

5.6 VALIDITY

Validity typically looks at the end result of a measurement in order to gauge whether or not the unit said to be measured has, in fact, been measured, and whether or not it has been measured in the way it was intended to (Leedy & Ormrod 1993:40,41).

Herr and Anderson 2005, cited by Ivankova (2015:270), suggest that *validity* is not an acceptable term in quantitative based studies, as the traditional methods for measuring validity create a narrow view from which to gauge all problems associated with a qualitative study. The use of precedent studies, discussed in Chapter 3, is used to generate points and methods of measurement for this study in an attempt to make the study more valid.

Through the process of the precedent study, four of Leedy and Ormrod's (1993:41) categories for validity are identifiable in this research study. These categories of validity are:

i) Face validity: A reference to the researcher's subjective judgement of their study as to whether or not the research is successful in measuring whatever aspect was intended to be measured;
ii) Criterion validity: A reference to the accuracy and reliability of the instrument or criteria used to conduct measurement in a study;
iii) Content validity: This form of validity can be equated to face validity as it considers how effective the tools of measurement used are at measuring the intended unit;
iv) External validity: A gauge as to whether or not the conclusions drawn from the sample cases can be applied to other general cases. This criterion of validity is met in the dissertation through the usage of three countries of varying socio-economic aspects, to ensure that the forms of measurement can be applied in a variety of cases.

5.7 CONCLUSION

This chapter has outlined the theoretical research context for the dissertation through an examination of the research design and research philosophy in relation to the points of enquiry of this dissertation. Data analysis methods used to answer the research questions of this paper were outlined, along with the measures taken to ensure ethical and valid research.

The following chapter contains the research indicators used for this dissertation.

CHAPTER 6 RESEARCH INDICATORS (RFS 890 COMPONENT)

The previous chapter described the research methodology for this study, explaining the research philosophy and methodology to be used in this dissertation. The content for this chapter is linked to the precedent study presented in Chapter 3. This chapter gives detail on the research indicators selected for the research. Chapter 7 contains the findings of the indicators in this study.

6.1 THEORETICAL UNDERPINNING FOR SELECTED INDICATORS

Using the principles previously expressed in the precedent studies, as well as those derived from the literature review, indicators for this research project will be presented in the following section.

Indicators are parameters or facts used to indicate the trend of a category (Sustainability.is 2016). According to Sumner (2014), the definitions and indices used to measure quality of life have been redefined over the years. Beginning with the use of Gross Domestic Product (GDP) as the measure of quality of life within a country in the 1950s, quality of life was considered from a purely economic standpoint. This approach can be rationalised by the theory of utility, which assumes that the more income one has, the more they are able to purchase items and services to use within their lives, thus improving their wellbeing (Samuelson 1948). In the 1970s, the *United Nations Human Development theory* was added to the theoretical definition of quality of life. This led to the incorporation of a broader set of indices to measure quality of life, including the *Basic needs theory*, which adopts the notion that people assumed to have a high quality of life have significantly satisfied their developmental needs, which may or may not require monetary income to be met. The basic needs theory is based on Maslow's hierarchy of needs (1943), which separated higher- and lower-order needs, with lower-order needs comprising of factors such as health and safety and economic conditions, and higher-order needs including social, self-esteem, self-actualisation, knowledge and aesthetic factors (Sumner 2004). Dickson and Littrell (2013) made use of the *Basic needs approach* in their Mumbai study which is discussed in Section 4.1.2.2 above. In the 1980s, Nobel Laureate Amartya Sen developed an influential theory on quality of life (Costanza et al. 2007). Sen's (1999) theory divided a person's life in terms of functioning and capabilities. Functioning refers to achievements or the end goals of human life, while capabilities are the freedoms of choice a person has to experience functioning. Examples of functioning include observable achievements such as health status, level of education and current employment status (Costanza et al. 2007). This theory has strongly

influenced the *Human Development Index* (HDI), which is one of the most used development and quality of life indicators. The HDI has been published since 1990 (United Nations Development Programme 2016). In the late 1990s, a behavioural sciences approach to the measurement of quality of life was introduced. This approach opted to measure quality of life from a subjective point of view (Diener & Suh 1997). A recent development in theoretical approaches to quality of life is the concept of sustainability, which can be described as the effort to meet the needs of the present generation without compromising those of future generations. This theory considers both environmental and human wellbeing concepts and implies that people and the ecosystem must be treated equally. The City of Melbourne (2013) study mentioned in Section 4.1.2.3 sought to make future housing developments more sustainable, in that the city wanted to ensure housing developments that are flexible enough to meet the needs of their residents both now and in years to come as their housing needs mutate (City of Melbourne 2013:31). This will be achieved through improving architectural design and housing developments based on subjective and objective aspects of architectural design in homes in Melbourne's future housing developments. According to social scientist Joseph Sirgy (2011:15), *one cannot have a good human condition in a bad environment*. Sirgy's (2011:6) own theory on *personal utility* is explained as the personal evaluation of community members' satisfaction with their overall life, social life, family life and spiritual life, and can be viewed as a subjective theoretical approach to quality of life.

In recent years, there has also been a movement to construct composite indices of quality of life that *are multidimensional and include either objective, subjective or both types of indicators* (Cummins 2000:56). On this basis, quality of life researchers such as Sen, Cummins and Sirgy use a combination of strategies including:

i) Continuous numerical data;
ii) Discrete and/or ordered categorical data;
iii) Interval ordinal; and
iv) Nominal data.

Both qualitative and quantitative data is used to deduce the necessary information for each study.

Stiglitz, Sen and Fitoussi (2009:58) state that the information relevant to evaluating quality of life includes an individual's self-rapport and perceptions, as well as measures of their functionings and freedoms. As there is no standard definition of quality of life, this dissertation is influenced by the aforementioned theories - subjectivity, objectivity,

functioning and capabilities, personal utility and sustainability. It will use a combination of indicators to make a conclusion relevant the research questions posed in Chapter 1.

6.2 RESEARCH INDICATORS

The section below describes the indicators used to answer this study's research questions. These indicators were used to analyse four residential homes per country under each one of the indicator categories. A room-by-room analysis for each room in each residence was carried out. Results for this analysis are provided along with a summary of findings for each home in Chapter 8, which presents the cumulative findings for each country. These cumulative findings are the summary of the findings for the four homes featured in each country, and will be further compared with regards to the inhabitants that live or lived in each home. The averages for each home within a country will be given, compared and averaged out to give a typical report on average conditions for each indicator per country. The averages for each country will then be presented and compared, explaining the relevance for each indicator in Chapter 8.

The indicators were used to derive average values for each house in each country. Thereafter, a country average was derived for each indicator. Findings are presented below. The indicator categories, or the description of the conditions of a home within the indicator, are explained within the standardised ergonomic or architectural norms such as *Neufert Architects' data* (2008) and country standards. The final indicator may or may not fall within these standards, as the main aim of the indicators in this research is to understand the subjective experience within a space and formal standards are not as easy to measure through a subjective human experience (Hanington & Martin 2012). As explained in Chapter 5, due to the pragmatic research approach where more than one method is used to derive data (Ivankova 2015:17), the construction of each indicator is not solely based on industry standards or country standards such as SANS 10400. The construction of each indicator is described on a case-by-case basis.

6.2.1 List of research indicators

A list of the selected indicators is presented below; the indicators and measurements for these indicators are explained in the section 6.3.

<u>General architectural indicators:</u>

- Area of residence in square meters (m^2); and
- Residential Typology.

Spatial Ratio Indicators

- Total number of rooms in the house;
- Number of bedrooms in the house;
- Average area of bedrooms in the house in m^2;
- Average number of bathrooms per residence;
- Typical dimensions of bathroom + average area of bathroom in m^2;
- Space with the highest usage; and
- Average area of public rooms m^2.

Privacy Indicators:

- Sound transmittance to and from surrounding rooms (Likert Scale);
- Sound transmittance to and from main rooms (Likert Scale);
- Average acoustic privacy (Likert Scale); and
- Average visual privacy (Likert Scale).

Internal conditions

- Average natural light (Daylight Factor); and
- Average natural ventilation (Likert Scale).

Outdoor Typology Indicators

Recreational and outdoor facilities

- Outdoor space typology, area in m^2;
- Opportunities for gardening in pots;
- Opportunities for small scale vegetable bed in m^2;
- Opportunities for growing fruit trees;
- Opportunities for large subsistence farming;
- Space for practice of field sports (such as netball, court soccer, basketball);
- Space available for gathering people; and
- Space available for children to play safely.

6.3 EXPLANATION OF INDICATORS

6.3.1 Area of residence in square metres (m^2)

This indicator gives a single value for the total area of each residence. Measured in square meters (m^2), this indicator was also used in the City of Melbourne's (2013:31) study where

the size of the home is defined as *the amount of internal floor space available for residents to live in, and the external floor space provided for private open space*. The size of residential spaces has an effect on residents' movement in the home, residents' relationships and interactions with one another, the number of people who can comfortably live in the house, the rooms and spaces that can be utilised by the entire household and the rooms and spaces that can be utilised by a few members of the household at a time. A smaller sized dwelling limits the flexibility and adaptability of activities in a home, as a limited amount of space results in shared rather than separate spaces for cooking, studying, socialising, eating, playing and recreating, with limited room for storage and circulation while these take place, if they are able to.

6.3.2 Residential Typology

Free standing/Semi-detached/Row house/Apartment

Architectural typology refers to a commonly accepted classification for a commonly occurring architectural style of home, categorised by the proximity of residential units to one another according to rules of horizontal or vertical assemblage of the building (Baldea 2013). For the purposes of this study, four main architectural typologies were selected in order to standardise the study and lay a basic understanding of the layout of a featured home in the study from the onset based on the typical architectural characteristics of a given typology. The selected typologies for this study include: free-standing homes, semi-detached homes; row house homes, and apartments. A vertical description of the home may be given in addition to the standard typology index for the sake of clarification. Examples of vertical descriptions of homes considered in this study include: walk-up home, duplex home, and high-rise building. A detailed background relating to history, economics, politics and identity and the relation of these topics to housing typologies in South Africa, Zimbabwe and Great Britain is provided in the literature review. This theoretical background is to be linked to typology classification in order to give a historical, political and economic background to the selected home in each case study. Certain typologies are more common in specific countries than in others. The main purpose of housing typologies is to differentiate one type of residential building from another (Council for Scientific and Industrial Research 2007:2).

6.3.3 Total number of rooms in the house

The total number of rooms in a house in correlation with the total area of a house gives a quick overview of the density of rooms in house. This is a quantitative value that is of importance to this study for comparison between case studies for density of functions in the home as compared to the space made available via architectural design for these homes. Within the African history of colonial design, housing for lower income residents consisted of fewer rooms (usually a maximum of four), which were to be utilised for all residential,

cooking and ablution uses, with cooking and toilet spaces sometimes allocated outside of the main house, whereas homes for higher income residents were designed with rooms allocated for separate functions (Gutschow 2012:400). In addition, modern reports show that urban residents with lower incomes use less space to perform more functions, sometimes using a single room to perform all residential functions. Low income is associated with a high density of functions within the space (Ashcraft 2013).

6.3.4 Number of bedrooms in the house

The reasons for this index for measurement are similar to the above. This is a quantitative measure to consider the ratio between the total available spaces for a total number of people in a home and the allocated amount of this ratio for sleeping space. This ratio will give an indication of the architectural intent behind the design of the home, looking at subtle indications such as whether or not the number of people that can be allocated in public rooms of the home can be comfortably distributed among sleeping spaces. The ratio, though quantitative in nature, is used to give more information on subjective experiences and choices that inhabitants of a residence may experience due to the relation of public rooms in the residence to private bedrooms.

6.3.5 Average area of bedrooms in the house (m^2)

This index regards the ratio of the total floor area space in the home in comparison to the space allocated for bedrooms which are typically used as the most private spaces within a home. The use of this indicator within each home will give an idea of the function and use of this room. It is assumed that larger bedroom spaces allow for greater comfort, circulation and use than bedrooms with a smaller floor area do (City of Melbourne 2013:31). It is a quantitative measure that is intended to deduce qualitative and subjective data on possible user experience within a residential home.

6.3.6 Average number of bathrooms per residence

This indicator acts as a category of measurement aimed at comparing the number of rooms in each residence to the number of available bathrooms. National building codes, including the South African National Standards (SANS10400), ensure that there is a minimum amount of ablution facilities for a specific expected population. A link between the total numbers of rooms within a residence in comparison to the number of rooms available for ablution allows for comparisons of the population-to-bathroom ratio in each home.

6.3.7 Space with the highest usage in the home

This is a quantitative observation made by the researcher through behavioural and territory mapping methods (Hanington & Martin 2012). These observations are made as a record of subjective experiences in the home and are to be linked to all other indices in order to look

for any correlated links such as a relation between the indoor conditions (levels of natural light, ventilation or privacy) and/or size and location of the room within the home. This index aims to make sense of any similar patterns between case study homes and homes within each of the three featured countries. The information deduced from this indicator will give an idea of general subjective experiences within the home and may or may not give information as to which rooms in the house are preferred by users of the home from a subjective point of view, thus giving indications of the effect of design on lifestyle patterns and quality of life in the individual homes. Socio-economic conditions within each country may also affect the observations made around this index as socio-economic conditions have a large effect on the day time cycles and life-cycles within a home.

6.3.8 Average area of public rooms

For the purposes of this study, *public rooms* refers to rooms that are accessible to anyone who enters a residence, usually referring to dining rooms and living rooms. This quantitative index for measurement aims to compare the total amount of space designated for public use in rooms such as living rooms, dining rooms, and other communal areas in comparison to the floor area of the rest of the residents' home. This ratio ties into the socio-economic values implied by the architectural design of the home. The ratio of the public spaces in relation to the total area is shown as a link between the intended amount of communal time possible for present and future users to make use of these spaces in the home. In areas where recreation, entertainment and communal gathering of residents of the home are mostly provided for outside of the home, it is assumed that this ratio will show smaller communal spaces intended for intimate, small or short term gatherings in communal spaces of the home, with larger ratios for the same spaces used to indicate the inverse.

6.3.9 Privacy indicators

A home or residential space is considered to be a space of privacy and domestic comfort away from the public for its inhabitants (Lindsay, Willaims & Dair 2010:34). Some areas in the home are designated for more public functions, such as the entertainment of guests in the home, for only the family or inhabitants of the home spend time together, or for completely private spaces designated for individual use in the home (Othman et al. 2014:13). Privacy relates to autonomy of movement and behaviour within a space. Privacy, whether visual or acoustic, can loosely be defined as the avoidance of unwanted interaction with others present or in the nearby area (Gifford 1997). Architectural design is generally not defined by a specific set of rules with regard to room layout and design, with architects often designing on a case by case basis rather from a rigid set of design rules (City of Melbourne 2013:7). The layout of a home thus depends on cultural variations and norms in terms of interaction and privacy in the home (Rahim 2014:537). Thus, parameters for levels of

privacy and personal space within a home vary, depending on several factors that may include the introduction of architectural elements such as spaces as acoustic or spatial barriers (Abu-Gaueh 1995:93). Privacy in the home offers individuals solitude, anonymity, intimacy and reserve (Westin 1971, cited by Lindsay et al. 2010:5). Levels of privacy in the home offer an opportunity for residents to recuperate and adjust from their public life, giving benefits in mental health and social skills when an individual is able to comfortably control and inhabit their home in conditions of sufficient privacy (Goffman 1961). Concepts of human behaviour regarding territoriality and behaviour patterns can allow for architectural design that gives a space's residents a sense of privacy and control (Hanington & Martin 2012:28). The roles of the varying forms of privacy, visual and acoustic (Othamn et al. 2014:16), are thus important when regarding architectural design and privacy in relation to the quality of life of the inhabitants of a home. Walls assist in separating spaces, creating intimacy spaces, and allowing for solitude. The higher the density of residential spaces, the more limited the opportunities for visual and acoustic privacy become (Gifford 1997; Lindsay et al. 2010:4).

Visual and acoustic privacy protect an inhabitant's ability to undertake private activities in rooms and private open spaces in a manner that does not impact on views, outlook, ventilation, solar access, or the function of internal and external spaces (City of Melbourne 2013:46). Throughout the research process, no standard measurement or regulation for acoustic or visual privacy was found. However, all research studies and literature reviews on visual and acoustic privacy in residential homes used distance as a measure for both acoustic and visual privacy. See *Table 6.1*.

For the purposes of this dissertation, acoustic and visual privacy levels will be measured through Likert scales giving values for different subjective measures of both visual and acoustic privacy on a room by room basis within each room of each residence. An average score will be given, calculated as the average score for acoustic privacy. This average score will be used to make a representation of acoustic privacy in the home. Comments on unique scenarios of good or bad architectural design practice will be mentioned. The use and validation for subjective experiences of residential spaces studied for this dissertation are explained in the literature review in Chapter 2, and in the research methodology in Chapter 5.

Name of study	Author and year of study	Country and area of focus	Commentary on privacy in residential homes	Method used to measure privacy or recommendations on privacy in architectural design
Understanding the quality of housing design	City of Melbourne 2013	Melbourne, Australia	• Privacy in a residence means that people cannot be unreasonably watched or overheard by neighbours. • Visual privacy promotes the ability for the resident to undertake private activities without interference from other people in the household. • Good visual privacy is beneficial for mental health.	Spacing between housing developments should be at a distance that assures that residences cannot overlook one another, and that household within a development have visual and acoustic privacy from another through adequate distances and strategic design decisions
Is there room for privacy in a compact city?	M. Lindsay, K. Williams and C. Dair 2010	London, UK,	An increase in density in residential areas has resulted in smaller homes where privacy at an acoustic and olfactory level is limited with regard to neighbours and between inhabitants within homes, due to limited design options as a result of the small residential spaces being created.	A questionnaire to residents with responses on a Likert scale deduced that: ● Homes in high density developments should be designed so that nearby amenities do not interrupt privacy in the home ● Distance from the street to the front door should be maximised ● Insulation in wall and floors should be maximised for acoustic privacy within a home and between dwellings
Privacy as the basis of architectural planning in the Islamic culture of Saudi Arabia	T. Abu-Gaueh 1995	Saudi Arabia	The Islamic religion affects all aspects of life including the design of and lifestyle in the home, with special precautions to keep public meeting spaces for men and women in the home separate.	Architecture in areas where Islam is the predominant religion includes features that allow for varying hierarchy and transition from private to public space. Anthropological concepts should be translated into design space.

Table 1.1: A summary of existing studies on levels of acoustic and visual privacy in residential Architecture

(Adapted from: Abu-Gaueh 1995; City of Melbourne 2013; Lindsay, Williams & Dair 2010; Othman, Aird & Buys 2014)

Name of study	Author and year of study	Country and area of focus	Commentary on privacy in residential homes	Method used to measure privacy or recommendations on privacy in architectural design
Privacy, modesty, hospitality, and the design of Muslim homes: A literature review	Z. Othman, R. Aird and L. Buys 2014	Though written in Australia; focus is on Muslim homes globally	A home provides its dwellers or owners with meaning that serves both their personal and social needs. Macro-level factors, such as climate, culture, socioeconomic coditions, and religion, shape individual perceptions of home.	Provides specifics on how Islamic architecture allows for privacy: ● The main door is placed far away from the street in the inner-end of the courtyard. ● Street level is higher than residential level, thus windows onto street are still private ● Timber lattice screens on windows ● Thick walls between all rooms to allow for acoustic privacy ● Incense burnt regularly to create a uniform smell in the house

***Table 2.1 continued*: A summary of existing studies on levels of acoustic and visual privacy in residential Architecture**

(Adapted from: Abu-Gaueh 1995; City of Melbourne 2013; Lindsay, Williams & Dair 2010; Othman, Aird & Buys 2014)

6.3.10 Average acoustic privacy

A Likert scale will be used to indicate levels of acoustic privacy for each room. Two categories will be used to measure and explain the acoustic privacy levels in each room. These two categories of measurement are:

(i) **Sound transmittance to and from surrounding rooms** (from the room being studied) - this indicator aims to measure the levels of acoustic disturbance from the room being measured to other surrounding rooms. This indicator is useful for measurement of acoustic levels to more private areas of the residential space.

(ii) **Sound transmittance to and from main rooms** - This indicator is useful for measurement of acoustic levels to more public areas of the residential space.

The Likert scale values for these two indicator categories are given in *Table 6.*2.

Likert Scale Value	Meaning of Value
1	Very private: sound transmittance barely audible
2	Private enough: sound transmittance audible, but no definite words or sounds audible
3	Privacy possible only when necessary: sound transmittance audible with some definite words or sounds audible, depending on volume of sound
4	Not private: sound transmittance completely audible with all definite words or sounds audible

Table 6.2: Likert Scale Values for perceived levels of sound transmittance to and from rooms in residence

6.3.11 Average Visual Privacy

A Likert scale will be used to indicate levels of visual privacy for each room. The categories of measurement are given in *Table 6.3*.

Likert Scale Value	Meaning of Value
1	Very Private
2	Private Enough
3	Privacy possible only when necessary
4	Not Private

Table 6.3: **Likert scale values for perceived visual privacy in the residence**

6.3.12 Internal Conditions

Internal conditions are the elements of a residential dwelling that make it enjoyable for residents to live there (City of Melbourne 2013:40). Within this research project, indicators for internal conditions were measured on a Likert scale where a lower score indicates a higher presence of the amenity in the residence and a higher score refers to a low presence of the amenity in the given room or residence.

6.3.13 Daylight factor

Levels of natural light refer to the quality of diffused natural light that enters a building between dawn and dusk, providing illumination from any opening where natural light is

allowed to enter a room (City of Melbourne 2013:40). Natural light is measured by the daylight factor (D), which is given as a percentage. Daylight factor can be used to give the levels of luminance within a room through calculations. According to Neufert (2008:157) the following methods are used to calculate the daylight factor:

a) *Daylight factor calculation*

   Daylight factor in a room

   D = Ei/(Ea x 100%)

   Where:

   Ei represents internal illuminance.

   Ea represents external illuminance.

b) *Daylight factor at a specific point in a room*

   D = (DH + DV + DR) x t x k1 x k2 x k3

   Where:

   DH = Component of light from the sky

   DV= Effect due to neighbouring buildings

   DR= Contribution from internal reflection

   t = Light transmission factor for glass

   k1 = The scatter effect due to the construction of the window

   k2 = The scatter effect due to the type of glazing in the window

   k3 = Effects of the angle of incidence of the daylight

c) Minimum standards for day lighting for residential areas are stipulated as such:
   (i) Neufert (2008:157-158) states that a daylight factor of greater than 1% must be the minimum standard for working and living rooms.
   (ii) The British regulation (BRE 1, 2, 3 cited in Neufert 2008:158) stipulates a minimum daylight factor of 2% for kitchens, 1.5% for living rooms and 1% for bathrooms.

(iii) The South African National Standard (SANS10400: Part O), states that the size of the opening for natural light shall not be less than 10% of the total floor area of the room it serves or 0.2m^2 , whichever is greater.

In calculation b), the size and construction of a window has an effect on the calculated amount of daylight in the room, while calculation a) relates to the regulations in the daylight factor regulations stated in (c).

Only calculation c) (iii) will be used for the purposes of this dissertation. This calculation is used to calculate the size of an opening in comparison to the total floor area of the room in which is located. If the window opening area has an area of 10% of the total floor area of the room, it will be recorded as having sufficient natural light levels. This South African Standard will be used to calculate the daylight factor for all of the homes in this research study. This calculation is used as it is relevant for the inhabitant populations of these homes (Zimbabweans), who originate from a country which uses the South African National Standards as a basis for a number of its own building regulation, as stated in Section O of the Zimbabwean National Standard. *Table 6.11* at the end of the chapter gives more details.

Additionally, a Likert scale value will be allocated to each room in order to describe the subjective sense of natural light in each room. *Table 6.4* shows the subjective scale on which natural light levels were measured for each of the homes, on a scale of very good to inadequate. Good levels of natural light and sunlight within a residence, whether subjectively perceived or technically calculated, are known to have a positive emotional effect on residents and allow them to enjoy activities inside the dwelling during the day (Sharman, Nicola & McPartland 2016). Good levels of natural light reduce the use of artificial light and heating sources, reducing energy consumption and related living costs for the residents (Neufert 2008:157; Sharman et al. 2016).

Likert Scale Value	**Meaning of Value**
1	Very Good (Bright)
2	Good enough (Bright Enough)
3	Not Good (Dim)
4	Inadequate (Extremely Dim/Dark)

***Table 6.4*: Likert scale values for perceived levels of day lighting in the residence**

6.3.14 Average natural ventilation

The flow of and circulation of fresh air through internal living spaces is referred to as natural ventilation (City of Melbourne 2013:44). Natural ventilation can be caused by the movement of air due to differences in pressure from room to another which may occur as a result of many factors, including natural wind or temperature differences from room to room (Neufert 2008: 105). The internationally understood measurement for ventilation is air changes per hour. *Table 6.11* at the end of this chapter details various calculations for the measurement of natural ventilation in a residential area.

The stipulation in Part F of the British national building regulations introduces natural ventilation standards by stating that cross ventilation between rooms should be provided for through openings, such as a 10mm gaps, between rooms, and that a minimum head height of between 2.1m and 2.4 m should allow for the natural flow of air (due to air pressure) through rooms, thus providing natural ventilation. *Every room featured in this study meets these conditions, and thus only a calculation of the subjective levels of natural ventilation are accounted for through the Likerst scale values ascribed in Table 6.5.*

Further regulations in the relevant standards give more detail with regards to artificial ventilation standards. For the purposes of this study, subjective values as per a Likert scale will be given as measurements of average natural ventilation in the study homes. Natural ventilation has both economic and health benefits for residents of a dwelling. Health benefits include a continual fresh air supply and continual fresh air changes in a space, which allows for cleaner air levels. In addition, the use of natural ventilation reduces the need for artificial ventilation strategies ,which require an energy supply to run. Natural ventilation is not always possible or ideal, especially in the case of extreme temperature conditions (Neufert 2008: 105).

Likert Scale Value	**Meaning of Value**
1	Very Good (Very Airy)
2	Good enough (Airy)
3	Not Good (Stuffy)
4	Inadequate (Artificial ventilation needed)

Table 6.5: **Likert scale values for perceived levels of natural ventilation in the residence**

6.3.15 Recreational and outdoor facilities

This set of indicators considers additional outside spaces of the home intended for use for recreational purpose. Examples of spaces include balconies, porches, front gardens and back gardens. Outdoor and recreational facilities are the primary elements dictating the quality of life of urban residents, especially in scenarios where they may have low income and thus occupy small and uncomfortable residential units. Outdoor facilities offer opportunities for social interaction as well as large scale access to natural ventilation and natural light, which are deemed as positive qualities for any space (Sebake 2014:12). Outdoor spaces encompass the hierarchy of all classifications for outdoor spaces including public outdoor spaces, semi-public outdoor spaces, semi-private outdoor spaces, shared outdoor spaces and private outdoor spaces. Outdoor spaces have numerous spatial uses including, seating, circulation, activity, and scenic spaces (Huang 2006). The following indicators regard various aspects of possible urban outdoor spaces and consider how they contribute to quality of life in the urban dwellings featured in this study. As the variety of activities that can take place within an outdoor space are unlimited, this indicator seeks to define the scale on which the listed outdoor activities are feasible for each outdoor space featured in the study. Each indicator is listed with Likert scale ordinal categories relevant for measurement in each case. The indicator categories for possible activities in outdoor spaces are listed below

6.3.16 Outdoor space typology

Balcony, veranda, front yard and/ or backyard.

6.3.17 Area in square metres

This indicator states the size in square metres (m^2) of the outdoor space in question. Some outdoor spaces may be undefined, or may have a certain classification but not have the typical size for that class of outdoor space. This indicator seeks to clarify these characteristics.

6.3.18 Available space for agricultural activities (subsistence scale)

Outdoor spaces have the best conditions for growing plants as they provide access to natural sunlight and room for growth. The amount of space available for growing plants or similar agricultural practices varies. This indicator seeks to describe the outdoor space in relation to the available and possible agricultural activities in the space.

6.3.19 Opportunities for gardening in pots

Garden pots exist in a great variety of shapes and sizes. They are used to grow herbs, flowers, shrubs and vegetables in both interior and exterior conditions. This indicator seeks to gauge how much space exists in the study houses' exterior space, through roughly

estimating how many pots of one size can fit into that space. Vernon, Tennant and Garmony (2013:107-112) give spatial standards on how much space different shrubs may take up in the *Landscape architect's pocket book*. However, they do not stipulate a standard garden pot size. Using pragmatic research methods, a standard garden pot size that can hold a good variety of garden shrubs was determined to be the best way to determine the space needed for this indicator. The dimensions of the garden pot used for this indicator has a volume of $0.07m^3$, or 70 litres. This translates to a rectangular-shaped garden pot of with dimensions similar to: a height of 0.3m, a length of 0.755m, and a width of 0.325m. In a circular garden pot, this volume would manifest in pot plant with dimensions approximated to be 0.23m in diameter, Height: 0.3m (Lord 2017; Patterson 2017).

6.3.20 Opportunities for small-scale vegetable beds in square metres

The size of a vegetable garden is dependent on the needs and resources of the gardener; hence, guidelines on how to plant specific plants, as opposed to details on garden sizes, are stipulated in pocket books such as Vernon et al's. (2013) *Landscape architect's pocket book*. A vegetable garden can therefore be any size. For the purposes of this study, a small scale vegetable garden will be defined as any garden area, containing one or more vegetable plants, with a total area of approximately $5m^2$. A garden of this size allows for comfortable growth of several varieties of vegetables with adequate spacing for garden functions such as weeding space and foot paths. Vegetable beds of this size are allocated to urban residents in areas such as New York City (Patterson 2017). *Table 6.6* allocates values for space for a vegetable garden in the study.

Likert Scale Value	**Meaning of value with regards to space available for small garden bed (m^2)**
0	Not possible ($0m^2$)
1	Single bed only ($5m^2$)
2	Maximum of 3 beds ($15m^2$)
3	Maximum of 8 small vegetable beds ($40m^2$)
4	More than 8 Small vegetable beds ($>40m^2$)

Table 6.6: **Likert scale values for space available for a small vegetable garden**

6.3.21 Opportunities for growing fruit trees

An approximate number of fruit trees that can be accommodated in the outdoor space will be estimated. This estimation will be made on the basis that an average fruit tree takes up a

circular space of 2.5-3.5 m^2 (Vernon et al. 2013:140).The approximate number of trees that can fit in a space will be estimated from this figure.

6.3.22 Opportunities for large scale subsistence farming

A single large vegetable bed is defined as an area for growing agricultural produce with a total area of approximately 55m^2. A bed of vegetables of this size has the same characteristics as those of a smaller vegetable garden (as defined in section 6.3.15), and will yield enough food to feed a family of 6 and still have enough left over to sell or freeze for use later on (Patterson 2017). *Table 6. 7* presents the allocated Likert scale values.

Likert Scale Value	**Meaning of Value with regards to space available for Large Vegetable garden bed (m^2)**
0	Not possible (0m^2)
1	Single large bed only (55m2)
2	Maximum of 3 beds (55-165m^2)
3	More than 3 Large vegetable beds (>165m^2)

Table 6. 7: **Likert scale values for space available for large-scale subsistence farming**

6.3.23 Space available for recreational gathering

Open spaces are most optimal for recreational and social gatherings of people when they are attached to residential dwellings and amenities such as toilets are conveniently available. This indicator seeks to clarify the number of adult people that can comfortably gather in a specific outdoor space. Subjective conclusions about the recreational space in relation to the attached dwelling, such as whether or not the amenities of the home are adequate or inadequate for the number of individuals that can gather in the outdoor space for recreation, can be deduced. Neufert *Architects' data* (Neufert 2008*)* is a guideline commonly used in the architectural industry to determine dimensions for a space. Where a dimension is applicable and relevant, it will be applied to the indicator and where it is not, values and methods used to derive the indicator will be specified.

6.3.24 Space for practice of field sports (such as netball, court soccer, basketball)

In some scenarios, outdoor spaces allow for sports and recreation to take place. The amount of space available for sporting activities varies. This indicator seeks to describe the outdoor space in relation to the available and possible sporting activities that can take place there. Neufert's (2008:489-540) *Architects' data* describes the necessary dimensions for

playing fields or courts for each individual sport to take space. The same source gives detailed ergonomic measures for a full-grown adult in various poses and positions that may take place while playing these sports (Neufert 2008:16-17). Rather than give a breakdown of the space needed for each sport, an estimate is made from subjective human experience on how many people may safely participate in various sports activities in each of the residential homes, using the ergonomic measurements given in Neufert (2008:16-17) as a guideline. *Table 6.8 presents* the allocated Likert scale values.

Likert scale value	**Meaning of value**
0	Not possible - None
1	Maximum 4 players
2	Maximum 8 players
3	Maximum 10 players
4	Maximum 12 Players
5	13 players or more

Table 6. 8: **Likert scale values for space available for practice of field sports**

6.3.25 Space available for gathering people

When people gather, they may enjoy recreational activities in either the seated or standing position. According to Neufert (2008:45), a full sized adult occupies a clearance of 0.65x0.7m when in a relaxed seated position at a table. This is square area of 0.45m^2. For this study, an approximate area of 0.45m^2 is calculated for an adult to be comfortable (seated or standing) in a recreational area. Another 1.05m^2 is added for free movement, including walking and gesturing, thus an average area of 1.5m^2 is used as the average amount of space needed for a fully grown adult to comfortably recreate in gathering spaces such as living rooms. This measure is used to create categories for an index of measurement for the research study, and is shown in *Table 6.9*.

Likert scale value	Meaning of value
0	Not possible – none ($0m^2$)
1	4 people maximum ($6m^2$)
2	6 people maximum ($9m^2$)
3	8 people maximum ($12m^2$)
4	10 people maximum ($15m^2$)
5	12 people or more ($18m^2$ or more)

***Table 6.9*: Likert scale values for space available for people to gather**

6.3.26 Space available for children to play safely

Children are deemed to be any person between the age of infancy and 12 years. For this research study, it is assumed that a single child requires between 1.5 - $3m^2$ in order to play, move and interact in comfortable manner (Neufert 2008:140). Table 6.10 gives the allocated Likert scale values.

Likert scale value	Meaning of value
0	Not possible – none ($0m^2$)
1	2 - 4 Children maximum ($12m^2$)
2	8 Children maximum ($24m^2$)
3	12 Children maximum ($36m^2$)
4	16 Children maximum ($48m^2$)
5	20 Children or more ($60m^2$ or more)

***Table 6.10:* Likert scale values for space available for children to play**

Table 6.11 provides a summary of the national standards and/or Neufert standard that is relevant for each of the indicators listed in *section 6.2.1* and discussed in *sections 6.3 to 6.3.26*.

Table 6.11: **Summary of National Standards in South Africa, Zimbabwe and the UK relating to indicators**

(Adapted from: Government of Zimbabwe 1998; NBR 2009; NBR 2010; Neufert 2008; Poulsen and Silverman 2005; SABS1990; Vernon, Tennant & Garmony 2013)

	Neufert Architects' Data	British National Building Regulations	South African National Standards	Zimbabwe National regulations and Building Standards
Area of residence in square meters (m^2)	Page 245-295	-	Page 52 PART O Minimum total area of $30m^2$	Section C1 The floor area of any dwelling unit shall not be less than that necessary to provide one habitable room and a separate room containing toilet facilities.
Average area of bedrooms in the house in square meters (m^2)	Design layout and suggested dimensions given on page 257	Part M1 Appendix D, page 56 - Minimum manoeuvring area of 1.2x1.2m - Minimum area for a Main bedroom (as per total minimum furniture dimension: $3.62m^2$, including double bed, bedside table, desk and chair, chest of drawers, double wardrobe) - Minimum area for single bedroom (as per total minimum furniture dimension: $2.28m^2$, including single bed, bedside table, chest of drawers, double wardrobe)	PART O - Minimum of $6m^2$ with a height of 2.4m over a minimum of 70% of the room, 2.1m at minimum pages 51-52	-
Average number of bathrooms per residence + typical dimensions of bathroom + average area of bathroom	Design layout and suggested dimensions given on pages 262-263	Part M1 Page 8 A minimum width of 850 for clearance area in the WC region and on sides, minimum depth of 750mm (for door and depth of WC) - Minimum dimensions given for a bathroom to fit WC and cistern, bath, wash basin with total minimum area of $1.81m^2$	Table 4, Part P 1 WC, 1 washbasin, 1 bath or shower on page 125	Section C1 -The floor area of any dwelling unit shall not be less than that necessary to provide one habitable room and a separate room containing toilet facilities.

	Neufert Architects' Data	British National Building Regulations	South African National Standards	Zimbabwe National regulations and Building Standards
Average area of public rooms	-	Part M1 Appendix D, page 56 - Minimum clearance of 775mm for the doorway - Minimum area for dining room (as per minimum furniture dimensions: 0.64 for table with space for two dining chairs, - Minimum area for living room (as per total minimum furniture dimensions: 3.135m^2, including an arm chair, 3 seater couch, TV, storage unit, additional table as the minimal furnishings able to fit in the space) - Minimum manoeuvring area of 1.5 x 1.5m	PART O No given minimum size Minimum height of 2.1m PART O 0.8m^2 per person or 6m^2 pages 51-52 - Minimum of 6m^2 with a height of 2.4m over a minimum of 70% of the room, 2.1m at minimum 0.6m^2 - 0.8m^2 per person in the room for public rooms	-

	Neufert Architects' Data	British National Building Regulations	South African National Standards	Zimbabwe National regulations and Building Standards
Average feeling of natural light	Pages 157, 158 D= Refers to daylight factor. Dmin >/= 1% in living rooms, and workrooms. Given window dimension. Rooms with 5-7m depth require window height of 1.35m in a room with a 2.5m, and a window height of 1.85m in a room with a height of 3m. (Page 157)	A minimum average daylight factor (2% kitchens, 1.5% living rooms, 1% bedrooms); the position of the no-skyline at working plane height (0.85m). If the area beyond the no-skyline is more than 50%, the room will look gloomy; these are identical to standards in Neufert and found in BRE 1, 2, 3 (as opposed to in the NBR).	SANS Part O Any habitable room, bathroom or WC room must have ventilation and lighting. It is preferred that both natural and artificial ventilation are catered for, with at least one opening onto an external wall for natural light that meets the requirements, with artificial light supplementing natural light when necessary. The size of the opening for natural light shall not be less than 10% of the total floor area of the room it serves or 0.2m^2, whichever is greater. - Glazed openings must be translucent - With a space of (i) At least half the height of the openin; (ii) The opening must stand a distance of >0.5m from a building line and 0.1m from another building provided (iii) Where there is an obstruction of an a) Habitable room b) Bathroom or toilet, there must be a space of a) 1/3H of window b)1/10 H of Window in front of the opening. (iv) Where this opening is onto a duct, the duct must be at least 1m and uncovered at the top (Pages 101, 102, 106)	Section O1, O2 - Any habitable room, bathroom, shower-room and room containing a toilet pan or urinal, or any room...shall be provided with a means of lighting and ventilation which will enable such room to be used. The requirement of sub-regulation (1) shall be deemed to be satisfied where the lighting and ventilation are in accordance with SANS 10400-O. - Any habitable room in any dwelling house or dwelling unit, or any bedroom in any building used for residential occupancy shall, notwithstanding the provision of artificial lighting, be provided with at least one opening for natural light

	Neufert Architects' Data	British National Building Regulations	South African National Standards	Zimbabwe National regulations and Building Standards
Average feeling of natural ventilation	Description of sources of natural ventilation conditions but no specifications. Window ventilation through sash windows is suggested (page 105)	Part F: 1.2.1.2 Provision should be made to facilitate transfer of air and cross ventilation between rooms, e.g. a 10mm gap should be provided under doors. - A provision of minimum head heights (2.4m for the majority of the room, and 2.1m for the minority area of the room), is advised, to improve the natural flow of air. -A habitable room may be ventilated through an adjoining space, with each room having no less than 8000m^2 as a total area, the adjoined space must have means of natural ventilation other than through the space - Kitchens must have a means of mechanical extract ventilation or passive stack ventilation - An opening with a total area not less than 1/20th of the total floor area of two adjoined rooms serves as a sufficient opening for natural ventilation. - Ventilation through stack ventilation and the usage of openings through ducts is also considered a form of natural ventilation. (Pages 9,12, 16)	SANS Part O Any habitable room, bathroom or WC room must have natural ventilation and lighting. It is preferred that both natural and artificial ventilation are catered for. The size of the opening should not be less than 5% of the total floor area of less than 0.2m^2 (page 101) provided. (Pages 101-107)	Section O1, O2 - Any habitable room, bathroom, shower-room and room containing a toilet pan or urinal, or any room... shall be provided with a means of lighting and ventilation which will enable such room to be used. The requirement of sub-regulation (1) shall be deemed to be satisfied where the lighting and ventilation are in accordance with SANS 10400-O.
Space available for children *to* play safely	Ergonomic standards on page 140	-	-	The requirements of sub-regulations (1) and (2) shall be deemed to be satisfied where the area and plan dimensions of any room or space, the room heights and, in the case of any dwelling house, the floor area comply with SANS 10400-C.
Indicator categories with no specific standards mentioned				

Neufert Architects' Data	British National Building Regulations	South African National Standards	Zimbabwe National regulations and Building Standards
Residential typology	No standard for this indicator. Typologies were defined by typology definitions by Poulsen and Silverman's *Design Strategies for the Densification of Low Income Housing* (2005) and Neufert (2008:273)		
Total number of rooms in the house	No specification; indicator category simply notes the number of rooms		
Number of bedrooms in the house	No specification; indicator category simply notes the number of rooms		
Average feeling of Acoustic Privacy	No specification; indicator category notes subjective experience assigning values to experience on a Likert Scale		
Average feeling of visual privacy	No specification; indicator category notes subjective experience assigning values to experience on a Likert Scale		
Opportunities for gardening in pots	No standard specification. Average size of garden pot determined by shrub sizes in Vernon, Tennant and Garmony's *Landscape Architect's Pocket Book* (2013) and pot sizes available on the market		
Opportunities for small-scale vegetable bed in square metres (m^2)	No standard specification. Average size of garden pot determined by plant sizes in Vernon, Tennant and Garmony's *Landscape Architect's Pocket Book* (2013) and garden bed sizes by online guides by Patterson 2017, Rhoades 2017		
Opportunities for growing fruit trees	No standard specification. Average size of fruit tree determined by plant sizes in Vernon, Tennant and Garmony's *Landscape Architect's Pocket Book* (2013:140)		
Opportunities for large-scale subsistence	No standard specification subsistence scale bed sizes by online guides by Patterson 2017, Rhoades 2017		
Space for practice of field sports (Netball, court soccer, basketball, etc.)	Standard specifications given in Neufert (2008:489-497) for the dimensions needed for each court size, however ergonomic posed supplied in Neufert (2008:17-18) were used as rough estimate values for the space required by the number of people playing the sport.		
Space available for gathering people	Space needed per individual is derived from Neufert (2008:45), and multiplied according to the total number of people that can fit in a space		
Space with the highest usage	No specification Indicator category simply notes the rooms with the highest usage		

Continued - Table 6.11: **Summary of National Standards in South Africa, Zimbabwe and the UK relating to indicators**

(Adapted from: Government of Zimbabwe 1998; NBR 2009; NBR 2010; Neufert 2008; Poulsen and Silverman 2005; SABS1990; Vernon, Tennant & Garmony 2013)

6.4 SUMMARY OF CHAPTER

Approaches to quality of life studies were presented in the three precedent studies discussed in chapter 3. These studies were used as examples on how to measure quality of life within a residential space in the context of architectural design.

Quality of life can be measured from both an objective and a subjective perspective. Theoretical discourse revealed that one must collect data in order to supply resources for the research project and in the context of quality of life, research methods and data may vary and supply both quantitative and qualitative results. The research project must narrow down a scope in which to consider and measure quality of life, whether it be a basic needs approach, which looks at subjective experiences of meeting needs and fulfilment in order to improve quality of life, or a purely objective measurement of existing physical conditions amongst different socio-economic areas to measure quality of life. Research methods that do both can also be utilised provided that indicators are clearly defined in relevance to the research context.

Thus, sixteen indicators organised into four main categories were defined in order to be used to gauge quality of life in respect of architectural design in residential homes in the three countries selected for this dissertation.

Thus far, the research philosophy has been described in Chapter 5. Chapter 7 provides a detailed description of the research findings.

CHAPTER 7 RESEARCH DATA FINDINGS (RFS 890 COMPONENT)

The previous chapter presented the research indicators used to measure spatial characteristics of each room in each house featured in this research study. The initial body of this chapter presents the raw research data for each of the study homes. A summary of how each case study home relates to each family is given, followed by the research data for each home presented country-by-country.

7.1 RESEARCH DATA

The research data is presented in two ways:

1. The data is presented within the context of the residents who lived in the homes. This is shown through a summary image which gives a summary of family with regards to the inhabitants of the home, and the home they lived in Zimbabwe or South Africa and the home in which they lived thereafter, either in South Africa or the UK.

2. Findings for each home are presented in four formats, they are described as follows:
   a) *Urban Context Map*: This map shows the location of the home and all urban amenities within a 500m to 1000m radius from the home.
   b) *Floor plan drawing:* A floor plan for each home gives the layout, room dimensions, entrances, exits, windows and doors for each residential home. This floor plan serves as a form of visual data and ties in with the written data for each home.
   c) *Behaviour Maps*: The maps show the usage of spaces by users of the home under to categories. The two mapped categories are shown through:
      (i) User maps showing which areas of the home are used the most during four time zones namely: 04h00 – 09h00; 09h00 – 17h00; 17h00 – 22h00; 22h00 – 04h00
      (ii) Public/Private Mapping in which the more public areas and more private areas of the home are shown on the floor plan.
   d) *Table containing a summary of conditions*: This table contains the findings for each indicator category defined in chapter 6 for each room in each home. The summary of the indicators for each home are given in Chapter 8, as part of the discussion for the spatial characteristics for the case study homes in each in of the countries.

7.2 RESEARCH DATA IN RELATION TO THE INHABITANTS OF THE CASE STUDY HOMES

This section of the thesis seeks to present the data for each of the case study homes to the six families which currently live on or previously lived in the case study homes.

The basis of the selection of these families is due to their homes as a source of research data, as explained in chapter 1. Each of the selected families originates from Zimbabwe, i.e. one or both of the independent adult members of the home lived in Zimbabwe. Thus, each of the families can, in one way or another, relate to Zimbabwe's socio-economic conditions as detailed in chapter 4. In addition, a generic understanding of the socio-economic climate of their current countries of residence, either South Africa or the UK, can be derived from chapter 4 as well.

Table 7.1 below shows which family resided in each of the case study homes featured in this dissertation. *Figure 7.1* below is a legend for the family members, and should be used in relation to *Figure 7.1 – Figure 7.6* which summarise the family's lifestyle choices and quality of life in relation to the relevant case study homes.

Country of origin and country of relocation	Family residing in home	Initial residence of family	Latter residence of family	Figure Number
Zimbabwe to RSA	Blue Family	Zimbabwe House 4 Free-standing back house	RSA House 2 Sublet apartment	7.1.1
Zimbabwe to RSA	Red Family	Zimbabwe House 2 Free-standing house	RSA House 1 Walk-up apartment	7.1.2
Zimbabwe to UK	Yellow Family	Zimbabwe House 1 Duplex apartment	UK House 3 Duplex rowhouse	7.1.3
Zimbabwe to UK	Pink Family	Zimbabwe House 3 Free-standing house	UK House 4 Apartment	7.1.4
RSA to UK	Brown Family	RSA House 3 Apartment	UK House 2 Semi-detached cabin house	7.1.5
RSA to UK	Green Family	RSA House 4 Free-standing house	UK House 1 Semi-detached house	7.1.6

***Table 7.1:* Case study homes in relation to the related inhabitant families**

Icon	Title*	Assumed age group*	Assumed Characteristics
	Father/ Dependant adult	Age 22+	Independent member of household (main source of finance)/Dependant adult*
	Mother/ Dependant adult	Age 22+	Independent member of household (main source of finance)/Dependant adult*
	Grandfather	Age 60+	Older than independent household members Dependant on independent members for shelter and/or income, etc.
	Grandmother	Age 60+	Older than independent household members Dependant on independent members for shelter and/or, income etc.
	Son	Age 7-21	Younger than independent household members
	Daughter	Age 7-21	Younger than independent household members
	Infant son	Age 0-6	Descendant of older household members
	Infant Daughter	Age 0-6	Descendant of older household members
	**+** Indicates a member of the household who resides in the latter household but not the initial household*		
	**-** Indicates a member of the household who resides in the initial household but not the former household*		

Table 7.2: **Legend for case study home inhabitants**

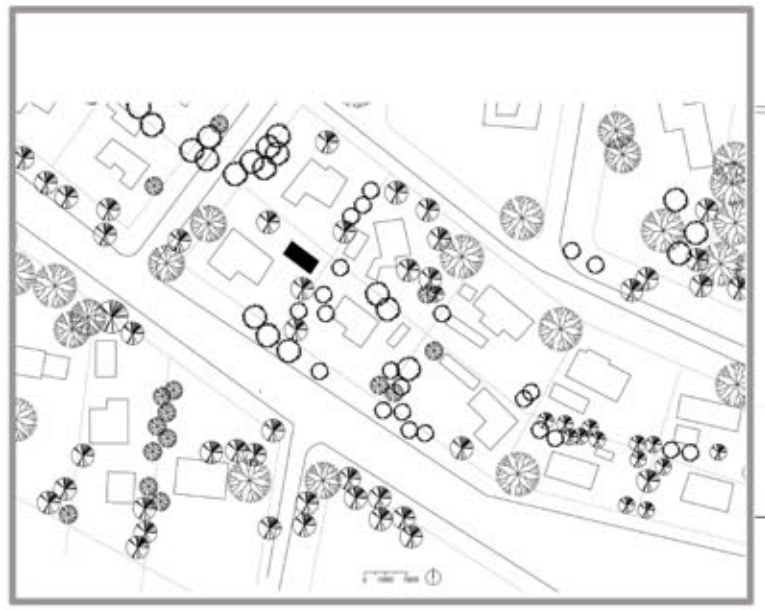
(Axt, 2013)

A summary of the inhabitant families in relation to the case study homes is given in this order:

Father 25+, Mother 25+, Daughter 1

This family unit has remained the same over the transition.

Zimbabwe
ZIM House 4
Blue Family
Location A



Site Plan

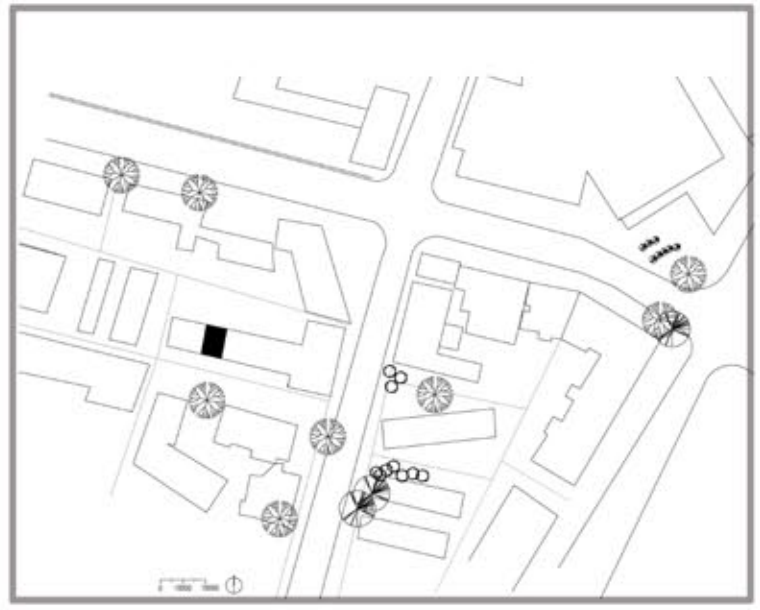
Floor Plan

Neighbourhood Typology: Suburb
Typology: Back House/ Cottage in the yard of Free Standing House
Area: 61.65sqm
Number of bedrooms: Two
Average area of bedrooms:11.65sqm
Number of Bathrooms: One and a half
Daylight Average: 24.4%
Outdoor Space: Shared Back and garden with main house, predominantly occupied by vegetable garden

Father 30+, Mother 30+, Daughter 7

This family unit has remained the same over time, while growing older.

South Africa
RSA House 2
Blue Family
Location B



Site Plan

Floor Plan

Neighbourhood Typology: Urban mixed commercial and residential highrise
Typology: Sub-let Apartment
Area: 47.477sqm
Number of bedrooms: Two
Average area of bedrooms:10.51sqm
Number of Bathrooms: One
Daylight Average: 27.83%
Outdoor Space: None

Figure 7.1 Summary comparison of the Blue Family's residence initially in Zimbabwe and subsequently in South Arica

Father 30+, Mother 30+,
Daughter 7, Son 6

This family unit was changed overtime due to the death of the father and daughter.

Zimbabwe
ZIM House 2
Red Family
Location A

Site Plan

Floor Plan

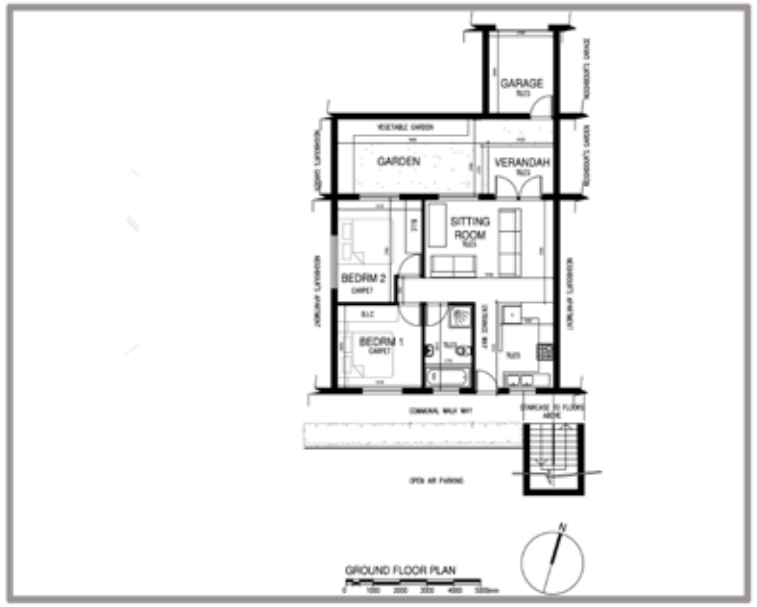
Neighbourhood Typology: Suburb
Typology: Free Standing House
Area: 171.12sqm
Number of bedrooms: Five
Average area of bedrooms:12.6sqm
Number of Bathrooms: Three
Daylight Average: 14.37%
Outdoor Space: Large Back and front garden

Husband 28, Wife 26
Mother 50+

This family unit has changed.The Son has grown up and gotten married. His mother lives with he and his wife occasionaly (usually for a month at a time).

South Africa
RSA House 1
Red Family
Location B

Site Plan



Floor Plan

Neighbourhood Typology:
Gated Development (uniform 2 storey walkup homes)
Typology: Ground floor unit of Walk-Up
Area: 47.47sqm
Number of bedrooms: Two
Average area of bedrooms:10.51sqm
Number of Bathrooms: One
Daylight Average: 27.83%
Outdoor Space: Back garden

Figure 7.2 Summary comparison of the Red Family's residence initially in Zimbabwe and subsequently in South Arica

Father 30+, Mother 30+, Daughter 4, Son 10

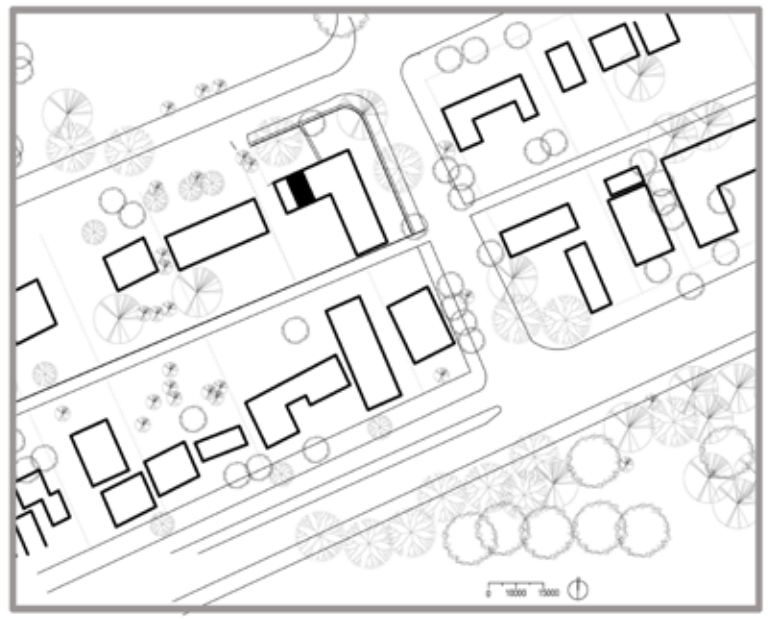
This family unit has remained the same during the transition.

Zimbabwe

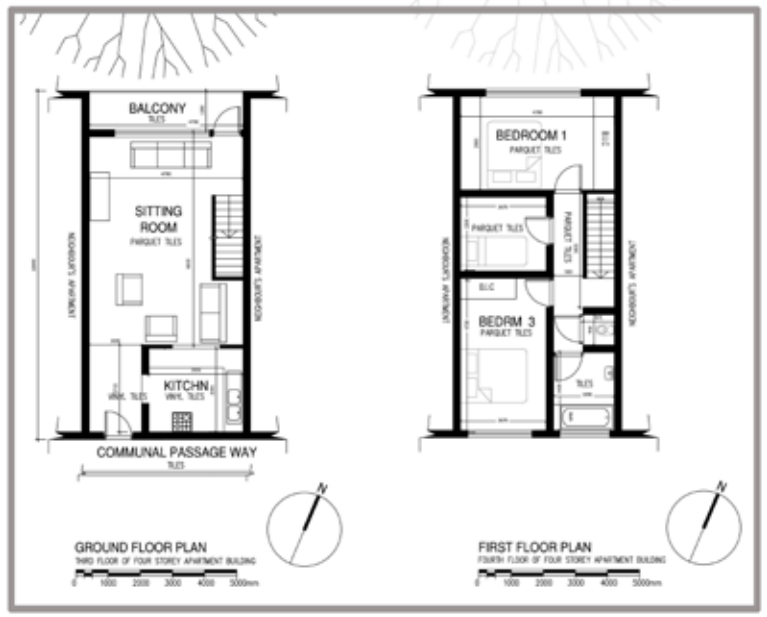
ZIM House 1

Yellow Family

Location A



Site Plan



Floor Plan

Neighbourhood Typology: Urban Residential
Typology: Duplex Apartment
Area: 89.689sqm
Number of bedrooms: Three
Average area of bedrooms:10.89sqm
Number of Bathrooms: One and a half
Daylight Average: 22%
Outdoor Space: Balcony

Father 50+, Mother 50+, Daughter 22, Son 28,

This family unit has remained the same with family members growing older.

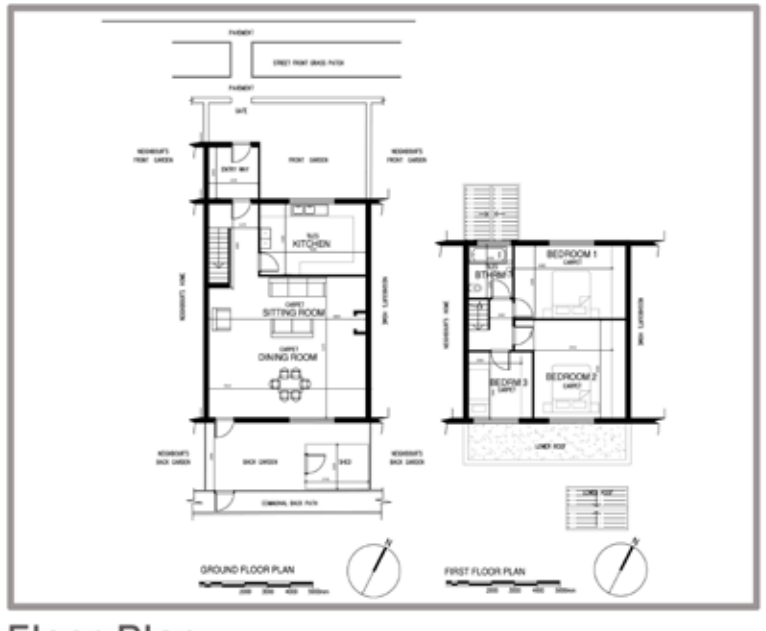
UK

UK House 3

Yellow Family

Location B

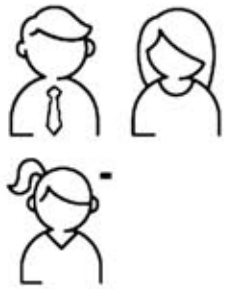
Site Plan



Floor Plan

Neighbourhood Typology: Suburb
Typology: Duplex Row House
Area: 104sqm
Number of bedrooms: Three
Average area of bedrooms:11.4sqm
Number of Bathrooms: One
Daylight Average: 23.25%
Outdoor Space: Backgarden

Figure 7.3 Summary comparison of the Yellow Family's residence initially in Zimbabwe and subsequently in the UK



Father 30+, Mother 30+,
Daughter 17, Daughter 7

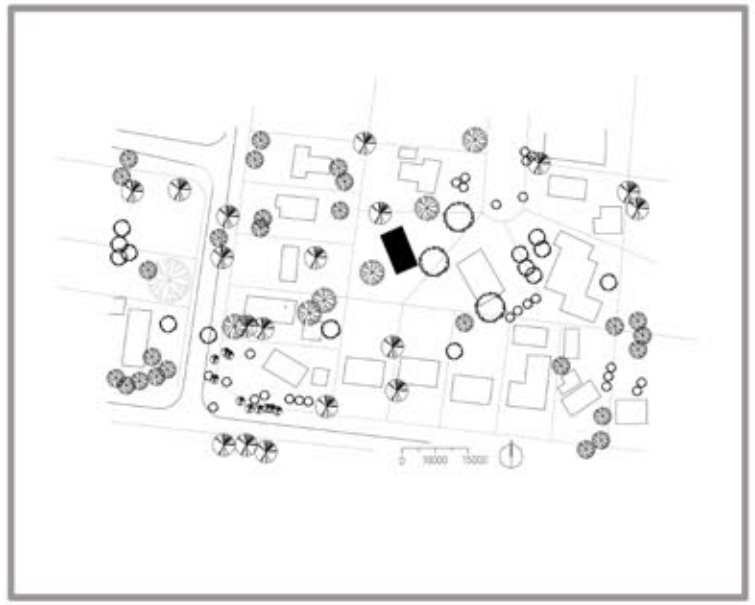
This family unit became smaller during the transition.

Zimbabwe

ZIM House 3

Pink Family

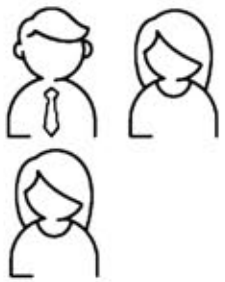
Location A



Site Plan

Floor Plan

Neighbourhood Typology: Suburb
Typology: Freestanding House
Area: 89.74sqm
Number of bedrooms: Three
Average area of bedrooms:11.83sqm
Number of Bathrooms: One and a half
Daylight Average: 19%
Outdoor Space: Back and front Garden



Father 50+, Mother 50+,
Daughter 22

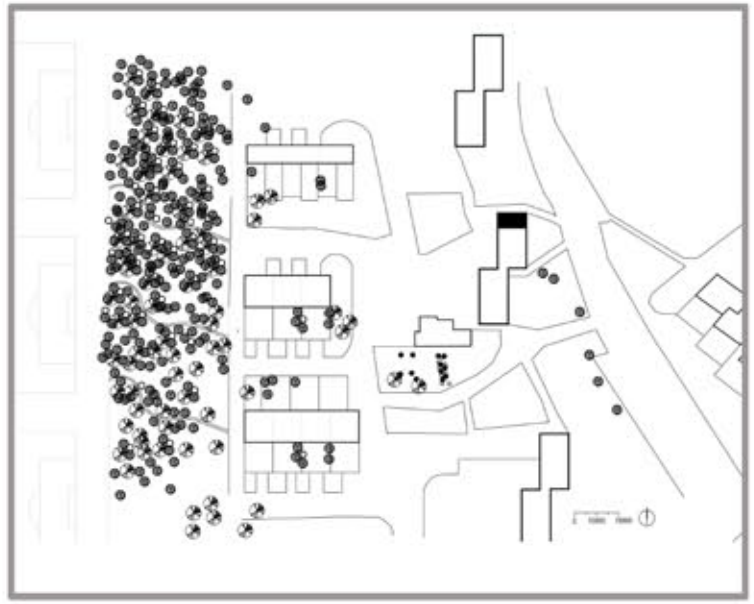
This family unit has aged and only the younger sibling has still resides with her parents

UK

UK House 4

Pink Family

Location B



Site Plan

Floor Plan

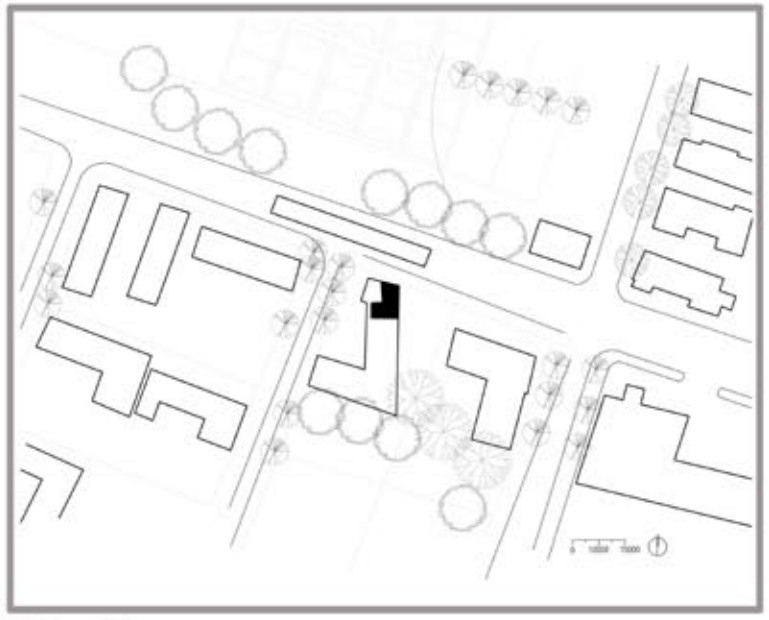
Neighbourhood Typology: Urban high rise
Typology: Apartment
Area: 58.76sqm
Number of bedrooms: Two
Average area of bedrooms:10.15sqm
Number of Bathrooms: One and a half
Daylight Average: 23.25%
Outdoor Space: Balcony

Figure 7.4 Summary comparison of the Pink Family's residence initially in Zimbabwe and subsequently in the UK

Father 25+, Mother 25+,
This family unit grew over time during the transition to the UK.

South Africa
RSA House 3

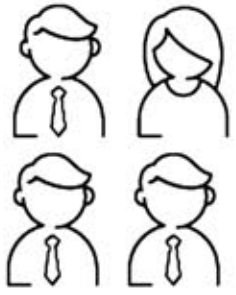
Brown Family
Location A



Site Plan

Floor Plan

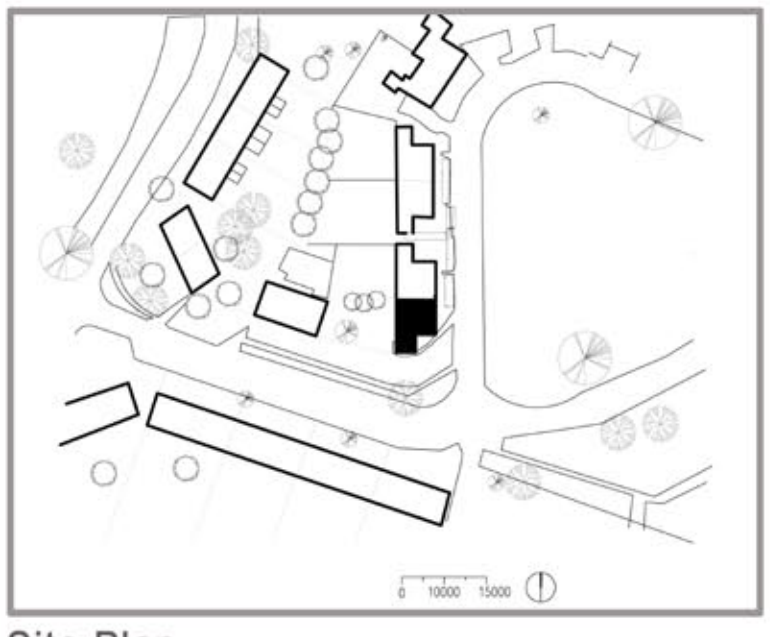
Neighbourhood Typology: Mixed Urban and residential
Typology: Apartment
Area: 70.23sqm
Number of bedrooms: Two
Average area of bedrooms: 13.42sqm
Number of Bathrooms: One
Daylight Average: 27.83%
Outdoor Space: Balcony



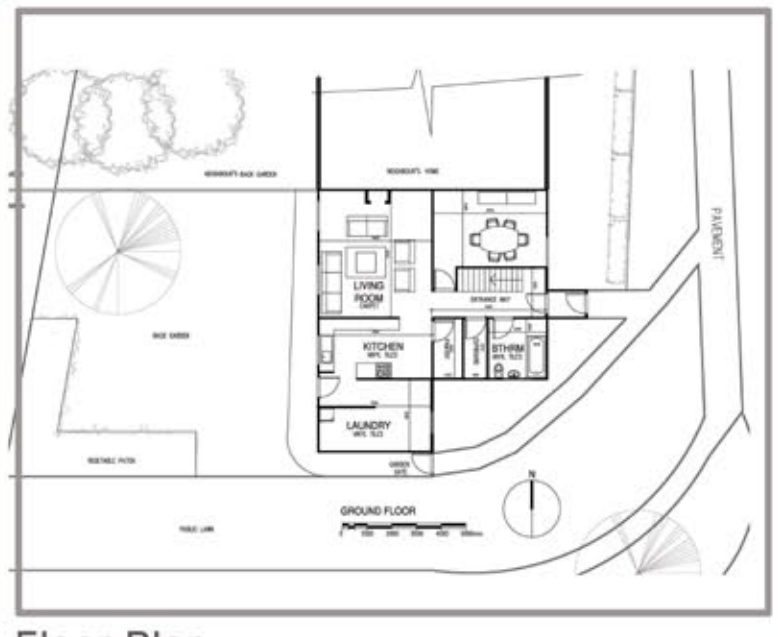
Father 40+, Mother 40+,
Son 12, Son 10
This family unit has remained the same over time, while growing older.

UK House 2

Brown Family
Location B



Site Plan



Floor Plan

Neighbourhood Typology: Suburb
Typology: Semi-detached Cabin
Area: 120sqm
Number of bedrooms: Two
Average area of bedrooms: 15.8sqm
Number of Bathrooms: One
Daylight Average: 13.63%
Outdoor Space: Back garden

Figure 7.5 Summary comparison of the Brown Family's residence initially in South Africa and subsequently in the UK

Father 30+, Mother 30+, Grandmother 60+Daughter 10, Son 8,Daughter 2, Son 1

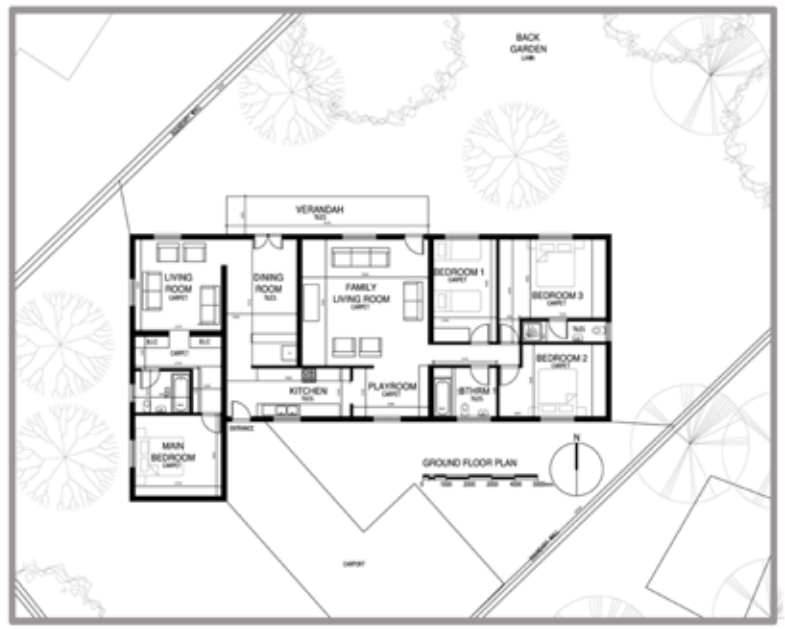
This family unit has remained the same over time, with the exception of the grandmother who did not relocate with them.

South Africa

RSA House 4

Green Family Location A

Site Plan



Floor Plan

Neighbourhood Typology: Suburb
Typology: Free Standing House
Area: 158.66sqm
Number of bedrooms: Four
Average area of bedrooms:12.6sqm
Number of Bathrooms: Three
Daylight Average: 24.4%
Outdoor Space: Large Back and front garden

Father 50+, Mother 50+, Daughter 27, Son 25, Daughter 19, Son 18

This family unit got due to the grandmother no longer residing with them. All family members have grown older.

UK

UK House 1

Green Family Location B

Site Plan

Floor Plan

Neighbourhood Typology: Suburb
Typology: Duplex Semi-detached House
Area: 140sqm
Number of bedrooms: Four
Average area of bedrooms:13.4sqm
Number of Bathrooms: Two and a half
Daylight Average: 14.7%
Outdoor Space: Backgarden

Figure 7.6 Summary comparison of the Green Family's residence initially in South Africa and subsequently in the UK

7.3 RESEARCH DATA FOR CASE STUDY HOMES IN THE UNITED KINGDOM

Findings for the UK case study homes are featured in this section, in this order:

United Kingdom homes raw data

***Figure 7.7*: Legend: UK case study amenity maps**

***Figure 7.8*: Legend for UK case study homes: Behaviour maps**

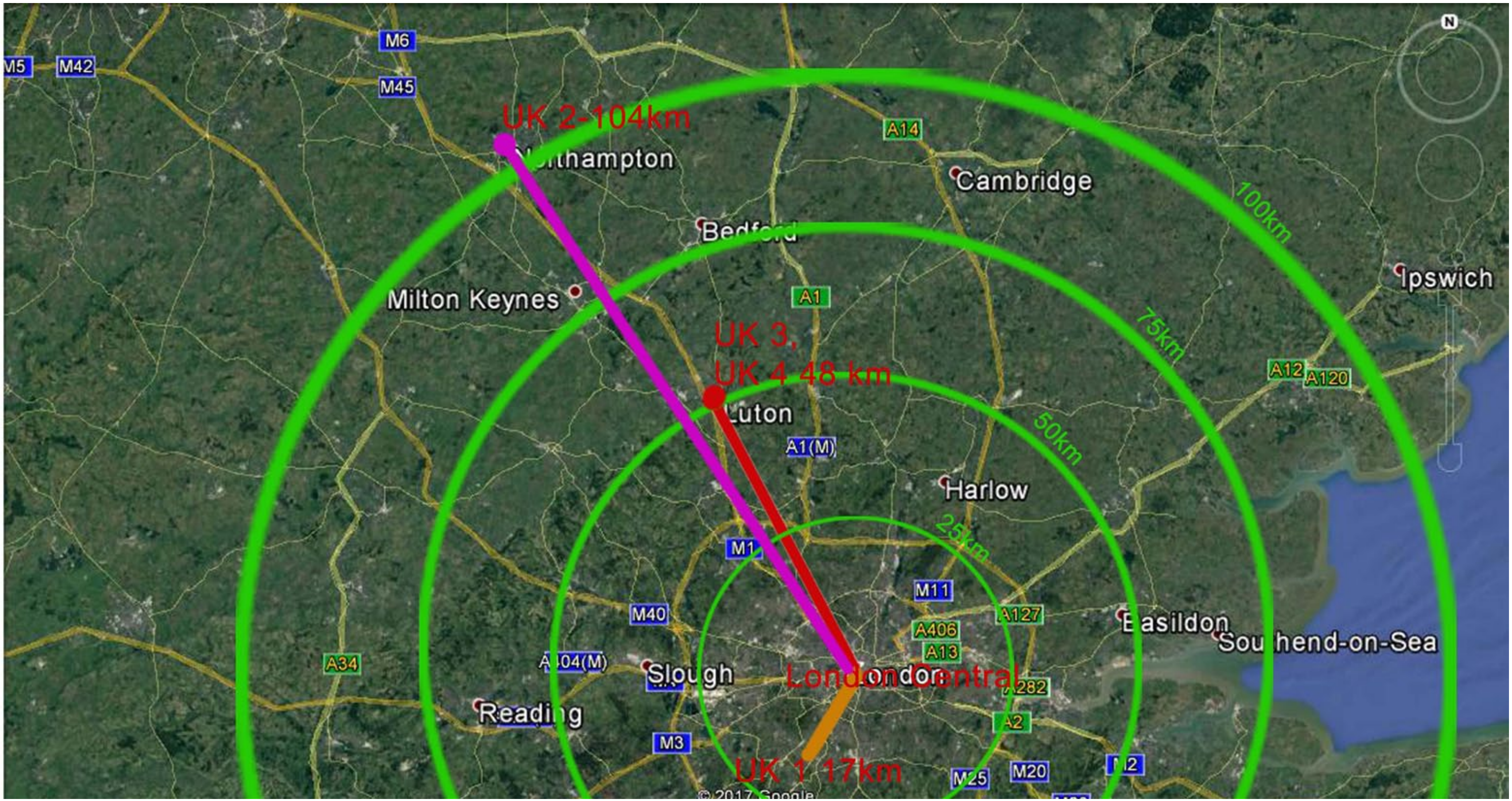
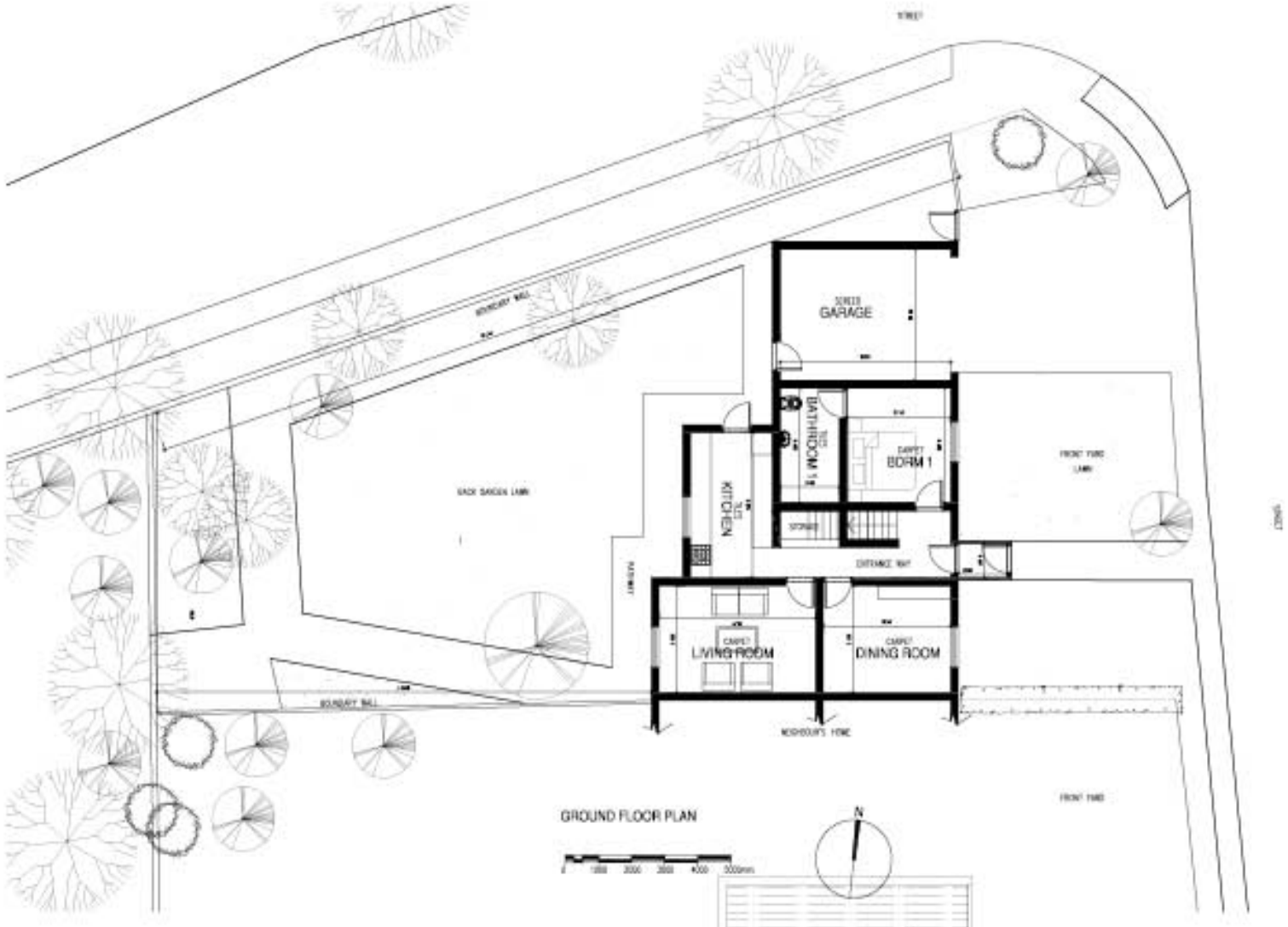
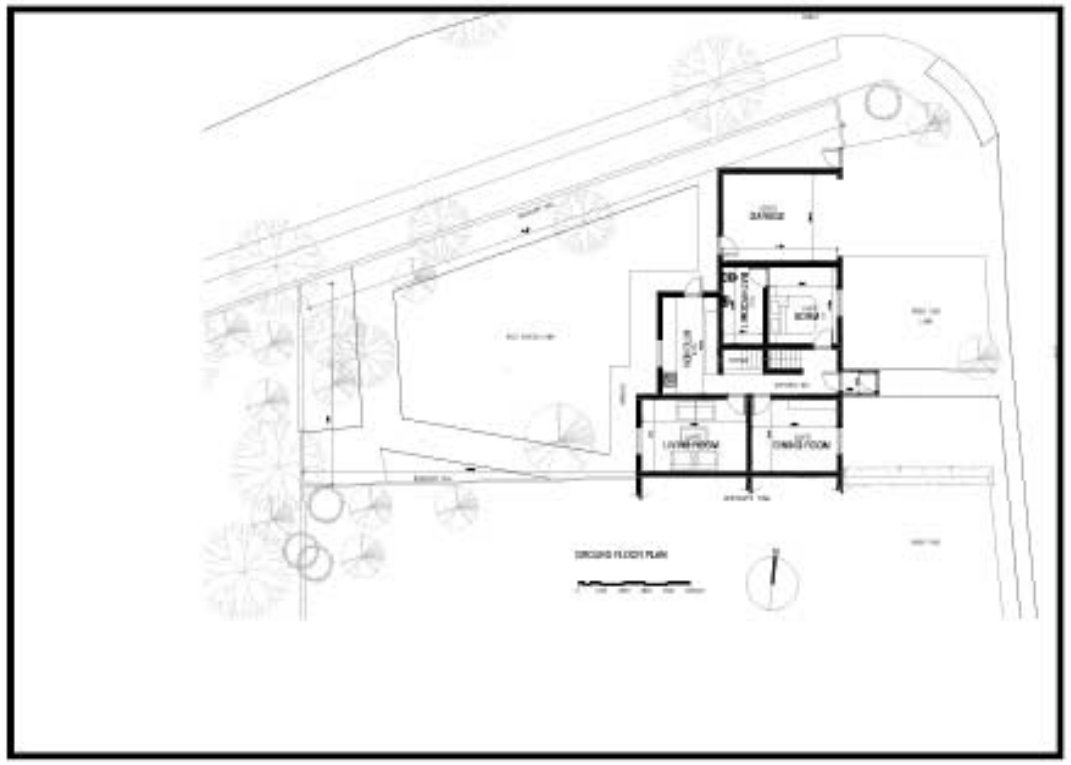


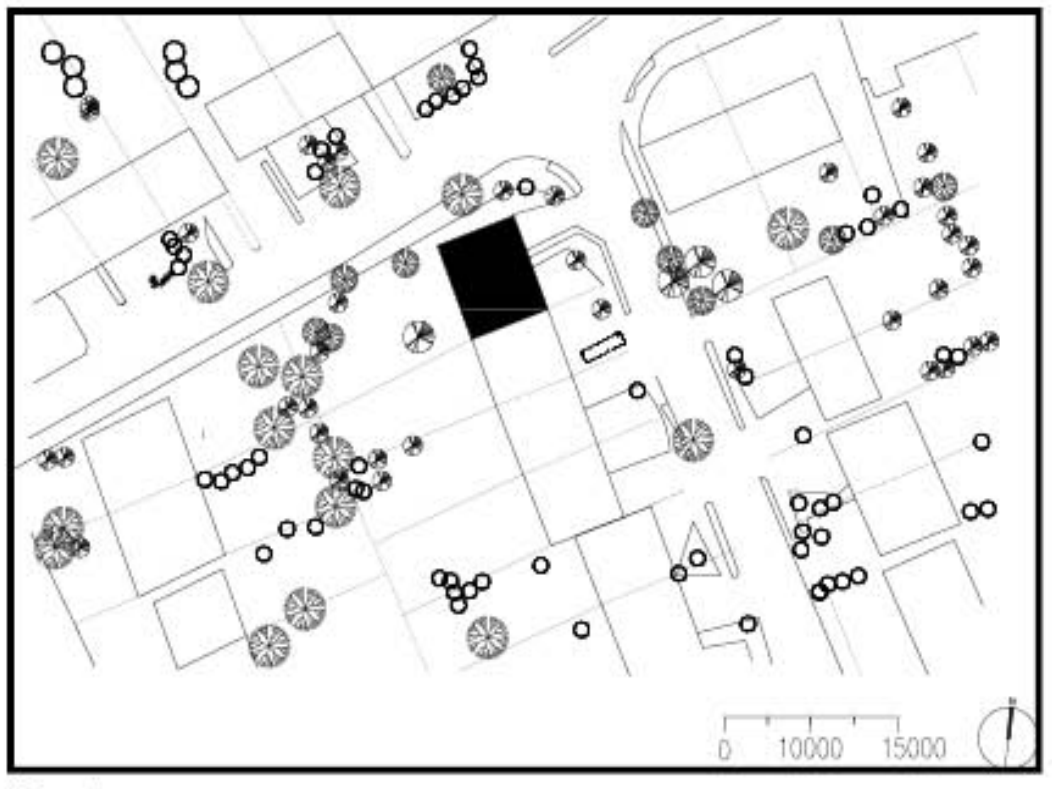
Figure 7.9 Locality Map All UK houses in proximity to London (Google 2017)



Floor plan



Context plan



Site plan

Case study Family: Green Family
Location B
Inhabitants: Father, Mother, Daughter x2, Son x2

Figure 7 10: UK House 1 - Floor plan, site plan and context plan

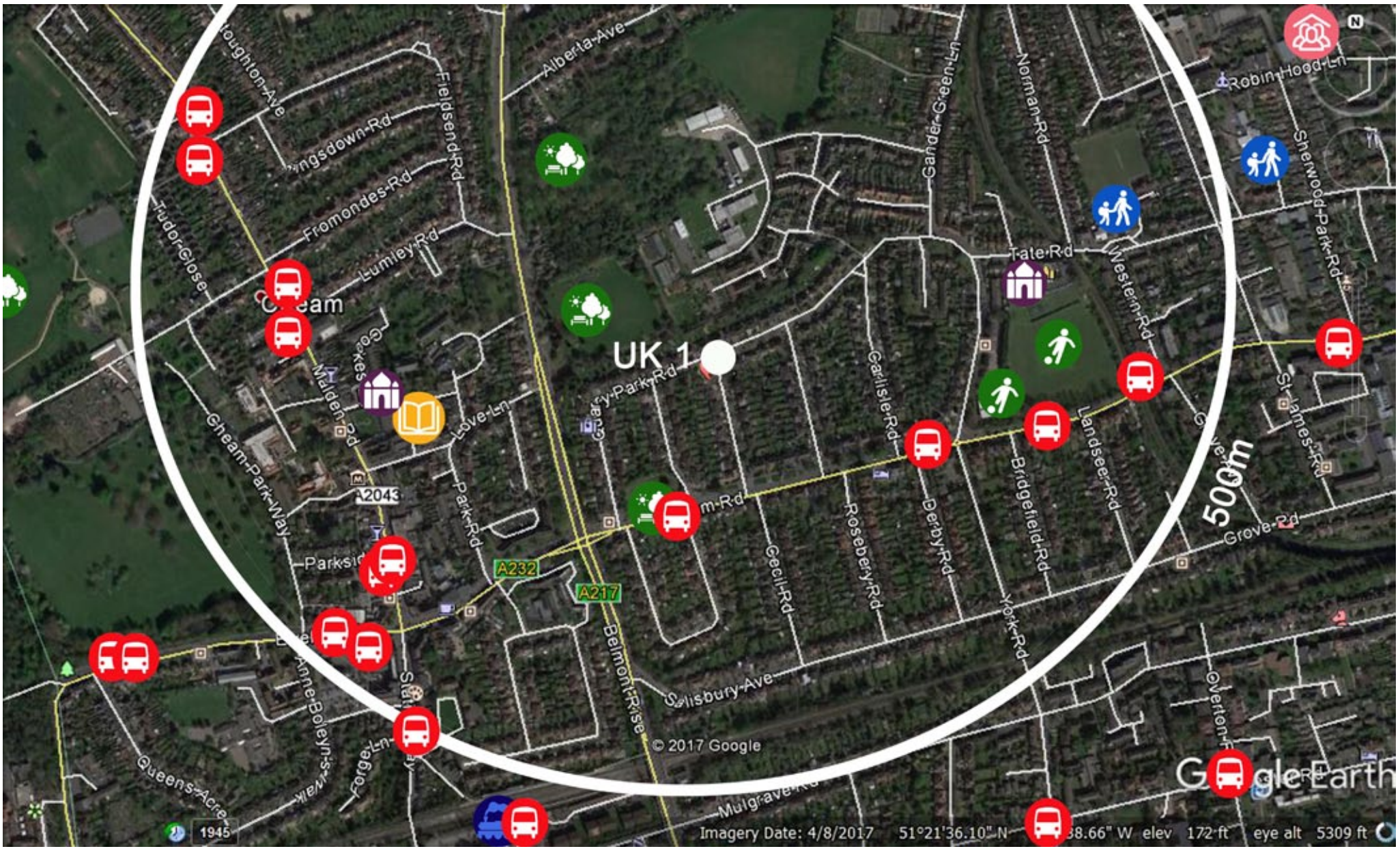
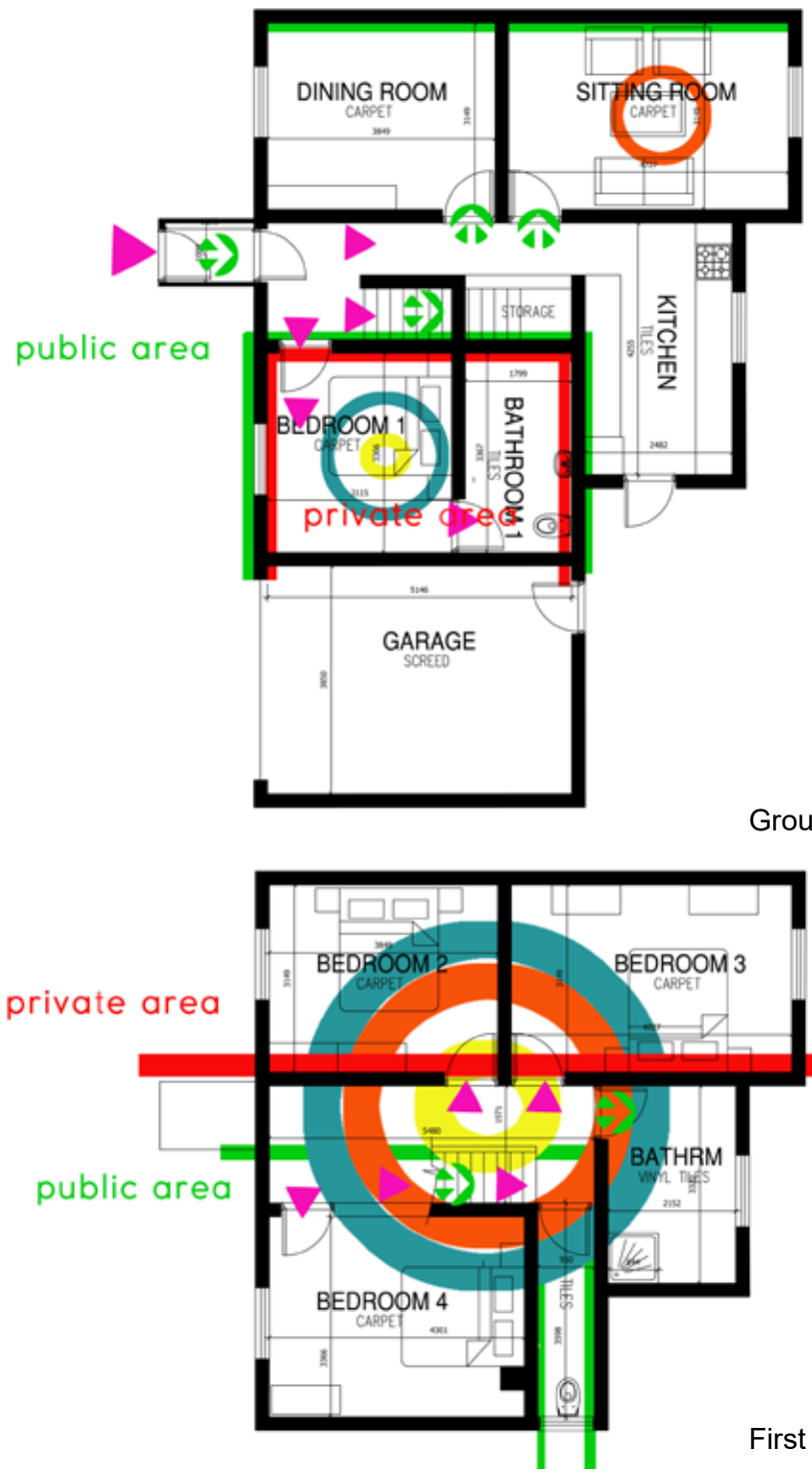


Figure 7 .11: UK House 1 - Locality map (Google 2017) – See *Figure 7.7* for Legend



Ground Floor

First Floor

Figure 7 .12 UK House 1 - Locality map (Google 2017) – *See Figure 7.8* for legend

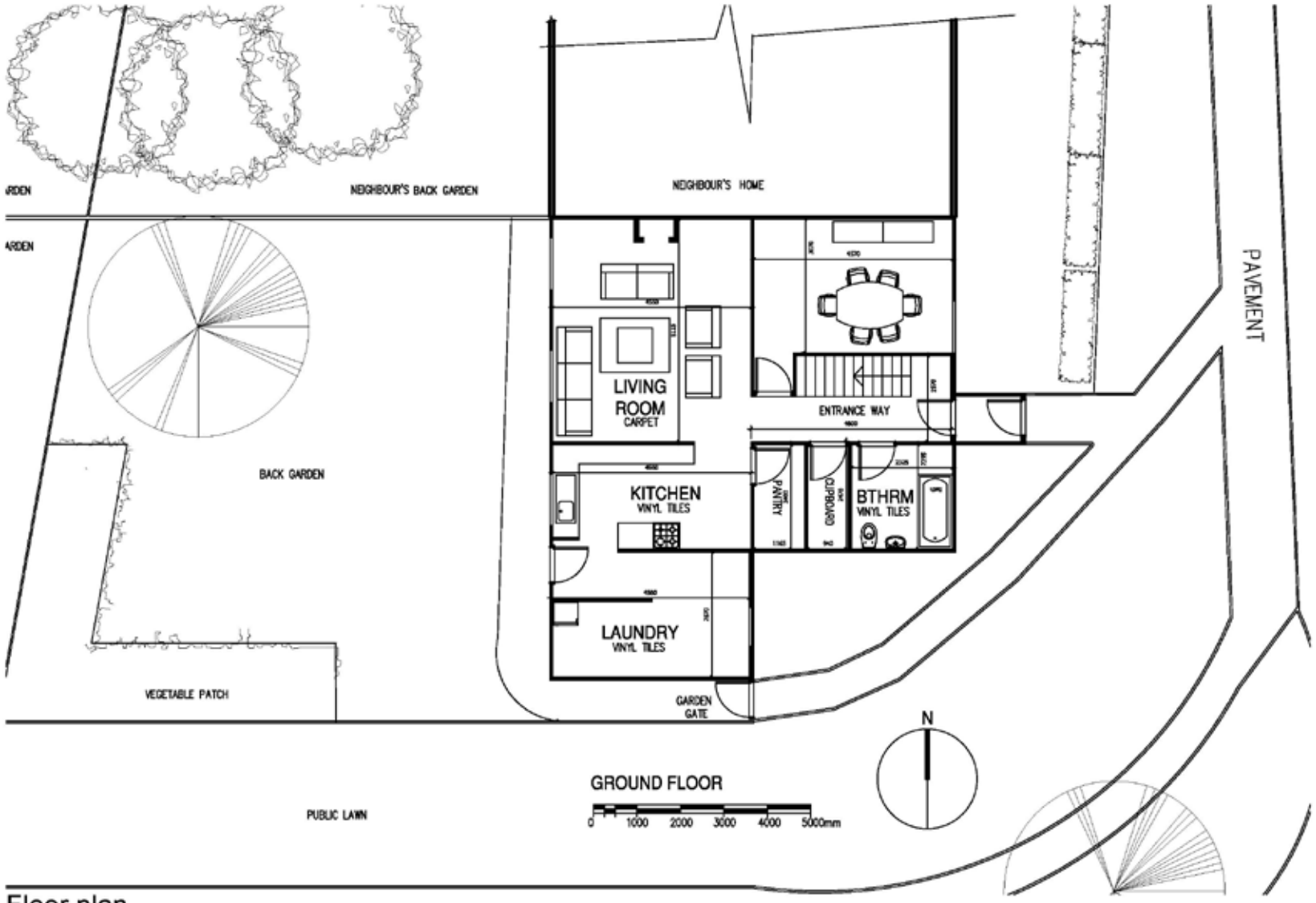
UK House 1	Semidetached

Room Name:	Size and Area	No. of entrances / exits	Doors present	Attached room (Door / wall)	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance to/from surrounding rooms	Sound transmittance to/from to/from main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural Light	Natural Ventilation	No. and size of openings for ventilation hxw
Garage	3.85x5.2=20.02	2	2	Front yard, Backyard, (Bedroom 1, Bathroom 1)	1	1	1	1	Very private with exception of view from the front yard	0/20.02=0	No, 0%	4	3	Garage Door
Dining Room	3.85x3.15=12.13	1	1	Passage (Sitting Room, Front yard)	1	1	2	2	Very private with exception of view from the front yard	2.034/12.13=0.167	Yes, 17%	1	1	1xL
Sitting Room	4.7x3.2=15.04	1	1	Passage (Dining Room, Kitchen, Backyard)	1	1	2	2	Good acoustic privacy due to location and acoustic insulation properties of carpet	2.034/15.04=0.134	Yes, 13%	3	2	1XL. But the room is deep so not sufficient
Kitchen	4.25x2.5=10.63	2	1	Backyard, Passage , (Sitting Room)	1	3	3	3	Adequate for set function	2.034/10.63=0.191	Yes, 19%	1	1	1XL
Bedroom 1	3.2x3.4=10.88	1	1	Passage, (Bathroom Front yard)	1	2	2	2	Good privacy due to location	2.034/10.88=0.19	yes, 19%	3	1	1XL
Bathroom 1	1.8x3.4=6.12	1	1	Bedroom1 (Kitchen, Storage, Backyard, Garage)	1	1	2	1	Very Private	0.714/6.12=0.116	Yes, 12%	3	2	1X S
Bedroom 2	3.9x3.15=12.98	1	1	Passage (Bedroom3)	2	2	3	1	Not Private enough due to location next to other rooms	3.37/12.98=0.259	Yes, 26%	2	1	1XL
Bedroom 3	4.8x3.15=15.12	1	1	Passage (Bedroom 2)	2	2	2	1	Not Private enough due to location next to other rooms	3.37/15.12=0.22	Yes, 22%	1	1	1XL
Bedroom 4	4.3x3.4=14.62	1	1	Passage (Toilet)	2	2	1	2	More private due to location in passage and relative to othe rooms. Larger room means that activities happen in the areas of the room that are further from others	3.37/14.62=0.23	Yes, 23%	2	1	1XL. Wrong orinetation
Toilet 1	3.6x.95=3.42	1	1	Passage (Bathrrom, Bedroom 4)	2	3	3	2	Location at top of stairs takes away acoustic sense of privacy	0.36/3.42=0.105	Yes, 11%	1	1	1XS
Bathroom 2	3.3x2.2=7.26	1	1	Passage (Toilet, Bedroom 3)	2	2	2	2	Location at top of stairs takes away acoustic sense of privacy	1.0305/7.26=0.142	Yes, 14%	1	1	1XM
Stair Passage	5.48x1.9=10.4	11	10	Dining Room, Sitting Room , Kitchen, Storage, Bedroom 1 (Bathroom1),Bedroom 2-4, Toilet	3	3	3	3	Adequate for set function	0/10.4=0	0%	2	1	None.Light from doorway and attached rooms
	1.5+20.02+12.13+15.04+10.63+10.88+6.12+12.98+15.12+14.62+3.42+7.26+10.4													

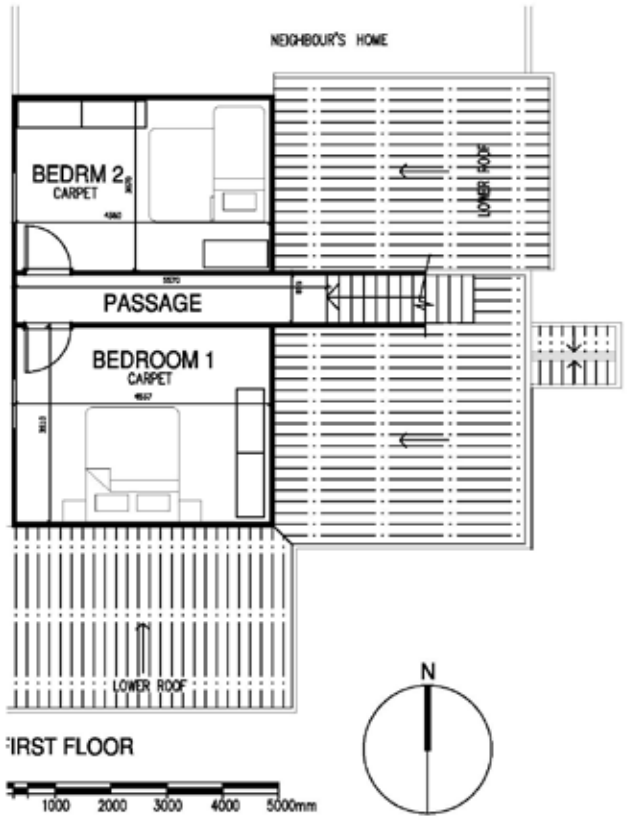
Table 7.3 - UK House 1 - Summary of conditions

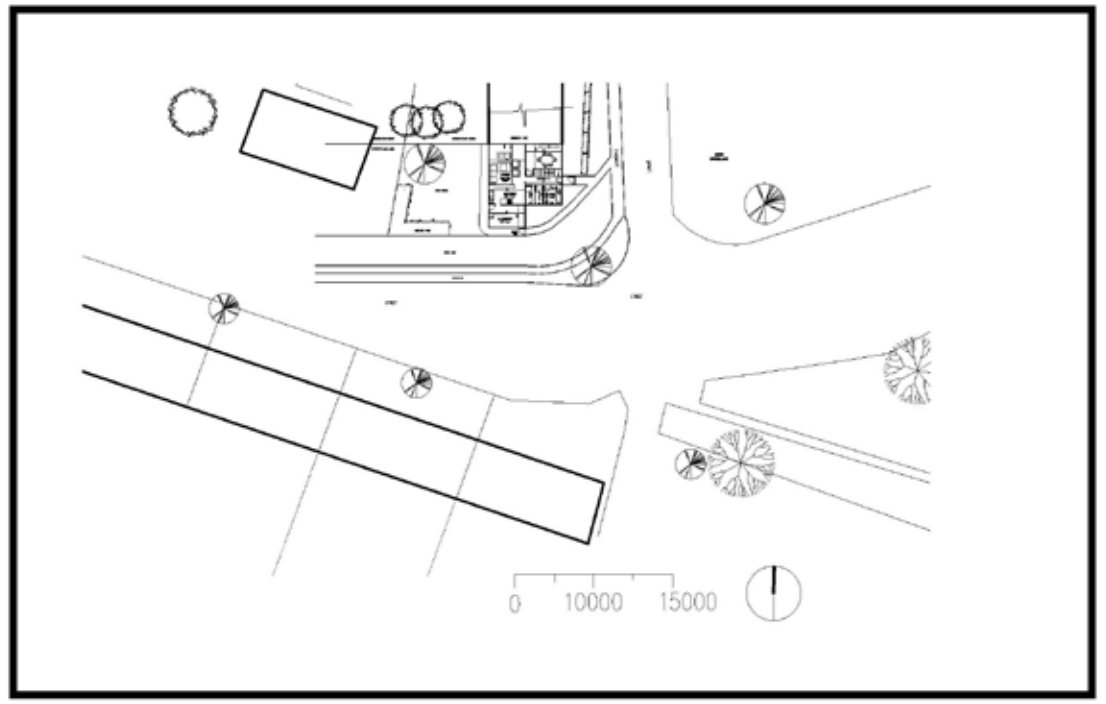
UK House 1	
Outdoor space typology	Backyard
Area in square metres	
Opportunities for gardening in pots	Possible for more than 10 pot plants (0.75 x 0.32mm x 10)
Space available for small scale vegetable gardens	2: 1-3 vegetable beds possible (15m2)
Space available for fruit trees	Maximum 6 fruit trees (6 x 3.5m2)
Space available for large scale subsistence farming	1 - Area available for a single field of a single crop (55m2)
Space available for practice of sports	5 -Space available for 12 players
Space for gathering people	5: 12 people or more (18m2 or more) - with a max capacity of 25 people in either the front or back yard.
Space for little children to play safely	5- Space for up to 20 children to play safely (60m2)

Table 7.3 - UK House 1 Summary of conditions continued

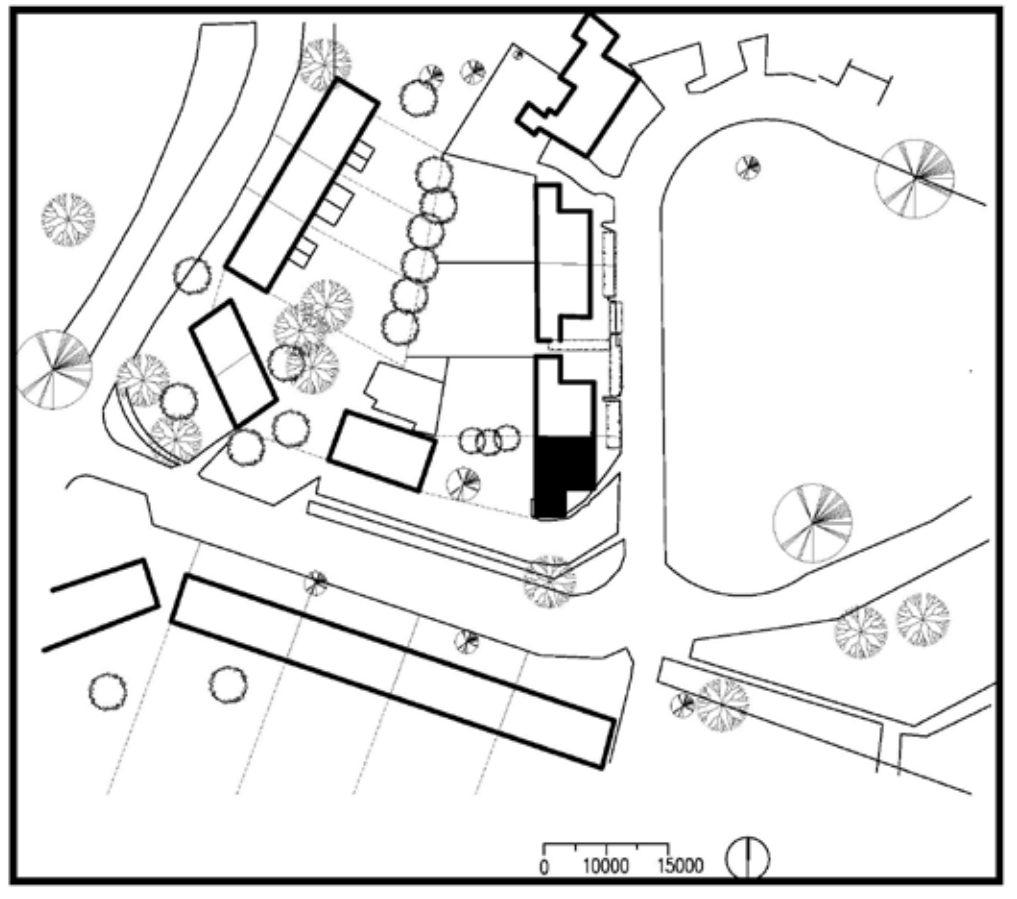


Floor plan





Context plan



Site plan

Case study Family: Brown Family
Location B
Inhabitants: Father, Mother, Son x2

Figure 7 13: UK House 2 - Floor plan, site plan and context plan

Figure 7.14 UK House 2 - Locality map (Google 2017) – See *Figure 7.7* for legend

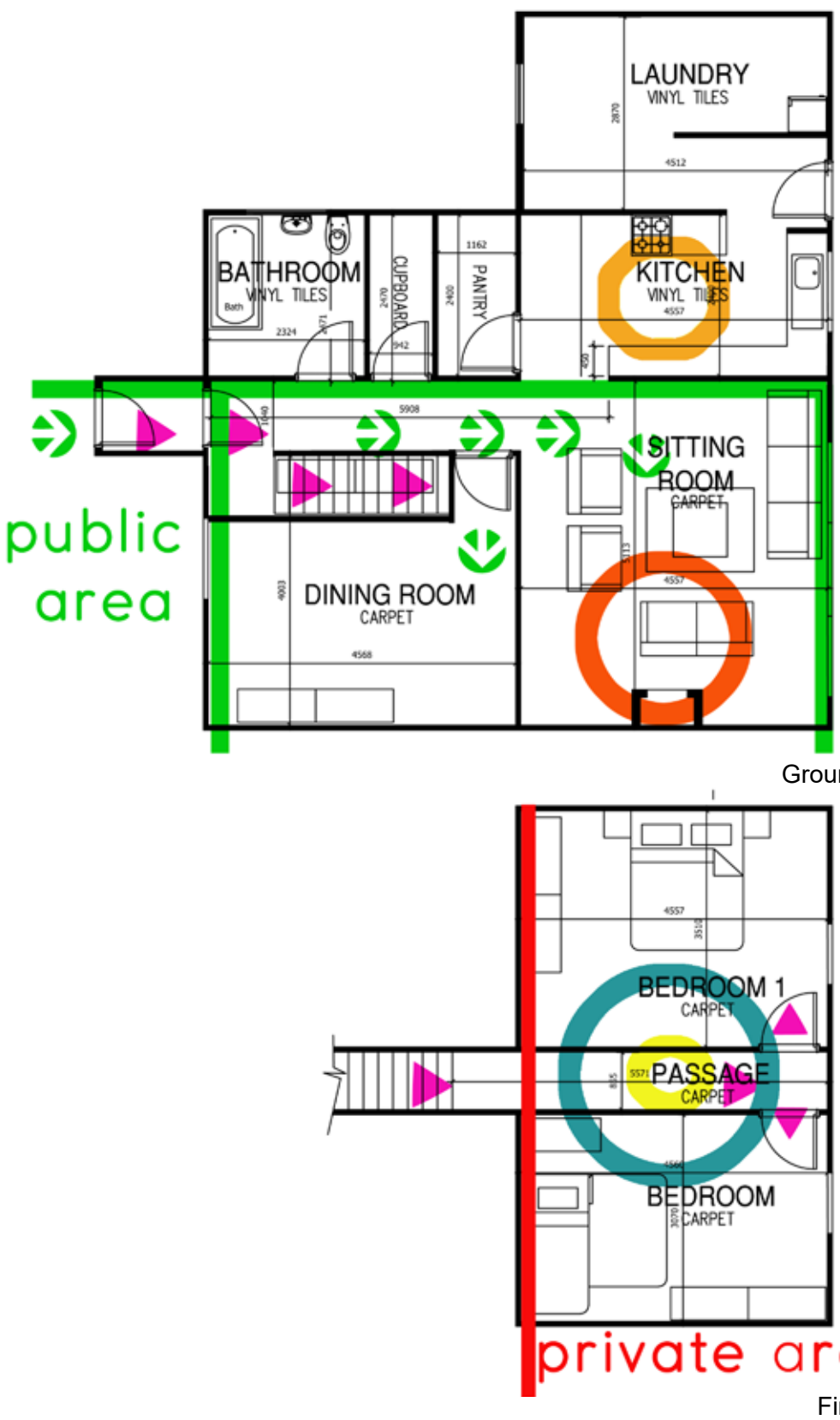


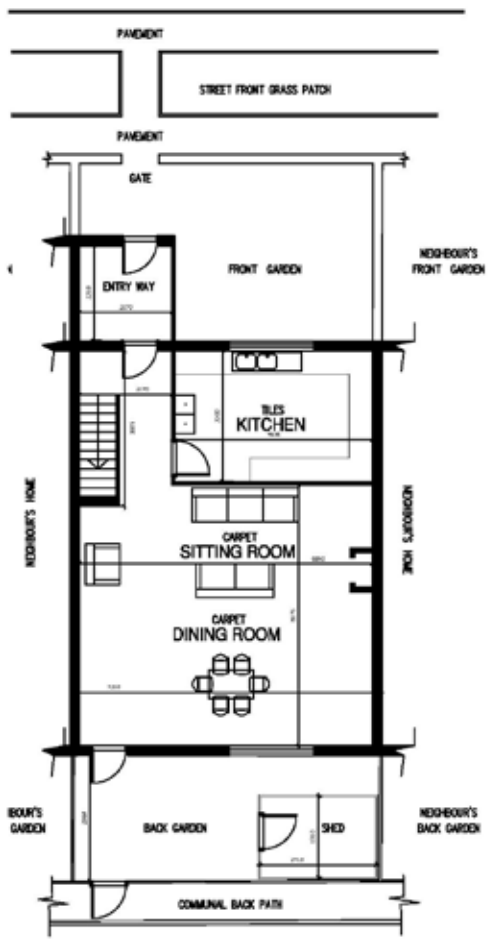
Figure 7. 15: UK House 2 - User and public/private maps See Figure 7.8 for legend

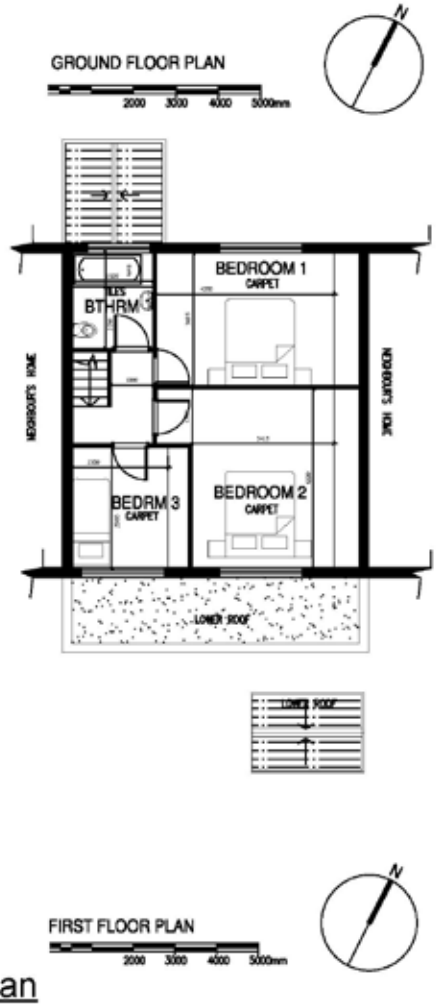
UK House 2	Semidetached-Cabin													
Room Name:	**Size and Area**	**No. of entrances / exits**	**Doors present**	**Attached room (Door / wall)**	**Resultant Visual Privacy**	**Acoustic Privacy**	**Sound transmittance to/from surrounding rooms**	**Sound transmittance to/from to/from main rooms**	**General Comments on privacy**	**Daylight Factor: Area of window/Total Area**	**Daylight Factor: Area of window >10% of total square foot area of room**	**Natural Light**	**Natural Ventilation**	**No. and size of openings for ventilation hxw**
Bathroom	2.324x2.4=5.58	1	1	Passage (Cupboard, Front yard)	1	1	2	2	Is seemingly not-private due to location nex t to front door but is away from areas with most human traffic	1.03/5.58=0.184	Yes,18%	1	1	1xM
Cupboard	.942x2.4=2.26	1	1	Passage, (Bathroom, Passage)	1	1	1	1	Good	0/2.26=0	No, 0%	4	4	None
Pantry	2.400x 1.162=2.87	1	1	Kitchen, Passage (Bathroom, Front yard)	1	1	1	1	Very Good	0/2.87=0	No, 0%	4	4	None. Doorway
Kitchen	4.56x2.4=10.94	3	1	Laundry Room, passage, Living room (Backyard)	1	3	2	2	Suitable	2.03/10.94=.185	Yes, 18%	2	2	1XL
Laundry Room	2.87x4.5=12.915	1	0	Kitchen (Front yard)	1	1	1	1	Most private area in the home	2.034/12.915=0.15	Yes, 15%	3	2	1XL
Sitting Room	4.5*5.1=22.95	2	0	Kitchen, Passage (Dining Room, Back yard)	2	1	2	2	Good	3.75/22.95=0.163	Yes,16%	3	1	2 X L
Dining Room	4 x 4.5=17.8	1	1	Passage(Sitting Room, Front yard)	1	2	1	2	Very Private, with execption of window onto front yard	2.034/17.8=0.11	Yes, 11%	2	1	1XL
Bedroom 1	4.6x3.5=16.1	1	1	Upstairs Passage (Kitchen below)	1	1	2	1	Very private with exception of flow of noise to rooms below	2.03/16.1=0.12	Yes, 12%	3	1	1XL
Bedroom 2	4.6x3.1=14.26	1	1	Upstairs Passage (Living room below)	1	2	2	1	Very private with exception of flow of noise to rooms below	1.03/14.26=0.07	No, 7%	3	1	1X M
Passage way	1.04x5.9=6.14	6	4	Bathroom, Cupboard, Entranceway,Dining Room , Sitting room, (pantry)	2	3	3	3	Adequate for set function	0/6.14=0	No, 0%	1	1	None. Light from surrounding rooms and doorway
Upstairs Passage	5.6x.86=4.2	3	2	Bedroom 1, Bedroom 2, Stairway	4	4	3	3	Adequate for set function	0.714//4.2=0.116	Yes, 12%	1	1	1xS +Light from rooms below and above
	6.15+5.58+2.26+2.87+10.94+12.915+22.95+17.8+16.1+14.26+4.2													
	120.025													

Table 7.4 - UK House 2 Summary of conditions

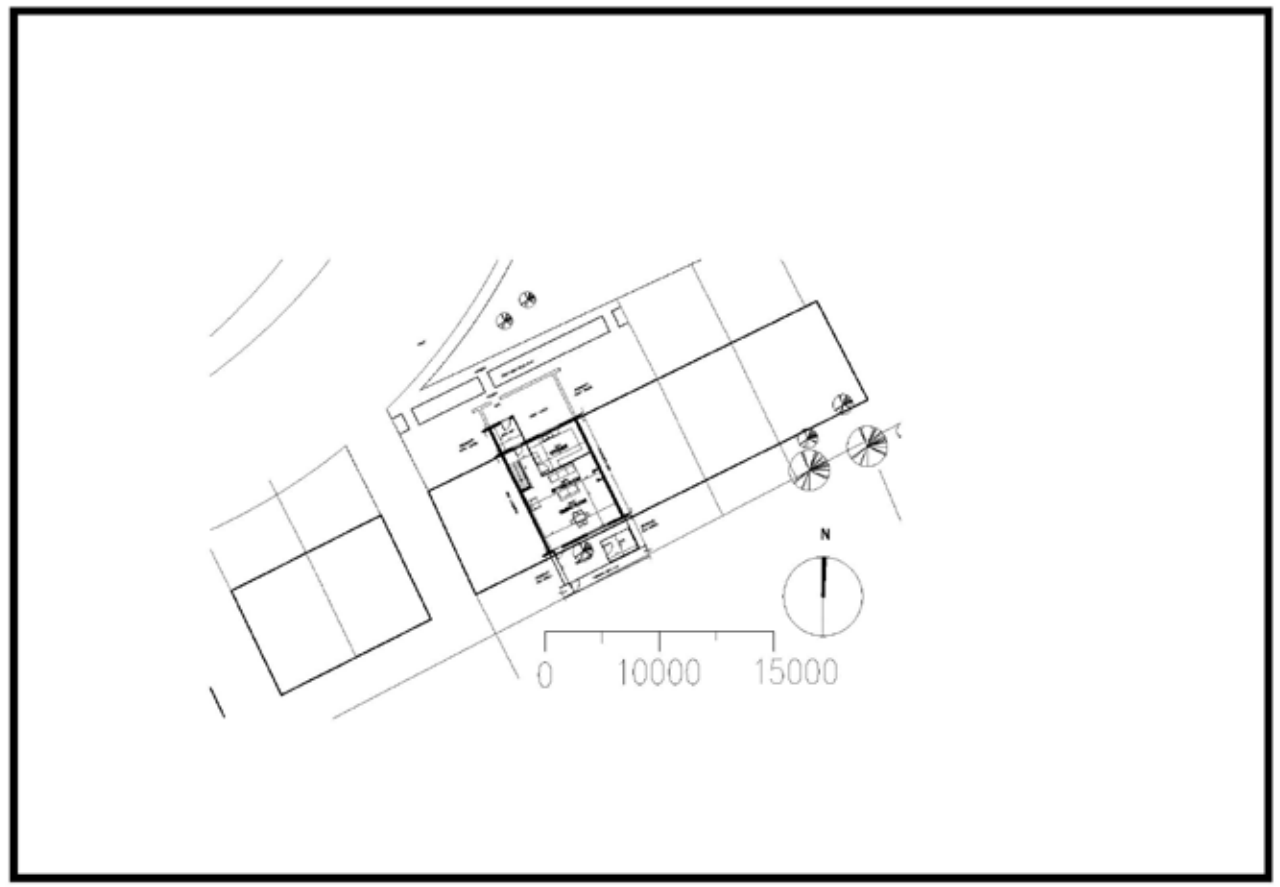
UK House 2	
Outdoor space typology	Backyard
Opportunities for gardening in pots	Possible for more than 10 pot plants (0.75 x 0.32mm x 10)
Space available for small scale vegetable gardens	4-Space available for 1-4 vegetable beds possible (40m2)
Space available for fruit trees	Maximum 3 fruit trees (3 x 3.5m2)
Space available for large scale subsistence farming	0- Not possible
Space available for practice of sports	1 -Maximum of 4 players safely
Space for gathering people	4 - Maximum of 8-10 people comfortably (15m2)
Space for little children to play safely	2 - Safe play of 8 children safely (24m2)

Table 7.4- UK House 2 Summary of conditions continued

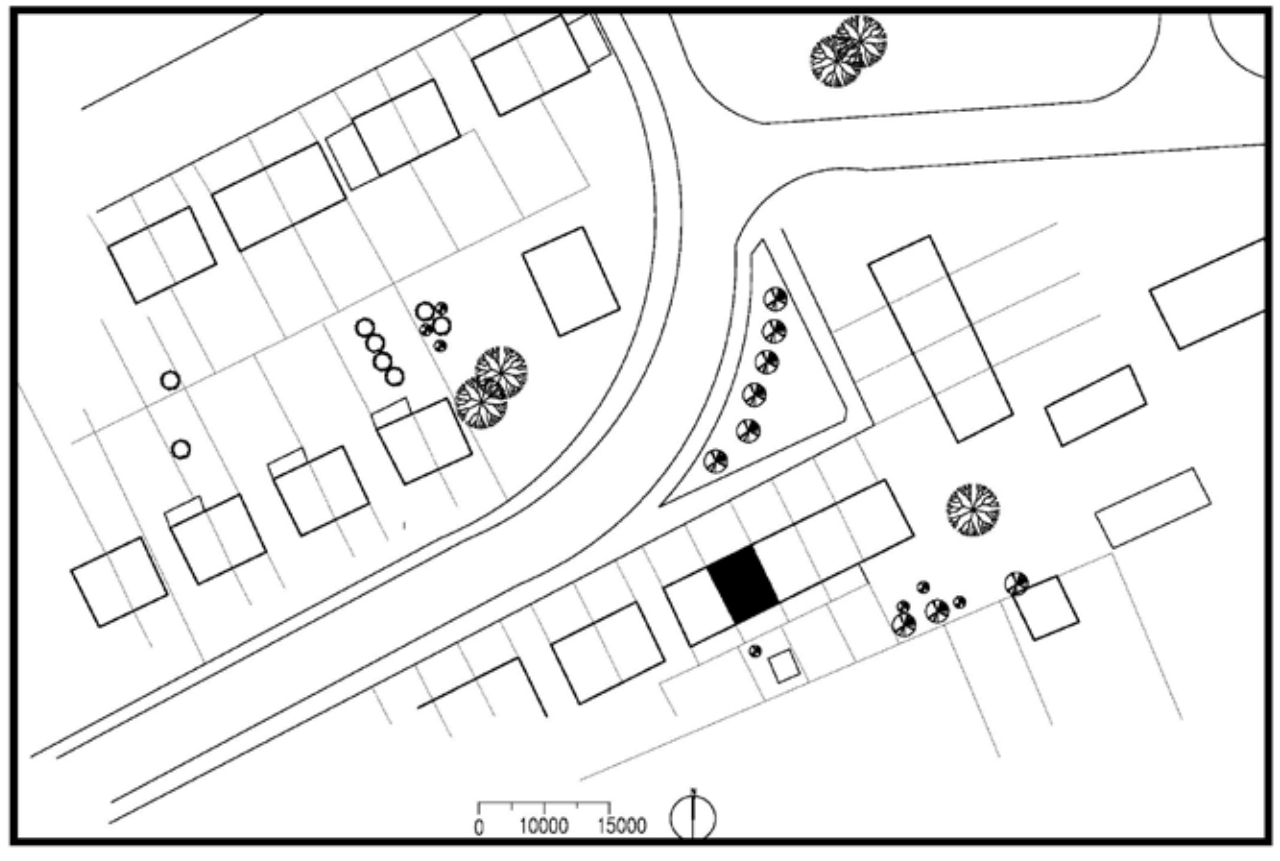




Floor plan



Context plan



Site plan

Case study Family: Yellow Family
Location B
Inhabitants: Father, Mother, Son , Daughter

Figure 7.16 UK House 3 - Floor plan, site plan and context plan

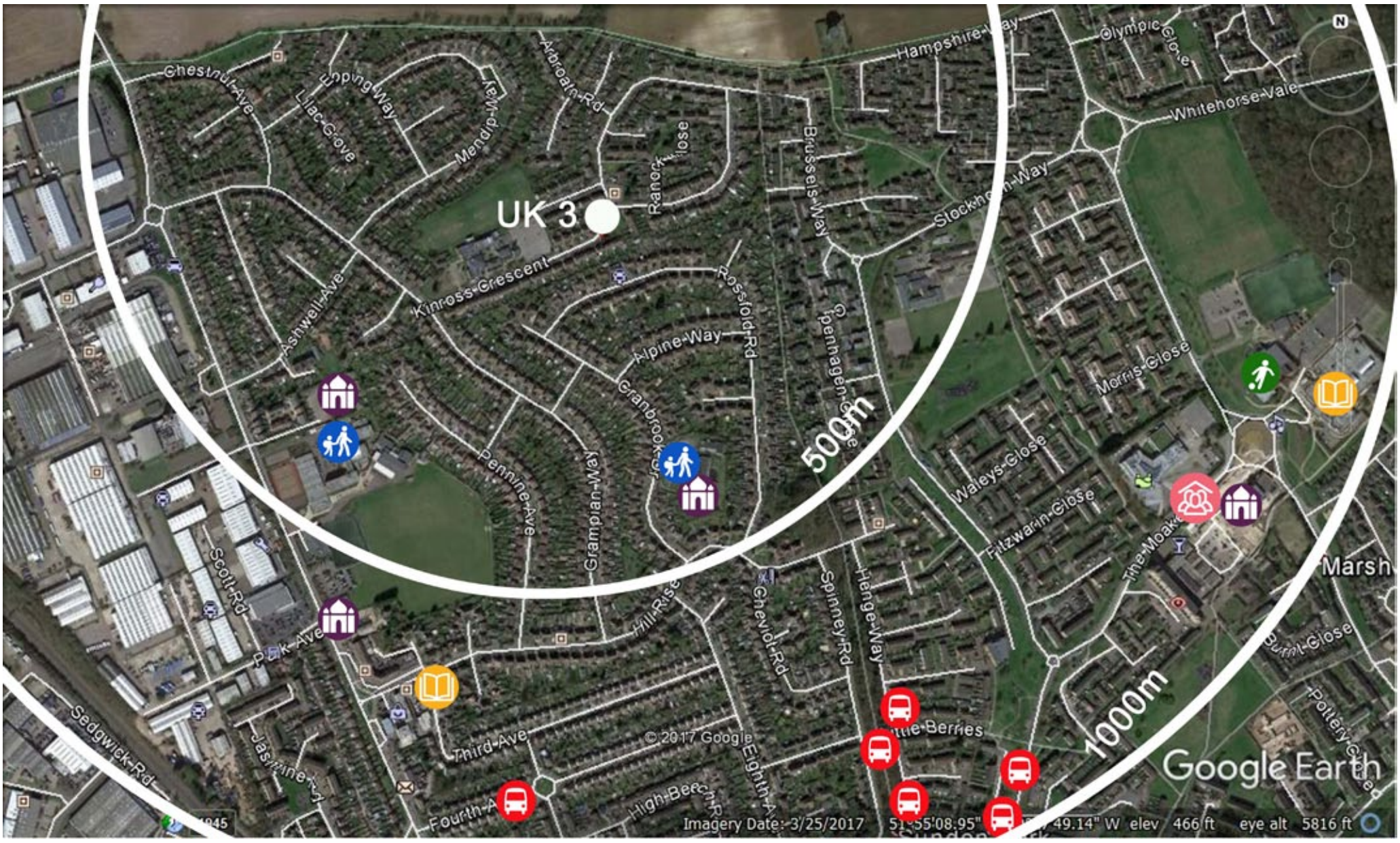


Figure 7.17 UK House 3- Locality Map. *(Google 2017) – See Figure 7.7 for legend*

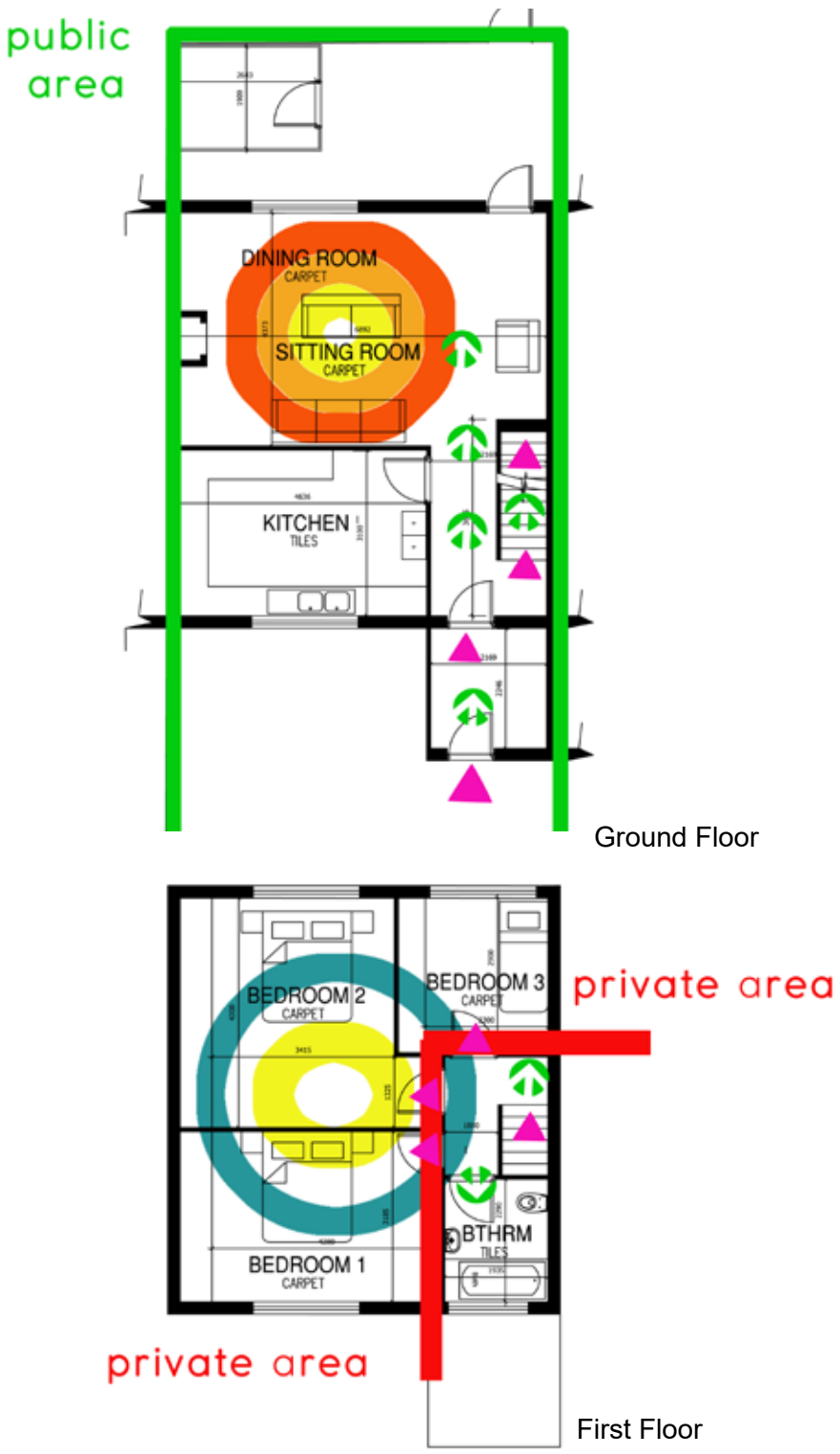


Figure 7.18 . UK House 3- User and Public/Private Maps. *See See Figure. 7.8 for legend*

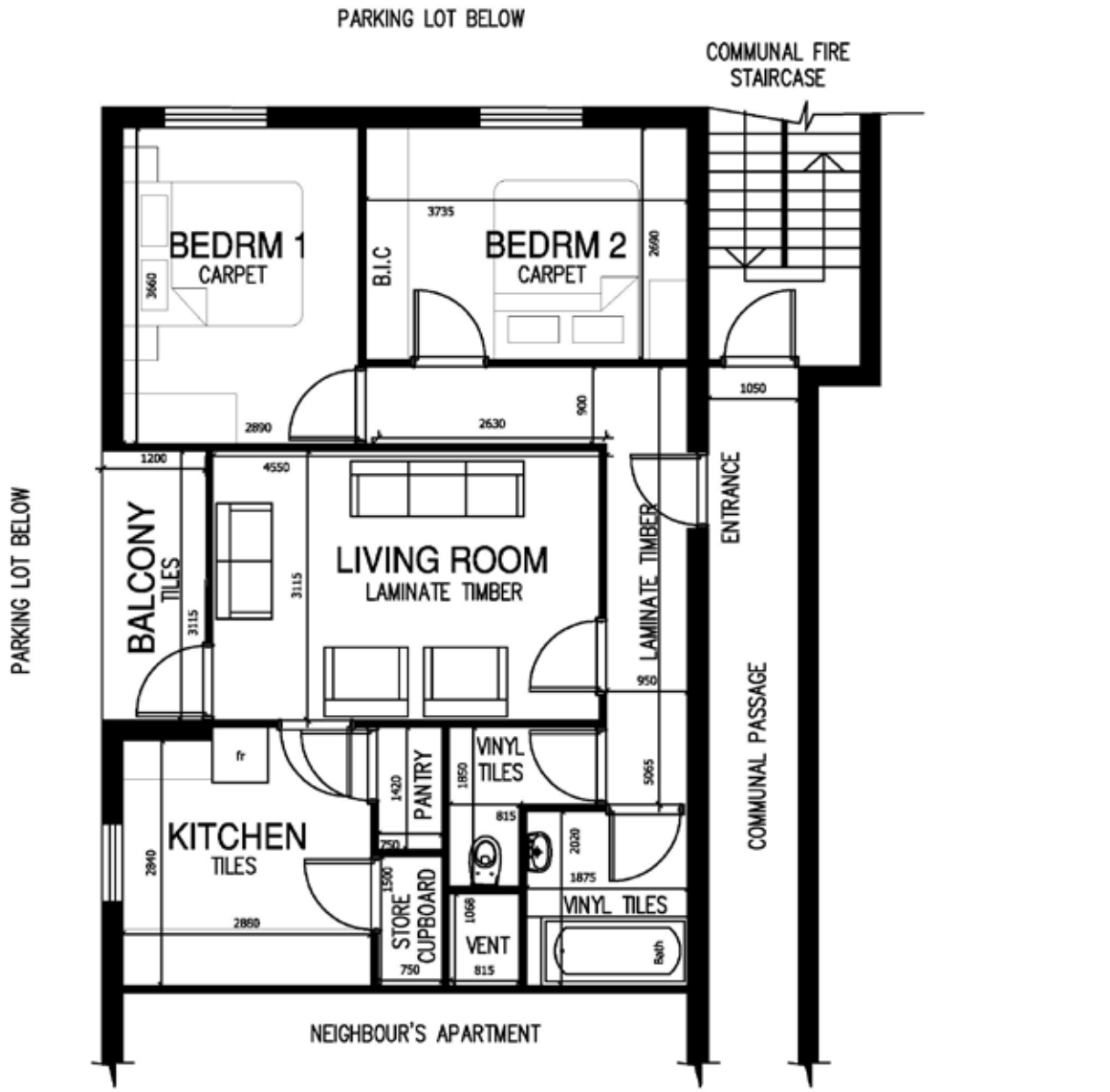
UK House 3 - Rowhouse

Room Name:	Size and Area	No. of entrances / exits	Doors present	Attached room	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance to/from surrounding rooms	Sound transmittance to/from to/from main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural light	Natural Ventilation	No. and size of openings for ventilation hxw
Entrance Hall	2.25*2.17=4.88	2	2	Passage (Kitchen, Neighbour)	1	3	3	3	Acoustic privacy generally not necessary. Not possible due to the double doors	1.91/4.88=.39	Yes, 39%	2	2	1 Door to the outside
***Sitting Room**	4.373*6.892=30.14	2	0	Passage, Stairway, Kitchen , Backyard	1	1	2	2	Well shielded from other rooms in the house	3.75/30.14=0.1244	Yes, 12%	3	3	XL Window
Shed	1.909*2.643=5.05	1		Back garden (Neighbours garden)	1	1	1	1	39	.0714/5.05=0.14	Yes, 14%	3	1	x 1 S Smells damp due to weather
Stair passage	2.96*3.69=10.92	2	2	Passage (Wall shared with neighbour)	4	4	4	4	Privacy may or may not be necessary depending on sstuation	0 /10.95=0	No, 0%	4	2	None
Bedroom 1	4028*3.19=12.85	1	1	Passage (Bathroom, Bedroom 2)	1	2	2	1	Movement and sound are carried into rooms below, which is the kitchen, which makes it ok	2.03/12.85=0.16	Yes, 16%	3	3	1xL
Bedroom 2	4.3*3.42=14.71	1	1	Passage (Bedroom 1 and 3, Backgarden)	2	2	1	1	Movement and sound are carried into rooms below, which is the lounge./not so great	2.03/14.71=0.138	Yes, 14%	3	3	1xL
Bedroom 3	2.9*2.3=6.67	1	1	Passage,Stairway (Back garden, Neighbour, Bedroom 2)	3	2	1	2	Very well located away from the entrances of other rooms.Movement and sound are carried into rooms below, which is the lounge./not so great	2.03/6.67=0.304	Yes, 30%	2	2	1xL
Kitchen	4.34x3.1=13.545	1	1	Passage (Lounge,Neighbour)	1	2	2	3	Very Private, with execption of window onto front yard	2.03/13.545=0.15	Yes, 15%	2	1	1xL
Bathroom	2.29*1.935=4.43	1	1	Passage (Bedroom 1, Stairway, Frontyard, Neighbour)	2	2	2	1	Could be more private, but is in a low traffic area making it private enough	2.03/4.43=40.4588	Yes, 46%	1	3	1xL
	14.353+4.88+30.14+5.05+10.92+12.85+14.71+6.67+4.43													
	104.003													

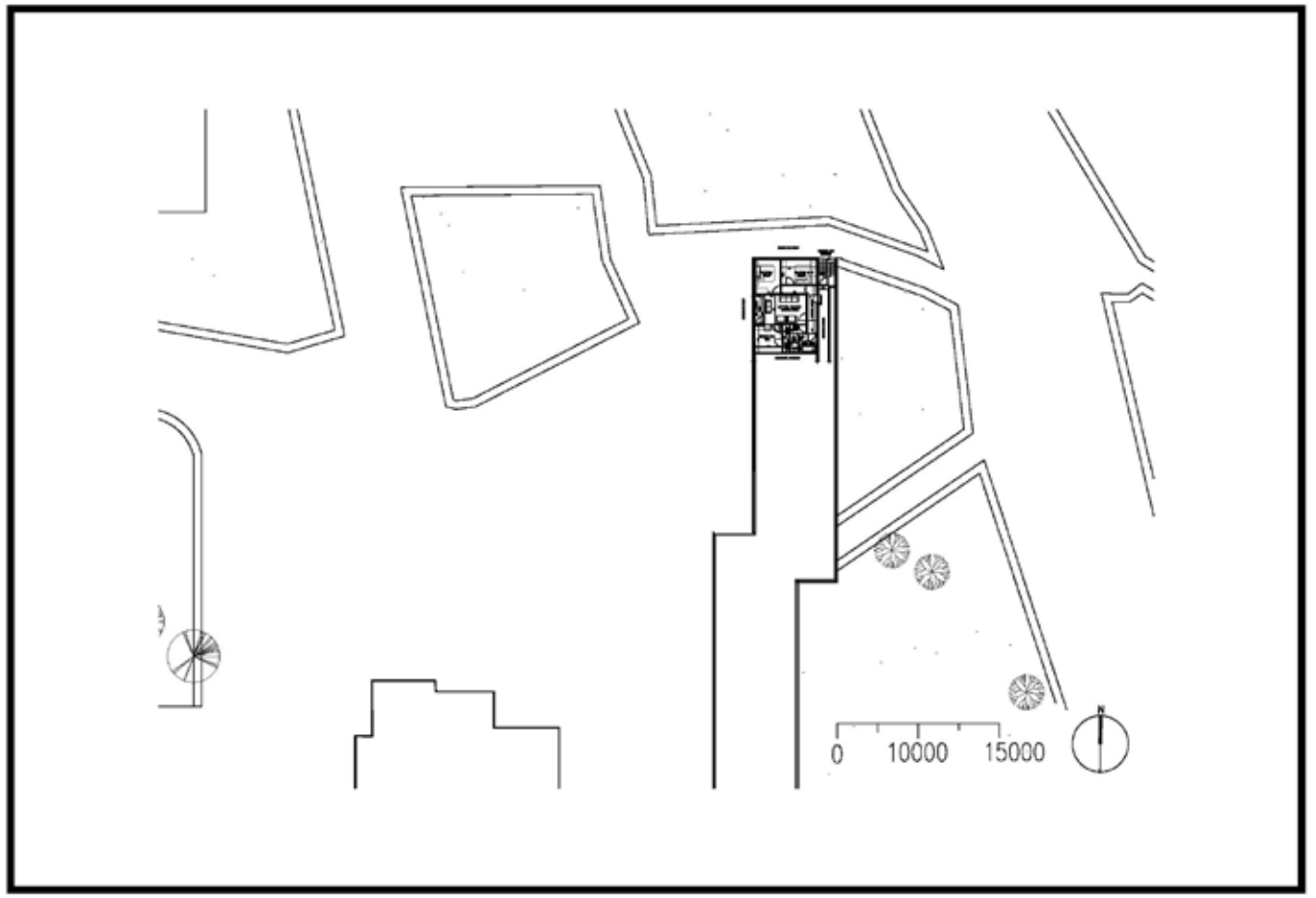
Table 7.5 - UK House 3 Summary of conditions

UK House 3 - Row house	
Outdoor space typology	Backyard
Area in square metres	
Opportunities for gardening in pots	Possible for a maximum of 6 pot plants ((0.75 X 0.32mm) x 6)
Space available for small scale vegetable gardens	0- Not possible (0m2)
Space available for fruit trees	0- Not possible
Space available for large scale subsistence farming	0-Not possible not enough space
Space available for practice of sports	0-Not possible not enough space
Space for gathering people	1 - Maximum of 4 people comfortably (6m2)
Space for little children to play safely	1 - Safe play of 2-4 children safely (12m2)

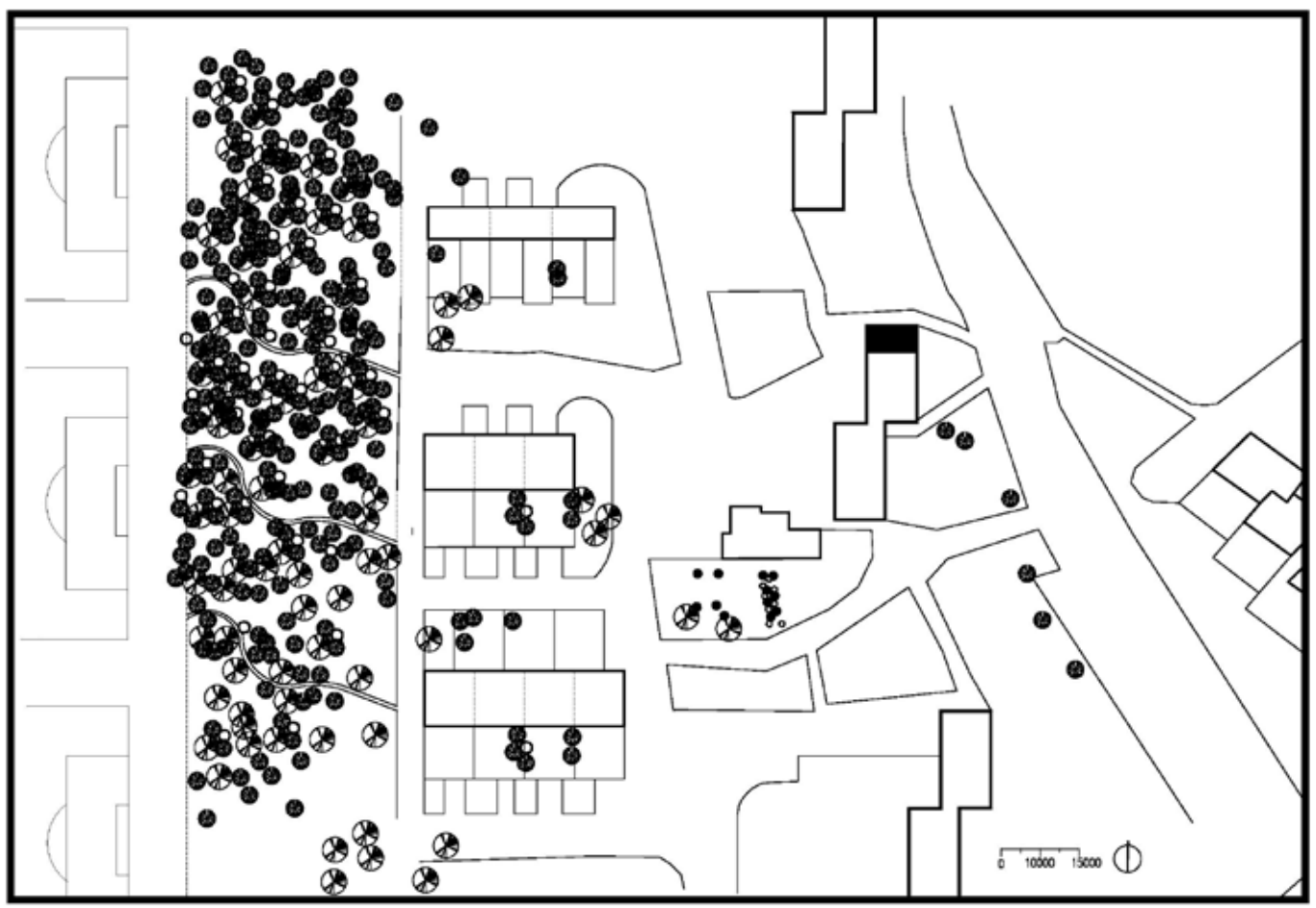
Table 7.5 - UK House 3 Summary of conditions continued



Floor plan



Context plan



Site plan

Case study Family: Pink Family
Location B

Inhabitants: Father, Mother, Daughter

Figure 7 19: UK House 4 - Floor plan, site plan and context plan

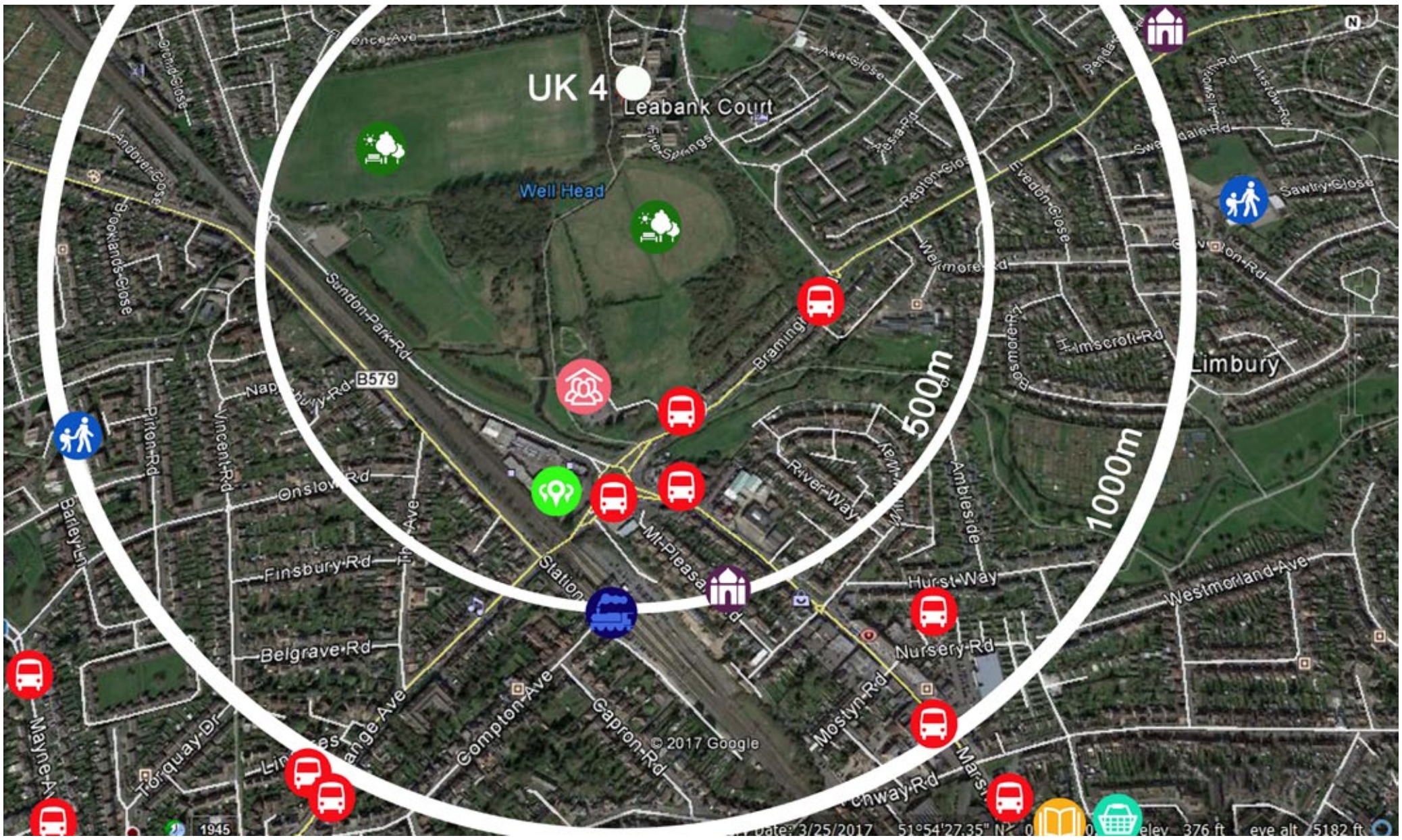


Figure 7.20. UK House 4- Locality map (Google 2017) – See *Figure 7.7* for legend

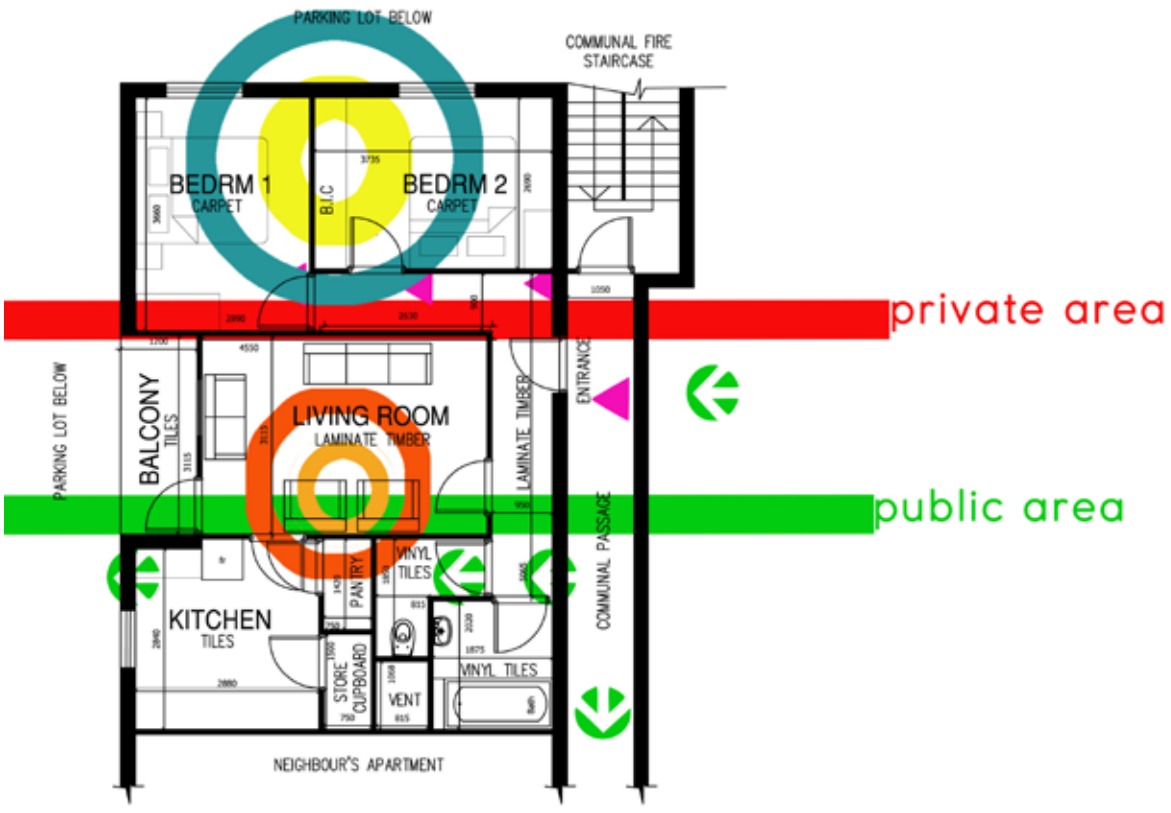


Figure 7.21. UK House 4- User and Public/Private Maps. - See *Figure. 7.8* for legend

UK House 4 **Apartment in high rise in building**

Room Name:	Size	No. of entrances / exits	Doors present	Attached room (Door / wall)	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance to/from surrounding rooms	Sound transmittance to/from to/from main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural Light	Natural Ventilation	No. and size of openings for ventilation hxw
Passage way	(5.1 x .95) (.9x2.6)= 4.845+2.34=7.185	6	6	(Bathroom, Toilet, Sitting Room, Bedroom1, Bedroom 2, External Passage)	3	2	3	3	Adequate for function	0/7.185=0	Yes, 26%	4	2	From doorways of other rooms
Bathroom	2x1.86=3.72	1	1	Passage, (Toilet, Neighbour)	2	2	2	1	Location in house is very well done for small space	0/3.72=0	No, 0%	4	4	None
Toilet	1.85x.9=1.665	1	1	Passage (Kitchen Cupboard, Bathroom)	1	2	1	1	Location in house is very well done for small space	0/1.665=0	No,0%	4	4	None/Fan
Sitting Room	4.55x3.1=14.105	3	3	Balcony, Kitchen, Passage	1	2	2	2	Location in house is very well done for small space	3.7/14.105=0.262	Yes, 27%	2	2	1xXL + door
Kitchen	2.88x2.8=8.065	1	3	Sitting Room (Pantry, Storage cupboard)	1	2	3	3	Location in house is very well done for small space	1.0305/8.065=0.1277	Yes, 13%	1	2	1XM
Balcony	1.2x3.1=3.72	1	1	Sitting Room(Kitchen, Bedroom 1)	1	3	3	3		n/a	n/a	1	1	Door and window into living room
Bedroom 1	2.9x3.67=10.64	1	1	Passage (Bedroom 2, Balcony, Sitting Room)	1	2	2	1	Location in house is very well done for small space	1.0305/10.64=0.096	No, 9%	2	3	M Window + De-Humidifier
Bedroom 2	2.69x 3.59=9.66	1	1	Passage (Bedrrom1, External Parking lot)	2	2	2	1	Least privately located room in the house	1.0305/9.66=0.11	Yes, 11%	3	3	M Window + Humidifier
	7.185+3.72+1.665+14.105+8.065+3.72+10.64+9.66													
	58.76													

Table 7.6 - UK House 4 Summary of conditions

UK House 4	
Outdoor space typology	
	Balcony
Opportunities for gardening in pots	0- Not possible not enough space (0m2)
Space available for small scale vegetable gardens	0-Not possible not enough space
Space available for fruit trees	0- Not possible not enough space (0m2)
Space available for large scale subsistence farming	0- Not possible not enough space (0m2) with amenities nearby (see urban context map).
Space available for practice of sports	0- Not possible not enough space (0m2) with amenities nearby (see urban context map).
Space for gathering people	2- Space for maximum 6 people (9m2)
Space for little children to play safely	1 - Space for 2-4 children to play safely (3-12m2)

Table 7.6 - UK House 4 Summary of conditions

7.4 RESEARCH DATA FOR CASE STUDY HOMES IN SOUTH AFRICA

Findings for the South African case study homes are featured in this section, in this order:

South African (RSA) homes raw data

***Figure 7.22*: Legend: South Africa case study amenity maps**

***Figure 7.23*: Legend for South Africa case study homes: Behaviour maps**

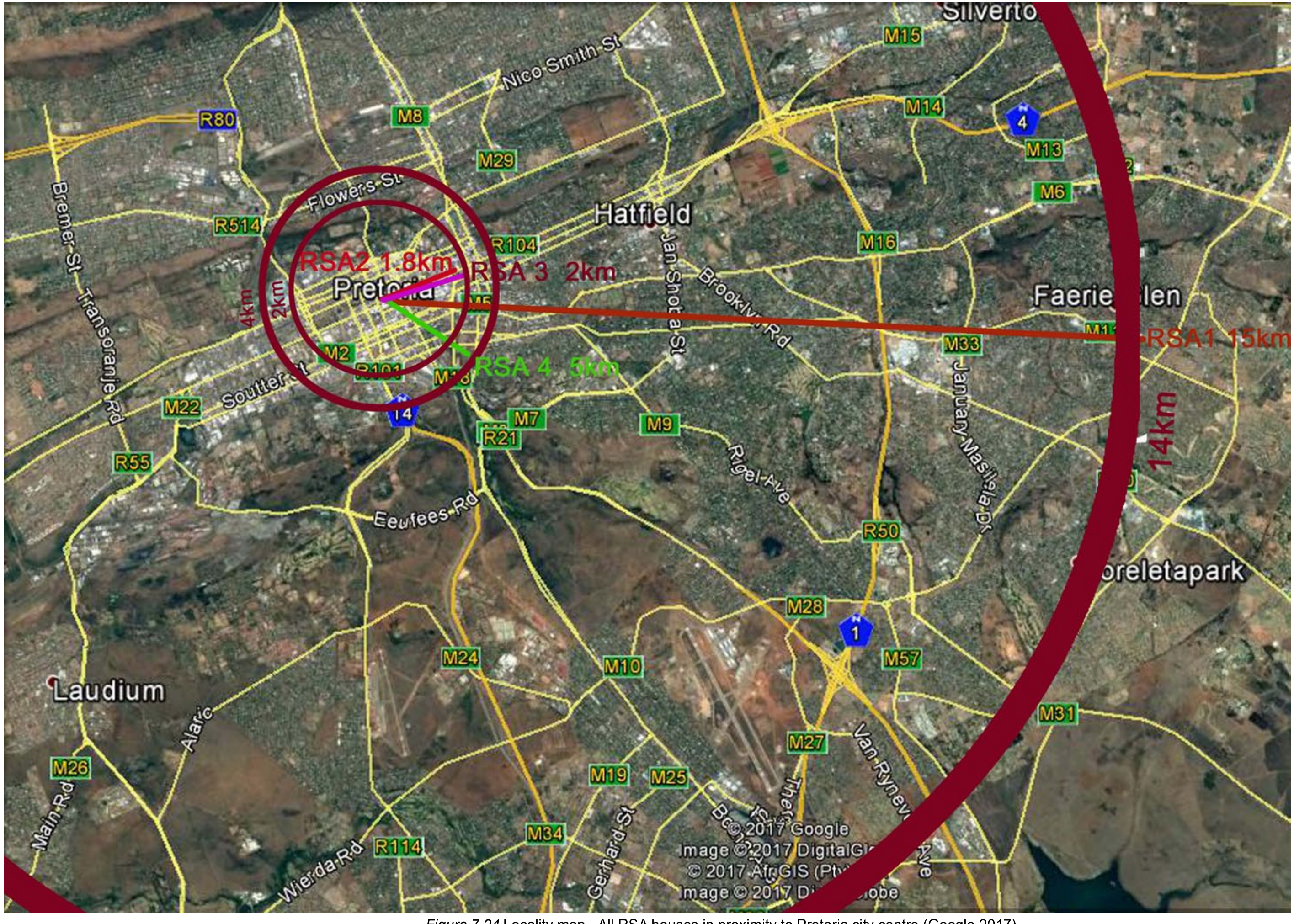
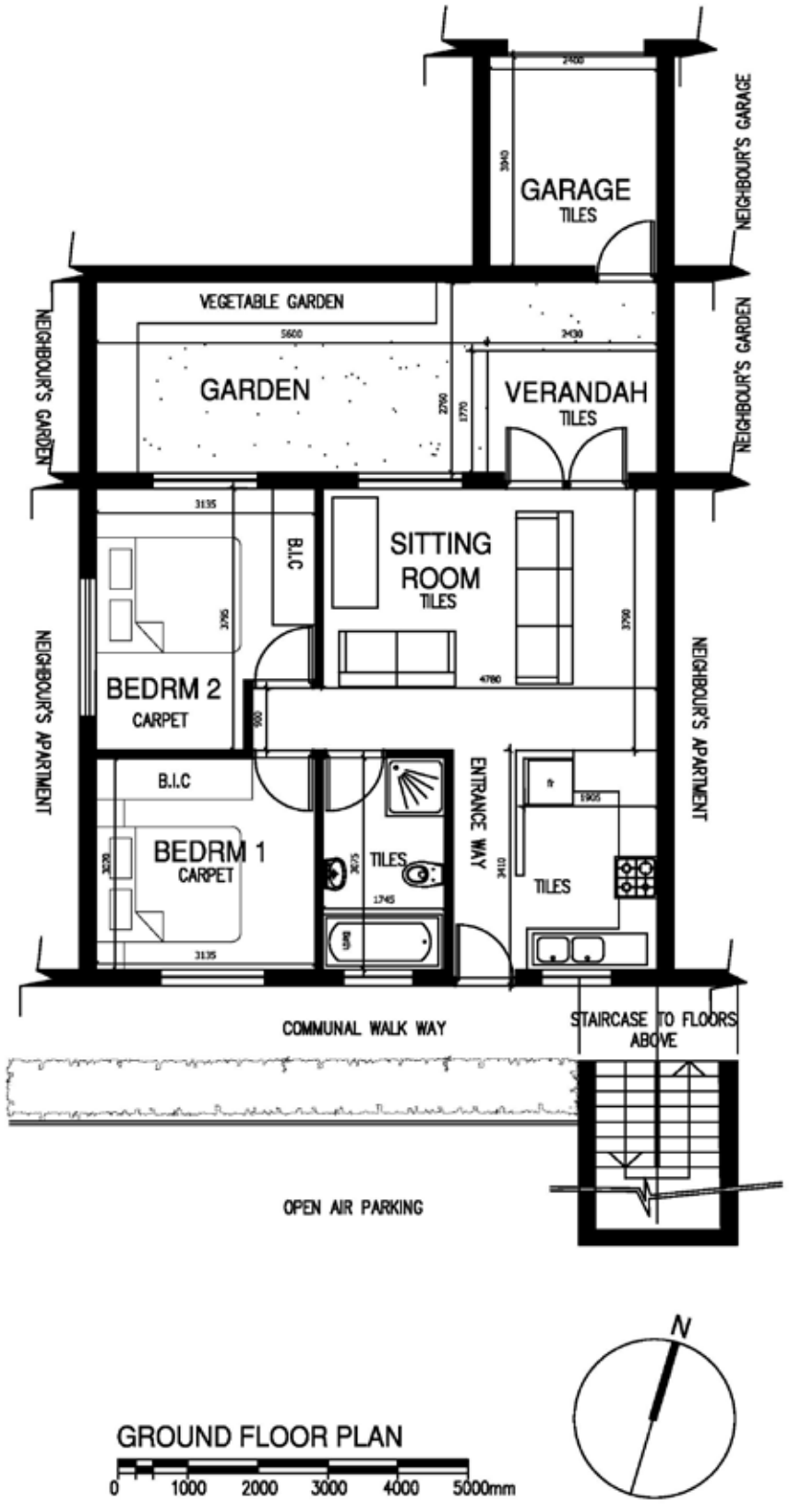
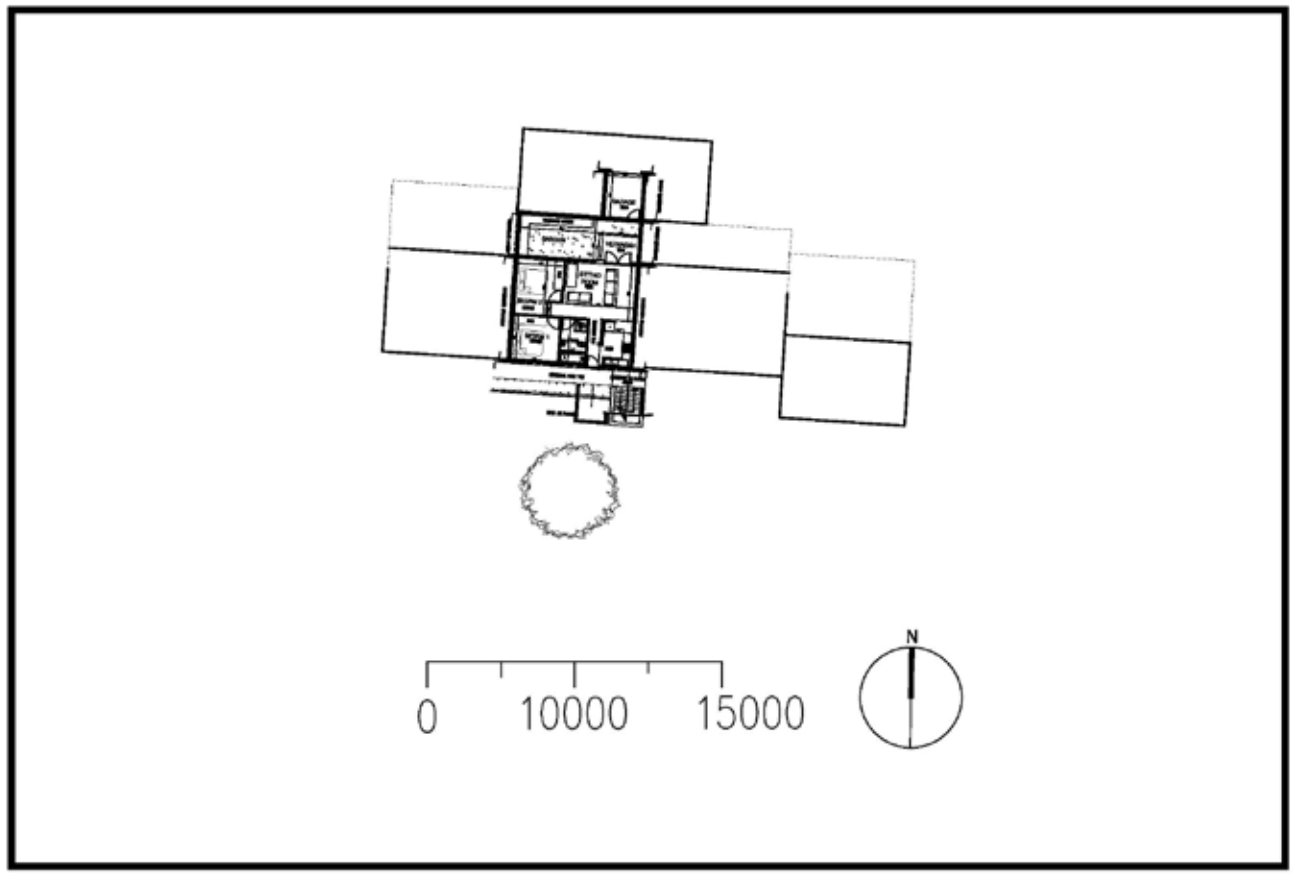


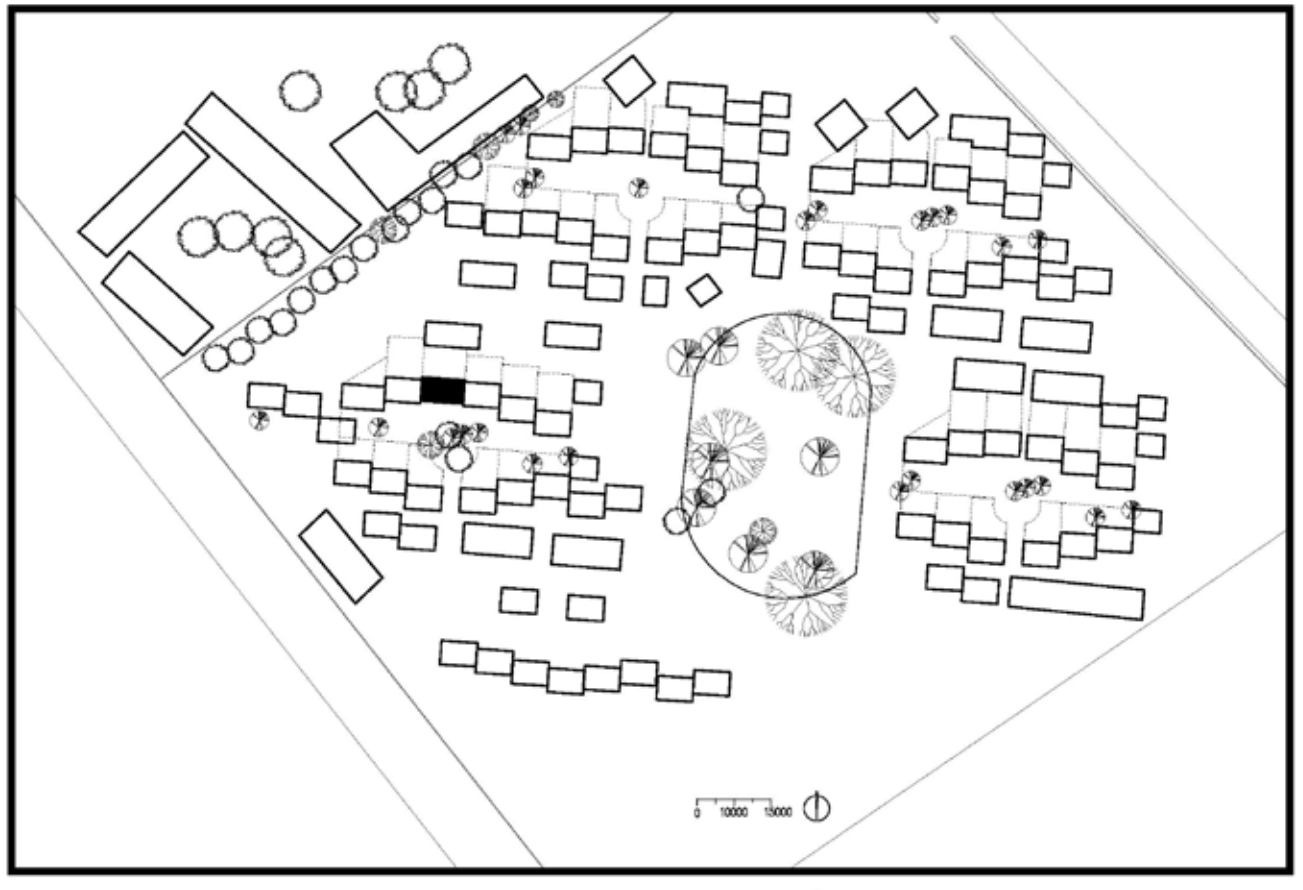
Figure 7.24 Locality map - All RSA houses in proximity to Pretoria city centre (Google 2017)



Floor plan



Context plan



Site plan

Case study Family: Red Family
Location B
Inhabitants: Husband, Wife , Mother in Law

Figure 7.25 RSA House 1 - Floor plan, site plan and context plan

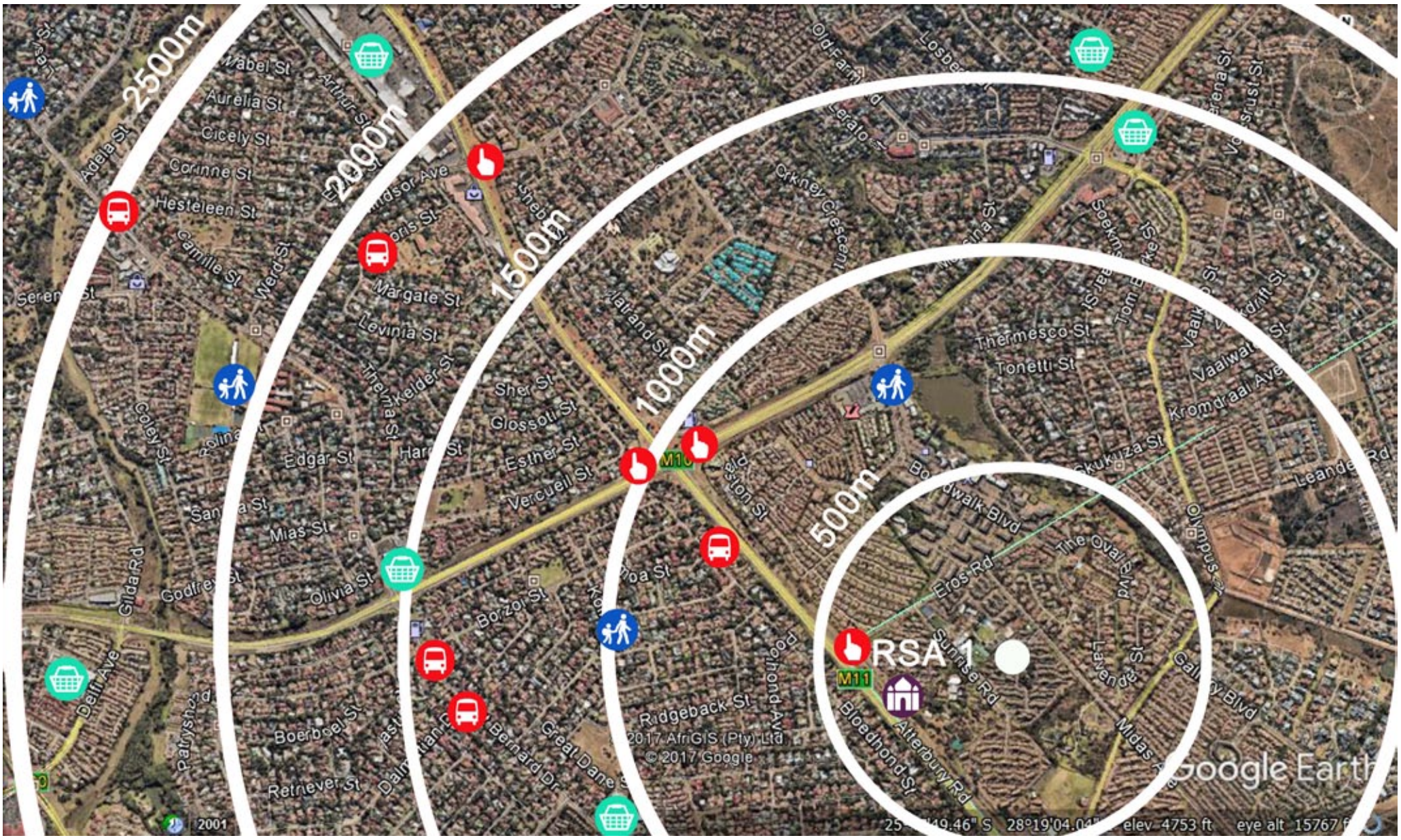


Figure 7.26: RSA House 1 - Locality map (Google 2017) – See Figure 7.22 for legend

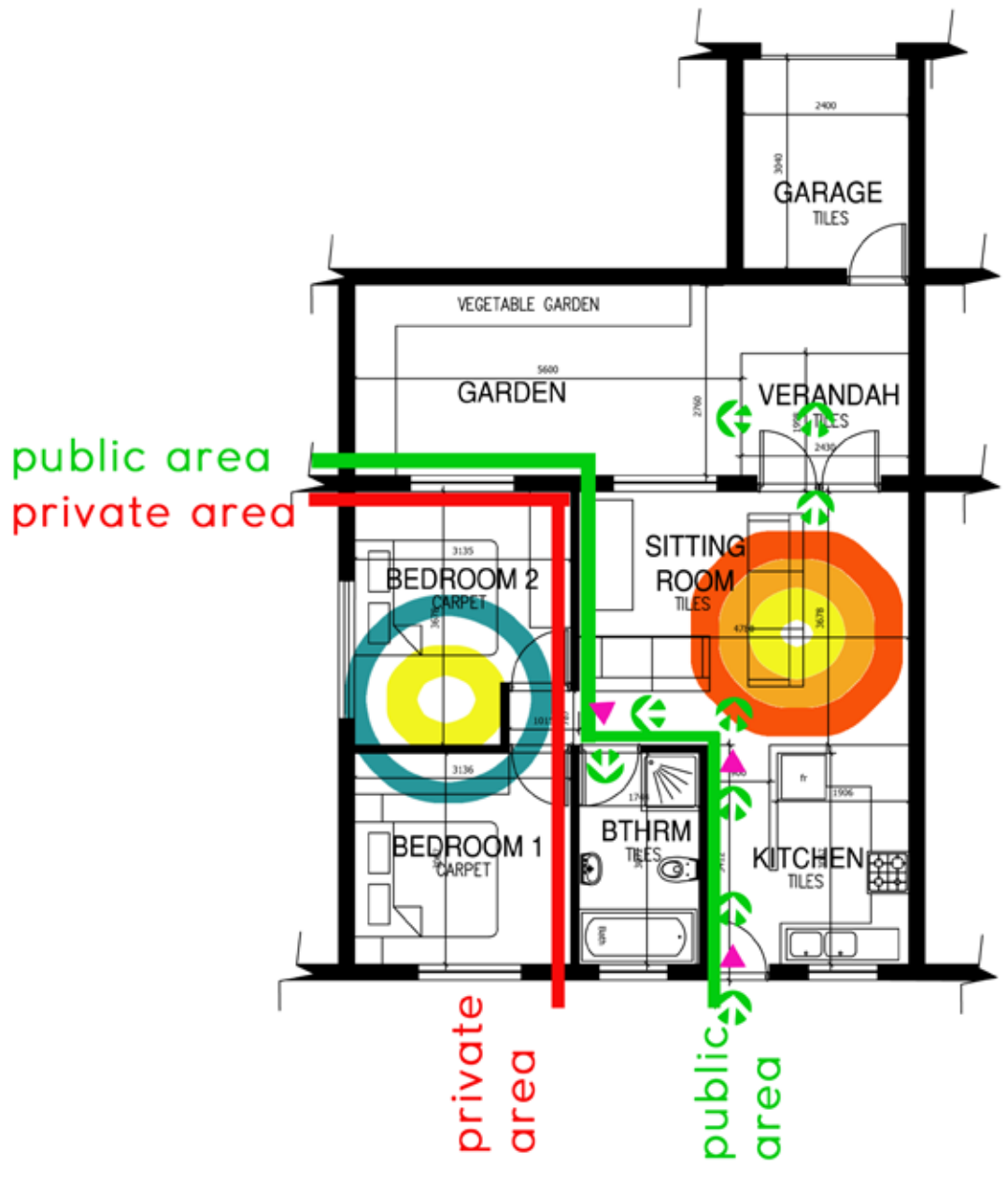


Figure 7.27 RSA House 1 - User and public/private maps – See Figure 7.23 for legend

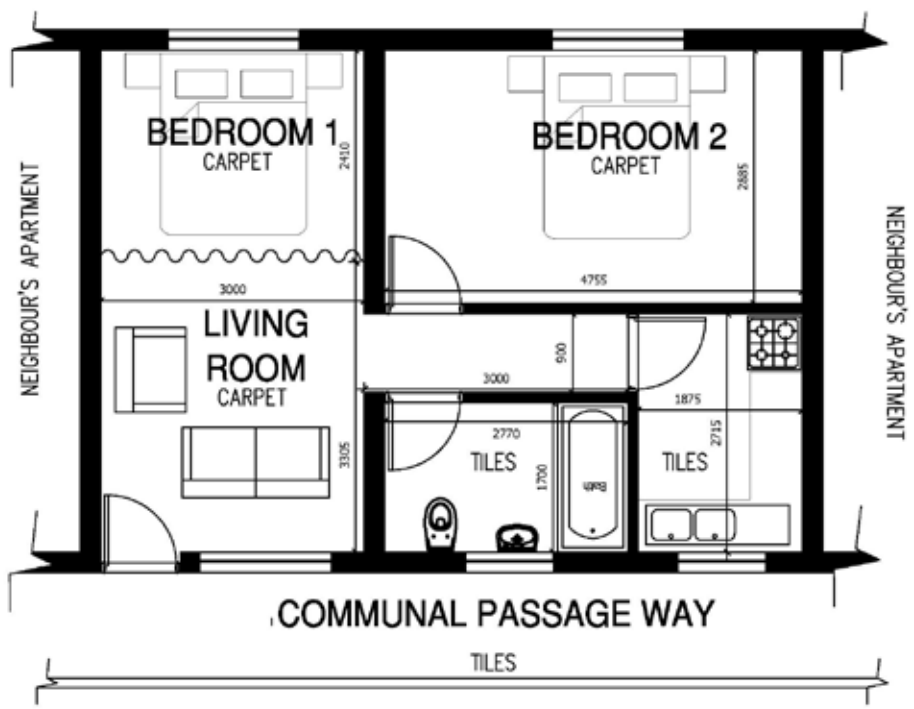
RSA House 1
Walkup

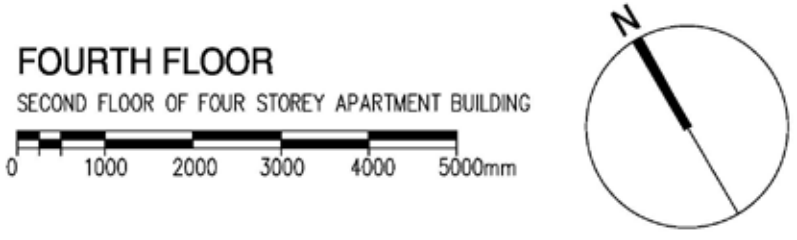
Room name:	Size	No. of entrances / exits	Doors present	Attached room	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance to/from surrounding rooms	Sound transmittance to/from main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural Light	Natural Ventilation	No. and size of openings for ventilation hxw
Bedroom 1	3.1 x 3=9.1	1	1	Sitting Room	2	2	3	2	Entrances to bedrooms are to public	2.034/9.1	Yes, 22%	3	1	x 1 L Window
Bedroom 2	3.7 x 3.14=11.62	1	1	Sitting Room	1	2	3	2		1.0305/11.62	No, 8%	2		x 1 M Window
Sitting Room	4.8 x 3.7=17.76	4	4	Bedroom 2, Bedroom 1, Bathroom, Kitchen	1	2	4	2		2.034/17.76	Yes, 11%	2		x 1 L Window
Bathroom	1.74 x 3.07=5.34	1	1	Sitting Room	3	3	2	2		1.0305/5.34	Yes, 20%	1		x 1 M Window
Kitchen	3.4 x (.9 + 1.9)=5.23	2	1	Sitting Room	1	1	4	4	Located Well	2.034/5.23	Yes, 38%	1	1	x 1 L Window
Verandah	2.43 x 1.99=4.84	1	1	Sitting Room, Garden, Garage	4	3	2	2	Privacy not adequate on verandah	n/a	n/a	1	1	n/a
Garden	5.6 x 2.76=15.47	2	2	Garden, Verandah	4	4	2	1	Adequate Privacy from neighbours	n/a	n/a	n/a	1	n/a
Garage	2.4 x 3= 7.2m	2	2	Garden, Driveway	2	1	1	1	Adequate Privacy	7.2	No, 0%	0/4	3	1 garage door
	9.1+11.62+17.76 +5.34+5.23+4.84 +15.47+ 7.2				2.25									
	76.56													
	Minus Veranda h- Garden- Garage D53													
	49.05													

Table 7.7 - RSA House 1 Summary of conditions

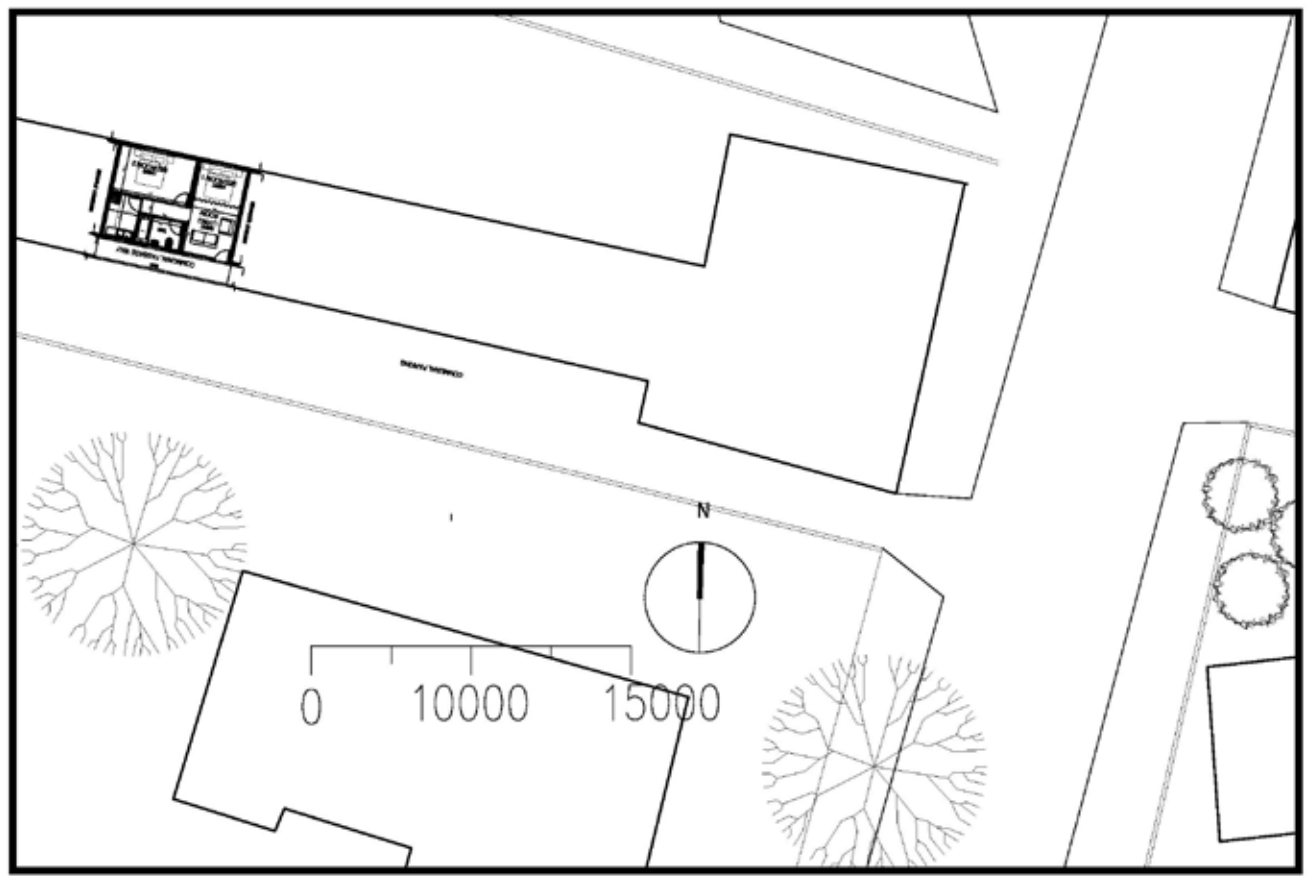
RSA House 1 Walk-up	
Outdoor space typology	Backyard and Front yard
Opportunities for gardening in pots	Possible for 8 pot plants ((0.75 x 0.32) x 8
Space available for small scale vegetable gardens	1- Space for a single vegetable bed (5m2)
Space available for fruit trees	Maximum 1 fruit tree (1 x 3.5m2)
Space available for large scale subsistence farming	0- 0 space available. Space available for 1 small scale field if lawn is removed
Space available for practice of sports	1 - Space available for a maximum of 4 players
Space for gathering people	4: 10 people maximum comfortably (15m2)
Space for little children to play safely	1 - Space for 4 children to play safely and comfortably (12m2)

Table 7.7: RSA House 1 Summary of conditions continued

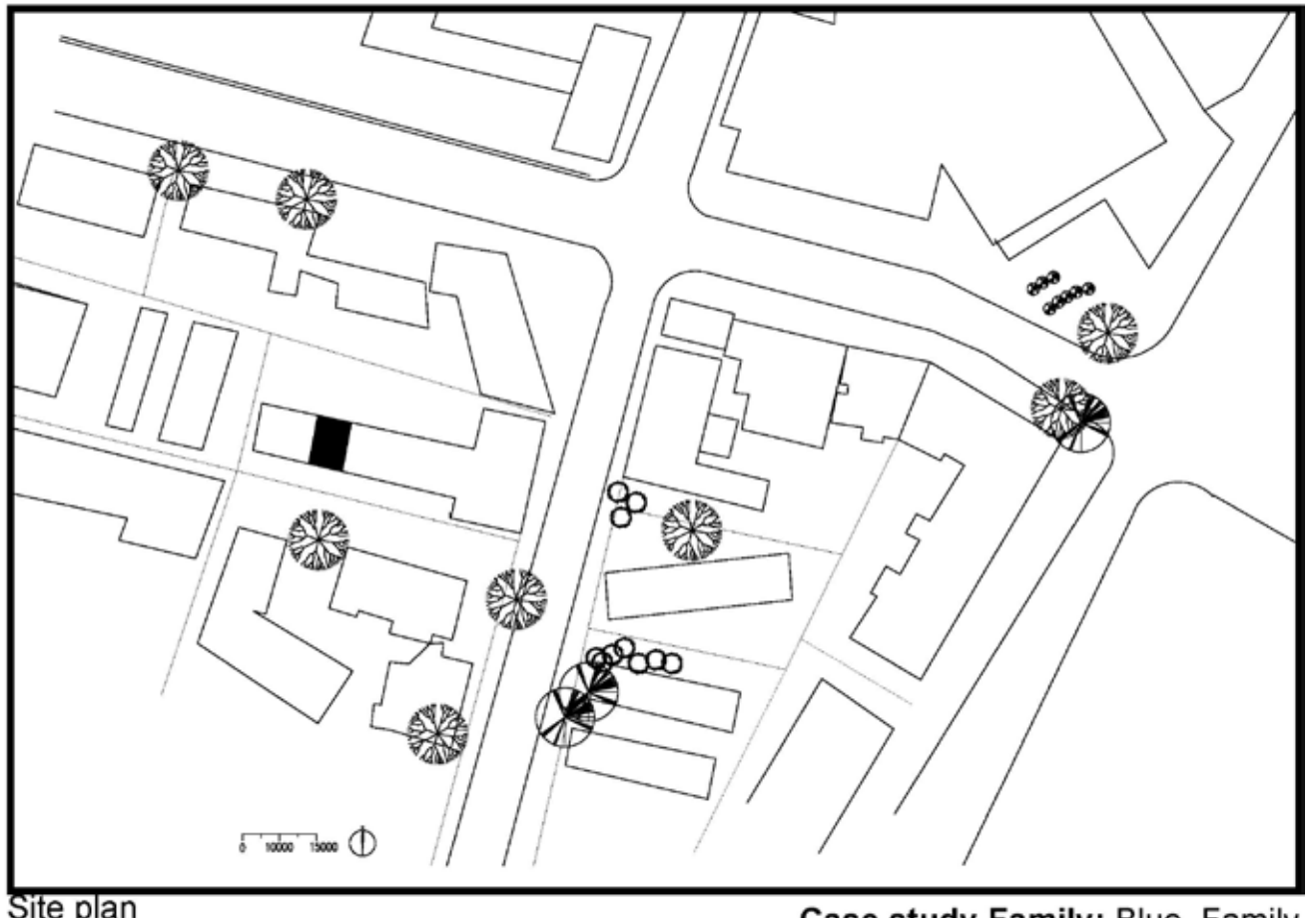




Floor plan



Context plan



Site plan

Case study Family: Blue Family
Location B
Inhabitants: Father, Mother, Daughter

Figure 7.28: RSA House 2 - Floor plan, site plan and context plan

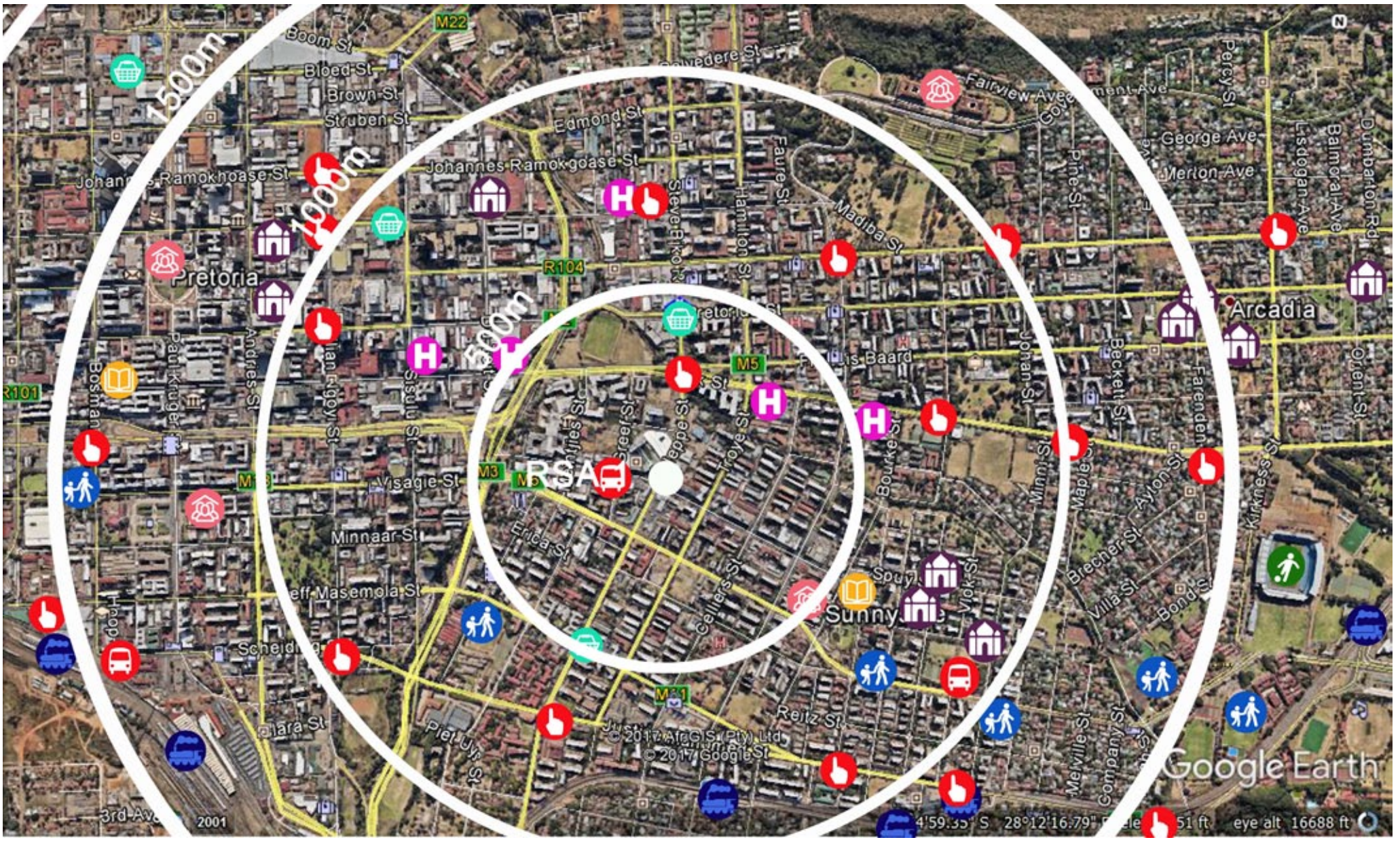


Figure 7.29: RSA House 2 - Locality map (Google 2017) – See Figure 7.22 for legend

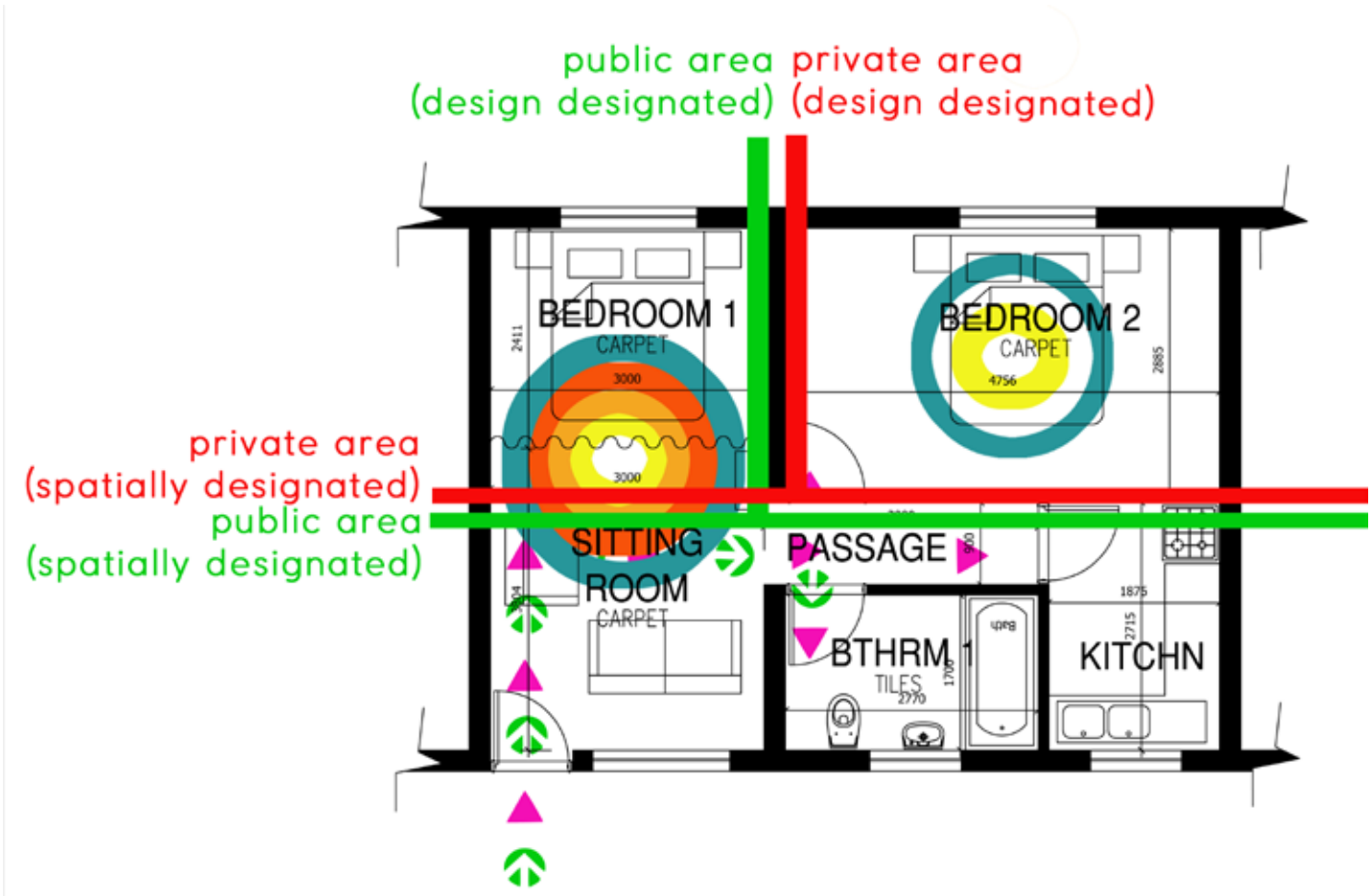


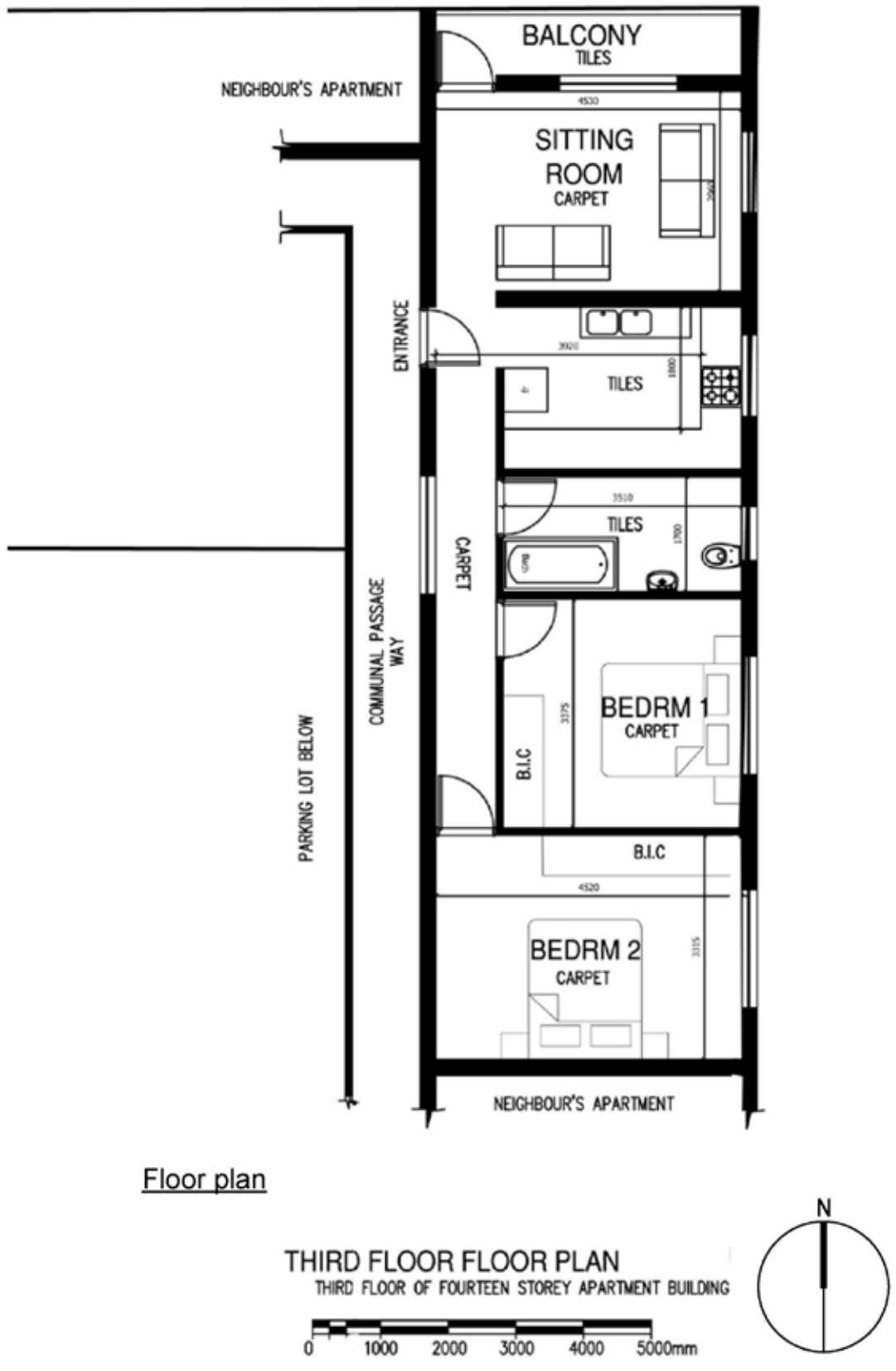
Figure 7.30 RSA House 2 - User and public/private maps – See *Figure 7.23* for legend

RSA House 2 Apartment

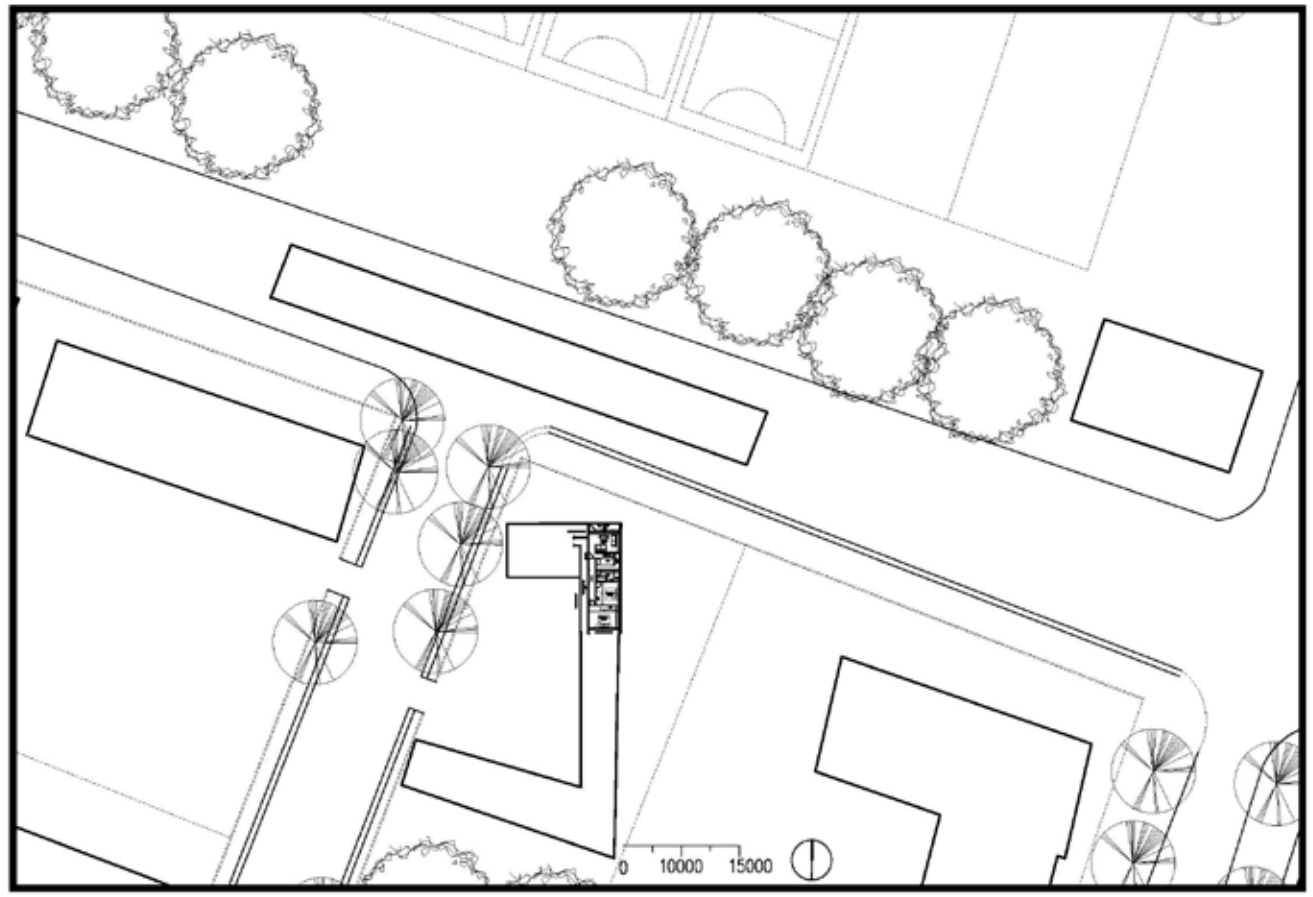
Room Name:	Size	No. of Entrances and Exits	Doors present	Attached room	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance to/from surrounding rooms	Sound transmittance to/from main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural Light	Ventilation	No. and size of openings for ventilation hxw
Bedroom 2	2.885x4.8=13.824	1	1	Passage	3	2	2	2	Doorway is located less privately	2.034/13.824	Yes 15%	2	2	x 1 L Window
Bedroom 1	2.4 x 3=7.2	1	None (Curtain)	Sitting Room, Balcony	4	4	4	4	Curtain is not good for privacy	3.37/7.2	Yes, 46%	1	1	x X1 L Window
Sitting Room	3.3x3=9.3	3	1	Bedroom 1, Passage	2	2	3	3	Adequate Privacy	2.034/9.3	Yes, 22%	2	2	x 1 L Window
Passage	3x.9=2.7	4	3	Sitting Room, Kitchen, Bathroom	3	4	4	4	Adequate Privacy for the use	0/2.7	No, 0%			None. Light from surrounding rooms
Bathroom 1	2.7 x 1.7=4.59	1	1	Passage	2	3	2	2	Adequate Privacy for the use	2.034/4.59	Yes, 44%			x 1 L Window
Kitchen	2.7 x 1.9=5.13	1	1	Passage	2.8	2	2	2`		2.034/5.13	Yes, 40%			
	42.774													

RSA House 2 Apartment	
Outdoor space typology	Balcony
Opportunities for gardening in pots	Not applicable
Space available for small scale vegetable gardens	0- Not possible not enough space (0m2)
Space available for fruit trees	Not possible not enough space
Space available for large scale subsistence farming	0- Not possible not enough space (0m2)
Space available for practice of sports	0- Not possible not enough space (0m2) with amenities nearby (see urban context map).
Space for gathering people	0-No space available
Space for little children to play safely	0-No space available

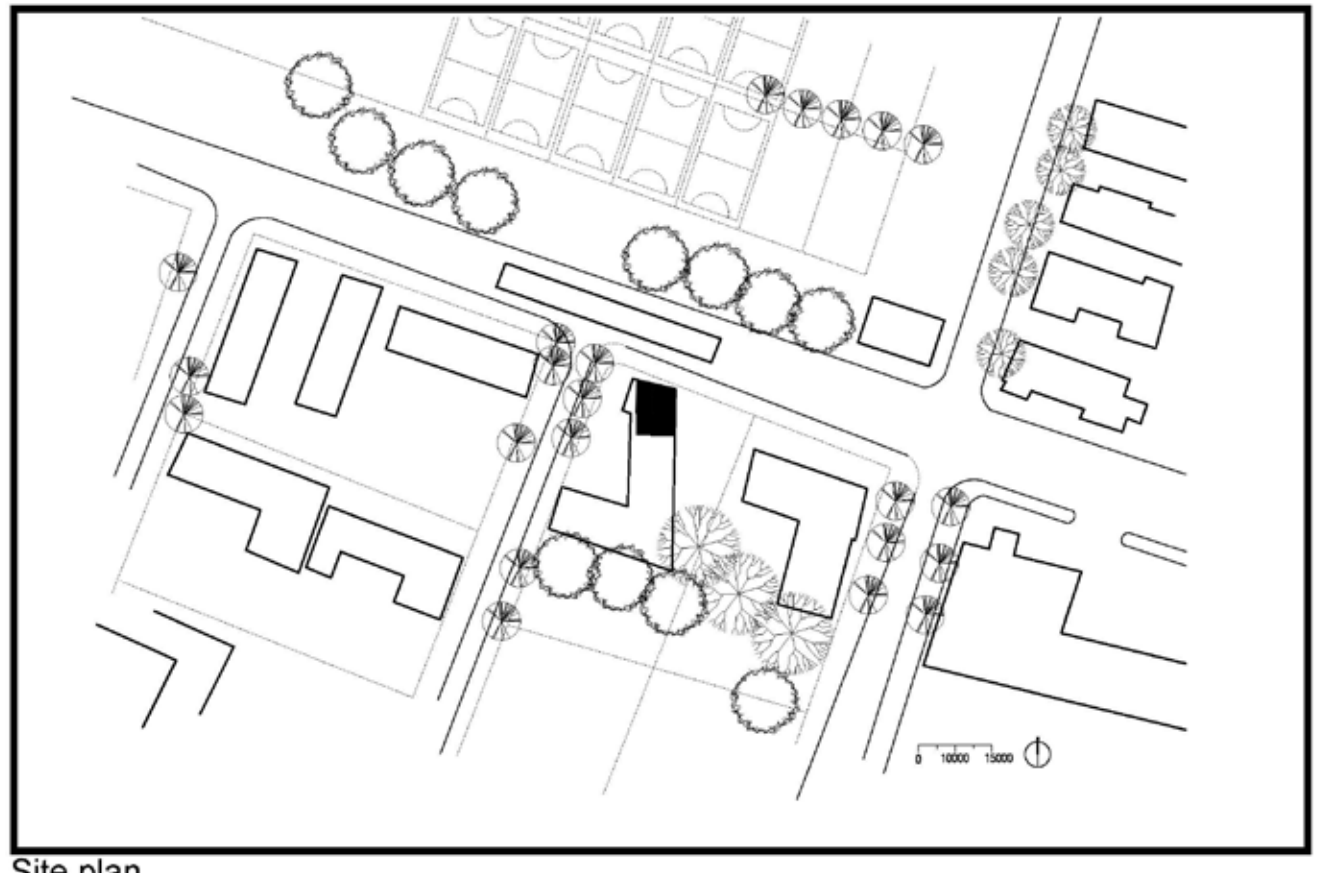
. *Table 7.8* - RSA House 2 Summary of conditions



Floor plan



Context plan



Site plan

Case study Family: Brown Family
Location A
Inhabitants: Father, Mother (Husband, Wife)

Figure 7.31 RSA House 3 - Floor plan, site plan and context plan

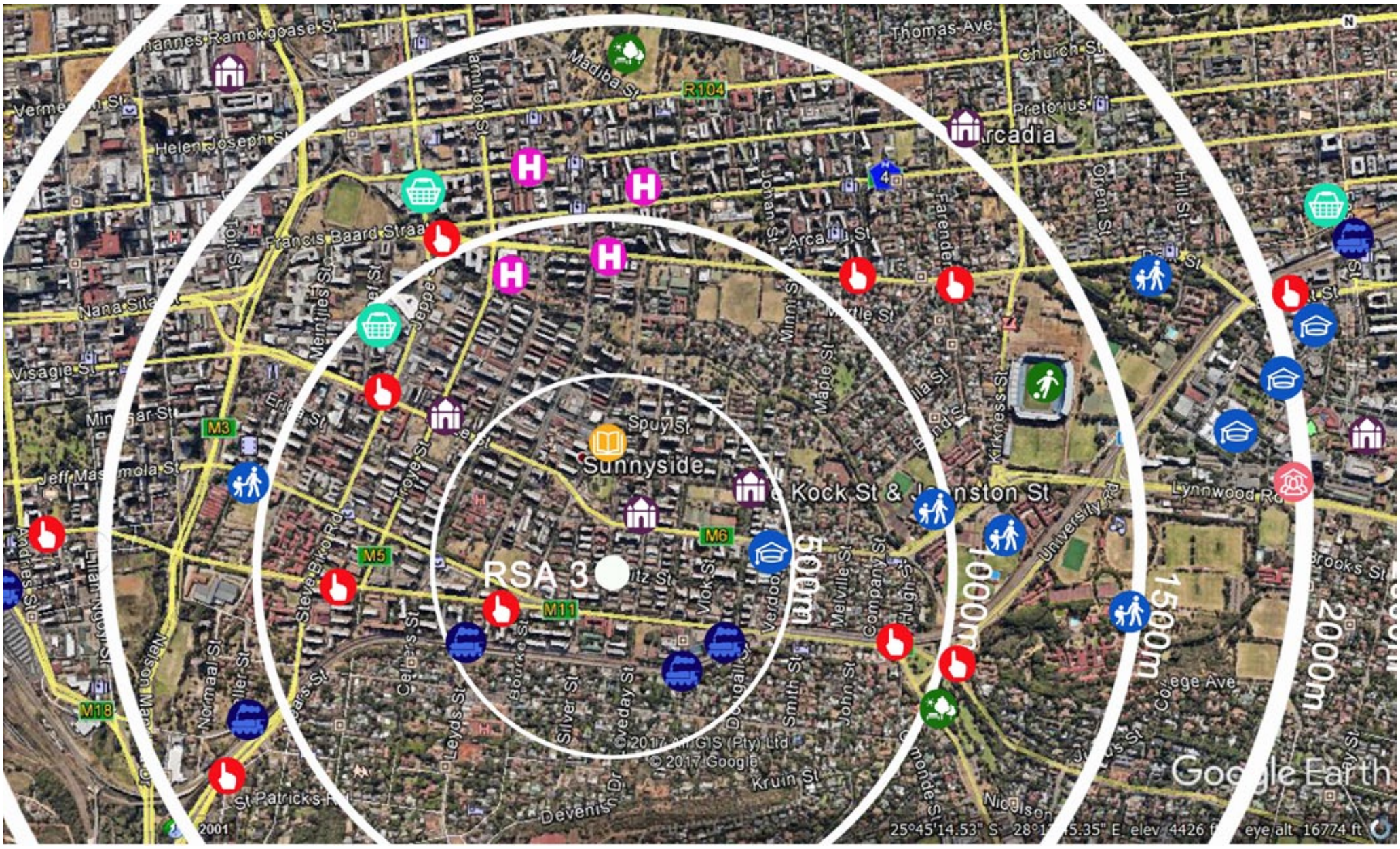


Figure 7.32 RSA House 3 - Locality map (Google 2017) – See Figure 7.22 for legend

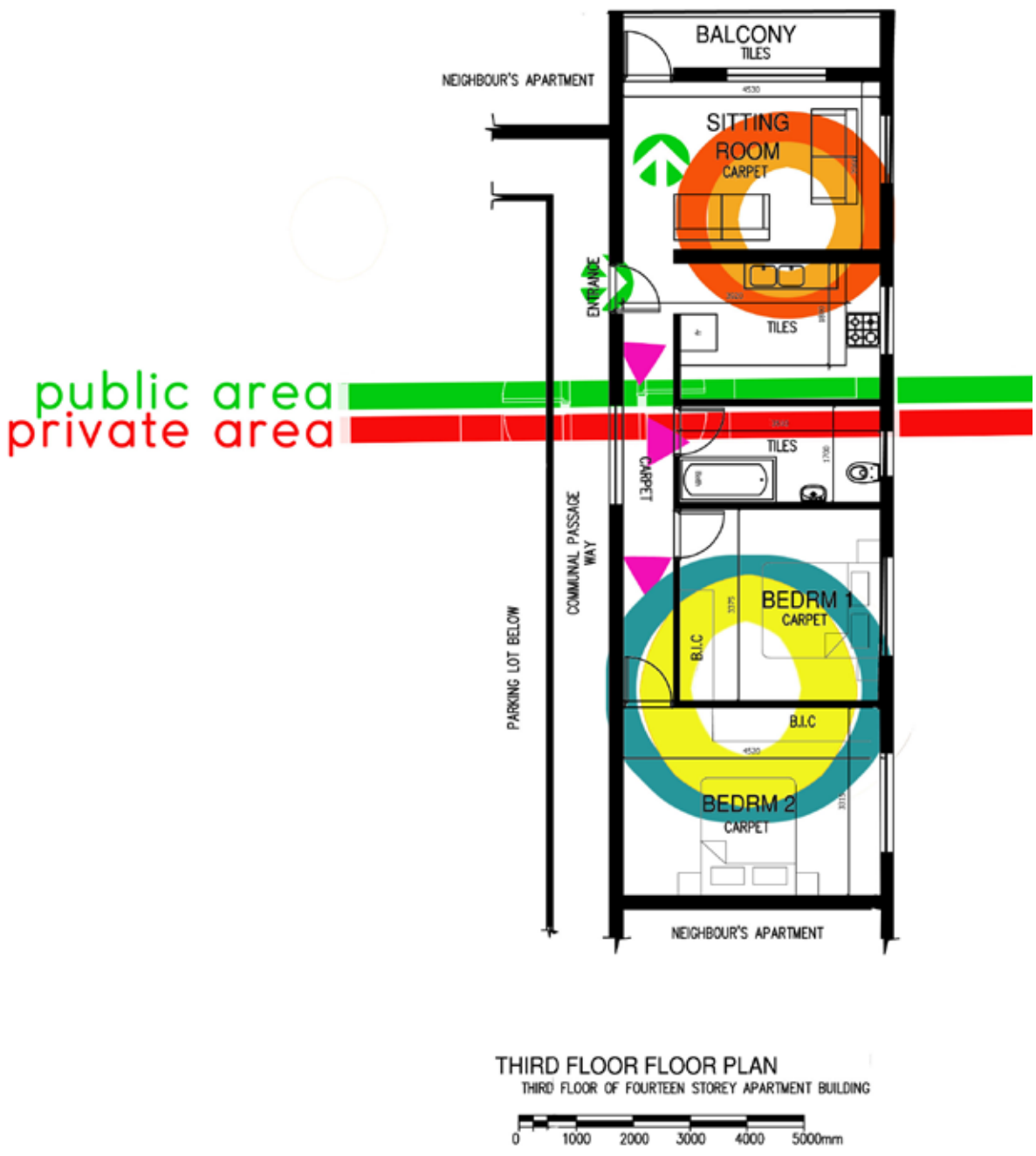
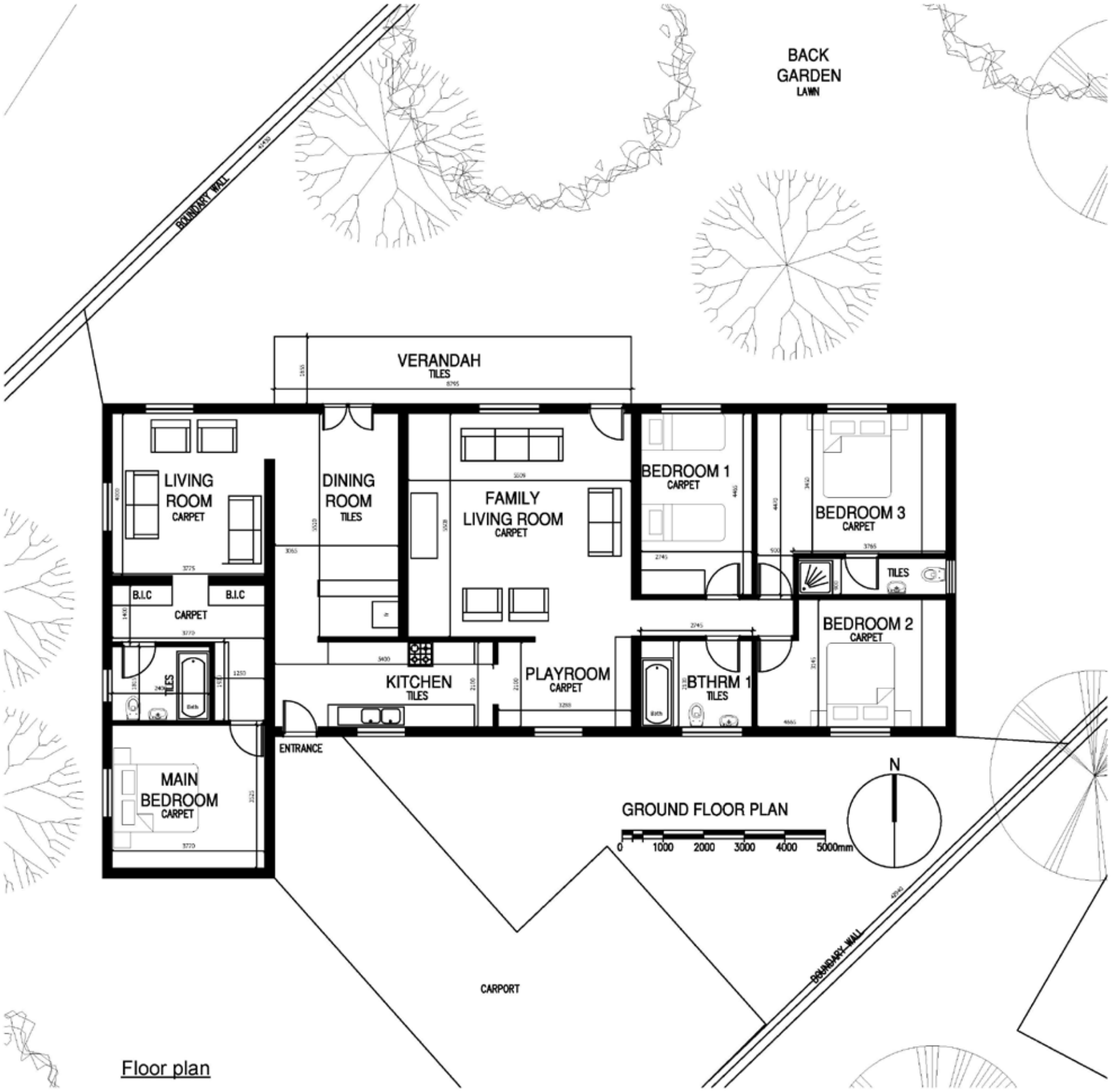


Figure 7.33: RSA House 3 - User and public/private Maps – See Figure 7.23 for legend

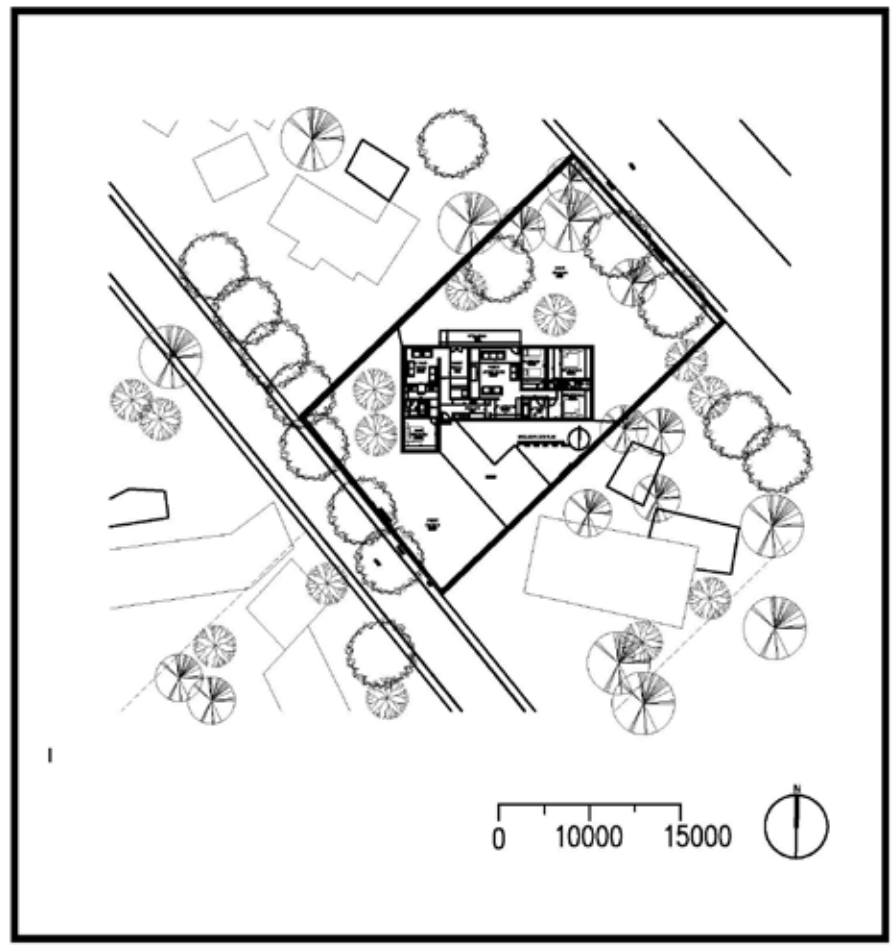
RSA House 3 Apartment Room Name:	Size	No. of entrances / exits	Doors present	Attached room	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance to/from surrounding rooms	Sound to/from transmittance main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural Light	Natural Ventilation	No. and size of openings for ventilation hxw
Passage	.90x 7.8= 7.02	6	5	All	4	3	3	4	3	0/16.45	No. 0%	1	1	x1 M Window
Kitchen	3.5 x 2.3 = 8.05	1	0	Passage	2	3	3	4	Privacy not necessary. Would be a more private space if closing door was utelised	1.0305/8.05=	Yes 12.79%	1	1	x1 M Window
Bathroom	3.50 x 1.7 = 5.95	1	1	Passage	4	3	3	3	Lack of privacy due to location. Closing door assist in creating privacy barrier	1.0305/5.95	Yes, 17%	1	1	x1 M Window
Bedroom 1	3.5 x 3.375 = 11.81	1	1	Passage	2	2	2	2	Adequately private	3.37/ 11.81	Yes, 28.5%	1	1	x1 L Window
Bedroom 2	4.5x3.315=14.92	1	1	Passage	2	2	2	2	Adequately private	3.37/14.9	Yes, 22.6%	1	1	x1 L Window
Sitting Room	4.53 x 2.96 =13.41													
Balcony	4.53 x 1 = 4.53													
							3.2							
	70.23													

RSA House 3 Apartment	
Outdoor space typology	None - Sports Courts nearby
Opportunities for gardening in pots	Not applicable
Space available for small scale vegetable gardens	0- Not possible not enough space (0m2)
Space available for fruit trees	Not possible not enough space
Space available for large scale subsistence farming	0- Not possible not enough space (0m2)
Space available for practice of sports	0- Not possible not enough space (0m2) with amenities nearby (see urban context map).
Space for gathering people	0-No space available
Space for little children to play safely	1 - 2 to 4 children maximum

Table 7.9 - RSA House 3 Summary of conditions



Floor plan



Context plan

Site plan

Case study Family: Green Family
Location A
Inhabitants: Father, Mother, Grandmother, Daughter x2, Sonx2

Figure 7.34 RSA House 4 - Floor plan, site plan and context plan

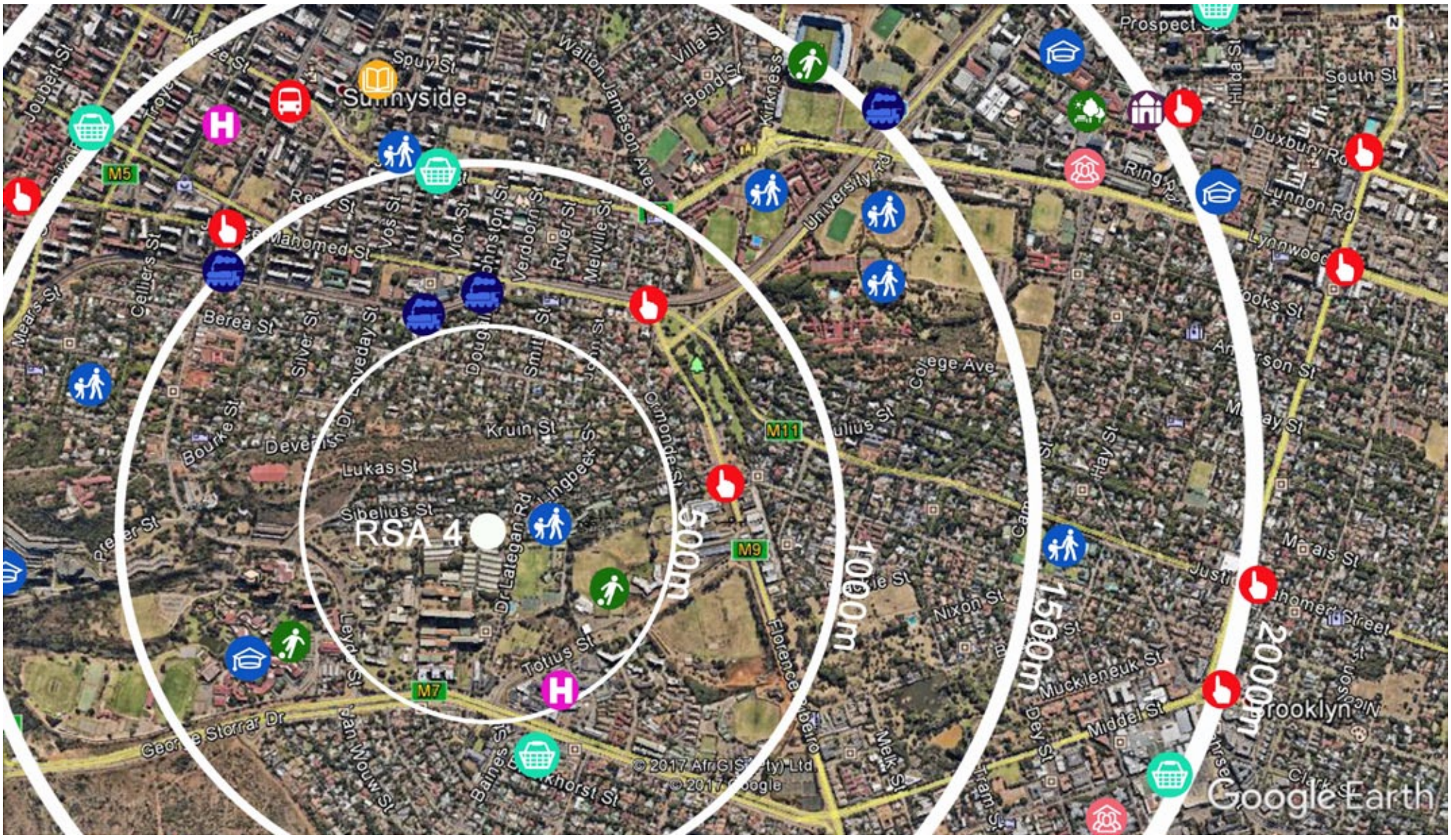


Figure 7.35: RSA House 4 - Locality map (Google 2017) – See Figure 7.22 for legend

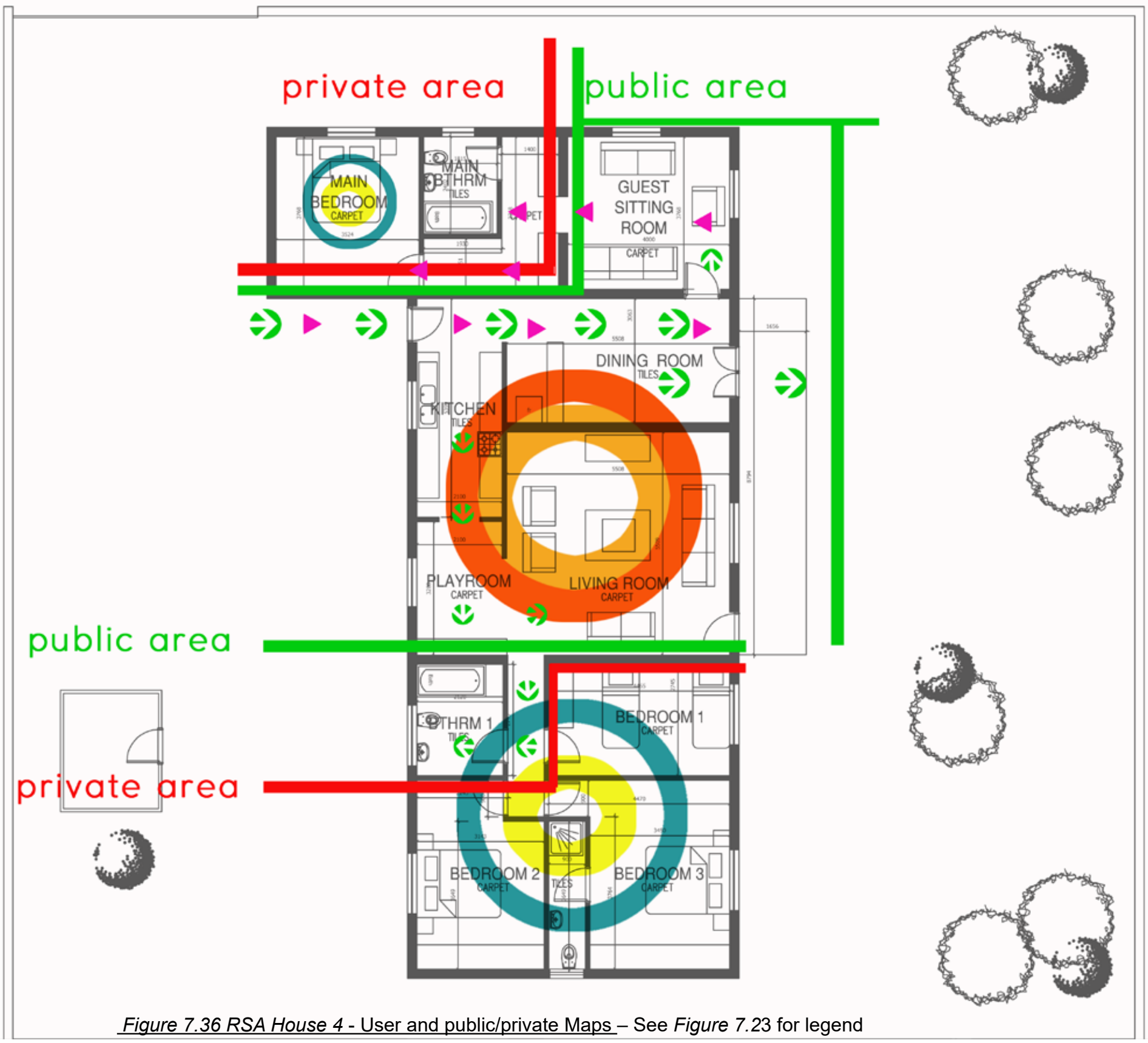


Figure 7.36 RSA House 4 - User and public/private Maps – See *Figure 7.2*3 for legend

RSA House 4

Free Standing

Room Name:	Room size and area	No. of entrances / exits	Doors present	Attached room	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance to/from surrounding rooms	Sound to/from transmittance main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural Light	Natural Ventilation	No. and size of openings for ventilation hxw
Main Bedroom	3.8x3.5=13.5	1	1	Walk In closet	1	1	3	1	Very private due to location in a separate wing of the house	1.0305/13.5=	No, 8%	3	2	x 1 M Window
Main Bathroom	2.4x1.8=4.32				1		2	1		0.71/4.32	Yes ,16%			x1 S Window
Guest Sitting Room	3.8x4=15.2				1		3	2		(2 x 2.034) /15.2	Yes 27%			x 2 L windows
Walk-in Closet	(1.25 x 1.93) + (3.8x1.4)=2.412 5 + 5.32=7.7325	2	1	Guest Sitting Room, Main Bathroom and Main Bedroom	2	1	3	3	Area and acts as privacy barrier for has very good sound insulation and acts as main privacy barrier for main bedroom	0/7.7325	No, 0%	4	2	2 door size openings
Dining Room	5.5x.3.6=19.8	2	1	2.00x.6	2	2	3	3	Adequate privacy	(2x 1.93 + 2.034)/19.8	Yes, 29%	1	1	x 1 Glass door with x 1 Lwindowon sides
Kitchen	2.1x5.4=11.34	3	2	Dining Room, Playroom	1 (More than adequate)	2	2	1	Adequate privacy	3.37/11.34	Yes, 29%	1	1	x1 XL Window
Playroom	2.1x3.3=6.93	3	3	Kitchen, Playroom, Passage	2	4	4	4	Adequate privacy	2.034/6.93	Yes, 29%	1	1	x 1 L Window
Living Room	5.5x5.5=30.25	2	1	Playroom, Passage	3 (None necessary)	3	3	3	Adequate privacy	3.37/30.25	Yes , 11%	1	1	x 1 XL Window
Bathroom 1	2.1x2.75=5.775	1	1	Passage	2	3	3	2	Door onto passage	1.0305/5.775	Yes, 18%	1	1	x1 M Window
Bathroom 2	3.6x.9=3.24	1	1	Bedroom 3	1	1	5	2	Very good due to ensuite	0.714/3.24	Yes, 22%	1	1	x1 S Window
Bedroom 1	4.465x2.7=12.0 5555	1	1	Passage	3	2	2	3	Location not so good	2.034/12.0005	Yes, 17%	1	1	x 1 L Window
Bedroom 2	(.9x2.2)+(3.6x3. 1)=(1.98+9.6)=1 1.58	1	1	Passage	1	2	2	1	Good location on the corner of the house	2.034/11.58	Yes, 18%	1	1	x 1 L Window
Bedroom 3	(.9x4.5) + (3.8x3.4)=4.05+ 12.92=16.97	1	1	Passage	1	1	1	1	Good location on the corner of the house	2.034/16.97	Yes, 12%	1	1	x 1 L Window
	13.5+4.32+15.2 +7.73+19.8+11. 34+6.93+30.25 +5.775+3.24+1 2.05+11.58+16. 97				1.38									

Table 7.10 - RSA House 4 Summary of conditions

RSA House 4	Freestanding
Outdoor space typology	Backyard
Opportunities for gardening in pots	Possible for more than 10 pot plants (0.75 x 0.32mm x 10)
Space available for small scale vegetable gardens	3: 1-8 vegetable beds possible (40m2)
Space available for fruit trees	Maximum 6 fruit trees in garden bed area (6 x 3.5m2)
Space available for large scale subsistence farming	1- Space available for approximately 3 beds if lawn is removed, and only one bed if it is not (55m2)
Space available for practice of sports	5 -Space available for 16-20 players
Space for gathering people	5: 12 people or more -(18m2 or more) - with a max capacity of 35 people in either the front or back yard.
Space for little children to play safely	5: Space for up to 20 children to play safely (60m2)

Table 7.10 - RSA House 4 Summary of conditions continued

7.5 RESEARCH DATA FOR CASE STUDY HOMES IN ZIMBABWE

Findings for the South African case study homes are featured in this section, in this order:

Zimbabwean (ZIM) Homes Raw Data

***Figure 7.37*:** Legend: Zimbabwe case study amenity maps

***Figure 7.38*:** Legend for Zimbabwe case study homes: Behaviour maps

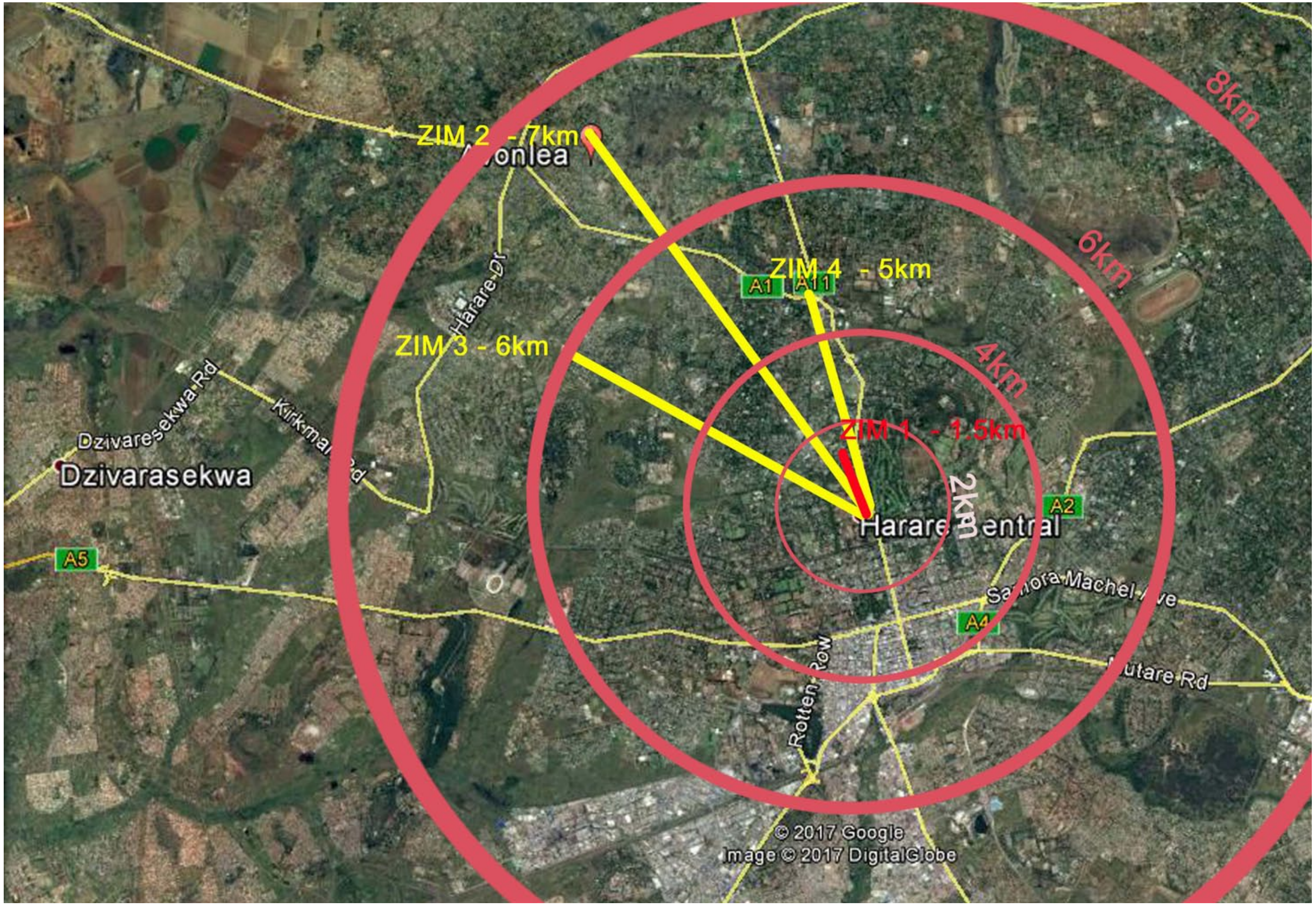
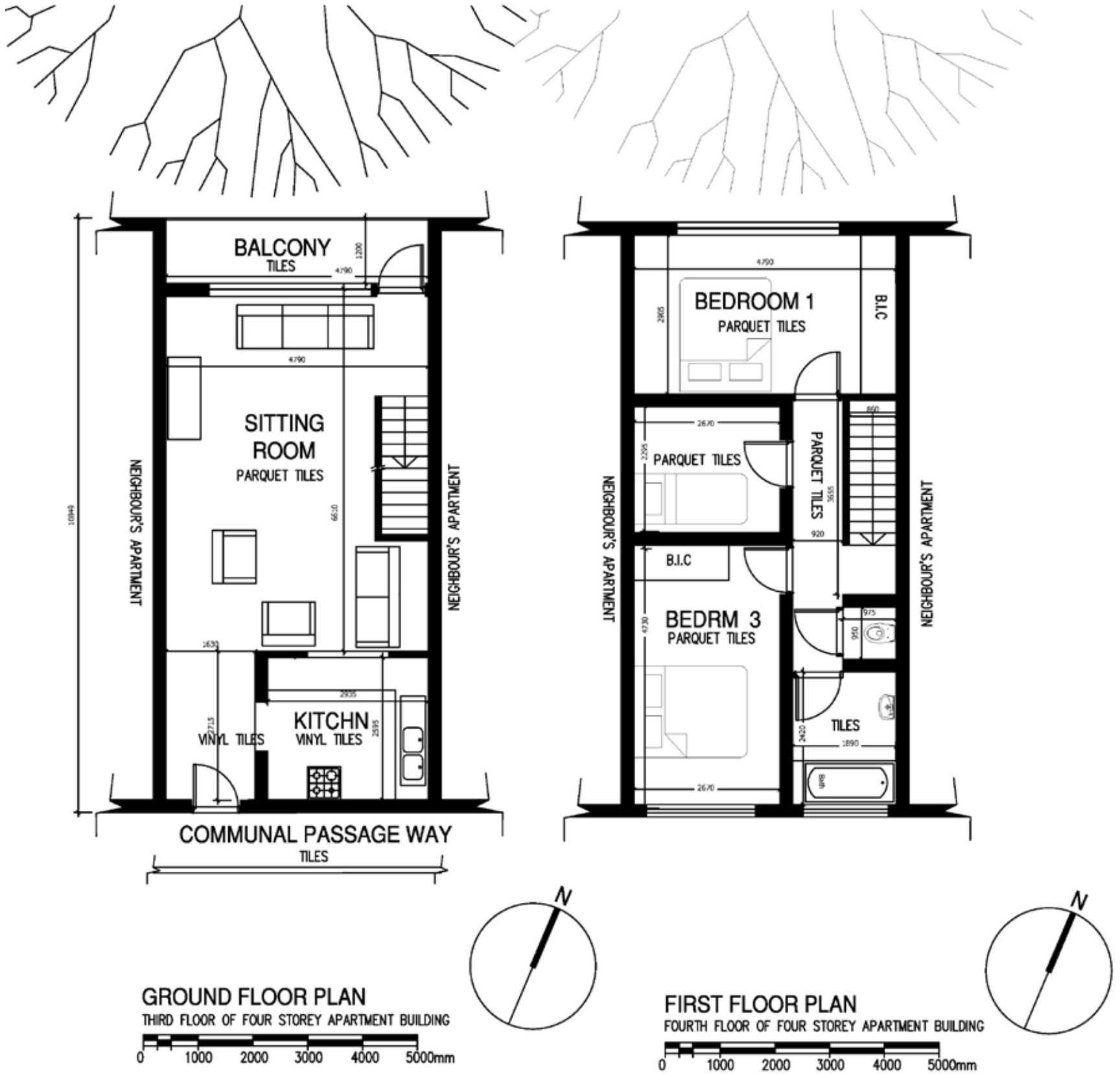
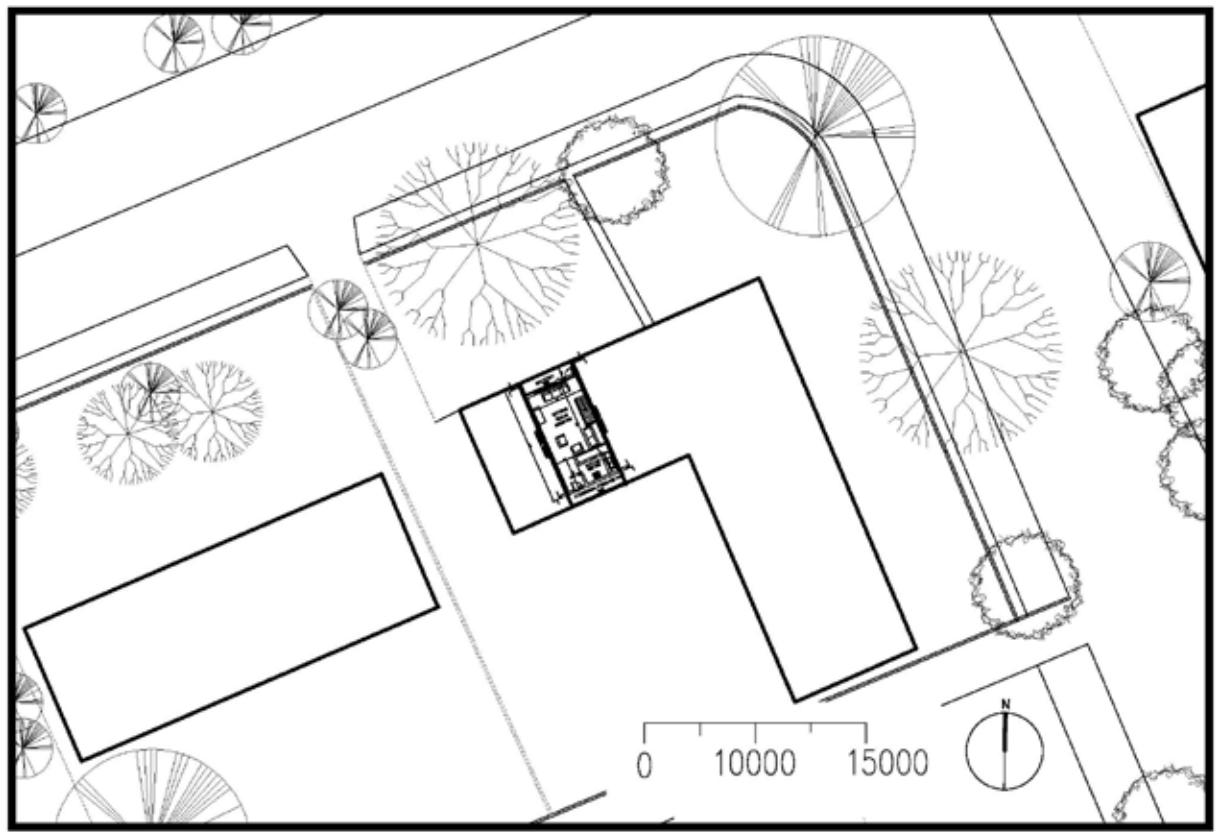


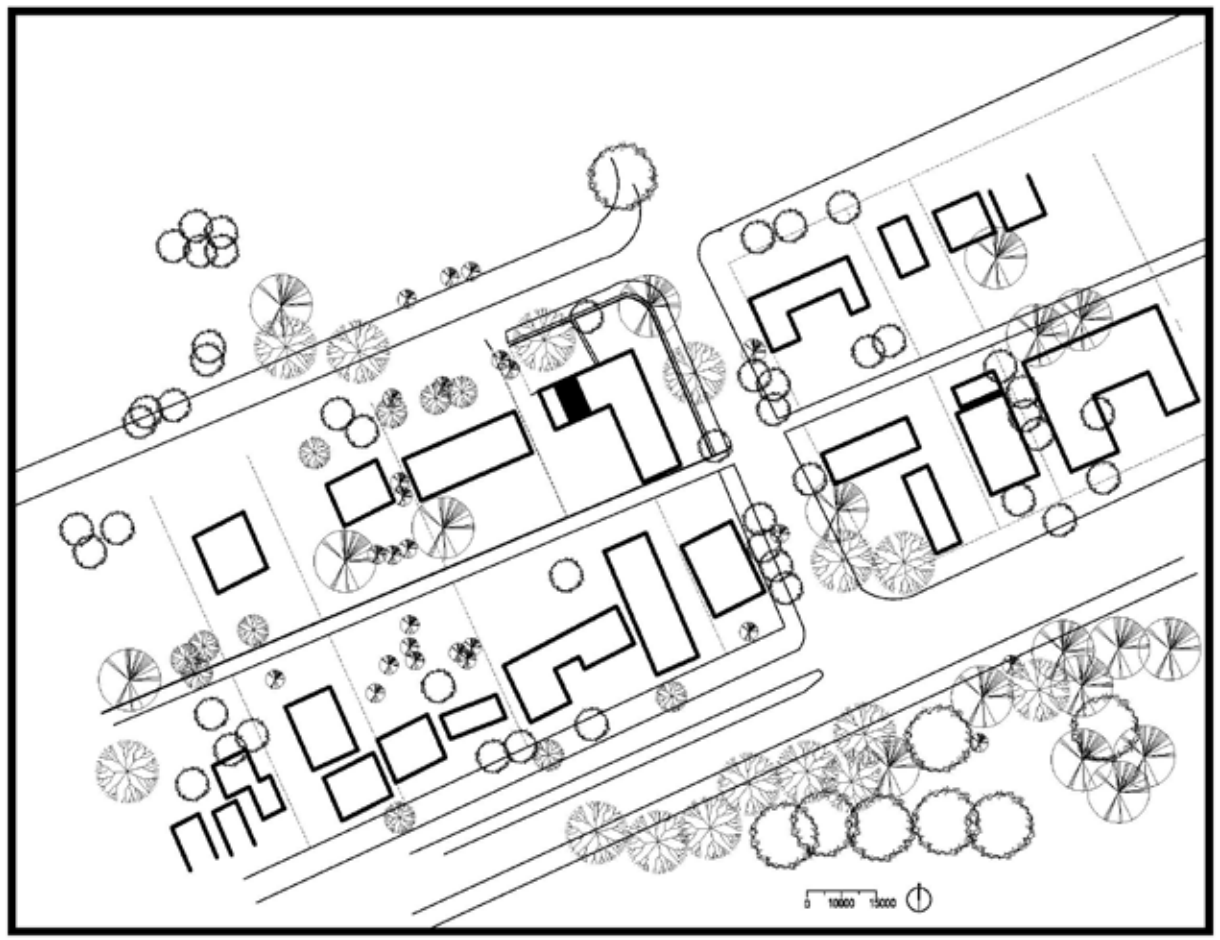
Figure 7.39 Locality Map- All ZIM Houses in proximity to Harare City Centre (Google 2017)



Floor plan



Context plan



Site plan

Case study Family: Yellow Family
Location A
Inhabitants: Father, Mother, Grandmother, Daughter, Son

Figure 7.40 ZIM House 1 - Floor plan, site plan and context plan

Figure 7.41 ZIM House 1 - Locality map (Google 2017) – See Figure 7.37 for legend

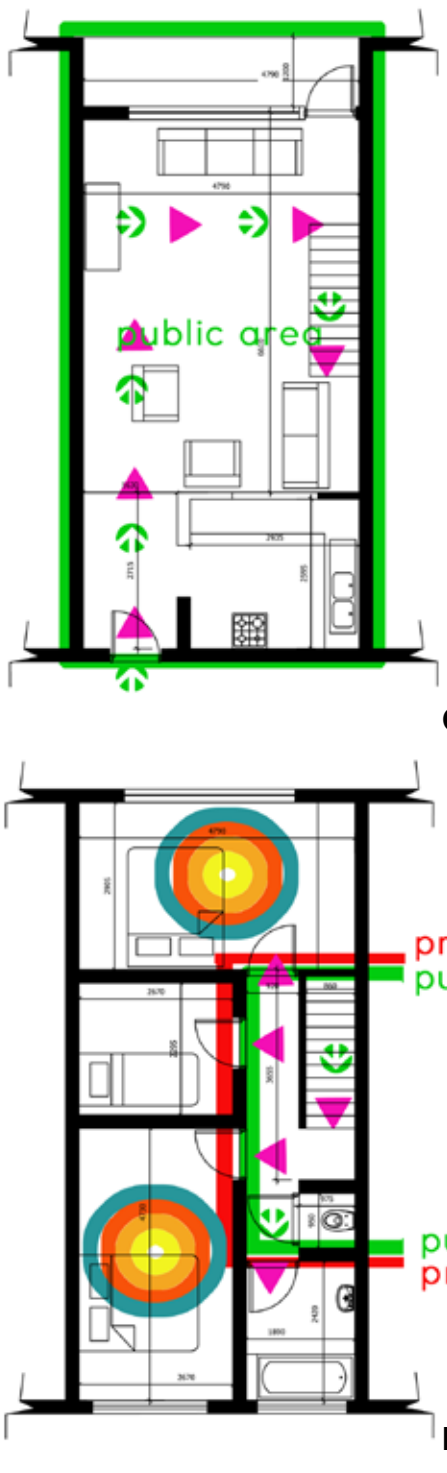


Figure 7.42: ZIM House 1 - User and public/private maps-– See Figure 7.38 for legend

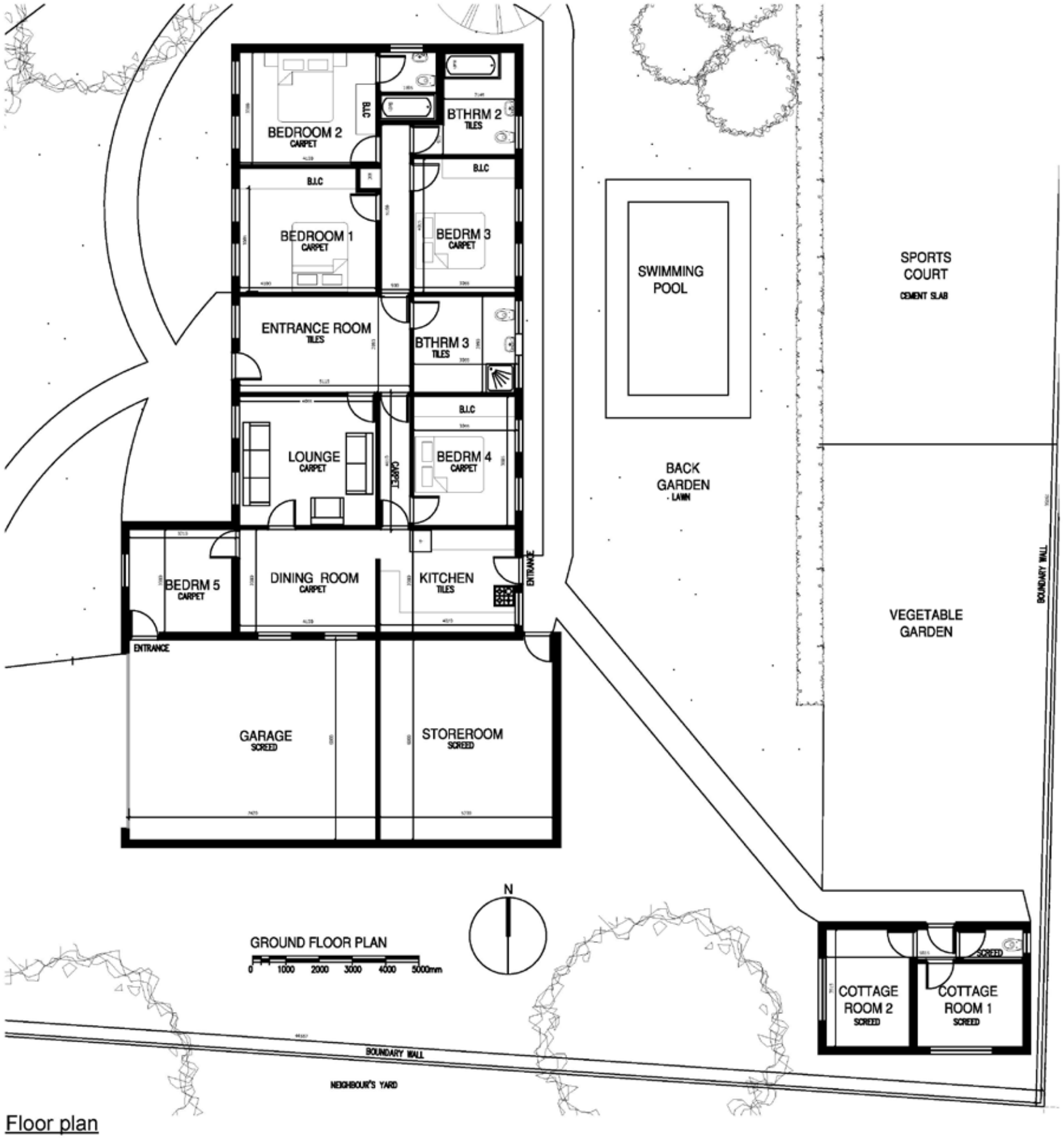
ZIM House 1 **Duplex Apartment**

Room Name:	Size	Area	No. of entrances / exits	Doors present	Attached room	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance from/to surrounding rooms	Sound transmittance from/to main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural Light	Natural Ventilation	No. and size of openings for ventilation hxw
Living Room	4.79 x 6.61	31.66m2	2	2	Kitchen, Balocony, Entrance and Strair Passage	2	2	2	2	Generally a very non-private area, as it is open paln onto the surrounding rooms	3.37/31.66	Yes, 10%	3	1	x1 XL Window. Open plan
Balcony	4.79 x 1.2	5.75m2	1	1	Living Room	3	1	2	4	Private as it is located only alonside the very large living room area	n/a	No, 0%	1	1	n/a
Kitchen	2.595 x 2.935	7.62m2	1	1	Entrance Passage, Living Room	1	2	2	3	Very private in comparison to the adjoined open plan living room as it contains a closable door and window onto living room. Since this area is located above the ground floor, there is a good amount of privacy due to the altitude	2.03/7.62	Yes,10%	1	1	x1L Window
Entrance Passage	2.175 x 1.63	3.55m2	1	1	Kitchen, Living Room	2	2	4	4	Relatively not private, This area is not supposed to function as private space so this is tolerable	0/3.55	No, 0%	2	1	x1 Door
Stair Passage	1.78 x 3.655	6.51m2	2	4	Downstaitrs area, Upstairs passge onto all bedrooms	2	3	4	4	Sufficiently private for its function	0/6.51	No, 0%	2	1	Open
Toilet	.95 x .975	.923m2	1	1	Bathroom, Upstairs Passage	2	2	2	2	The separate entry way for the toilet and bathroom area provides an acoustic and privacy barrier for the toilet area	0.36/0.932	Yes, 38%	2	2	x1XS small window on top of the door, x1 Door
Bathroom	1.89 x 2.42	4.58m2	1	1	Toilet	1	1	4	2	The separate entry way for the toilet and bathroom area provides an acoustic and privacy barrier for the toilet area	2.034/4.58	Yes, 44%	1	1	x1 L Window
Bedroom 1	4.79 x 2.9	13.89m2	1	1	Stair Passage, Bedroom 2	1	1	2	1	Very private, with windows facing onto the street. Since this room is located above the ground floor, there is a good amount of privacy due to the altitude	3.37/13.89	Yes, 25%	2	1	x1 XL Window
Bedroom 2	2.67 x 2.295	6.13m2	1	1	Stair Passage, Bedroom 1&3	1	3	2	1	Adequatly private, due to the lack of any windows in this room, that was intended for storage. The ;ack of windows limits the rooms long term usability	0/6.13	No, 0%	4		None
Bedroom 3	2.67 x 4.73	12.6m2	1	1	Stair Passage, Bedroom 2, Toilet, bathroom	1	2	2	1	Very private, with windows facing onto the street. Since this room is located above the ground floor, there is a good amount of privacy due to the altitude	3.37/12.6	Yes, 27%	2	1	x1 L Window
		89.69													

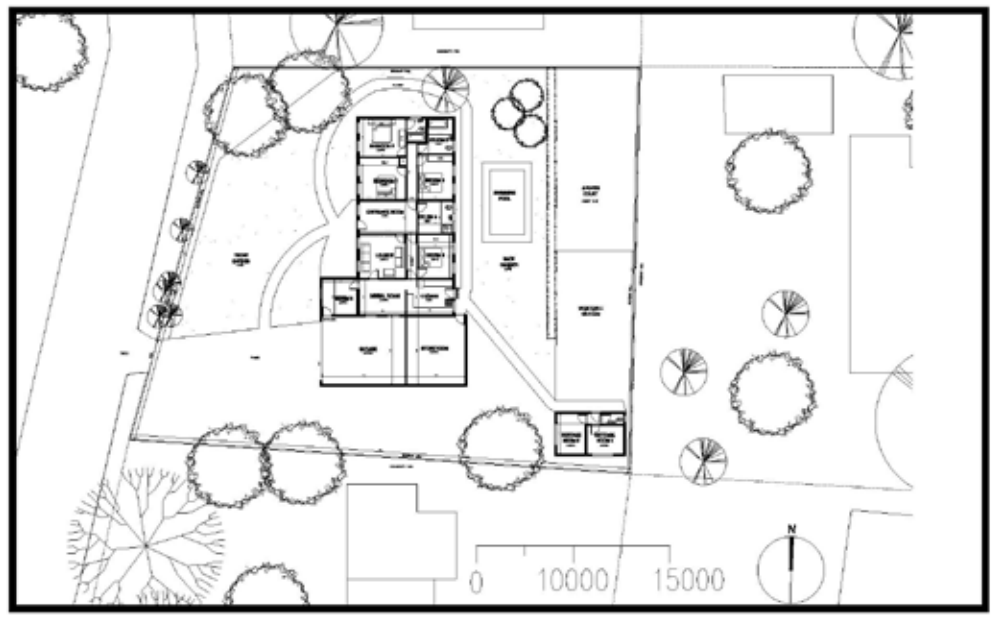
Table 7.11 - ZIM House 1 Summary of conditions

ZIM House 1	Duplex Apartment
Outdoor space typology	Balcony
Area in square metres	
Opportunities for gardening in pots	Possible for 4 pot plants (0.75 x 0.32mm x 4)
Space available for small scale vegetable gardens	0- Not possible not enough space (0m2)
Space available for fruit trees	Not possible not enough space
Space available for large scale subsistence farming	0- Not possible not enough space (0m2)
Space available for practice of sports	0- Not possible not enough space (0m2) with amenities nearby (see urban context map).
Space for gathering people	2: 6 people maximum (9m2)
Space for little children to play safely	1: Space for 3 children to play safely (<12m2)

Table 7.11 - ZIM House 1 Summary of conditions continued



Floor plan



Context plan

Site plan

Case study Family: Red Family
Location A
Inhabitants: Father, Mother, Daughter, Son

Figure 7.43 ZIM House 2 - Floor plan, site plan and context plan

Figure 7.44 ZIM House 2 - Locality map (Google 2017) – See *Figure 7.37* for legend

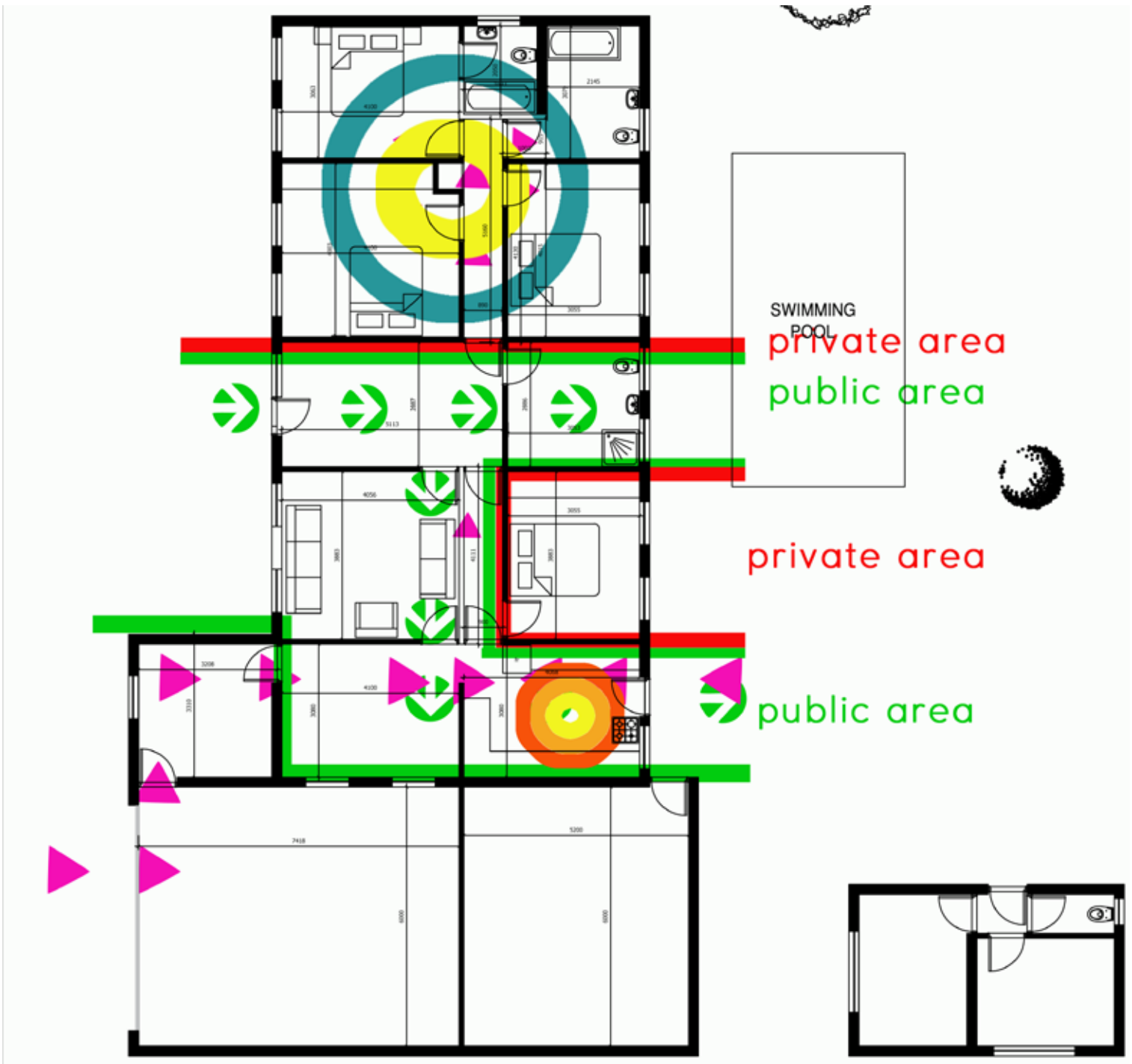


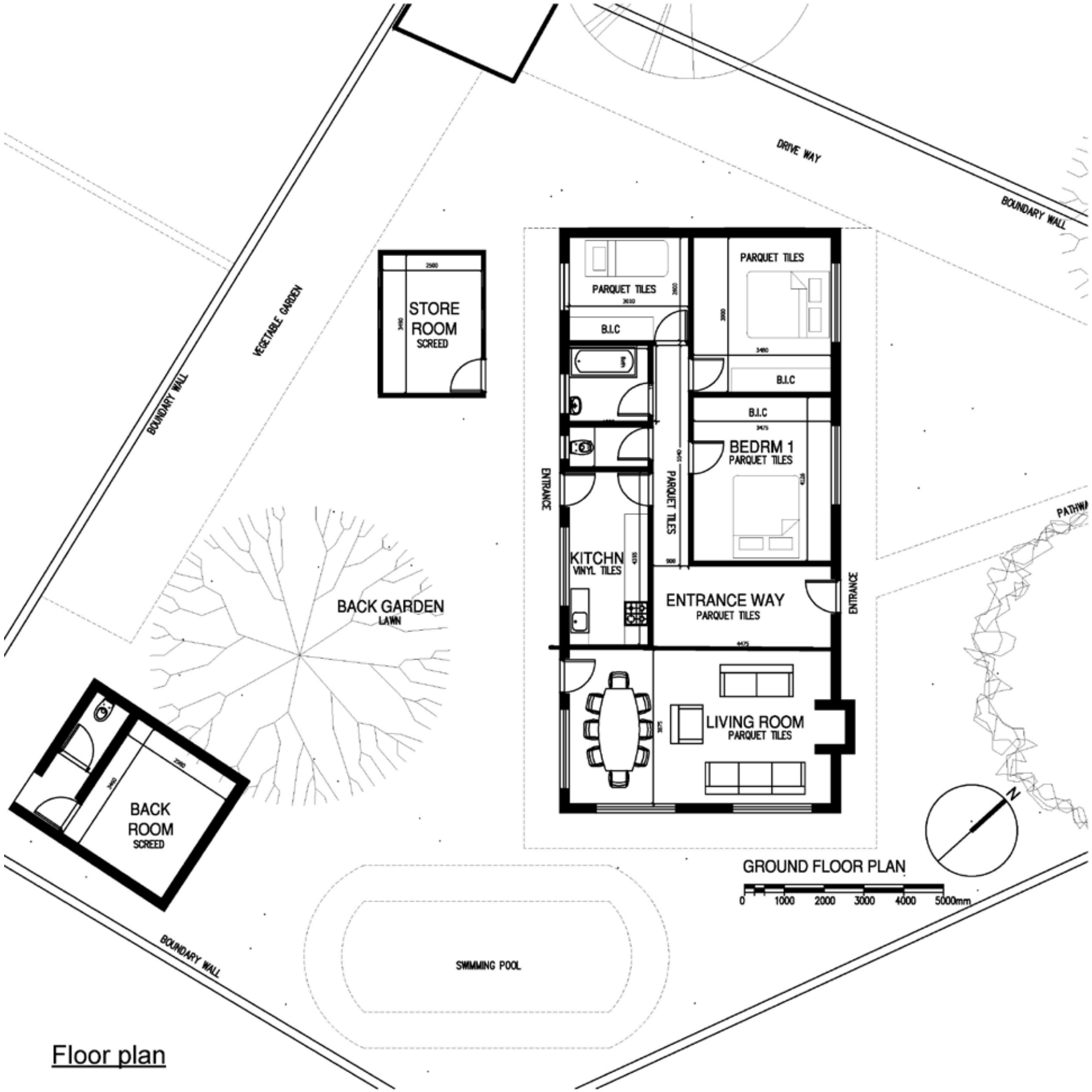
Figure 7.45: ZIM House 2 - User and public/private maps – *See Figure 7.38* for legend

Room Name:	Size	Area	No. of entrances / exits	Doors present	Attached room	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance from/to surrounding rooms	Sound transmittance from/to main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural Light	Natural Ventilation	No. and size of openings for ventilation hxw
Entrance way	5.11x2.89=14.77	14.77	4	4	passagex2,lounge,outside	3	4	1	1	Adequate for use	1.0305/14.77	No, 7%	2	1	1xm Window
Passageway 1	5.16x.9=4.64	4.64	5	5	Bedrooms, bathrooms, Entrance	4	4	2	2	Adequate for use	0/4.64	No, 0%	4	2	From doorways of attached room
Bedroom 1	4.1x4=16.1	16.1	1	1	Passage, bedroom 2,Entrance	2	2	2	1	Position on passage makes it private. Lack of privacy due to attachement to front yard	(2 x 1.0305) /16.1	Yes, 13%	1	1	2xM Windows
Bedroom 2	4.1x3.06=12.16	12.16	2	2	Bathroom 2, Bedroom 1, Outside garden	1	2	2	1	Position on passage makes it private. Lack of privacy due to attachement to front yard	(2 x 1.0305) /12.16	Yes, 17%	2	1	2xM Windows
Bathroom 1	1.69x2.05=3.46	3.46	1	1	Bedroom 2 and outside garden	1	1	1	1	Very well located for privacy	1.0305/3.46	Yes, 30%	1		x1 M Window
Bathroom 2	(2.140x3.08)+(1x.915)=6.6+9.49=16.09	16.09	1	1	Passage, Bedroom 3, outside Garden	3	3	2	1	Very well located for privacy from inside of home, however large window onto pool area along backyard makes the bathroom less private	1.0305/16.09	No, 6%	3	1	1 x M Window
Bedroom 3	(4.015x3.005)=12.1	12.1	1	1	Bathroom 1, Bathroom 3, Back garden	2	3	3	1	Large windows onto pool area make the bedroom less private when there are persons in that area	(2 x 1.0305)/12.1	Yes, 25%	1	1	x2 M Windows
Bathroom 3 (grey)	2.089 x3.05=6.37	6.37	1	1	Entrance Room, Bedroom 3, Bedroom 4, Back garden	1	4	3	1	Sound echoes from this bathroom into the entrance, limiting the the audio privacy of the room. Sound from other rooms into the bathroom is not audible, due to it being a step lower. The bathrrom has high windows onto the pool area, thus the bathroom has good visual privacy but poor audio privacy	(2 x .36)/ 26.37	Yes, 27%	2	3	x X2 XS Windows
Bedroom 4 (Guest)	3.88x3.06=11.9	11.9	1	1	Passage 2, Kitchen, Bathroom 3, Back garden	3	1	2	1	Large windows onto pool area make the bedroom less private when there are persons in that area. Location gives this bedroom very good audio privacy	(2 x 1.0305)/11.9	Yes, 17%	1	1	x2 M Windows
Living Room	4.06 x 3.88=15.75	15.75	2	2	Entrance room, Dining Room, Passage 2, Front Garden	1	1	1	2	Large windows onto front yard area make the room less private when there are persons in that area (which is rare). Location in the home gives room very good audio privacy except for onto the dining room onto which it has no closable door	(2 x 1.0305)/15.75	Yes, 14%	2	1	x2 M Windows
Bedroom 5	3.31x3.2=10.59	10.59	2	2	Garage, Dining room, front garden	1	1	2	2	Large windows onto front yard area make the room less private when there are persons in that area (which is rare). Location gives room very good audio privacy	1.0305/10.59	No, 8%	1	1	x1 M Windows
Garage	7.42x.6=4.45	4.45	2	2	Bedroom 5, DiningRoom, Kitchen,Store room,Garden	1	2	2	1	Location gives room very good audio privacy	4.45	No, 0%	3	2	x1 L Garage Door, x1 Brise Soliel Wall
Storeroom	5.2 x6=31.2	31.2	1	1	Kitchen, Garden			1	1	Location gives room very good audio privacy	0/31.2	No, 0%	4	3	x1 L Garage Door, x1 Brise Soliel Wall
Kitchen	3.08 x 4.07=12.54	12.54	3	3	Dining room, Passage, Storeroom, Back garden	2	4	2	2	Location gives room very good audio privacy , cooking however is a loud activity and is always audib;e when cooking takes place	3.37/12.54	Yes, 27%	1	1	x13 Doors, x1 XL window
		172.12													

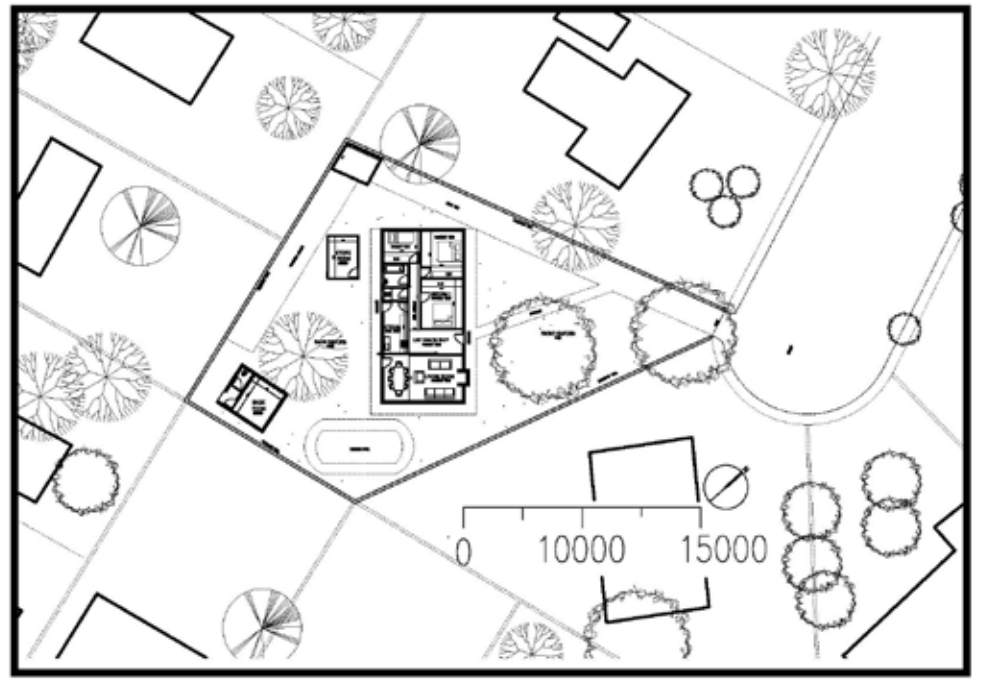
Table 7.12 - ZIM House 2 Summary of conditions

ZIM 2 House	Free Standing
Outdoor space typology	Backyard and Front yard
Area in square metres	
Opportunities for gardening in pots	Possible for more than 10 pot plants (0.75 x 0.32mm x 10)
Space available for small scale vegetable gardens	3: 1-8 vegetable beds possible (40m2)
Space available for fruit trees	Maximum 8 fruit trees in garden bed area (8 x 3.5m2)
Space available for large scale subsistence farming	2- Space available for approximately 3 beds if lawn is removed, and only one bed if it is not (55m2)
Space available for practice of sports	5 -Space available for 16-20 players
Space for gathering people	5: 12 people or more (18m2 or more) - with a max capacity of 50 people in either the front or back yard.
Space for little children to play safely	Space for up to 30 children to play safely (90m2)

Table 7.12 - ZIM House 2 Summary of conditions continued



Floor plan



Context plan

Site plan

Case study Family: Pink Family
Location A
Inhabitants: Father, Mother, Daughter x2

Figure 7.46 ZIM House 3 - Floor plan, site plan and context plan

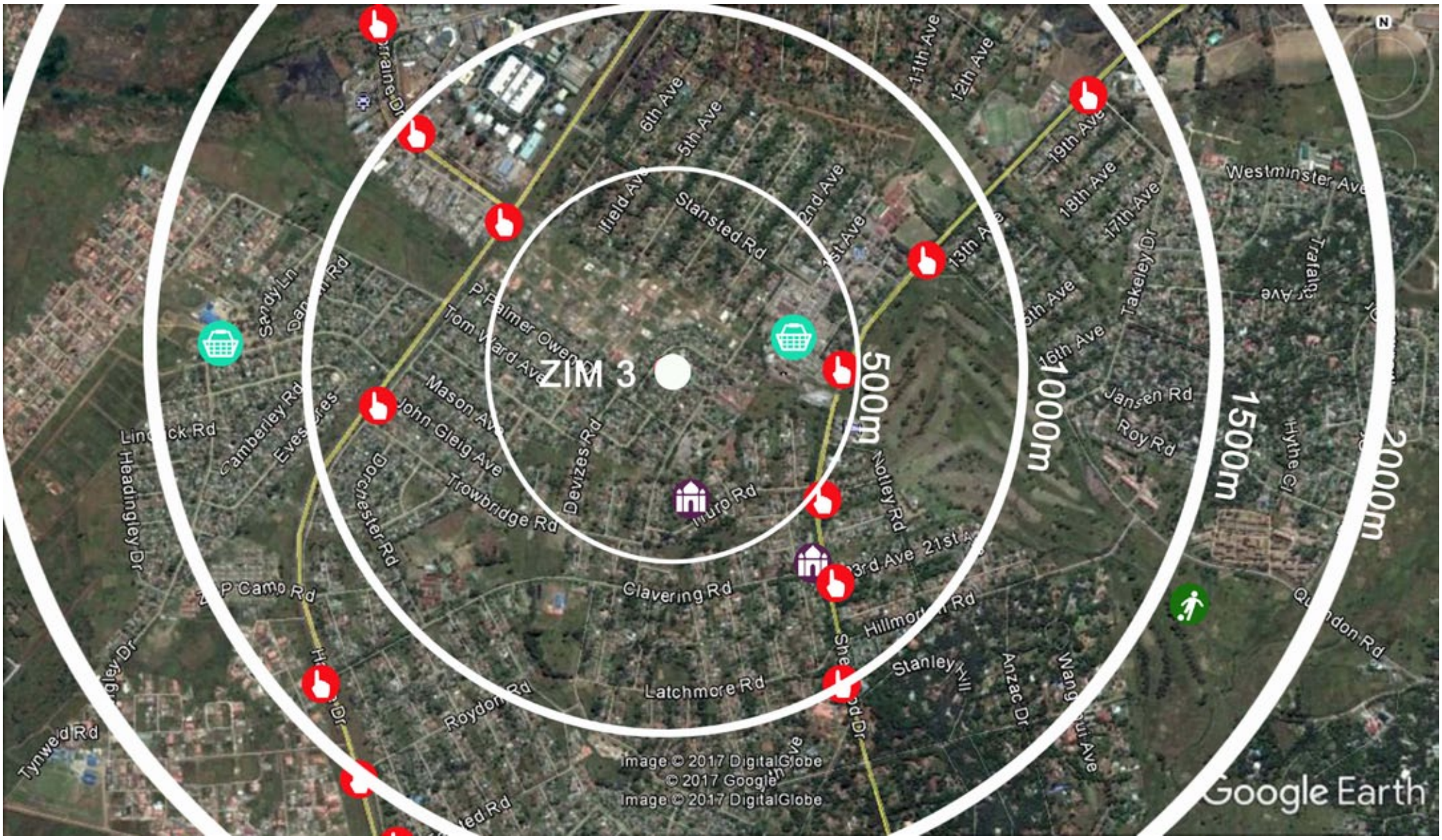


Figure 7.47 ZIM House 3 - Locality map (Google 2017) – See *Figure 7.37* for legend

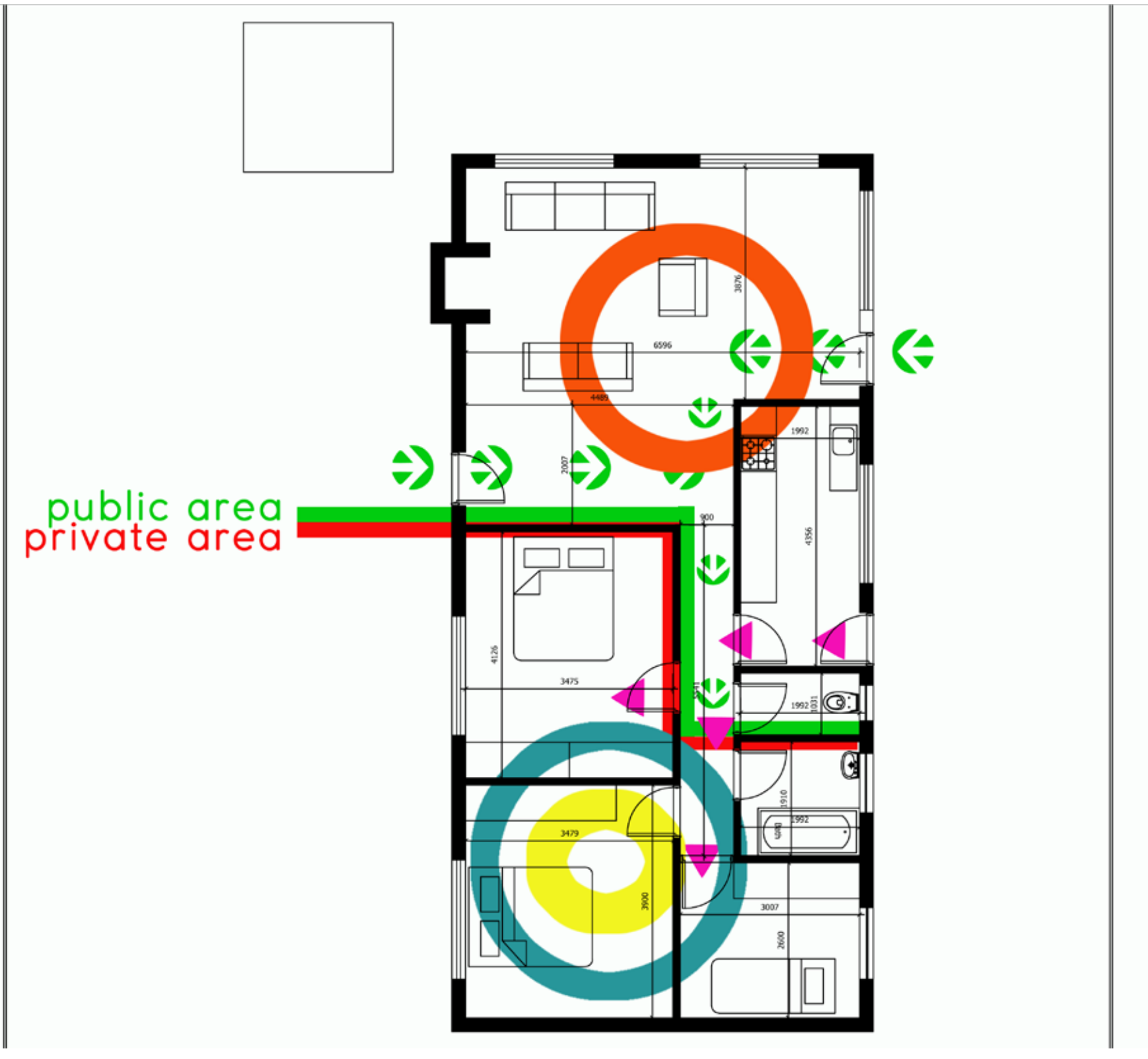


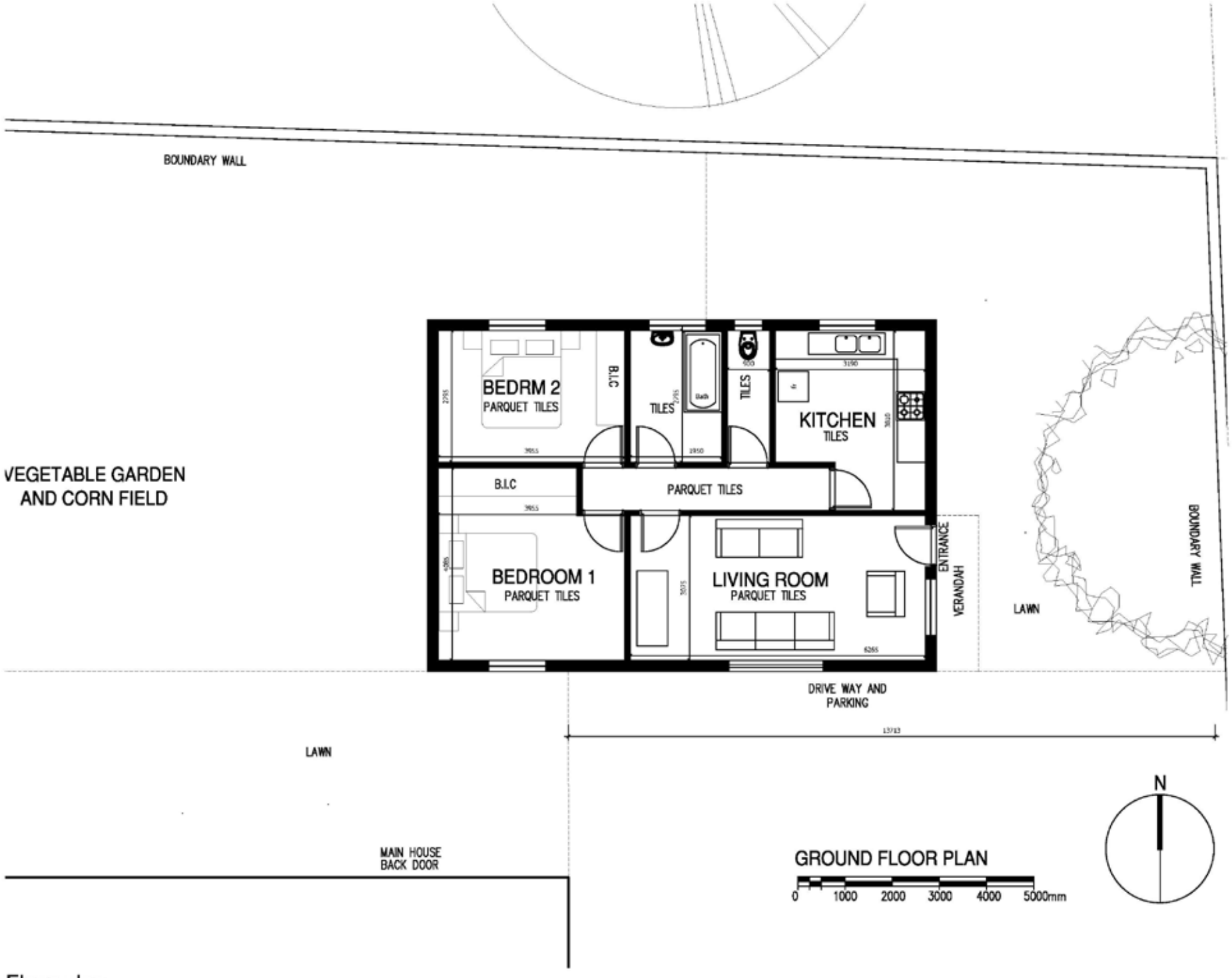
Figure 7.48 ZIM House 3- User and Public/Private Maps. *See Figure 7.38 for legend*

Zim House 3	Free standing														
Room Name:	**Size**	**Area**	**No. of entrances / exits**	**Doors present**	**Attached room**	**Resultant Visual Privacy**	**Acoustic Privacy**	**Sound transmittance from/ to surrounding rooms**	**Sound transmittance from/to main rooms**	**General Comments on privacy**	**Daylight Factor: Area of window/Total Area**	**Daylight Factor: Area of window >10% of total square foot area of room**	**Natural Light**	**Natural Ventilation**	**No. and size of openings for ventilation hxw**
Entrance Way	2x4.49=8.8	8.8	1	1	Living Room, Passage, Kitchen, Bedroom 1, garden	1	2	2	4	Doorways concealed in passage make it private, exept to living room	1.913/8.8	No,0% *	2	2	L =Door
Living Room	6.59x3.88=25.6	25.6	2	2	Kitchen , Bedroom 1, Entranceway	2	1	3	4	Doorways concealed in passage make it private, exept to relevant rooms (entrance way and kitchen)	(3x2.034)/25.6	Yes, 42%	1	1	3xL
Kitchen	4.4x1.99=8.76	8.76	2	2	Back garden, Living room, passage	1	3	3	3	Door way into passage and opening into lounge do not allow for acoustic and visual privacy in kitchen. But this is not necessary for such a public room	3.37/8.76	Yes,32%	1	1	1xXL
Bedroom 1	4.13x3.48=14.38	14.38	1	1	Passage, Entrance way, Bedroom 2	1	3	3	3	If cupboard was located on otherside of room it would be more private	2.034/14.38	Yes,24%	2	1	1xL
Bedroom 2	3.9x3.48=13.58	13.58	1	1	Bedroom 1, Bedroom 3, passage	1	2	3	2	Good acoustic privacy due to BIC on shared wall and parralel doors with Bedroom 3	2.034/13.58	Yes,15%	1	1	1xL
Bedroom 3	2.6x3=7.8	7.8	1	1	Passage, Bathrrom, bedroom 2	1	1	2	2	Has best privacy due to location	1.0305/7.8	Yes, 13%	2	2	1xM
Passage way	5.54x.9=4.99	4.99	6	5	Bedroom 1-3 Bathroom, Toilet, Kitchen, Entrance way	2	2	4	4	No privacy due to all doors being located onto passage, but no privacy is necessary	0/4.99	No,0% *	2	2	0
Bathroom	1.91x1.99=3.78	3.78	1	1	Toilet, Passage	1	1	2	2	Door directly onto passage	1.0305/3.78	Yes, 28%	1	1	1xM
Toilet	1.03x1.99=2.05	2.05	1	1	Passage, Kitchen, bathroom, back garden	2	2	3	2	Door directly onto passage	0.36/2.05	Yes, 18%	1	1	1xS
	8.8+25.6+8.76+14.38+13.58+7.8+4.99+3.78+2.05														
		89.74													

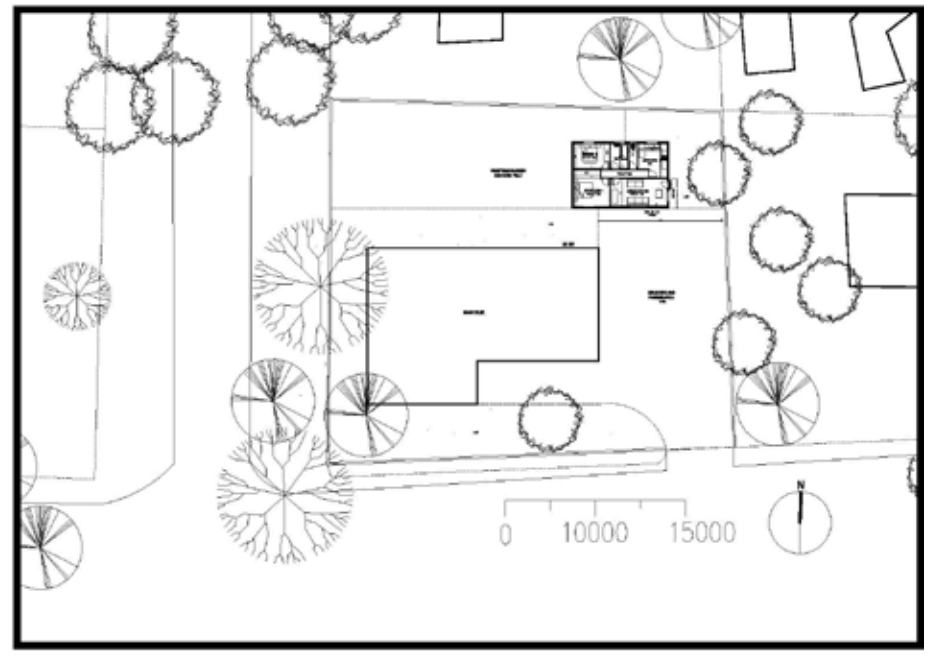
Table 7.13 - ZIM House 3 Summary of conditions

Zim House 3	Free standing
Outdoor space typology	**Front yard and Back yard**
Area in square metres	
Opportunities for gardening in pots	Possible for more than 10 pot plants (0.75 x 0.32mm x 10)
Space available for small scale vegetable gardens	3: 1-8 vegetable beds possible (40m2)
Space available for fruit trees	Maximum 4 fruit trees in garden bed area (4 x 3.5m2)
Space available for large scale subsistence farming	2- Space available for approximately 2 beds if lawn is removed, and only one bed if it is not (55m2 x 2)
Space available for practice of sports	5 -Space available for 16-20 players
Space for gathering people	5: 12 people or more (18m2 or more) - with a max capacity of 40 people in either the front or back yard.
Space for little children to play safely	5: Space for up to 20 children to play safely (60m2)

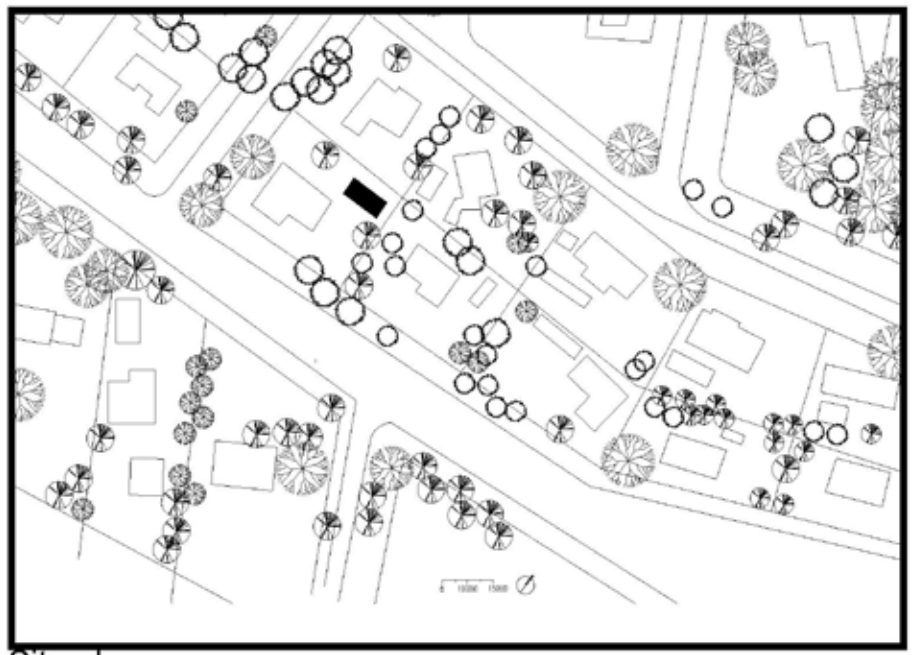
Table 7.13- ZIM House 3 Summary of conditions continued



Floor plan



Context plan



Site plan

Case study Family: Blue Family
Location A
Inhabitants: Father, Mother, Daughter

Figure 7 49: Zim House 4 - Floor plan, site plan and context plan

Figure 7.50 ZIM House 4- Locality Map (Google 2017) See *Figure 7.37* for legend

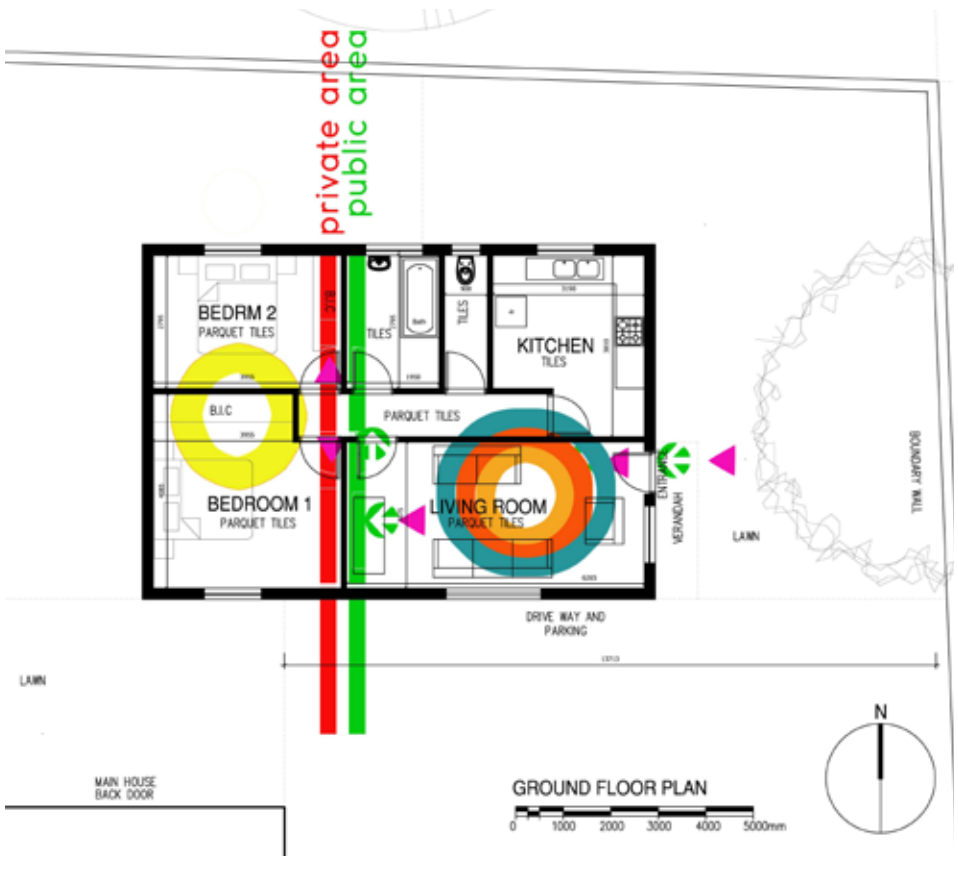


Figure 7.51. ZIM House 4- User and Public/Private Maps. See *Figure 7.38* for legend

Room Name:	Size	Area (m2)	No. of entrances / exits	Doors present	Attached room	Resultant Visual Privacy	Acoustic Privacy	Sound transmittance from/to surrounding rooms	Sound transmittance from/to main rooms	General Comments on privacy	Daylight Factor: Area of window/Total Area	Daylight Factor: Area of window >10% of total square foot area of room	Natural Light	Natural Ventilation	No. and size of openings for ventilation hxw
Living Room	(3.075*6.265) + (2.147*1.01)	21.43	2	Yes	Main Passage, External Verandah	2	2	2	3	Door allows for acoustic privacy from this room to the rest of the house, however sound system in the lounge transfers entertainment audio to the rest of the home	3.37/21.43	42	2	1	x1 XL1 Window@2.49m2= 1.245 x 2
Kitchen	2.8x3.2 =3.83	3.83	1	Yes	Main Passage	1*	1	1	2	Location gives room very good audio privacy . Door at entrance also allows the room to be more private	2.034/3.83	Yes 53%	1	1	x1 L Window.96m2
Passage	5.3 x .88 =4.664m2	4.66	7	Yes	Everyroom in the house	1*	3	4	4	No privacy due to all doors being located onto passage, but no privacy is necessary	(1.9 x 7)/4.66	No,0% *	2	1	7 doors
Bathroom	2.796x1.947 =5.44m2	5.44	1	1	Passage	3	3	3	3	3-Due to being attached to passage when there is movement in the passage the bathroom does not feel private	1.0305/5.44	Yes, 19%	1	1	1 door, x1M window
Bedroom 1	3.09*3.954=12.22 + 2.98=15.2m2	15.2	1	1	Passage	2	2	2	2	More private than the other bedroom due to being located alongside the bathroom	2.034/15.2	Yes, 14%	3 (bad orientation)	1	x1 L Window
Bedroom 2	3.95x 2.796=11.05m2	11.05	1	1	Passage	2	2	3	2	Less private than the other bedroom due to being located alongside the living room	2.034/11.05	Yes, 19%	3 (bad orientation)	1	x1 L Window
	21.43+3.83+4.664+5.44+15.2+11.05														
		61.65													

Table 7.14 - ZIM House 4 Summary of conditions

ZIM House 4 Outdoor space typology	Free Standing Back house Front yard and Back yard
Opportunities for gardening in pots	Possible for more than 10 pot plants (0.75 x 0.32mm x 10)
Space available for small scale vegetable gardens	3: 1-8 vegetable beds possible (40m2)
Space available for fruit trees	Maximum 3 fruit trees in garden bed area (3 x 3.5m2)
Space available for large scale subsistence farming	1- Space available for a field of a single crop (55m2)
Space available for practice of sports	4 -Space available for 12 players
Space for gathering people	5:12 people or more (18m2 or more) - with a max capacity of 20 people in either the front or back yard.
Space for little children to play safely	3: Space for up to 12 children to play safely (36m2)

Table 7.14 - ZIM House 4 Summary of conditions continued

This concludes the raw data findings for the case study homes of this chapter. Chapter 8 contains a discussion on the case study findings of each country as well as a summary of the differences in living conditions for the inhabitant families in the case study homes.

CHAPTER 8 RESEARCH DATA DISCUSSION OF FINDINGS (RFS 890 COMPONENT AND ARG 895 COMPONENT)

8.1 RESEARCH STUDY FINDINGS

This chapter shows the research findings of the homes studied for this dissertation. Six families were selected, with each of these families currently, or having previously, residing in each of the case study homes. Through this process, four homes within each country have been studied under a given set of indicators which are listed and explained in chapter 6 and derived from the precedent studies detailed in chapter 4. The previous chapter presented the raw data findings for each home. These findings for these indicators are presented in the context of each case study country, and thereafter in relation to the families who lived in these homes.

8.2. RESEARCH FINDINGS: THE UNITED KINGDOM

The findings for the UK homes considered in this study are summarised point by point.

- Area

UK House 1, the home with the largest area, had a total area of 140m^2. The smallest case study home was UK House 4, which had an area of 58.76m^2. The smallest home is a single-storey apartment with a total area that is 56% smaller than the second-smallest UK residence considered in the study. This finding showed a correspondence with the apartment typology and the total floor area of a home of that typology. Semi-detached homes were found to have the largest total floor area, and single-storey apartments were found to have the smallest.

- Typology

The summary of findings for the UK homes in this study revealed vertical movement involving stairs was common in the residential case study homes. Stairs were featured within the duplex unit, and/or within the building to access an individual apartment unit. Three of the four case study homes in this study were duplex units (comprised of two floors), and all the UK homes in the study include at least one shared wall with another residence, with semi-detached homes, row house and apartment typologies all featuring in the study.

- Total number of rooms in the house

There was a correlation in the findings between total number of rooms and the related total area of UK homes in this study. The UK home (UK House 1) with the highest number of rooms in this study also had the highest total area, with the same result in relation to the

home with the smallest total area. The total number of rooms per home varied between 8 rooms and 12 rooms. Homes with a larger total of rooms containing more convenience rooms, such as additional bathrooms and toilets and separate spaces for conveniences such as laundry and separate dining and lounge areas were observed.

- Number of bedrooms in the house

From the findings of this study, on average the UK homes contain 2.75 (2-3) bedrooms. There was no correlation between the total area of a home and the number of bedrooms which it contained. Neither was there any correlation noted between typology and the number of bedrooms per residence. UK House 1 was found to be the home with the highest number of bedrooms with four bedrooms, while half of the UK homes studied included only two bedrooms.

- Average area of bedrooms in the house

For this case study, UK House 4 was found to be the home with the smallest total area. It also had the smallest average area per bedroom. The same was not for the case for the home with the largest total floor area, UK House 1. This indicates that the size of a residential home does not automatically determine the size of bedrooms in that home. Bedrooms in the UK selection have an area between 10.15m^2 and 15.18m^2, with an average area of 12.01m^2.

- Number of bathrooms per residence

Only one of the UK homes in this study, UK House 4, contained more than a single bathroom. Of the three homes containing a single bathroom, two of these homes, UK House 1 and 2, consisted of separate rooms for the bath and or shower and the WC. In UK House 1 (a home containing two bathrooms) one of the bathrooms contained a WC, while the other contained a separate WC.

- Typical dimensions of bathroom and average area of bathroom

The smallest width per bathroom in the UK houses identified in this study was found to be 1.86m (UK House 4), with the longest length found to be 3.3m in UK House 1. Bathrooms were found to be more or less proportionately dimensioned. The largest bathroom for UK homes considered in this study had a total area of 6.6m^2 in UK House 1; the smallest, 3.72m^2 in UK House 4. The average area per bathroom in the UK examples was found to be 5.4m^2.

- Space with the highest usage

Living rooms were found to be the rooms in the home with the highest usage in the UK homes in this study. In cases where the average bedroom size was large in comparison to

other rooms of the house and the floor area of other homes bedrooms, use of the bedrooms was almost as high as the use of the living room. In the homes where the lounge/living room was found to be the space with the highest use, it was noted that the kitchen was adjoined to the living room and that the dining room and living room were combined. Typically, both these rooms were the only access point to the outdoor recreational space (garden, balcony) in the home. Where this was not the case, use of the living room was equal to use of bedrooms. It was also noted that in cases where bedroom usage was high, the bedrooms contained large windows, allowing more access to natural light and ventilation within the bedroom space.

- Average area of public rooms

Public rooms refer to rooms that are accessible to anyone who enters a residence, usually referring to dining rooms and living rooms (Othman et al. 2014:19). No correlation between the total average area of these public rooms and their use was found. This implies that bigger public rooms did not equate to higher usage in the case of the UK homes in this study. The average area of public rooms was found to be 22.37m^2. The largest public room observed in the study, in UK House 3, has a total area of 41.48m^2. This home has its study, lounge and dining area combined into one. In comparison to UK House 1, which has the smallest average area for public rooms at 13.56m^2, the living room, dining room, study area and kitchen of this home are all separate rooms, and the use of bedrooms in these homes is as high as the use of the living room.

- Average acoustic privacy

(i) Sound transmittance to and from surrounding rooms was found to have an average Likert score of 1.96, which rounds up to 2, translating to the sound transmittance to and from surrounding rooms in the UK houses as being private enough, with only sound transmittance, and not definite words or defined sounds, audible.

(ii) Sound transmittance to and from main rooms was found to have an average Likert value of 1.74 which is rounded off to a Likert value of 2, as being private enough; sound transmittance, and no definite words or defined sounds audible.

The average sense of acoustic privacy within these UK homes was a Likert scale value of 2.13, which is rounded down to a 2, meaning that acoustic privacy was found to be private enough. Strategic location of doors and built-in cupboards within the bedroom areas of the homes allowed for acoustic barriers between the rooms of these houses, improving acoustic privacy in these homes. The shared walls between homes in the typologies of UK houses means that privacy between homes sharing a wall may not be as good as desired; however, the overall subjective sense of privacy within the homes was found to be average.

- Average visual privacy

Visual privacy was measured using the Likert scale indicator determined in chapter 4. The average for the UK homes in this study was found to be 1.68, which is rounded up to a value of 2 on the Likert scale, indicating that, from a subjective point of view, the UK homes for this study were found to be private enough. It was found that the UK homes chosen for the study generally had the placement of private rooms such as bathrooms and bedrooms with windows on higher floors or areas with less traffic in the home, with exception of UK House 3, where visual privacy is compromised due to a large shower/bath window facing onto the street.

- Daylight Factor

On average, it was found that the UK homes considered in this study had an average daylight factor of 15.9%. The standard for the minimum legal daylight factor as per SANS10400 is any daylight factor above 10%. UK House 4 was found to be the UK home with the lowest average daylight factor, and had an average daylight factor of 12.28%. In this home, there were certain rooms which had a daylight factor of 0%. UK House 3 was found to be the UK case study home with the highest daylight factor of 23.25%, as it contained rooms where windows were almost the length of the entire wall on which they were placed.

- Average feeling of natural light

The score for average subjective feeling of natural light in UK homes for this study is 2.4 which is rounded down to a score of 2 on the Likert scale. This value translates to the average subjective sense of natural light in the selected UK homes as being experienced as good/bright enough. This point must be noted within the context of the UK, where, due to the solar angle of incidence, light levels are not as bright as they are in Africa. The home with the lowest levels of natural light contained a WC and bathroom with no windows, connected to a passage with no windows. Generally, due to space constraints as well as limited opportunities for windows as a result of shared walls, the homes considered in the study contained some rooms where natural light was limited.

- Average feeling of natural ventilation

The average subjective feeling for natural ventilation was 1.9. This means that on average, the homes considered in this study were found to have good levels of natural ventilation, as the value of 1.9 is rounded up to a value of 2. It was found that although some rooms,such as bathrooms,had no windows for natural ventilation, artificial ventilators were provided in these rooms. In general, in other rooms where more time is spent, such as in bedrooms and living rooms, natural ventilation levels were found to be good. In rooms such as kitchens in

the UK case study homes, air extractors were often utilised to get rid of excess moisture levels in the air as a result of cooking. Regulations for standards on ventilation focus more on air changes per hour in cases where ventilation is given. Recommendations for conditions that induce sufficient flows of natural ventilation are given in Part F of the British National Regulation. These regulations recommend that a minimum gap of 10mm between rooms, along with a minimum head height of 2.1m - 2.4m should encourage a flow of natural ventilation. All UK homes featured in this study met these conditions.

Outdoor typology indicators

- Outdoor space typology

Three of the four UK homes considered in this study contained a back garden, and one a balcony. See *Table 8.1* for details on the correlation between activities possible and the back garden in order to understand the varying back garden typologies investigated, which are generally different. The points below will also give more detail.

- Opportunities for gardening in pots

The reason for this indicator was for the description of scale within the recreational facilities of each home. See *Table 8.2* below for the individual circumstances for the UK study houses. 50% of the homes had recreational space available for a maximum of six pot plants. The standard size for a garden pot for this study was found to be a pot with a volume of $0.07m^3$, or 70 litres. This translates to a rectangular-shaped garden pot with dimensions similar to: height of 0.3m, length of 0.755m, and width of 0.325m, or a diameter of 0.23m (Lord 2017). This general indicator does not give a true sense of how this would work spatially as planting six pots may be feasible but in some cases may change the space's usability. Two (UK House 1 and UK House 2) of the four UK homes in the study were found to have space for more than ten pot plants of the dimensions mentioned above.

- Opportunities for small-scale vegetable gardens

The reason for this indicator within the context of this country was for the description of scale within the recreational facilities of each home. *Table 8.1* shows that the case study homes' ability to accommodate a vegetable garden is varied. UK House 4 has no space available, while UK Houses 1 and 2 have available space for up to three or four small-scale vegetable beds ($15m^2$). An average small-scale vegetable garden bed was deduced to have a total area of $5m^2$ (Patterson 2017; Vernon et al. 2013).

- Opportunities for growing fruit trees

The reason for this indicator within the context of this country was for the description of scale within the recreational facilities of each home. Only half of the studied UK homes were

able to accommodate fruit trees. The average amount of space required for a fruit tree for this research was determined to be $5m^2$ (Vernon et al. 2013:140). UK House 2 can accommodate only two fruit trees (approximately $10m^2$), while UK House 1 can accommodate up to six (approximately $30m^2$); the other two homes cannot accommodate any fruit trees due to spatial limitations.

- Opportunities for large-scale subsistence farming

Large-scale subsistence farming is only an option for one of the UK homes, UK House 1, in this study, and even in this case, it is only possible for one crop if the existing lawn is removed. Subsistence farming is not common practice in the UK due to spatial and weather conditions. It was determined that on average, a large-scale vegetable bed requires an area of $55m^2$ (Patterson 2017).

- Space available for court/field sports

This indicator is used to show the scale of recreational space, as well as the ground cover conditions of the recreational space of the homes. Playing field or court sports in the recreational space of the home is not possible for two of the UK homes, UK House 3 and UK House 4. Where playing field sport is possible for UK House 1 and UK House 2, this would only work with a maximum of either four players for one home and eight players in the other home.

- Space available for gathering people

This indicator is used to give an indication of the recreational usefulness of an outdoor space through the measurement of how many people can comfortably gather in that space. The smallest number of people that are able to gather in this data set is four people ($6m^2$) on the balcony of UK House 4, while UK House 1 is the home that can accommodate the largest number of people, holding 25 people comfortably ($37.5m^2$). This reflects a vast difference in conditions of the UK homes in this study.

- Space available for children to play safely

This indicator is also used to give an indication of the scale, area and surrounding conditions of the outdoor space of the homes considered in this study. Two of the four of the UK homes, UK House 3 and 4, can have a maximum of three children playing in the outdoor area safely. UK House 1 and 2, can respectively hold a maximum of eight and twenty children playing safely. There is a general correlation between the total area of the UK homes investigated and the size and usability of their outdoor and recreational spaces.

Table 8.1 presents a summary of the research findings of the UK homes.

Table 8.1: **Summary of UK case study homes**

	UK House 1	UK House 2	UK House 3	UK House 4	UK case study average
Area	140m^2	120m^2	104m^2	58.76m^2	105.75m^2
Typology	Duplex semi-detached house	Duplex semi-detached cabin	Duplex rowhouse	Apartment	N/A
Total number of rooms in house	12	11	9	8	10
Number of bedrooms in residence	4	2	3	2	2.75
Average area of bedrooms in residence	13.4	15.18	11.4	10.15	12.01
Number of bathrooms	2	1	1	1	1
Typical dimensions of bathroom:	3.3 x 2	2.33 x 2.4	2.29 x 1.93	2 x 1.86	2.48 x 2.05
Average area of bathroom (m^2)	6.6	5.6	4.42	3.72	5.4m2
Space with highest usage	Bedrooms and kitchen	Bedroom	Living room	Living room	Living room and bedroom
Average area of public rooms (m^2)	13.56 m^2	20.34 m^2	41.48 m^2	14.1 m^2	22.37m^2
Average feeling of acoustic privacy	1.9	2.25	2.25	2.125	2.13, which is rounded off to a Likert value of 2 which means private enough: Sound transmittance, but not definite words, audible

	UK House 1	UK House 2	UK House 3	UK House 4	UK case study average
Sound transmittance from/to surrounding rooms	2.16	1.8	1.63	2.25	1.96, which is rounded off to a Likert value of 2 = private enough: Sound transmittance, but not definite words or sounds, audible
Sound transmittance from/to main rooms	1.75	1.7	1.64	1.87	1.74, which is rounded off to a Likert value of 2 = private enough: Sound transmittance, but not definite words or sounds, audible
Average feeling of visual privacy	1.58	1.75	1.876	1.5	1.68, which is rounded off to a Likert value of 2, translating to private enough
Daylight factor: Area of window >10% of total square foot area of room	Yes, 14.7%	Yes,13.63%	Yes, 23.25%	Yes, 12.28%	Yes, 15.9%
Average feeling of natural light	2	2.25	2.25	3.125	2.4, which is rounded down to a Likert value of 2, translating to bright enough
Average feeling of natural ventilation	1.25	1.25	2.5	2.625	1.9, rounded up to a Likert value of 2, translating to good enough (airy)
Outdoor space typology	Back garden	Back garden	Back garden which contains a	Balcony	Back garden

	UK House 1	UK House 2	UK House 3	UK House 4	UK case study average
			garden shed		
Agriculture: Subsistence scale					
Gardening in pots	Possible for more than 10 pot plants	Possible for more than 10 pot plants	Possible for maximum 6 pot plants	Possible for maximum 6 pot plants	Typically, space is available for a maximum of 6-10 pot plants in the outdoor space. An average pot has the dimensions (0.3x 0.755x0.325)
Space available for small-scale vegetable gardens	3: 1-6 vegetable beds possible	3: 1-4 vegetable beds possible	2: Space available for a single vegetable bed	0: Not possible; not enough space	Typically, space is available for 0-3 vegetable beds available (0-15m^2)
Space available for fruit trees	Maximum 6 fruit trees	Maximum 2 fruit trees	Not possible; not enough space	Not possible; not enough space	Typically, space is available for 0-2 fruit trees (0-10m^2)
Space available for large-scale subsistence farming	1: Area available for a field of a single crop should the lawn be removed	0: Not possible	0: Not possible	0: Not possible	Typically not possible (0 m^2)
Sports and Recreation					
Space available for field sports	2: Maximum 8 players	1: Maximum 4 players safely	0: Not possible	0: Not possible	Typically space available for 0-4 players
Recreational gathering					

	UK House 1	UK House 2	UK House 3	UK House 4	UK case study average
Space for gathering people	6-25 people comfortably	4-8 people maximum	4 people maximum	5 people maximum	Typically space available for 4-12 people to gather comfortably (6-18m^2)
Space for children to play safely	Space for 20 children to play safely	Space for 8 children to play safely	Space for 3 children to play safely	Space for 3 children to play safely	Typically space available for 3-8 children to play safely (9 –24m^2), with a statistical average of enough room for 8.5 (25.5m^2) children

Continued - Table 8.1: **Summary of UK case study homes**

8.3. RESEARCH FINDINGS: SOUTH AFRICA

The findings for the South African homes included in this study are summarised point by point below.

- Area

The South African average area for the case study homes is 75.89m^2. RSA House 4, the largest South African home, has a total area of 158.66m^2. The smallest South African home, RSA 2, is the smallest at 48m^2. The size of each residence is related to its typology.

- Typology

Two of the four selected South African case study homes are apartments. One house, RSA House 1, is an apartment located within a walk-up. The fourth house, RSA House 4, is a free-standing house.

- Total number of rooms in the house

The average number of rooms per South African house in this study is 7.75 rooms per home. RSA House 4, with 13 rooms, is the largest home with the most number of rooms, while the other case study homes consist of six rooms each. There is a correlation between the typology of the house and the total number of rooms in the house, with larger homes and larger typologies containing more rooms.

- Number of bedrooms in the house

The average number of bedrooms per residence for this study sample was 2.5 bedrooms. RSA House 4 has the most number of bedrooms. The other three homes contain 2 bedrooms each.

- Average area of bedrooms in the house

The average area for bedrooms for the selected South African case study homes is 11.76m^2. RSA House 1 and 2 have an average bedroom area of approximately 10m^2. RSA House 3 has the largest average bedroom area of 13.37m^2.

- Number of bathrooms per residence

The average number of bathrooms per residence is 1.5 bathrooms per home. For three of the case study homes, there is one bathroom for every two bedrooms. RSA House 4, the largest home, contains 4 bedrooms and 3 bathrooms, giving a ratio of 1 bathroom for every 1.3 bedrooms.

- Typical dimensions of the bathroom and average area of the bathroom

The average dimensions for a bathroom were calculated to be 2.48m x 2.44m, with an area average of 5.74m^2. RSA House 2 has the bathroom with the largest total area of 7.2m^2. RSA House 4, the case study house with the largest total floor area, has the smallest average area for bathrooms of 4.45m^2.

- Space with the highest usage

The space with the highest usage for this study sample is the living room. In RSA House 1, the living room is located centrally in the home, alongside the open-plan kitchen, and is the only room in the home joint to all the other rooms, thus its high usage may be due to its location and high traffic volumes. In the case of RSA House 4, the largest South African house in this study, the living room is not centrally located but may be the choice for the most used room not only for its size, but because it is in the less private wing of the house, thus it serves as a non-private meeting area for all residents in the home.

- Average area of public rooms

The average area for public rooms in this portion of the study was found to be 15.63m^2. RSA House 4, the largest home, has the largest average area for public rooms. RSA House 1 and RSA House 3 have varying sizes of public rooms, which do not correlate to their ranking in size. RSA House 2, the case study home with the smallest total area, also has the smallest area for public rooms of 9.3m^2.

- Average acoustic privacy

(i) Sound transmittance to and from surrounding rooms was found to have an average Likert score of 2.3, which rounds of to 2. This Likert scale value means that a space is private enough. Lower levels of acoustic privacy were reported in RSA House 2 due to subletting conditions. Though the sublet residence skews the data, it was selected as part of the case study homes in order to give a real-life example of the scenario of a number of Zimbabweans who have moved from Zimbabwe to live in South Africa, and shows how this has impacted their residential quality of life.

(ii) Sound transmittance to and from main rooms was found to have an average Likert value of 2.61, translating to a Likert value of 3, which means that privacy is possible only when necessary with sound transmittance audible with some definite words or sounds audible depending on volume of sound. RSA House 2, the case study South African home with the poorest levels of acoustic privacy, happens to be the home where the living room is subdivided by a curtain demarcating a bedroom space from the remainder of this living room. Levels of acoustic privacy were recorded to be better in homes where rooms were separated by walls and doors. RSA Houses 1, 3 and 4, however, also obtained Likert scale ratings that round off to an average of 3 with regard to sound transmittance to and from main rooms. This may be due to the aligned door openings of the main rooms in these houses to the doorways of the private rooms, where the passage of sound is transferred down the passages of the homes.

- Average subjective acoustic feeling

The calculated figure for the average subjective acoustic feeling of the South African homes in this study is an average value of 2.28, which is rounded down to a value of 2 on the Likert scale. This translates to subjective levels of acoustic privacy that are considered to be private enough with sound transmittance, but with no definite words or sounds being audible. Poor levels of acoustic privacy occur in instances where rooms are used for purposes outside of the function for which they were originally designed. Examples include a sublet home, RSA House 3. RSA House 1 has an average subjective acoustic feel of 1.85. This may be due to the home's large size, which allows for a separate wing for the main bedroom. RSA House 1 and 2 a have poorer subjective sense of acoustics, which may because the rooms of these houses are closer to one another and that a single passage connects all rooms in the houses, allowing for easy passage of sound.

- Average feeling of visual privacy

The average feeling of visual privacy for the South African homes in this study was a value of 2.275 which is rounded down to a value of 2 based on the Likert Scale and is considered to be private enough. Reasons for the visual privacy ratings in each home are similar to those stated above.

- Daylight factor

On average, it was found that South African homes in this study had an average daylight factor of 24.05%. The standard for the minimum legal daylight factor as per SANS10400 is any daylight factor above 10%. RSA House 2 and 3 have the highest day lighting average of 27.83%. This is due to the large windows located in the homes. RSA House 1 is the home with the lowest average daylight factor with an average of 16.5%. In this home there were certain rooms with small windows which resulted in a low daylight factor.

- Average feeling of natural light

The average value for natural light in the South African residential homes in this study was 1.515. Based on the Likert scale, this was rounded up to a value of 2, which indicates that levels of natural light were found to be good/bright enough. In the study, rooms that were oriented to the south, or had no direct windows at all (due to subletting), were the reason for lower levels of natural light in certain homes. Overall, subjective levels of natural light were perceived to be quite good.

- Average feeling of natural ventilation

Subjective levels of natural ventilation were found to be the best feature of South African homes in this study, with an average rating of 1.3, which can be rounded to a score of 1 on the scale, indicating that levels of natural ventilation were considered to be very good. Even in areas that are sublet, levels of natural ventilation were rated as good. South Africa's temperate climate makes it feasible to open windows for ventilation, rather than using mechanical venitilation, throughout most of the year. This makes it possible for ventilation to occur through windows and natural airflow in residential homes. None of the South African homes in the study contained built-in devices for mechanical ventilation.

<u>Outdoor typology indicators</u>

- Outdoor space typology

RSA Houses 1 and 4 in this study have back gardens, including garden spaces in addition to well-sized verandas. RSA House 3 has a balcony and RSA House 2 has no outdoor space. Locality maps and site plansshow that access to communal outdoor facilities are

better in high-density areas where apartment buildings are located than in lower-density areas of in terms of the case study homes in South Africa.

- Opportunities for gardening in pots

RSA Houses 1, 3 and 4 have, on average, enough room for 6 pot plants. RSA House 2, the smallest home, has no space available for this outdoors. The largest home, RSA House 4, has the most space available for pots.

- Opportunities for small scale vegetable gardens

RSA Houses 2 and 3, both apartment typologies, have no space for vegetable farming at all. The largest South African home in the study, RSA House 4, has enough room for up to 8 small vegetable beds, while RSA House 1 has room for only one bed of $5m^2$ (Patterson 2017; Rhoades 2017).

- Opportunities for growing fruit trees

The results are similar to those above. RSA Houses 2 and 3, both of which are apartment typologies, have no possibility of growing fruit trees in or around the residential space, while RSA House 1 has space available for a maximum of one fruit tree, and RSA House 4 has space for six trees.

- Opportunities for subsistence farming

For the reasons explained above, RSA Houses 2 and 3 could not possibly contain a field of crops for subsistence farming. This would, however, be possible at RSA house 4, and, on a smaller scale, RSA House 1, in the event that the lawn were removed.

- Space available for court/ field sports

For the South African examples, field or court sports are not possible at RSA House 2 and 3, the apartment typology case study homes. RSA House 1 can accommodate field and court sports for a maximum of 4 players, while RSA House 4 can accommodate up to 25 players. The findings are related to typology and other factors explained above, with communal sporting facilities made available to residents in higher-density areas.

- Space available for gathering people

There is no space for events and recreational gathering of people in RSA House 2, as it has no balcony. RSA House 3 can accommodate up to 4 people on its balcony. RSA House 1 could accommodate a maximum of 10 people ($15m^2$) comfortably for a recreational gathering, both in the indoor and outdoor spaces of the home, while RSA House 4 could accommodate a maximum of 35 people comfortably ($52.5m^2$).

- Space available for children to play safely

RSA House 2 has no space available for children to play safely outdoors. RSA House 3, of the same apartment typology, has enough room for up to 3 children to play safely. RSA House 1, a ground-floor apartment located in a walk-up, has space available for up to 6 children to play safely (18m^2), while RSA House 4, a free-standing home, has space for up to 20 children to play safely (60m^2). In the context of these four homes, space for play is related to building typology, with characteristics of a space in relation to its typology explained above. In high-density areas where apartment buildings are found, communal play areas within walking distance to apartment blocks make provision for the lack of play space in the homes.

Table 8.2 presents a summary of the research findings of the South African homes.

***Table 8.2:* Summary of South African case study homes**

	RSA House 1	RSA House 2	RSA House 3	RSA House 4	Country Average
Area	49.05m^2	47.477 m^2	70.23 m^2	158.66 m^2	81.35 m^2
Typology	Walk-up	Apartment	Apartment	Free-standing house	Apartment
Total number of rooms in house	6	6	6	13	7.75
Number of bedrooms in residence	2	2	2	4	2.5
Average area of bedrooms in residence	10.36	10.51	13.37	12.66	11.76m^2
Number of bathrooms	1	1	1	3	1.5
Typical dimensions of bathroom	3.07x1.74	2.4x3	1.7x3.51	2.7x1.49	2.48x1.97

	RSA House 1	RSA House 2	RSA House 3	RSA House 4	Country Average
Average area of bathroom (m^2)	5.34	7.2	5.97	4.45	5.74
Space with highest usage	Living room	Living room	Living room	Living room	Living room
Average area of public rooms (m^2)	17.76 m^2	9.3 m^2	12.72 m^2	22.72 m^2	15.63 m^2
Average feeling of acoustic privacy	1.83	3	2.5	1.85	2.295, which translates to a Likert value of 2, meaning private enough: Sound transmittance, but not words, audible
Sound transmittance from/to surrounding rooms	2.63	2.83	2.5	2.46	2.61, which translates to a Likert value of 3 which means privacy possible only when necessary: Sound transmittance audible with some definite words or sounds audible, depending on volume of sound

	RSA House 1	RSA House 2	RSA House 3	RSA House 4	Country Average
Sound transmittance from/to main rooms	2.46	2.83	3	1.61	2.5, which translates to a Likert value of 3, meaning privacy possible only when necessary: Sound transmittance audible with some definite words or sounds audible depending on volume of sound
Average feeling of visual privacy	2.25	2.8	2.67	1.38	2.275, which translates to a Likert value of 3, meaning privacy possible only when necessary
Daylight factor: Area of window >10% of total square foot area of room	Yes, 16.5%	Yes, 27.83%	Yes, 27.83%	Yes, 24.4%	Yes, 22.63%
Average feeling of natural light	1.85	1.67	1	1.54	1.515, which this translates to a Likert value of 2 , meaning good (bright) enough
Average feeling of natural ventilation	1.375	1.67	1	1.15	1.3, which translates to a Likert value of 1, meaning very good (very airy)
Outdoor space typology	Back garden and veranda	None	Balcony	Back garden	Back garden

	RSA House 1	RSA House 2	RSA House 3	RSA House 4	Country Average
Agriculture: Subsistence scale					
Gardening in pots	Possible for 8 pot plants	Not possible	Possible for 6 pot plants	Possible for more than 10 pot plants	Where there is space for pot plants, statistically there is enough room for approximately 6 pots (4.25x(0.3x 0.755x0.325))
Space available for small-scale vegetable gardens	2: Space for a single vegetable bed	Not applicable	Not applicable	3: 1-8 vegetable beds possible	Where space is available, there is statistically sufficient space for 2.5 vegetable beds (12.5m^2)
Space available for fruit trees	Maximum 1 fruit tree	Not applicable	Not applicable	Maximum 6 fruit trees in garden bed area	Space is statistically available for 1.75 fruit trees per residence (8.75 m^2)
Space available for large-scale subsistence farming	1: If lawn is removed, 1 small-scale field is available.	Not applicable	Not applicable	2: Space available for approximately 4 fields if lawn is removed, and only 1 if lawn is not removed	Space is typically not available for a large vegetable bed
Sports and recreation					
Space available for field sports	1: Space for maximum 4 players	Not applicable	Not applicable	5: Available space for 16-25 players	Space is statistically available for 7.25 people to play

	RSA House 1	RSA House 2	RSA House 3	RSA House 4	Country Average
Recreational gathering					
Space for gathering people	10 people comfortably maximum	Not applicable	5 people maximum	6-12 people or more (Maximum of approximately 35 people can comfortably gather in the front and/or back garden)	Space is statistically available for 12 people to gather ($18m^2$)
Space for children to play safely	Space for up to 4 children to play safely	Not applicable	Space for up to 3 children to play safely	Space for up to 20 children to play safely	Space is statistically available for 7 ($18m^2$)children children to play safely

Continued - Table 8.2: **Summary of South African case study homes**

8.4. RESEARCH FINDINGS: ZIMBABWE

The findings for the homes located in Zimbabwe are summarised point-by-point.

- Area

The Zimbabwean (ZIM) homes in this study have a calculated average area of 103m^2. The largest house, ZIM House 2, has an area of 172m^2, while the smallest, ZIM House 4, has an area of 61.65m^2; both of these residences are free-standing houses.

- Typology

Three of the four homes for this study located in Zimbabwe are free-standing homes, although the smallest of these three homes is a back garden cottage, as opposed to a main house. Main houses tend to be larger than cottages. The other typology which appeared in the Zimbabwean study is a duplex apartment building.

- Total number of rooms in the house

The average number of rooms per home is eight. ZIM House 4, the house with the least number of rooms has six rooms in total, while the two middle-sized homes, ZIM Houses 1 and 3, have a total of 9 rooms. The largest home, ZIM House 2, contains a total of 14 rooms.

- Number of bedrooms in the house

The average number of bedrooms per residence for this study sample was 3.25. The largest home, ZIM House 2, contains five bedrooms. ZIM House 4 contains two bedrooms, and the other two homes contain three bedrooms each. There is a positive correlation between the total number of bedrooms per house and the total area of the home, with larger homes containing more bedrooms.

- Average area of bedrooms in the house

The average area for bedrooms in the Zimbabwean examples is 11.74m^2. The largest average bedroom size in this study sample is 12.6m^2, found in ZIM House 2, and the smallest 10.89m^2, found in ZIM House 1. The difference in the spatial quality of these rooms is that ZIM House 2 contains bedrooms with large, openable windows, which brings both natural ventilation and light into the space, while ZIM House 1 has a small bedroom which contains only a door, and no windows, making it an unpleasant space in which to spend long periods of time.

- Number of bathrooms per residence

The average number of bathrooms per Zimbabwean home is 1,875, which can be rounded down to two bathrooms per home. The largest home, ZIM House 2, contains three

bathrooms, while the other three homes contain 1.5 bathrooms each. In the case of ZIM Houses 1, 3 and 4, where there is only one WC per residence, this WC is separate from the main bathroom, allowing for more than one resident at a time to use of the bathroom facilities. This separation of facilities makes them more convenient for residents in the home.

- Typical dimensions of bathrooms and the average area of bathrooms

The average dimensions for a bathroom were calculated to be 1.92x2.44m, with an area average of 5.1m^2. Bathroom size was found to be more or less the same in all homes, regardless of whether or not a home was smaller or larger than the others.

- Space with the highest usage

In this study sample, it was found that residents in Zimbabwean homes spend most of their time in the kitchen of the home, with living rooms having the second-highest amount of time spent. This finding correlates with the typical socio-economic scenario in Zimbabwe, where bread-winners spend their daytime hours outside of the home, while housekeepers and homemakers constitute the primary users of residential spaces as they spend most of their time at home in the kitchen.

- Average area of public rooms

Public rooms in the Zimbabwean homes of this study were found to have an average area of 19.59m^2. ZIM House 2, the largest home in the study sample, has an average area of 15.57m^2, similar to the average area for the public rooms found in homes such as ZIM House 3, which has the smallest area of 11.92m^2 for public spaces in the home. The duplex apartment contained the largest area for public rooms. No correlation was found between the size of the home and the size of its public spaces.

- Average acoustic privacy

(i) Sound transmittance to and from surrounding rooms was found to have an average Likert score of 2.41, which rounds down to 2, a Likert value which means that, on average, the homes were found to be private enough with sound transmittance audible in the Zimbabwean homes considered in this study.

(ii) Sound transmittance to and from main rooms such as living rooms and kitchens, was found to have an average Likert value of 2.075, translating to a Likert value of 2, which means that, on average, the sound transmittance from/to singular rooms, such as bedrooms and toilets, to the main rooms in the Zimbabwean examples allowed for acoustics to be private enough with sound transmittance, but no definite words or sounds being audible.

- Average feeling of acoustic privacy

The calculated figure for the average acoustic feeling of the Zimbabwean urban homes featured in this study is 2.07. This translates to a Likert value of 2, which means the subjective sense of acoustic privacy was found to be private enough with sound transmittance, but no definite words or sounds being audible. In ZIM House 4, the home with the poorest score as per the Likert Scale, the door to the public rooms is aligned directly to the door of the bathroom, making it possible for acoustic transfer to occur between the rooms. This may lead to uncomfortable scenarios. Homes with a better subjective score for acoustic privacy included acoustic privacy barriers such as the location of built in-closets at the entrance of each bedroom. These built-in cupboards are all located on the shared walls between bedrooms, acting as an added acoustic barrier between the bedrooms.

- Average visual privacy

The calculated value for average subjective feeling of visual privacy for the Zimbabwean homes was found to be 1.48, translating to a Likert value of 1. This means the subjective sense of visual privacy allows for areas in the Zimbabwean homes to feel very private.

- Daylight factor

On average, it was found that Zimbabwean homes in this study have an average daylight factor of 19.07%. The standard for the minimum legal daylight factor as per SANS10400 is any daylight factor above 10%. The South African National Standard (1990) is used here as Part-O of the Zimbabwean National Standard (1998) stipulates that as long as a room has an opening for natural light, it is deemed satisfactory, thus SANS 10400 was used in order to measure the standard. ZIM House 2, the Zimbabwean home with the lowest score, has an average daylight factor of 14.7%. In this home, there were certain rooms that contained no windows, resulting in a low household average daylight factor. ZIM House 1, found to be the Zimbabwean case study home with the highest daylight factor of 22% as it contained rooms with large windows.

- Average feeling of natural light

Subjective natural light levels were calculated to have an average Likert value of 1.64. This is rounded up to a Likert value of 2, which means subjective levels of natural light are perceived to be good (bright) enough. Zimbabwe has good levels of natural light due to its latitudinal position. ZIM House 1 contains one bedroom with no windows or access to natural light. This is a room that was intended for storage but is big enough to fit a bed. Users of this bedroom were observed to only sleep here, and use adjoining bedrooms for other activities, such as getting dressed and recreating. It was observed that only rooms intended for little to no human inhabitation, including rooms intended for storage and garages, have poor natural light conditions, thus contributing to lower scores on natural light

levels in the findings. However rooms intended for human occupation on a long-term basis have good ratings for natural light levels within the context of the Zimbabwean examples.

- Average feeling of natural ventilation

The Zimbabwean average value for natural ventilation was calculated to be 1.45, rounded down to a Likert value of 1. This means very good (very airy). Zimbabwe generally does not experience any climate extremes, making it possible to use open windows to generate natural air flow for ventilation. All rooms in the Zimbabwean scenario met the recommendation for good levels of natural ventilation stipulated in Part O of the Zimbabwean National Standard, as openings for ventilation are provided either through windows and/or doors.

Outdoor typology indicators

- Outdoor space typology

Three of the Zimbabwean homes considered in this study contain both front and back gardens. One of these homes, ZIM House 1, includes a balcony as an outdoor space. Residential typology in this study is related to outdoor space typology, as the free-standing homes in this study include front and back gardens, while the duplex apartment has a balcony space.

- Opportunities for gardening in pots

Gardening in a pot is possible for all the Zimbabwean residences in this study. One of the homes, ZIM House 4, can fit a maximum of four pot plants within the gardening space, while the larger typologies are able to fit 10 or more pot plants in the outdoor space. The significance of the amount of space available for planting food at homes located in urban Zimbabwe is linked to practices such as growing food at a subsistence-scale for food supply and cultural urban and rural links. This is explained in Section 4.1.3.

- Opportunities for small-scale vegetable gardens

Three of the four Zimbabwean case study homes have enough space for 1-8 small scale vegetable gardens (5-40m^2). These homes contain both back and front gardens. The maps in Chapter 7 show that most residential stand sizes around the studied homes also have sufficient space for a 1-8 small scale vegetable gardens. Socio-economic development during the colonial period was aimed at providing a country lifestyle in suburban Zimbabwean cities, as explained in Section 4.1.3. The fourth home, ZIM House 1, includes balconies as an outdoor typology, thus, it is not possible for small-scale gardening to take place here.

- Opportunities for growing fruit trees

With the exception of ZIM House 1, where planting of fruit trees is not an option, it is possible to plant between 4 and 8 fruit trees in the garden space of the other three Zimbabwean case study homes. These three homes contained trees, such as lemon, avocado, mango, guava and banana trees within the garden.

- Opportunities for large-scale subsistence farming

Relating to the explained correlation between the size and type of residential homes and their outdoor typology, it was found that large-scale subsistence farming is not possible at ZIM House 1. Space is available for between 1 and 2 large-scale crop cultivation in the other three case study homes.

- Space available for court/ field sports

There is no space available for field sports at non-freestanding homes in this study, as balcony space does not allow for safe playing of sports. Density and amenity maps in Chapter 7 show that a large open communal space for recreational activities is within walking distance of homes where there is no space on the premises in which to play sports. The other three case study homes contain both front and back garden space, and it was calculated that space is available for safe and comfortable field sports with a total number of 12-20 players taking part.

- Space available for gathering people

ZIM House 1 contains a balcony as an outdoor typology; there is space for a maximum of 4-6 people to gather comfortably on the balcony space ($6m^2$-$9m^2$). The other three homes have, on average, space for up to 35 people ($52.5m^2$) to gather. ZIM Houses 2 and 4 contain enough space for more people to gather comfortably in the back and/or front garden. Only one of the free-standing homes, ZIM House 2, has an outdoor recreational area leading off from the kitchen space rather than from the lounge and living room spaces, as is the case with the other homes. Subsequently, the use of the kitchen space is highest in this home, where the outdoor back garden and pool area could only be accessed from the kitchen. The kitchen was furnished to accommodate recreational gathering, and this home makes less use of the living room area. In the other homes where the outdoor recreational area was linked to the outdoor living room space, use of the living room was high.

- Space available for children to play safely

ZIM House 1, the Zimbabwean homes in the study that has a balconiy as an outdoor typology, has space available for a maximum of 3 children to play safely in the outdoor area ($9m^2$). For the remaining residences that include back and front gardens, there is space for between 12 and 30 children to play safely, depending on the size of the respective yard.

Table 8.3 presents a summary of the research findings of the Zimbabwean homes.

***Table 8.3:* Summary of Zimbabwean case study homes**

	ZIM House 1	ZIM House 2	ZIM House 3	ZIM House 4	Country average
Area	89.689	172.12	89.74	61.65	103.3m^2 with large house, 80.46m^2
Typology	Duplex apartment	Free-standing house	Free-standing house	Free-standing house	Free-standing House
Total number of rooms in house	9	14	9	6	8, or 9.5 including large houses
Number of bedrooms in residence	3	5	3	2	3.25
Average area of bedrooms in residence	10.89	12.6	11.83	11.65	11.74m2 (3.325x3.95)
Number of bathrooms	1.5	3	1.5	1.5	1.875
Typical dimensions of bathroom:	1.89 x 2.42	1.95 x 2.55	1.91 x 1.99	1.947 x 2.79	1.92x2.44
Average area of bathroom (m^2)	5.4	5.78	3.78	5.44	5.1m^2
Space with highest usage	Bedroom	Bedrooms and kitchen	Living room	Living room and kitchen	Living room and kitchen

	ZIM House 1	ZIM House 2	ZIM House 3	ZIM House 4	Country average
Average area of public rooms (m^2)	31.62	15.57	11.92	19.26	19.59m^2 , but 15.58m^2 if large homes are excluded
Sound transmittance from/to surrounding rooms	2.6	1.85	2.7	2.5	2.41, which translates to a Likert value of 2 meaning private enough: Sound transmittance, but no definite words or sounds, audible
Sound transmittance from/to main rooms	2.4	1.29	2.8	2.6	2.28, which translates to a Likert value of 2 meaning private enough: Sound transmittance, but no definite words or sounds, audible
Average feeling of acoustic privacy	1.67	2.07	1.89	2.67	2.075, which translates to a Likert value of 2 meaning private enough: Sound transmittance, but no definite words or sounds, audible
Average feeling of visual privacy	1.67	1.79	1.33	1.167	1.48, which translates to a Likert value of 1, meaning very private
Daylight factor: Area of window >10% of total square foot area of room	Yes, 22%	Yes, 14.7%	Yes, 19%	Yes, 20.6%	Yes ,19,07%

	ZIM House 1	ZIM House 2	ZIM House 3	ZIM House 4	Country average
Average feeling of natural light	1.78	2.07	1.4	1.3	1.64, which translates to a Likert value of 2, meaning good (bright) enough
Average feeling of natural ventilation	1.56	1.5	1.3	1.3	1.415, which translates to a Likert value of 1, meaning very good (very airy)
Outdoor space typology	Balcony	Back garden and front garden	Back garden and front garden	Back garden and front garden	Back garden and front garden
Agriculture: Subsistence scale					
Gardening in pots	Possible for 4 pot plants	Possible for more than 10 pot plants	Possible for more than 10 pot plants	Possible for more than 10 pot plants	Possible for more than 10 pot plants (10x(0.3x0.755x0.325))
Space available for small-scale vegetable gardens	0: Not possible; not enough space	3: 1-8 vegetable beds possible	3: 1-8 vegetable beds possible	3: 1-8 vegetable beds possible	3: 1-8 vegetable beds possible (5-40m ^{2})
Space available for fruit trees	Not possible; not enough space	Maximum 8 fruit trees in garden bed area	Maximum 4 fruit trees in garden bed area	Maximum 3 fruit trees in garden bed area	On average, a maximum of 5 fruit trees in garden bed area (25m^2)
Space available for large-scale subsistence farming	0: Not possible	2: Space available for approximately 3 beds if lawn is removed, and only 1 if the	2: Space available for approximately 3 beds if lawn is removed, and only 1 if the	1: Enough space for a field for a single crop	Space available on average for 1 large vegetable field (55m^2)

	ZIM House 1	ZIM House 2	ZIM House 3	ZIM House 4	Country average
		lawn is not removed	lawn is not removed		
Sports and Recreation					
Space available for field sports	0- Not Possible	5: Space available for 16-20 players	5: Space available for 16-20 players	4: Enough space for approximately 12 players	On average, space for approximately 16 players
Recreational gathering					
Space for gathering people	4-6 people comfortably	6-12 people or more (Maximum of approximately 50 people can comfortably gather in front and/or back garden)	6-12 people or more (Maximum of approximately 40 people can comfortably gather in front and/or back garden)	6-12 people or more (Maximum of approximately 20 people can comfortably gather in front and/or back garden)	On average, between 12 and 35 people are able to gather ($18m^2$-$52.5m^2$)
Space for children to play safely	Space for 3 children to play safely	Space for up to 30 children to play safely	Space for 20 children to play safely	Space for 12 children to play safely	On average, 16 children are able to play safely ($48m^2$)

Continued - Table 8.3: **Summary of Zimbabwean case study homes**

8.5 COMPARISON OF FINDINGS AMONG ALL 3 COUNTRIES

This section comprises of a table that summarises the indicators and findings within the category of initial and latter country of residence for each case study family. There are three groups of latter and initial residence as shown in *Table 7.1* in Chapter 7. The findings of the

study are concluded through the content of *Table 8.4*, *Table 8.5*, and *Table 8.6*. Discussions on findings are discussed in detail in Sections 8.2 - 8.4 and are therefore only summarised in *Table 8.5*. *Table 8.7* presents a summary of all of the data from the three categories of initial and latter residences of the case study families. Conclusions of the study and findings are presented in Chapter 9.

***Table 8.4:* Changes in residence for case study families who relocated from Zimbabwe to South Africa**

	Red Family	Blue Family	Similar changes in both case study families
Case study home	Moved from ZIM House 2 to RSA House 1	Moved from ZIM House 4 to RSA House 2	Moved from Zimbabwe to South Africa
Typology	Moved from a free-standing house to the ground-floor apartment of a 2-storey walk-up building	Moved from a free-standing cottage to an apartment	Moved from a free-standing home to an apartment-style home
Family setup of inhabitants (gender and age)	The family transitioned from being a typical nuclear family of four residing in a home, to the son moving into the new home with his wife, and his mother staying at the home on a part-time basis	The family of three (mother, father, daughter) grew older during the transition; the daughter is now seven years old	Changes between homes are not comparable. See each home for details
Neighbourhood typology	Moved from a suburb to a gated community development	Moved from a suburb to an urban high-rise residential area	Moved from low-density residential areas (suburbs), to higher density areas
Area (m^2)	A change from a large to a small residence, with a total of 123m^2 in area difference	Moved from a 65.65m^2 home to a 47.48m^2 home. The new home is approx. 13m^2 smaller	Moved from larger homes to smaller homes; sometimes the one home was significantly smaller

	Red Family	Blue Family	Similar changes in both case study families
Total number of rooms in house	The previous home contained 14 rooms in total, while the latter is made up of six	Both homes were made up of six rooms in total; this family, however, does not have access to all rooms in the South African home they moved into due to subletting	Changes for each case study home are too different to compare. See each home for details
Number of bedrooms in residence	The previous home contained five bedrooms while the latter contains two	Both homes have two bedrooms. In the case of the new South African home, the family only uses one bedroom space (set up in half of the lounge area) as a bedroom due to subletting	Changes between homes are similar but not comparable. See each home for details
Average area of bedrooms in residence	Moved to home with bedrooms on average $2m^2$ smaller	Moved to home with bedrooms on average $3m^2$ smaller	Case study homes in South Africa were between $1m^2$ and 2 m^2 smaller than homes in Zimbabwe
Number of bathrooms	Moved from home with three bathrooms to a home with a single bathroom	Moved from home with 1.5 bathrooms to a home with a single bathroom	Case study homes varied in initial number of bathrooms but both South African residences have single bathrooms
Average area of bathroom (m^2)	Bathroom in new home is approximately the same size as the bathroom in previous home, at approximately at $5.4m^2$	Bathroom in new home is approximately $1.8m^2$ larger than the old bathroom. The old bathroom was $5.44m^2$	Changes between homes are similar but not comparable. See each home for details
Space with highest usage	Transitioned from using the kitchen and bedroom area to predominantly using the living room area	Transitioned from using the kitchen and living room the majority of the time to predominantly using the living room area	Both homes' families went from high usage of the kitchen and an additional room to predominantly using the living room

	Red Family	Blue Family	Similar changes in both case study families
Average area of public rooms (m^2)	Moved to a home where public rooms are approximately $2m^2$ larger in area than in previous home	Moved to a home where public rooms are approximately $10m^2$ smaller in area than in previous home. The old home had an average area for public spaces of $19.26m^2$	Changes for each case study home are too different to compare. See each home for details
Average sound transmittance to/from surrounding rooms	Moved to home with adequate acoustic privacy regarding sound transmittance to and from surrounding rooms to a home where these were found to be less than adequate	Moved to home with slightly less acoustic privacy from surrounding rooms, with an average Likert value of 2.5	Both families moved to RSA homes with lower perceived levels of acoustic transmittance from and to the surrounding rooms
Average sound transmittance to/from main rooms	Moved from a ZIM home with good levels of acoustic privacy regarding transference of sound to and from main rooms to surrounding rooms, to a RSA home where the same acoustic conditions were less than average	Moved to home with slightly less acoustic privacy from main rooms to surrounding rooms with an average likert value of 2.5	Both families moved to homes where the perceived levels of acoustic transmittance from the main rooms to the surrounding rooms was worse than in their previous homes
Average feeling of acoustic privacy	Moved from conditions of limited acoustic privacy, to a home where acoustic conditions were less conditioned for privacy	Moved from conditions of limited acoustic privacy, to a home where acoustic conditions were less conditioned for privacy; moved from a Likert value of 2.6 to 3.	Case study families moved to homes with lower levels of perceived acoustic privacy
Average feeling of visual privacy	Moved from a home where visual privacy was adequate to a home where visual privacy is more difficult to achieve	Moved from a home where visual privacy was adequate to a home where visual privacy is more difficult to achieve	Both case study families moved to homes with poorer perceived levels of visual privacy

	Red Family	Blue Family	Similar changes in both case study families
Average daylight factor	New home has 2% higher day lighting factor than previous home	New home has 1.5% higher day lighting factor than previous home	New homes have slightly higher average day lighting factors
Average feeling of natural light	Levels of natural light between the homes are more or less the same	Levels of natural light between the homes are more or less the same at an average of 1.4 on the Likert scale	Perceived levels of natural light in old homes to new home are the same for both families
Average feeling of natural ventilation	Levels of natural ventilation between the homes are more or less the same	Levels of natural ventilation between the old and new homes are more or less the same	Levels of natural ventilation between each family's old home and new home are perceived to be more or less the same
Outdoor space typology	Moved from a home with both a backand front garden to a home with only a back garden	Moved from a home with both a back garden and front garden to a home with no garden or balcony	Outdoor space typology for each family became smaller or non-existent
Gardening in pots	Moved from a home able to contain more than ten pot plants outdoors to a home that can accommodate up to eight pot plants	Moved from a home able to contain more than 10 pot plants outdoors to a home that cannot contain any	Both families moved to homes that can contain fewer pot plants, though the degree varied for each family
Space available for small-scale vegetable gardens	Moved from a home that could accommodate up to eight vegetable beds to a home that could accommodate a single vegetable bed	Moved from a home that could accommodate up to eight vegetable beds to a home that could not accomodate any	Both families moved from homes that could accommodate eight or more vegetable beds to homes that could contain one or no vegetable beds
Space available for fruit trees	Moved from a home that could accommodate up to eight fruit trees to a home that could only fit one fruit tree	Moved from a home that could accommodate up to three fruit trees to a home that could not fit any	Both families moved from homes that could accommodate fruit trees to homes that could either fit one tree (Red Family) or none (Blue Family)

	Red Family	Blue Family	Similar changes in both case study families
Space available for large-scale subsistence farming	Moved from a home that could accommodate three large crop fields if the lawn were removed, and one crop field if it was not, to a home that could possibly accommodate a single small crop field if the lawn were removed	Moved from a home that could accommodate a single field of a large scale subsistence crop to a home that could not fit any	Both families moved from homes that could accommodate one or more large-scale crop fields to homes that, under specific conditions, could either fit one field (Red Family) or none (Blue Family)
Space available for playing field sports	Moved from a home where there was sufficient room for sports with teams made of up to 20 players to a home where only four players can play at time	Moved from a home where there was sufficient room for sports with teams up to 12 players to a home that had no outdoor space. There are communal sporting facilities within a 2km radius of the new home	Both families had the space available for field sports at their residences significantly reduced, with the Blue Family's home having no space for this at all
Space for gathering people	Moved from a home where up to 50 people could gather to a home where outdoor space is available for outdoor gatherings of a maximum of 10 people	Moved from a home where up 20 adults could gather to a home where no space is available for outdoor gatherings	Both families had the space available for people to gather at their residences significantly reduced, with the Blue Family's home having no space for this at all
Space for children to play safely	Moved from a home where up to 30 children could play safely outdoors to a home where only four children could play safely	Moved from a home where up to 12 children could play safely outdoors to a home where no space is available outdoors for children to play	Both families had the space available for children to play safely at their residences significantly reduced, with the Blue Family's home having no space for this at all

Continued - Table 8.4: **Changes in residence for case study families who relocated from Zimbabwe to South Africa**

***Table 8.5*: Change in residence for case study families who relocated from Zimbabwe to the UK**

	Pink Family	Yellow Family	Similar changes in both case study families
Case study home	Moved from ZIM House 3 to UK House 4	Moved from ZIM House 1 to UK House 3	Moved from Zimbabwe to the UK
Typology	Moved from a free-standing single-storey home to an apartment in a high-rise building	Moved from a duplex apartment to a duplex rowhouse, which are very similar	Changes between homes are similar but not comparable. See each home for details
Family setup of inhabitants (gender and age)	The family relocated without the older sister	The family remained the same over time, the only change was all family members growing older	Changes between homes are similar but not comparable. See each home for details
Neighbourhood typology	Moved from a suburban area to a high-rise residential area	Moved from an urban residential area to a suburb	Changes between homes are similar but not comparable. See each home for details
Area (m^2)	Moved to a residence that is 30.98m^2 smaller	Moved to a residence that is 15m^2 larger	Changes between homes are similar but not comparable. See each home for details
Total number of rooms in house	Despite being of different typologies, the old free-standing home only contained one more room than the new eight-room apartment	The previous and current home contain the same number of rooms	Number of rooms decreased by one room (Pink Family), or by none (Yellow Family)
Number of bedrooms in residence	The old home contained three bedrooms, while the new home contains two	The previous and current home contain the same number of bedrooms	Number of bedrooms decreased by one room (Pink Family), or by none (Yellow Family)
Average area of bedrooms in residence	Average area for bedrooms is smaller by 1.6m^2	Moved to a home with bedrooms on average the same size as the previous home	Changes between homes are similar but not comparable. See each home for details
Number of bathrooms	Both homes contain one bathroom	Moved from a home where the bathroom and toilet were separate, to a home where there is only one bedroom	Number of bathrooms remained the same (Pink Family), or decreased by one (Yellow Family)

	Pink Family	Yellow Family	Similar changes in both case study families
Average area of bathroom (m^2)	The average area of the bathroom in the old home is about the same as that of the new home	The average area of the bathroom in the old home is larger than that of the new home by $1m^2$	Area of the bathroom did not change at all (Pink Family), and increased by $1m^2$ (Yellow Family)
Space with highest usage	In the case of both homes, the living room is the space with the highest usage	Transitioned from mostly using the bedroom spaces to mostly using the living room spaces in the new house	In each family, the living room is the space with the highest usage in the new home
Average area of public rooms (m^2)	Average area of public rooms in both houses differs by $2m^2$, with the new home containing a larger average area for public rooms	Average area of public rooms in both houses differs by only $1.52m^2$	Average area of public rooms in each room differed by $1.5m^2$-$2m^2$. The Pink Family moved to a house with more average space in this area, the Yellow Family moved to a house with less average space in public rooms
Average sound transmittance to/from surrounding rooms	Moved from a home with low levels of acoustic privacy regarding sound transmittance to and from surrounding rooms to a home where these were slightly improved	Moved from a home with low levels of acoustic privacy regarding sound transmittance to and from surrounding rooms to a home where these were improved	Both families moved from a home with low levels of acoustic privacy regarding sound transmittance to and from surrounding rooms to a home where these were improved
Average sound to/from transmittance main rooms	Moved from a home with low levels of acoustic privacy regarding sound transmittance to and from main rooms to surrounding rooms to a home where the condition was improved	Moved from a home with low levels of acoustic privacy regarding sound transmittance to and from main rooms to surrounding rooms, to a home where the condition was improved	Both families moved from a home with low levels of acoustic privacy regarding sound transmittance to and from main rooms to surrounding rooms to a home where the condition was improved

	Pink Family	Yellow Family	Similar changes in both case study families
Average feeling of acoustic privacy	Levels of acoustic privacy in the home are considered to be more or less the same	The overall sense of acoustic privacy in the old home was perceived to be better than in the new home, perhaps because of the transition from using private bedroom spaces to using the public space the most in the home	Perceived levels of acoustic privacy either remained the same (Pink Family), or improved (Yellow family)
Average feeling of visual privacy	Levels of visual privacy in the home are considered to be more or less the same	Levels of visual privacy in the home are considered to be more or less the same	Levels of visual privacy between old and new homes of both families were considered to have remained the same
Average daylight factor	Levels of day lighting in the new home are lower than those in the old home, as the bathroom and WC in the new home have no windows	Day lighting levels in both homes were similar, with an average of 26.10%	Levels of day lighting decreased (Pink Family), or remained the same (Yellow Family)
Average feeling of natural light	Levels of natural light were perceived to be substantially better in the old home than in the new. The new home contains a bathroom and WC with no windows	Levels of natural light between the homes are more or less the same, with the latter home perceived as slightly better	Natural light levels in the Pink Family's new home were considered worse than their old home. Natural light levels in the Yellow family's new home were considered better than in their old home
Average feeling of natural ventilation	Levels of natural ventilation were perceived to be of better quality in the previous home	Levels of natural ventilation were perceived to be of better quality in the previous home	Levels of natural ventilation were perceived to be of better quality in the previous home for both families
Outdoor space typology	The old home contained both a front and a back garden, while the new home has a balcony outdoor space.	Moved from a home with a balcony to a home with a back garden	The Pink Family moved from a home with a front and back garden to a home with a balcony; the Yellow family moved from a home with a balcony to one with a back garden (the inverse of the Pink Family)

	Pink Family	Yellow Family	Similar changes in both case study families
Gardening in pots	The old home had sufficient space for more than ten pot plants, while the new home has only enough space for six	The new home can contain up to six pot plants while the old home could only contain up to four	Both families experienced a change whereby their new homes could accommodate fewer pot plants than their old homes
Space available for small-scale vegetable gardens	The old home contained enough room for up to eight vegetable beds, while the new home has no space for this	Both homes have space available for a single garden bed	Changes between homes are similar but not comparable. See each home for details
Space available for fruit trees	The old home had enough space for four fruit trees, while the new home has no space for this	Neither home has enough space for a fruit tree	The new homes for both families do not have enough space fruit trees. The Yellow Family's old home did not have space for fruit trees, while the Pink Family's old home could accommodate up to four fruit trees
Space available for large-scale subsistence farming	The old home had enough room for a large bed for subsistence farming, while the new home has no space for this	Neither home has enough room for subsistence farming	Both families' new UK homes do not have space for large scale subsistence farming. The one family's Zimbabwean home had enough space for one bed, while the other had no space
Space available for playing field sports	The initial home had enough room for up to 20 players to participate in field sport, while the latter home has no room available for this. Communal sports fields are located nearby the latter home	Neither home has enough space available for playing field sports. A public park was located nearby the Zimbabwean home that offered opportunities for this	The Pink Family had space for up to 20 people play at the old home, the Yellow Family had no space for this, and neither family's new homes has space for sports

	Pink Family	Yellow Family	Similar changes in both case study families
Space for gathering people	The old home allowed for up to 40 people to gather in the outdoor space, while the new home allows for a maximum of five people on the balcony	The old home allowed for a maximum of four people on the balcony, while the new home allows for up to six people to gather in the back garden	Both families' new homes have room for four to five people to gather in the outdoor space. The Pink Family had much more space available for this at their old home, while the Yellow Family had more or less the same amount of space at their old home
Space for children to play safely	The initial home had space for up to 20 children to play safely while the latter home has sufficient outdoor space for three children to play safely	Both homes have space for up to three children to play safely	Both families' new homes have outdoor spaces that allow for a maximum of three children to play safely. The Yellow Family had the same amount of space for this at their Zimbabwean home, while the Pink Family had space for 20 children

***Table 8.5*: Change in residence for case study families who relocated from Zimbabwe to the UK**

Table 8.6: **Change in residence for case study families who relocated from South Africa to the UK**

	Green Family	Brown Family	Similar changes in both case study families
Case study home	Moved from RSA House 4 to UK House 1	Moved from RSA House 3 to UK House 2	Moved from South Africa to the UK
Typology	Moved from a free-standing home to a semi-detached house	Moved from an apartment to a duplex semi-detached home	Both families' new homes are semi-detached, while their prior homes are different typologies
Family setup of inhabitants (gender and age)	The family relocated without their grandmother, but remained the same over time, with all family members growing older	The family unit grew from just a husband and wife into a family with two sons	Changes between homes are similar but not comparable. See each home for details
Neighbourhood typology	Remained in the same neighbourhood typology	Moved from a mixed urban residential and retail area to a suburb	Both families' new homes are located in suburbs; the Green Family initially also lived in a suburb, while the Brown Family initially lived in a mixed-use urban neighbourhood
Area (m^2)	Moved to a home $18m^2$ smaller	Moved to a home $50m^2$ larger	Changes between homes are not comparable. See each home for details
Total number of rooms in house	Moved from a home with 13 to rooms to a home with 12 rooms	Moved from a home with 6 rooms to a home with 11 rooms	Changes between homes are not comparable. See each home for details
Number of bedrooms in residence	Both homes contain 4 bedrooms	Both homes contain 2 bedrooms	Both families' old and new homes had the same amount of bedrooms
Average area of bedrooms in residence	New home contains bedrooms more or less the same size as previous home	New home contains bedrooms on average $2m^2$ larger than previous home	The Green Family's new home has bedrooms on average the same size in both homes, while the Brown Family's new home has bedrooms on average $2m^2$ larger than their previous home
Number of bathrooms	The old home contained three bathrooms while the new home contains two bathrooms	Both homes contained one bathroom	Changes between homes are not comparable. See each home for details

	Green Family	Brown Family	Similar changes in both case study families
Average area of bathroom (m^2)	Average area for bathrooms is approximately $2m^2$ smaller	Average area for bathrooms is very similar	Average area for bathrooms is $2m^2$ smaller for the Green Family, and the same for the Brown family
Space with highest usage	The living room was the most used room in the old home, while the bedrooms and kitchen are the most used space in the new home	The living room was the most used room in the old home, while the bedrooms are the most used space in the new home	Changes between homes are not comparable. See each home for details
Average area of public rooms (m^2)	The average area for public rooms in the old home was $22.72m^2$, which is larger than the average area for public rooms in the new home, which is $13.56m^2$. There is an approximate difference of $11m^2$	The average area for public rooms in the old home was $12.72m^2$ in and $20.34m^2$ in the new home. There is an approximate difference of $8m^2$	Changes between homes are not comparable. See each home for details
Average sound transmittance to/from surrounding rooms	Levels of sound transmittance to and from surrounding rooms were roughly the same in both homes	Levels of sound transmittance to and from surrounding rooms were roughly the same in both homes	Levels of sound transmittance to and from surrounding rooms were the same in both homes of both families
Average sound to/from transmittance main rooms	Levels of sound transmittance to and from main rooms were roughly the same in both homes	Moved from a home with low levels of acoustic privacy regarding sound transmittance to and from main rooms to a home where these were improved	The Green Family had levels of sound transmittance to and from main rooms to surrounding rooms remain the same in both homes, while the Brown Family moved to a home where this was improved
Average feeling of acoustic privacy	Average sense of privacy remained the same between the two homes	Average sense of privacy was slightly improved in the latter home	Average sense of privacy remained the same for the Green Family, and improved for the Brown Family

	Green Family	Brown Family	Similar changes in both case study families
Average feeling of visual privacy	Average feeling of visual privacy remained the same between the two homes	Average feeling of visual privacy changed from poor to average levels	Average feeling of visual privacy remained the same for the Green Family and improved for the Brown Family
Average daylight factor	Day lighting levels in the previous home were 2% higher	Day lighting levels in previous home were 14.83% higher	Day lighting levels decreased slightly for Green Family, and decreased by 14.83% for the Brown Family
Average feeling of natural light	The sense of natural light in the old home was considered good, and only just better than the natural light in the new house	The sense of natural light in the old home was considered to be perfect, while in the new home it is just below adequate	Perceived levels of natural light reduced slightly for the Green Family, and reduced greatly for the Brown Family
Average feeling of natural ventilation	The average feeling of natural ventilation was the same for both homes, and considered to be good	The average feeling of natural ventilation was the same for both homes, and considered to be good	The average perceived feeling of natural ventilation was the same for both homes for both families
Outdoor space typology	Both homes have a back garden, while the old home also had a front garden	The old home had a balcony, while the new home has a back garden	The outdoor typology for the Green Family changed to only a back garden, whereas previously they had both a front and back garden. The Brown Family's new home has a back garden, while their old home only had a balcony
Gardening in pots	Both homes contain enough room for more than ten pots	The new home can contain more than ten pot plants, while the old home could contain six pot plants	The Green Family lived and lives in a home that can contain more than ten pot plants, while the Brown Family's new home can contain more than ten pot plants, whereas their old home could contain only six pot plants
Space available for small-scale vegetable gardens	The old home had sufficient space for up to eight beds, while the new home has room for up to six beds	The old home had no space for a vegetable garden, while the new home has sufficient space for up to four vegetable beds	The Green Family's new home has space for two fewer vegetable beds than they did at their previous home, while the Brown Family has space for up to four when they previously had space for none

	Green Family	Brown Family	Similar changes in both case study families
Space available for fruit trees	Both homes have sufficient space for a maximum of six fruit trees	The old home had no room for fruit trees, while the new home has enough for two fruit trees	The Green Family's old and new home have enough room for the same amount of trees, while the Brown Family has space for two fruit trees, whereas they had no space before
Space available for large-scale subsistence farming	The old home contains enough room for one large-scale vegetable bed, as does the new home	Neither home has space available for large-scale subsistence farming	Spatial availability for large-scale subsistence farming did not change for either family
Space available for playing field sports	The old home had sufficient space for up to 25 players to play in the garden, while the new home has sufficient room for up to eight players	The old home had no space available for playing sports, while the new home has sufficient space for a maximum of four players	The Green Family's new home has less space for field sports than their previous home, while the Brown Family's new home has more space for sports than their previous home
Space for gathering people	The old home had sufficient room for up to 35 people to gather, while the new home has enough room for up to 25 people to comfortably gather	The old home had enough space for up to five people on the balcony, while the new home has enough room for eight people maximum	The Green Family's new home has less space for gathering people outdoors, while the Brown Family's new home has more space for gathering people than their old South African home
Space for little children to play safely	Both the old and new homes have enough room for 20 children to play safely	The old home had enough room for three children to play, while the new home has enough room for eight children to play	The Green Family's old and new home have the same amount of space available for children to play, while the Brown Family's new home has more space available for children to play than their old home

Continued - Table 8.6: **Change in residence for case study families who relocated from South Africa to the UK**

Table 8.7: **Summary of changes in case study families from their initial residence to their latter residence**

* Indicates results too diverse too compare

	Changes for families that moved from Zimbabwe to South Africa	**Changes for families that moved from Zimbabwe to the UK**	**Changes for families that moved from South Africa to the UK**
Case study home	Moved from Zimbabwe to South Africa	Moved from Zimbabwe to the UK	Moved from South Africa to the UK
Typology	Both families moved from free-standing homes in ZIM to apartment-style homes in RSA	***Case study did not result in conclusive comparison	Both families' new UK homes are semi-detached, while their RSA homes were of different typologies
Family setup of inhabitants (gender and age)	***Case study did not result in conclusive comparison**		
Neighbourhood yypology	Moved from low density ZIM residential areas (suburb), to higher density areas in the UK	***Case study comparison did not result in conclusive comparison**	Both families' new UK homes are located in suburbs; initial ZIM neighbourhood typologies differed
Area (m^2)	Moved from larger homes in ZIM to RSA homes with smaller areas; sometimes the RSA homes were significantly smaller	***Case study did not result in conclusive comparison**	
Total number of rooms in house	***Case study did not result in conclusive comparison**	Number of rooms from ZIM to UK decreased by one room (Pink Family), or by none (Yellow Family)	***Case study did not result in conclusive comparison**
Number of bedrooms in residence	***Case study did not result in conclusive comparison**	Number of bedrooms from ZIM to UK decreased by one room (Pink Family), or by none (Yellow Family)	Both families' RSA and UK homes had the same amount of bedrooms

	Changes for families that moved from Zimbabwe to South Africa	Changes for families that moved from Zimbabwe to the UK	Changes for families that moved from South Africa to the UK
Average area of bedrooms in residence	Case study homes in RSA were between $1m^2$ and $2m^2$ smaller than homes in ZIM	*****Case study did not result in conclusive comparison	
Number of bathrooms	ZIM case study homes varied number of bathrooms but both families relocated to RSA residences with single bathrooms	Number of bathrooms remained the same (Pink Family), or decreased (Yellow Family)	*****Case study did not result in conclusive comparison
Average area of bathroom (m^2)	*****Case study did not result in conclusive comparison	Area of the bathroom did not change at all (Pink Family), and increased by $1m^2$ (Yellow Family)	*****Case study did not result in conclusive comparison
Space with highest usage	Both families went from high usage of the kitchen and an additional room, to predominantly using the living room	For each family, the living room is the space with the highest usage in the new UK home	*****Case study did not result in conclusive comparison
Average area of public rooms (m^2)	*****Case study did not result in conclusive comparison	Average area of public rooms in each room differed by $1.5m^2$ to $2m^2$. The Pink Family moved to a UK house with more average space in this area, while the Yellow Family moved a UK house with less average space in public rooms	*****Case study did not result in conclusive comparison

	Changes for families that moved from Zimbabwe to South Africa	Changes for families that moved from Zimbabwe to the UK	Changes for families that moved from South Africa to the UK
Average sound transmittance to/from surrounding rooms	Both families moved to RSA to homes with lower perceived levels of acoustic transmittance from and to the surrounding rooms than their ZIM houses	Both families moved from a ZIM home with low levels of acoustic privacy regarding sound transmittance to and from surrounding rooms to a UK home where these were improved	Levels of sound transmittance to and from surrounding rooms were the same in both the RSA and UK homes of both families
Average sound to/from transmittance main rooms	Both families moved to RSA homes with lower perceived levels of acoustic transmittance from the main rooms of their new homes to the surrounding rooms of these houses	Both families moved from a ZIM home with low levels of acoustic privacy regarding sound transmittance to and from main rooms to surrounding rooms was limited, to a UK home where the condition was improved	The Green Family had levels of sound transmittance to and from main rooms to surrounding rooms remain the same in both RSA and UK homes, while the Brown family moved to a UK home where this was improved
Average feeling of acoustic privacy	Case study families moved to RSA homes with lower levels of perceived acoustic privacy than their previous ZIM homes	Perceived levels of acoustic privacy either remained the same (Pink Family), or improved (Yellow family) for the case study families moves from ZIM to the UK	Average sense of privacy remained the same for the Green Family, and improved for the Brown Family
Average feeling of visual privacy	Both case study families moved to RSA homes with poorer perceived levels of visual privacy than their previous ZIM homes	Levels of visual privacy between old ZIM and new UK homes of both families were considered to have remained the same	Average feeling of visual privacy remained the same for the Green Family and improved for the Brown Family
Average daylight factor	The new RSA homes had slightly higher average day lighting factors than old the ZIM homes for both families	Levels of day lighting decreased from ZIM to UK for the Pink Family, and remained the same for the Yellow Family	*****Case study did not result in conclusive comparison

	Changes for families that moved from Zimbabwe to South Africa	Changes for families that moved from Zimbabwe to the UK	Changes for families that moved from South Africa to the UK
Average feeling of natural light	Perceived levels of natural light from the old ZIM homes to the new RSA homes are the same for both families	***Case study did not result in conclusive comparison	***Case study did not result in conclusive comparison
Average feeling of natural ventilation	Levels of natural ventilation for both homes and both families were perceived to be the same	Levels of natural ventilation were perceived to be of better quality in the previous ZIM homes than in the UK homes for both families	The average perceived feeling of natural ventilation was the same for both homes for both families from RSA to UK
Outdoor space typology	Outdoor space typology for each family became smaller or non-existent for each family after the move from ZIM to RSA	***Case study did not result in conclusive comparison	The UK outdoor typology for the Green Family changed to only a back garden, whereas in RSA they had both a front and a back garden. The Brown Family's UK home has a back garden while their old RSA home had only a balcony
Gardening in pots	Both families moved to RSA homes that could contain fewer pot plants than their previous ZIM home	Both families experienced a change whereby their new UK homes could accommodate fewer pot plants than their old ZIM homes	Both families moved to UK homes where ten or more pot plants could be accommodated, with their RSA previous homes being able to accommodate six to ten pot plants

	Changes for families that moved from Zimbabwe to South Africa	Changes for families that moved from Zimbabwe to the UK	Changes for families that moved from South Africa to the UK
Space available for small-scale vegetable gardens	Both families moved from ZIM homes that could accommodate eight or more vegetable beds to RSA homes that could contain one or no vegetable beds at all	*****Case study did not result in conclusive comparison	*****Case study did not result in conclusive comparison
Space available for fruit trees	Both families moved from ZIM homes that could accommodate between three to eight fruit trees to RSA homes that could either fit one tree (Red Family) or no trees (Blue Family)	Neither new UK homes for both families has enough room for fruit trees. The Yellow Family's ZIM home did not either, while the Pink Family's ZIM home could take up to four fruit trees	*****Case study did not result in conclusive comparison
Space available for large-scale subsistence farming	*****Case study comparison did not result in conclusive comparison	Neither families' new UK homes had space for large scale subsistence farming. The one family's Zimbabwean home had enough space for one bed, while the others had space for none	Spatial availability for large-scale subsistence farming did not change for either family
Space available for playing field sports	Both families had the space available for field sports at their residence' significantly reduced with their relocation from ZIM to RSA, with the Blue Family's RSA home having no space for this at all	The Pink Family had space for up to 20 people toplay at the old ZIM home, while the Yellow Family had no space for this; neither families' new UK home has space for sports	*****Case study did not result in conclusive comparison

	Changes for families that moved from Zimbabwe to South Africa	Changes for families that moved from Zimbabwe to the UK	Changes for families that moved from South Africa to the UK
Space for gathering people	Both families had the space available for people to gather at their residences' significantly reduced by moving from ZIM to RSA, with the Blue family's RSA home having no space for this at all	Both families' new UK homes have room for four to five people to gather in the outdoor space. The Pink Family had much more space available for this at their ZIM home, while the Yellow Family had more or less the same amount of space at their ZIM home	*****Case study did not result in conclusive comparison
Space for children to play safely	Both families had the space available children to play at their residences' significantly reduced by moving from ZIM to RSA, with the Blue family's RSA home having no space for this at all	Both families' new UK homes have outdoor spaces that allow for a maximum of three children to play safely. The Yellow Family had the same amount of space for this at their ZIM home, while the Pink family had space for 20 children at their ZIM home	*****Case study did not result in conclusive comparison

Continued - Table 8.7: **Summary of changes in case study families from their initial residence to their latter residence**

* Indicates results too diverse too compare

8.6 DISCUSSION OF SUMMARISED FINDINGS WITHIN THE CONTEXT OF CASE STUDY FAMILIES

8.6.1 Indicators which gave no conclusion for study

The findings in *Table 8.7* show that a number of the indicators used to compare the 12 homes within the three countries gave no conclusive comparisons at the end of the research study. This is because the indicators could not give a conclusive comparison at the level of the four case study family homes within a single comparison of initial and latter residence of two families moving from and to the same country. An example of this is how there is no

conclusive comparison between the initial and latter homes of the Yellow and Pink family, because the residential typology of the Pink Family changed from a free-standing home in Zimbabwe to an apartment in the UK, while the family they were being compared with, the Yellow Family, had the same residential typology in the UK as they did in their initial residence in Zimbabwe.

Where at least one of the three grouped countries of residence, that is: relocation form Zimbabwe to South Africa, relocation from Zimbabwe to the UK or relocation from South Africa to the UK, was not possible, the indicator category was concluded to be incomparable as there were too many variables to make a comparison.

The indicator categories which gave no results at the level of comparison in *Table 8.7* are:

- Typology;
- Neighbourhood yypology;
- Area of home (m^2);
- Total number of rooms in the house;
- Number of bedrooms in residence;
- Average area of bedrooms in residence (m^2);
- Number of bathrooms in residence;
- Average area of bathroom (m^2);
- Space with the highest usage;
- Average area of public rooms (m^2);
- Average daylight factor;
- Average feeling of natural light (m^2);
- Outdoor space typology;
- Space available for fruit trees; and
- Space available for small-scale vegetable gardens.

8.6.2 Indicators with comparative conclusions

The indicator categories that did give comparative results at the level of comparison of *Table 8.7* are listed below, along with a summary of the conclusion of the comparison are:

8.6.2.1 Average sound transmittance to/from surrounding rooms

The study showed that, in the case study families that initially lived in Zimbabwe and moved to South Africa, levels of sound transmittance to and from surrounding rooms were poorer in the South African homes than in their previous Zimbabwean home. The study also showed that, from the same indicator case study families that moved from Zimbabwe to the UK,

there was an improvement in the levels of acoustic transmittance levels to and from main rooms in the house. Additionally, levels of acoustic transmittance to and from surrounding rooms in each house were the same in both the initial South African homes and latter UK homes of the case study families.

8.6.2.2 Average sound transmittance to/from main rooms

Both case study families that initially resided in Zimbabwe and moved to South Africa experienced poorer conditions in sound transmittance to and from main rooms in their new homes in South Africa than they did in their initial Zimbabwean homes. Both of the case study families that moved from Zimbabwe to the UK experienced an improvement in levels of sound transmittance to and from the main rooms of their UK residences in comparison to their initial Zimbabwean residences. For the case study families who initially resided in South Africa and moved to the UK, levels in sound transmittance from and to main rooms of their UK houses were found to be either the same or better than they had been in their initial South African houses.

8.6.2.3 Average feeling of acoustic privacy

The case study homes of families that initially lived in Zimbabwe and moved to South Africa showed that perceived levels of acoustic privacy were lower in the latter South African homes than in the Zimbabwean homes. Levels of acoustic privacy within the case study homes of the selected families who moved from Zimbabwe to the UK remained the same or improved. Similarly, perceived levels of acoustic privacy in the homes of the case study families who initially resided in South Africa and moved to the UK either remained the same improved.

8.6.2.4 Average feeling of average feeling of visual privacy

Levels of perceived visual privacy were poorer in the latter South African homes of the case study families who initially resided in Zimbabwe and moved to South Africa. Levels of perceived visual privacy remained the same in the initial and latter case study homes of families who relocated from Zimbabwe to the UK. Perceived levels of visual privacy remained the same or improved for the case study families who initially resided in South Africa and relocated to the UK.

8.6.2.5 Average feeling of natural ventilation

Levels of natural ventilation in the case study homes of the families who initially lived in Zimbabwe and relocated to South Africa were found to be the same in both countries. Levels of natural ventilation were perceived to be of better quality in the previous Zimbabwean homes of case study families who relocated from Zimbabwe to the UK. In the

homes of families that relocated from South Africa to the UK, the average perceived feeling of natural ventilation was the same for both initial South African homes and latter UK homes.

8.6.2.6 Gardening in pots

Case study homes in South Africa that were inhabited by families who initially resided in Zimbabwe and moved to South Africa had less space for pot plants than the previous Zimbabwean homes. The same was found for the UK homes of case study families who initially resided in Zimbabwe and moved to the UK. The case study families who relocated from South Africa to the UK moved from homes that could accommodate between six and ten pot plants to homes that could accommodate up to ten pot plants.

This concludes the summary of findings, both comparative and non-conclusive, for the case study families and their lifestyles in relation to the residential architecture of the homes. Conclusions and discussions of findings are discussed in the following chapter.

8.7 CONCLUSION OF CHAPTER

This concludes the discussion of research findings for the comparison of quality of life and lifestyle choices within selected homes in South Africa, the UK and Zimbabwe along with the comparison of the case study families and their lives in their initial and latter residence. The following chapter gives a conclusion on the research study.

CHAPTER 9 CONCLUSIONS (RFS 890 COMPONENT AND ARG 895 COMPONENT)

Chapter 8 discussed the findings of the research data, comparing the data of each residence in each of the three countries. This chapter gives the concluding statements of the research in relation to the initial intentions of the research as stated in chapter 1.

9.1 SUMMARY OF FINDINGS

Three sub-questions were used to break down the main research question. The research study's responses to the sub-questions are listed below, with responses to the main question presented thereafter.

9.1.1 Sub-question 1

The first research sub-question sought to define quality of life, and then further elaborated on the definition of quality of life within the context of urban planning and residential architectural design. The literature review in chapter 2 and the precedent study in chapter 3 responded to the question in the following ways:

(i) No single definition for quality of life could be concluded upon, as literature reviewed for the study referred to differing definitions of quality of life within the context of that particular study.

(ii) The literature review indicated that quality of life can be measured through *subjective* and *objective* information sources and perspectives, showing when and how subjective, objective or both thought paradigms can relate to quality of life.

(iii) The literature reviewed in chapter 2 consisted of a mixture of readings (books and journal articles) as well as a number of research reports on quality of life studies in various sectors. In order to further and more clearly define the context in which quality of life was to be defined for this study, a precedent study was introduced.

(iv) Chapter 3 contains a precedent study on three research reports that had the greatest influence on this research study in the way in which they were structured in order to show quality of life in a manner relevant to this study. This contributed to the research method used for the study and the resultant indicators used for the study as shown in chapter 6.

(v) Overall, no single definition for quality of life was successfully defined through the research conducted for this study. However, the relation of quality of life to architectural design and urban planning was expressed in the indicators that were deduced in chapter 6 for use in the research study.

9.1.2 Sub-question 2

The second sub-question sought to define a method of measuring quality of life and lifestyle in relation to residential architectural design. This question was resolved through the following:

(i) The introduction of measurement categories in the literature review in cchapter 2. Three main studies were discussed as precedent studies in chapter 3.

(ii) The precedent studies helped to frame the main questions for the study, thus contributing to the formulation of the research indicators used for the research study.

(iii) National and international residential building regulations provided the objective context for the research indicators, while Likert scales were developed to give reports on subjective experiences of rooms in each house of the study. Measurement indicators are described in chapter 6.

9.1.3 Sub-question 3

The third sub-question sought to differentiate the three case study countries with regards to quality of life, architectural design and urban context.

(i) The objective information shared in chapter 4 gave the socio-economic histories of each country. It was discovered that historically urban development in all three countries was influenced by differences between the living conditions of the urban poor. The differences in urban conditions between social classes in the UK took place almost 200 years before it did in Africa, with racial segregation playing a major role in urban development in Zimbabwe and South Africa until the late 1980s and early 1990s.

(ii) Challenges for urban development in the UK at present are predominantly centred on growing urban densities and the sizes of urban residences in the country shrinking as a result.

(iii) South Africa is currently struggling to create equally-developed urban residential areas for its citizens as racial segregation in the past led to urban areas where inequalities are still present in the urban geography and architecture.

(iv) Zimbabwe faces serious economic challenges resulting in the breakdown of urban services in urban residences. The link between urban and rural lifestyles for many of the country's urban inhabitants has resulted in methods of coping with the circumstances.

(v) Chapter 7 showed the raw data for twelve homes considered in the study. In the drawings and maps presented, differences in residential design and dimensions,

as well as access to urban amenities, are presented as visual data. Tables give further information on the derived indicators of each home.

(vi) The study only compares the findings on a country-by-country basis. This discussion and comparison is shown in chapter 8.

9.1.4 Main research question

The study is centred on the main research question which sought to examine how architectural residential design affected the quality of life and lifestyle of urban inhabitants of South Africa, the UK and Zimbabwe with the intent of comparing the quality of life in each country in a socio-spatial context. A summary of the findings is as follows:

(i) All three of these countries have a history of inequality of urban residential conditions (see chapter 4). The UK introduced social and urban planning policies in order to combat this challenge, resulting in urban residential architecture that has less variation between individuals of different social classes. The majority of this urban planning occurred during the post-war periods of WWI and WWII. South Africa has implemented urban planning strategies initiated after democracy in 1994 aimed at meeting basic housing needs. Prior to this, urban development in South Africa was based on racial separation as part of the apartheid regime's planning. Zimbabwe also had differences in urban development before and after independence in 1980. The majority of Zimbabwe's urban residential development took place before independence as urban development in Zimbabwe faced economic challenges from the late 1990s to the present day.

(ii) Methods to measure the links between quality of life and residential design include the use of indicators. These indicators are used as parameters to measure subjective and objective aspects that relate quality of life to architecture. Objective indicators include the use of national building regulations and standards. Subjective parameters of measurement can be measured using Likert scales and behaviour maps. A single spatial characteristic can be measured and described using both a subjective and an objective method of measurement. This was seen through the use of the derived research indicators in order to compare the residential spaces. An example of this is the usage of the scientific daylight factor calculation used to measure the percentage of daylight in a room, while a Likert scale measure was used to measure the perceived levels of daylight in the same room. Both measures can be used to draw a conclusion.

(iii) A comparison of residential spaces using the methods employed in this study serves to give detailed information as a result of data collection. However, the data collection method needs to be organised differently in order to give the study more meaning with regards to the distinct findings that the comparisons of information can give. Therefore, the study resulted in a comparison of lifestyle choices in the socio-spatial contexts of the case-study homes of the country, the quality of life.

(iv) While a comparison of architecture and urban amenities between the countries was possible, the comparisons in this study did not lead to many meaningful characteristics that could be grouped into country-by-country findings, but rather into typological comparisons. An example of this is how the UK case study homes consisted predominantly of semi-detached or rowhouses, while the Zimbabwean case study homes consisted of free-standing homes and the South African home were a combination of apartments and free-standing homes. Even within these accidental findings, it was evident that homes of the same typology in the different countries bore similarities to one another, alluding to the fact that the study may have been more beneficial had it been intended as typological comparison rather than a country-by-country comparison.

9.2 IMPLICATIONS OF THE RESEARCH FINDINGS

The findings of this study contribute to the academic body of work that aims to develop varied indicators to measure quality of life outside of the educational, health and economic indicators typically used to measure quality of life. This was achieved through:

(i) Studying and understanding the context that a design is intended for. This will assist greatly in making quality of life improvements for the users. The findings of this study showed the relation of existing homes to their urban contexts, as well as a background of the history of each of these countries, thus allowing an observation of what worked, did not work and could be improved in the residential design of the homes and urban areas in order to improve quality of life for the inhabitants. The literature review emphasised the relation of context (religious, cultural, social) to architectural design in order for it to make a contribution towards an improvement in its intended user's quality of life.

(ii) The recorded floor plans and urban contexts of the sublet residences in the study offer an opportunity for further observation of urban realities and lifestyles of sublet apartments. This offers an opportunity for the sector to investigate design

solutions for residential architecture, knowing that any home is a possible residence for more than one family unit.

(iii) The use of visual plans as a method of measuring quality of life could serve as a singular method of studying quality of life.

(iv) The history of the UK and its present day conditions show a difference in access to urban amenities, and thus serves as an entry point for further lessons in high-density development in urban residential areas.

(v) The outlined measurement parameters serve as an example of successful and non-successful measurements of comparing the specific design factors in relation to the linked indicator. Though the comparisons were not successful, the failure is a starting point on how comparisons for studies such as this can be made to give conclusive results.

9.3 SUMMARY OF CONTRIBUTIONS

This study has made contributions in the manners listed below:

(i) This research study has further contributed to the body of research on the socio-spatial environment and its link to studies on urban quality of life. The literature review and precedent study provide summaries on existing studies, making the study useful as a comparison to other studies.

(ii) This study has generated new indicators to measure aspects of residential architectural design in relation to quality of life.

(iii) This study has given a brief comparative study of the history of South Africa, the UK and Zimbabwe in a way that relates political and historical occurrences in each country to the socio-spatial urban environment today.

9.4 CONCLUSIONS

Based on the findings, the study concludes that:

(i) A comparison of quality of life in different regions will only result in a better understanding of lifestyle in each region, thus leading to findings on the reasons as to how the quality of life in different regions varies, rather than why the quality of life in one country is better than in another. Context is the basis on which any quality of life study should be based. This relates to the conclusions of several of the studies on quality of life included in the literature review.

(ii) Effects on quality of life as determined by architecture and urban planning can be improved by giving urban inhabitants options as to how they live their lives in the urban and residential environment. Quality of life in this regard must be considered in relation to both subjective and objective methods of measurements relating to architectural design and quality of life.

(iii) The residential home serves as a space in which inhabitants of the home can retreat from the public. Conditions for relaxation and comfort are designed into the home through various architectural design tools. Levels of privacy in the home assist in making the home more useable. Even within the home, degrees of privacy vary from grouped privacy in spaces intended for communal use, to more private spaces where individuals may choose to be alone. Design elements of visual and acoustic privacy relate to this.

9.5 RECOMMENDATIONS FOR FUTURE RESEARCH

Recommendations for future studies are as follows:

(i) In a study such as this, where both qualitative and quantitative research methods are utilised, subjective opinions of individuals other than that of the researcher will provide more diverse quantitative data. Questionnaires or interviews with individuals concerning content related to the subject matter may make the study findings more viable. Examples of this include surveys given to various categories of people. Suggested categories include people by age groups, prospective home buyers in different neighbourhoods (perhaps selected as they attend home viewings), estate agents and architects in each of the three study countries.

(ii) A more limited study scope of comparison is recommended for a similar research study. The intent of this research study was to make a complete comparison of the effect of architectural design on quality of life in three different countries. The study's results would have proved easier to compare had the study been more strictly categorised from the start — perhaps only comparing certain residential typologies in each country to one another, or only specific family types in each residence to one another. This would have eliminated the element of summarising many details of the study, and would have pushed a more concentrated study. This element of the research study was noted at the onset of the study, and several elements of the study have been eliminated as it is

presented. The study, however, would have proved to be easier to conduct had it been much narrower.

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APPENDIX

ETHICAL CLEARANCE

Communication on ethics from the faculty of the Engineering and Built Environment Ethics Committee (University of Pretoria) regarding this study.Which resulted in the omission of personal details of household inhabitants from research.

FACULTY COMMITTEE FOR RESEARCH ETHICS AND INTEGRITY

Your recent application to the EBIT Ethics Committee refers.

1 I hereby wish to inform you that the research project titled "A comparison of living conditions in the homes of Zimbabwean Economic migrants before and after migration" has been rejected by the Committee with note below.

Comments
The applicant indicates that approval of the research proposal has not been obtained yet, and therefore the ethics committee may not review this application yet. However, the ethics committee has given some preliminary feedback which should be considered in a new application (once the research has been approved). These should be discussed with your study leader as well. 1. The questionnaire collects very personal information that will probably not be approved. 2. The format of many questions is incomprehensible. If the participant, for example, shared a dwelling with person A in Zimbabwe and now shares one with person B, should they both be indicated as (say) Adult 2 or should the one be Adult 2 and the other Adult 3? Many questions also refer to a current situation, which becomes a question of the form "How do you do X in Zimbabwe?"; however, since the person left Zimbabwe, the person no longer does "X" in Zimbabwe. 3. The question about legal status does not mention "illegal immigrant" explicitly, but may elicit such a response. The possibility of such answers (and subsequent handling of the data) should be considered carefully. 4. It should also be noted that foreigners in South Africa may be seen as a vulnerable population. The particular measures to safeguard data may be important and should be clearly highlighted. 5. Consent need to be obtained by all the adults living in the household as well as the guardian of the children. 6. Gender, age and population group do not appear to be central or 'unavoidable' to the aim of the study and should be removed.

I will forward your signed letter by COB Monday 30 November 2015.

Regards
Sehaam