The ‘UniverCITY’: Integrating University design into 21st century South African cities. A case of Pretoria, South Africa.

The word ‘UniverCITY’ is a combination of two words, university and city, to symbolize integration of universities in the city as coined by the author.

A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Urban Design.
Johannesburg, 2020.

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Declaration

I declare that this research report is my own unaided work. It is being submitted to the Degree of Master of Urban Design to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.

JERRY MUNENE GACHUKI. 2010166 

(Signature of candidate)

____**11th**___day of___**February**_____year_____**2020**

day month year

Acknowledgement

To God the almighty, it would not have been possible without him. To my wife, Wendy and cousin Hildah for their unwavering support, criticism and love. To my supervisor, Christos Daskalakos, mentor Ludwig Hansen, all lecturers and peers for their encouragement, criticism and guidance throughout this journey.

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CHAPTER 05

DESIGN

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List of Abbreviations

DHET: Department of Higher Education and Training

TUT: Tshwane University of Technology.

CPTED: Crime Prevention Through Environmental Design

UNISA: University of South Africa

SPLUMA: Spatial Planning and Land Use Management Act 16 of 2013

CoT: City of Tshwane

IDP: Integrated Development Plan

Key words

University design

Town and gown experience

Integration

Safety and security

ABSTRACT

The 21st century has brought about numerous interventions and innovation in planning and design of cities globally. With such evolved systems, planning and design of universities within the urban fabric needs to shift focus from an introverted design approach to one that is more integrated with urban design in terms of connectivity, permeability, robustness, variety and richness. Universities as heavy contributors to the cities in terms of service and intellect seem to respond more to security and introversions than to integration with the built environment within the city. This research attempted to interrogate and question the role universities play in the growth of cities in the 21st century. A comprehensive study of the Tshwane University of Technology, Arts and Arcadia campuses in Pretoria, Gauteng, South Africa was explored. The approach was primarily done through a qualitative study approach that focused on research by design. This was followed by research methods of observations, photography, videography, sketches, detailed plans and 3d models in order to apply the theories and principles addressed during the literature review and case studies.

CHAPTER 01

1.0 INTRODUCTION

Universities in South Africa have gradually increased over the years with a total of 26 public universities as per 2018 (DHET, 2018). The number of enrolments has increased from 500,000 to approximately 1,000,000 over the past 15 years (DHET, 2018). Such a steady rise in the number of students has brought immense pressure to the Department of Higher Education in South Africa for more universities to be added or re organization of the existing universities to effectively accommodate the growing number of students. This not only triggers engagement with consultants within the urban design realm, but also provides possibilities through design that encourages positive urban environments where people, both students and the public, can engage and interact in harmony.

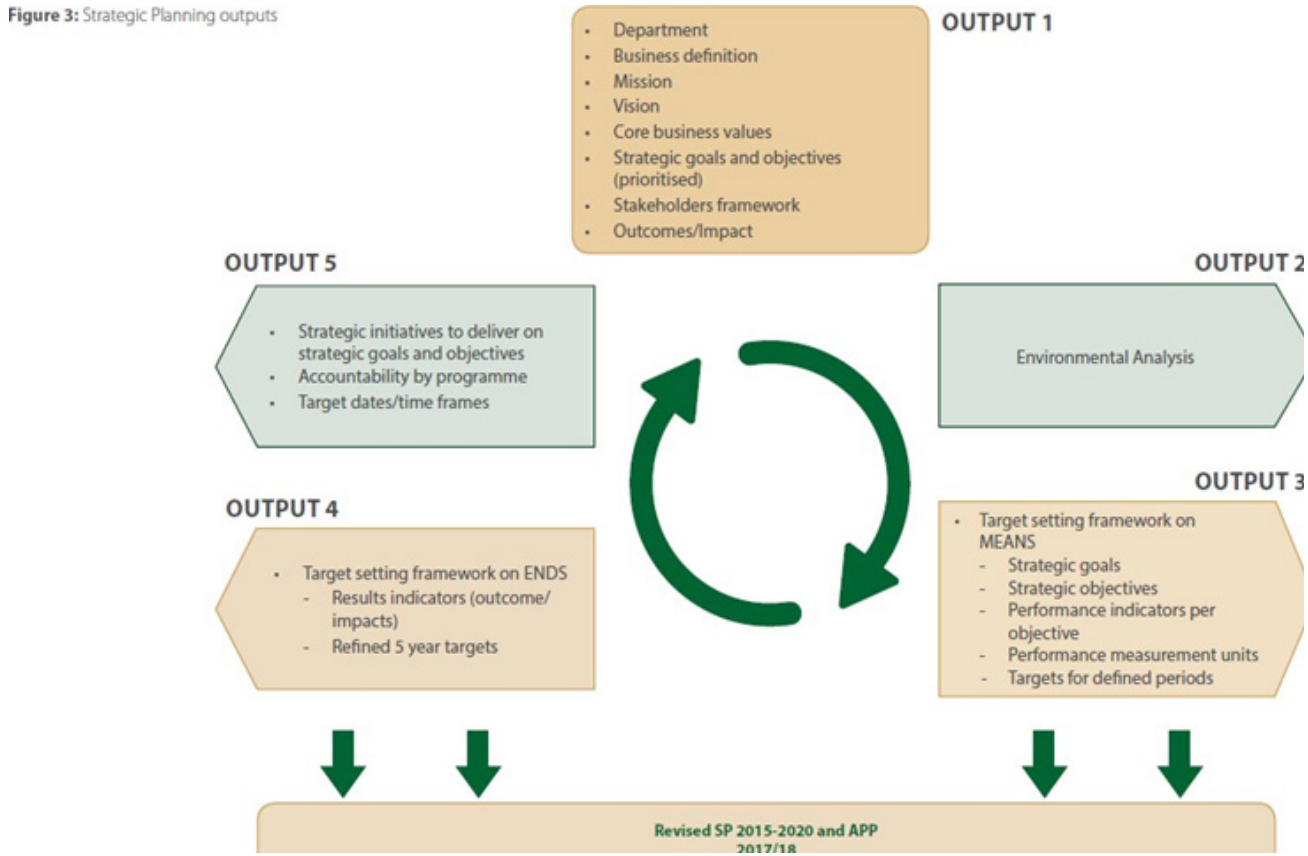

Figure 1: The higher education strategy in South Africa. Source: Adopted from (DHET, 2018).

1.1 Problem statement

Universities and campuses have been perceived as fortresses that are exclusive to only scholars and selected staff (Coulson et al, 2011). As much as they are heavy contributors to the cities in terms of service and intellect, they seem to offer a built environment that responds more to security and comfort than to spatial integration within the city. This seclusion and disconnectedness with the urban fabric leave universities in isolation with regards to the spatial organization of the city.

1.2 Research question

• How can universities be spatially integrated into the 21st century city?

1.3 Sub questions.

• In what ways have urban design trends in university design contributed to the city?

• How can universities be considered as spatial organizers of the city?

• In what ways can the urban design principles be used to ensure universities positively contribute to the city's quality?

• How can safety as an urban design concern be used to improve privacy gradients in university design in the city?

1.4 Rationale of the study

The research was primarily done through a qualitative study approach that focused on research by design. A rigorous desktop analysis consisting of theories on how people move, the choices they have in the city, the opportunities that they can explore and how they can differently use the city were interrogated. A comprehensive study of the Tshwane University of Technology, Arts and Arcadia campuses in Pretoria, Gauteng, South Africa was explored as a study area. This was done through research methods of observations, photography, videography, sketches, detailed plans and 3d models in order to apply the theories and principles addressed during the literature review and case studies.

1.5 Objectives

• To integrate universities into the 21st century city through the relevant and appropriate urban design principles.

• To establish universities as the considered spatial organizers of the city.

• To ensure the spatial design of the universities resonates with the university's visions, missions and goals.

• To use urban design principles of connectivity, and legibility as tools to offer safety in the study area.

1.6 Conceptual framework

The conceptual framework addressed the role of universities within the city. This was done through the strategic processes as highlighted in image 02.

1.7 Research methodology

A comprehensive study of the Tshwane University of Technology, Arts and Arcadia campuses in Pretoria, Gauteng, South Africa was explored. This was done through research methods of observations, photography, videography, sketches, detailed plans and 3d models in order to apply the theories and principles addressed during the literature review and case studies. The research also involved survey techniques that were in two categories; a historical survey and a situational contextual analysis. The historical analysis dealt with the historical aspects of Pretoria in terms of how the city was formed, its guiding principles and use of nature for its establishment. The situational survey was concerned with the current situation of the campuses in terms of their functionality, relation to the city and their current spatial organization in terms of infrastructure, services, walk-ability and safety.

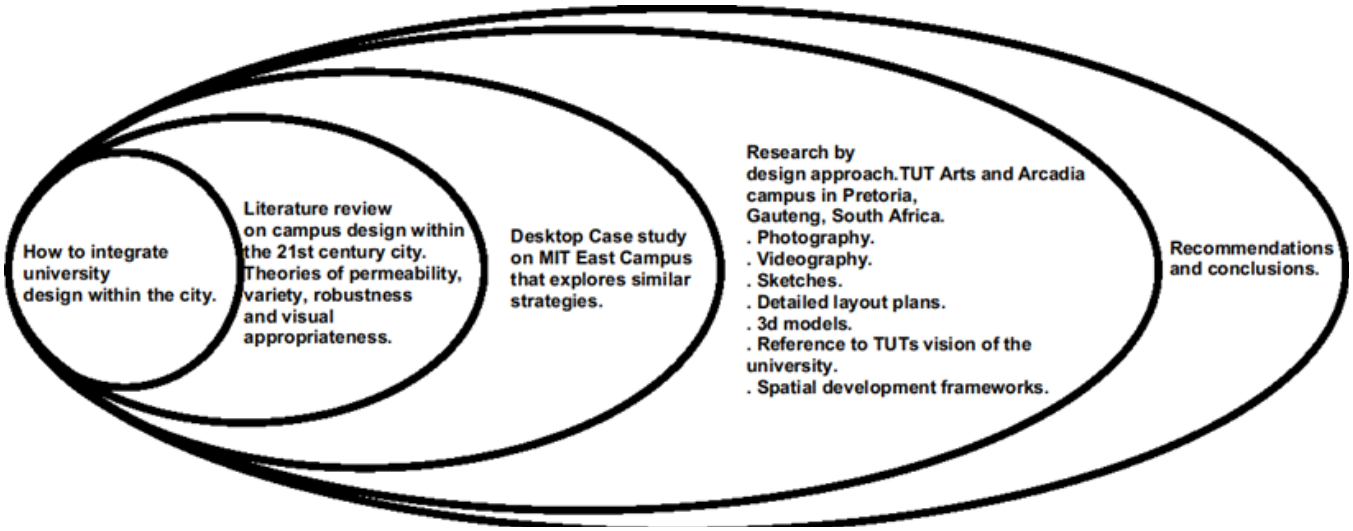

Figure 2: The conceptual framework. Source: Author.

CHAPTER 02

LITERATURE REVIEW

2.1 Origins

University design has been an epitome of shaping cities as the base of knowledge for centuries. The spaces between buildings, characterized by landscaping and activities around the buildings are one of the most important attributes that give a university it's sense of place. Through out history, universities and their evolution have been predominantly traced through European lenses (Coulson, et al. 2011). However, numerous arguments arise from African scholars showing presence of universities in Africa well before the medieval period. Scholarly institutions have been indicated to be in existence in Mali and Egypt since 300BC, though little information on this is available (Nampala et al, 2017). Both arguments show similarities that university design has been one of the oldest and strongest facets of shaping cities over the world. Of equal importance has been the relationship between the university and the city. This relationship can be traced in both European and African cities through the engagement with churches in Europe and mosques in Africa respectively (Lulat, 2015). The relationship between the university and the city set the precedence for this research and the relationship these two entities possess within the urban design realm.

Figure 3: An instance of one of the first campus design using courtyards in the University of Padua in Italy, 1222. Redrawn from (Coulson, et al, 2011). Source: Author (May 2019).

The driving factors for establishing these institutions was religious training in both the periods as mentioned in the previous paragraph. In the medieval period, around 1100s, classes were originally conducted in private houses and exams held in churches and convents within the city (Elliot, 2004). Population increase led universities to start gaining prestige due to endorsement by the Pope and the church respectively. The most important organizing principle in this period was the courtyard because of the way it could allow lecture halls to surround it and also offer a sense of privacy between student and lecture staff quarters (Coulson et al, 2015).

For over 500 years this remained the same until large open spaces and vistas were introduced. This has remained the most important organizing principle to date. These campuses are perceived as more inviting to the city as opposed to segregating it and being private (Edwards, 2000). Arguments however arise that in the 21st century, the stand-alone campus is looked at as more of a fortress than a contributor to the city form (Rodin, 2007).

SN.	Name of University	Year started	Location (City, Country)	Genesis
1	Alexandrian Academy or the Universal Museum Library at Alexandria	280 BC	Alexandria, Egypt	Alexandrian Museum, also called Museum of Alexandria, was an ancient centre classical learning at the city of Alexandria in Egypt. A research institute that w especially noted for its scientific and literary scholarship, the Alexandrian Museum w built near the royal palace about 280 BC. It is mentioned that the museum w a large complex of buildings and gardens with richly decorated lecture and banq halls linked by porticos, or colonnaded walks. The renowned Library of Alexand also formed part of the museum. In 272 AD, the buildings of the museum we destroyed in the civil war under the Roman emperor Aurelian, although t educational and research functions of the institution are reported to have continu until the 5th century.
2	University of AlKaraouine	859 AD	Fes, Morocco	Also called Al-Qarawiyyin, is one of the leading spiritual and educational centres the Muslim world and is considered the oldest continuously operating institution higher learning in the world. This university is recognized by the Guinness Book World Records as the world's oldest continuously-operating, degree-granti university
3	Al-Azhar University	972 AD	Cairo, Egypt	Al-Azhar Mosque and University, was founded in 970-972 AD as a centre of Islan learning. The mosque was built in two years from 969 AD, the year in which foundation was laid. The Madrasa connected with it was founded in 988 AD. It the chief centre of Arabic literature and Sunni Islamic learning in the world and t second oldest degree-granting university in Egypt after Cairo University. In 19 non-religious subjects were added to its curriculum. As a result it is considered that became a modern university in 1961.
4	Fourah Bay College – University of Sierra Leone	1827	Freetown, Sierra Leone	Fourah Bay College (University of Sierra Leone) was founded by the Chur Missionary Society in 1827, for the purpose of training Africans as schoolmaste catechists and clergymen. In 1876, the CMS succeeded in getting the College affiliat to Durham University. It is the oldest and first western-style university in West Afri It is located at Mount Aureol in Freetown, Sierra Leone.
5	University of Cape Town	1829	Cape Town South Africa	The University of Cape Town is the oldest South Africa's university, second oldest exta university in Africa, and one of Africa's leading teaching and research institutions. was founded in 1829 as the South African College, a high school for boys. T College developed into a fully-fledged university during the period 1880 to 19(

Figure 4:Some of the oldest universities in Africa. Source: (Nampala, 2017).

From around the 1500's, a system known as the college unit started taking shape at the Universities in Europe. Taking an example of Cambridge, smaller quarters were segregated that could offer both learning and living in small communities. These spaces consisted of self-contained units where lecturers and scholars lived together (Elliot, 2004). Learning took place within the same community but was more concentrated due to a limited number of students and classes. Due to the need of a sense of control, students lived in boarding houses with rooms that could accommodate four or five students at a time (Coulson et al, 2011). It is these boarding rooms that grew to be called colleges.

Universities have always played an integral part in the shaping of cities as evidenced by their history. It is this background that sets the pace for how important a role they have been playing into the 21st century.

This school of thought sets a good precedence for the design of universities and how they can improve the built form and improve the nature of cities as will be seen in the next chapters.

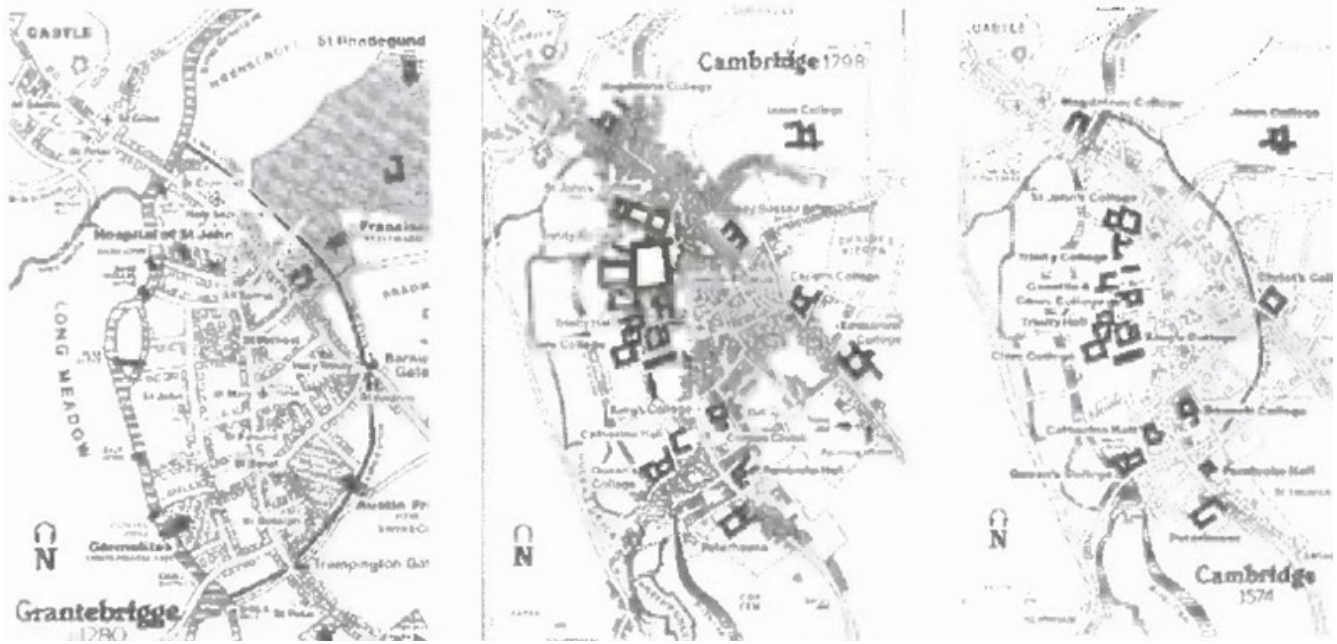

Figure 5: Establishment of the college system from 1280 to 1798 in Cambridge, England (Elliot, 2004).

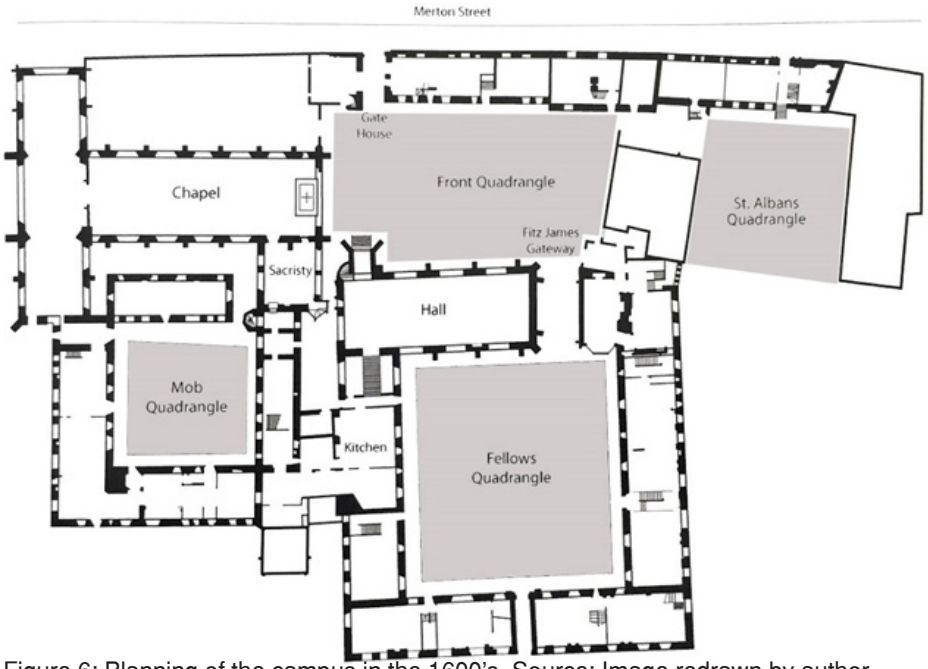

Figure 6: Planning of the campus in the 1600's. Source: Image redrawn by author from (Coulson et al, 2011).

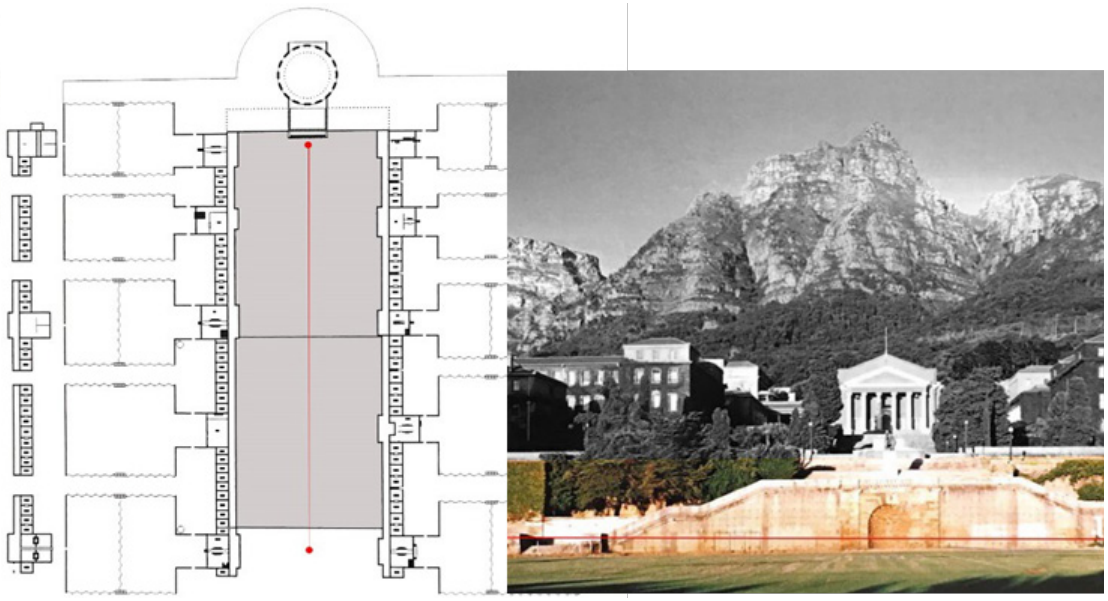

Figure 7: The vista organizing principle for the University of Virginia by Thomas Jefferson. Source: Redrawn by author from (Coulson et al, 2011) Image 07: The vista at University of Cape Town. Source: Image reformatted by author from (Coulson et al, 2011).

2.2 Trends

As discussed in the previous sub- chapter, universities have evolved due to various needs and requirements of their locality and academic goals. With the gradual increase of universities in the world and urbanization playing a great role in city design, universities have evolved into various built environments and typologies which respond to various site locations and needs of the universities in both the regional and local contexts.

The needs of the university in terms of growth combined with the governments' strategic plans regarding establishment of higher education institutions is a significant contributor to the location of these universities all over the world (Bunnell and Lawson, 2006). While this is not the only factor to consider in terms of university typologies, it plays a crucial role in their placement. Figure 08 shows the different university typologies that have manifested over thousands of years. Due to the urban design nature of this research, more emphasis was placed on the grid city typology and its impact on the city. The grid city campus typology such as the Tshwane University of Technology Arts and Arcadia campuses in Pretoria, South Africa has the opportunity to work within the confines of the urban fabric and trigger urban environments that resonate with mixed use

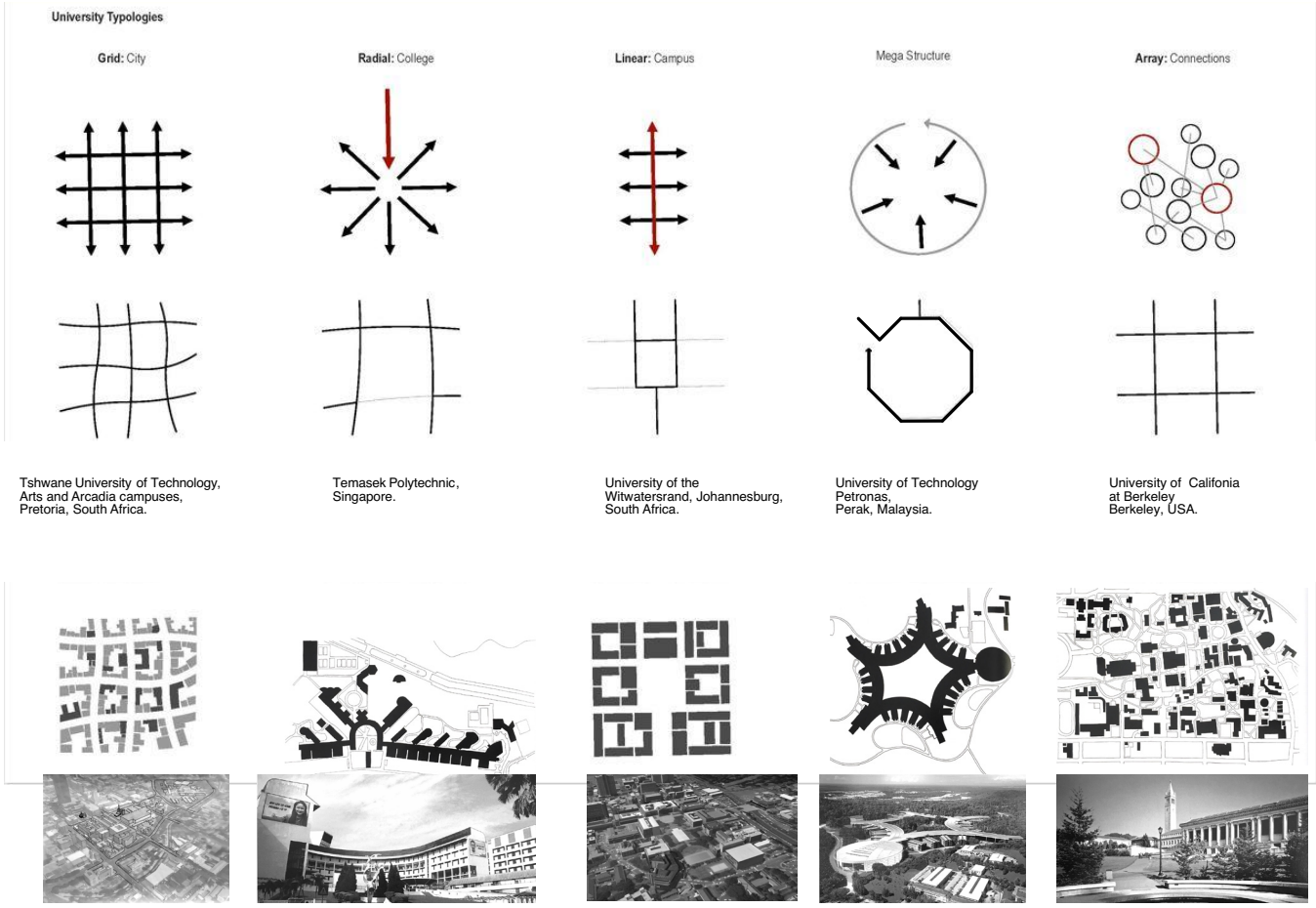

Figure 8: Types of universities within the 21st century city. Source: Redrawn by author from (Coulson et al, 2011) and (Hansen, L. 2019).

developments, encourage walk-ability and provision of pause points along the street and public spaces, while still using the city's infrastructure, services and public spaces, both open and closed.
However, this has not been the case due to the growing number of fortified university buildings and campuses marked by limited access, tight security measures and shortages of spaces such as student housing (Parmet, 2011). Such a typology, becomes a deterrent to campus and city integration often due to safety concerns despite its location.

An opposite typology is the standalone university such as the Temasek Polytechnic University in Singapore or University of South Africa that offers an environment of tranquillity that is more focused on providing a serene learning environment that is isolated from the day to day activities of an urban environment.

Most of the universities in South Africa are of the standalone type with a very introverted nature composed of physical barriers and heavy security presence mostly due to security concerns (DHET, 2019). Universities that are located in positive and rich urban environments often tend to reflect the social and environmental day to day activities of people (Dewar and Uytenboogardt, 1991).
This implies that at the smallest scale, the fine details of a city should be identified. These include the ability to walk about freely, pause to listen to a public lecture or buy an item from a street trader or even enjoy a cup of coffee as you watch people play in the park.

With regard to universities, a combination of the universities' ambitions and the richness of an urban environment might lead to a more comprehensive ecosystem which in turn allows universities to be more for the people and shaped by the activities around it. Dewar and Louw (2017), argue that the establishment of universities is not primarily based on giving an outright solution, but rather engaging in conversations with all the stakeholders involved. This will ensure that the university design is not rigid and unchanging, but rather flexible, inviting and allows for growth.

As urban designers, we have an obligation to align our design strategies with the universities' vision and constantly remind the academic leadership of the impact of design to the campus.

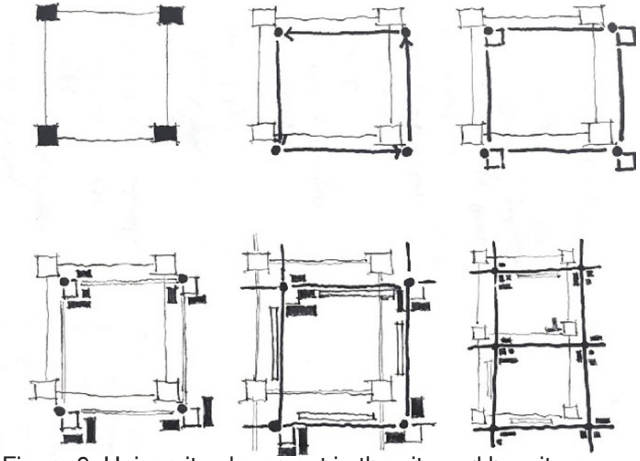

Figure 9: University placement in the city and how it can grow. Source: Re drawn by author from (Dewar and Louw,2017).

This in turn creates a sense of place that invokes a lasting memory to users (Gehl, 2006). The sense of place in this case is primarily formed by the people in the campuses and their activities.
The way the spaces and buildings are designed goes a great deal in instituting change in a society. Lazzeroni and Piccaluga (2015) argue that universities in the 21st century strive to impact cities and their locality in three distinct ways; through knowledge and economic wise, through providing for the communities around them and through empowering these communities. Knowledge base and the economy have the most direct impact by providing employment to the communities around it. This can happen through employing staff from around the community and city at large and also by students graduating from the university and being employed by the university. Such an aspect can help the university garner funding from the Government and improve collaborations with different players in the private sector, which in turn helps the university reach its development goals (Trencher et al, 2014).
The second aspect can be argued from a point of indirect impact of the university in the region and precinct. This is through working with the government to improve the areas around the university through policies that improve the safety and built environment in the university and its environs (Göransson and Brundenius, 2011). The third aspects of empowering can be observed through a number of perspectives. Firstly, through respect of the historical aspect of a university which gives it a unique identity that in turn transitions into a unique precinct and forms a destination within a region (Bank and Kruss, 2019). Secondly, good urban design strategies by the university can easily be transgressed into the greater city. It is this last aspect that the next chapter will emphasize on and theories on how the ideal campus design that can positively contribute to the greater city in general be discussed.

This chapter painted a general picture of how universities have been shaped throughout the years. An apparent trend has been that a relationship between the city and university existed well before the medieval period. This relationship existed through scholars being accommodated in built forms provided by the community such as churches and mosques before being set up in specific colleges. The growth of universities have had an impact on how the university is shaped both physically and knowledge based. This has led to universities having various typologies which in turn impact the city through learning, culturally and through the physical environment.

2.3 The university campuses within the 21st century city.

A university is considered as a city in its own right due to the multiple layers of elements that are required in order to make it functional. As discussed previously, the relationship between the university and the city takes various forms. These include but are not limited to; sharing of infrastructure and services, built forms, socio-cultural aspects, socio- economic aspects, sustainability and resilience. This means that universities require the same form of complexities in order to understand them and fully design for them (Coulson et al, 2015). With this in mind a collaborative approach instead of an imposing one is required (Dewar, et al, 2005). A collaborative approach becomes vital due to the nature in which university spaces follow a certain order while city planning follows another. It is this complex nature that suggests a more integrated approach that requires city policies and planning frameworks to recognize how campus design operates in order to establish a more integrated approach (Dewar et al, 2009). A collaborative approach in this case implies that constant engagements between the universities' stakeholders and the design fraternity happen and at various stages.

University and city planning require very complex processes with regard to design and establishment. This is due to the multiple layer combinations in order to realize a functional system. This is also not enough as the university requires growth as demands increase (Dewar and Louw, 2013). The rate of university growth in the 20th and 21st century has been quite rapid and it is this growth that planning should factor for unpredictability (Edwards, 2000).

The ability of a campus to relate to its context is primarily dependent on the way it wants to integrate with its immediate city context (Dewar and Louw, 2013). This can be done through a complete understanding of the campuses context and how that can contribute to the learning, recreational and movement patterns of both staff and students, while allowing the city to benefit from its connectivity. With this in mind, the positioning and location of the campus therefore play a great role in achieving connectivity. The location of the campus both regionally and locally determines its growth and cohesion (Elliot, 2004; Coulson et al, 2015; Dewar and Louw, 2018). The universities strategic location will be able to provide growth opportunities if both the needs of the university and the city are considered with equal measure.

The design of universities and campuses requires a well laid out thought process that takes in to consideration the growth and uncertainties of these institutions. This approach

becomes a more acceptable argument rather than a master plan. The uncertainty of growth of universities when put in to consideration, allows for a better planning process which in turn lead to a more flexible framework thus a better argument (Dewar and Louw, 2018).
It is also beneficial to lay out this argument with the mission and vision of the universities.
The importance of campuses as independent institutions leads to the prominence of universities in general. When campuses are analysed as an independent ecosystems from its inception and recognition of crucial design informants gives such institutions a unique identity that ensures continuity in terms of heritage and historical significance (Elliot, 2004). The ability to work with aspects of heritage significance not only allows for a unique identity but also promotes a sense of belonging and sense of place (Gehl, 2006). Heritage and history in a city help to give a campus identity and a unique character. If well planned for the identity can transcend and integrate the campus' unique character with that of the city. The campus is used in this instance to symbolize a unit of the entire university.
The importance of campuses as independent institutions leads to the prominence of universities in general. When campuses are analysed as an independent ecosystem from its inception, the ability of giving them a unique identity is increased (Elliot, 2004). This also includes the ability to work with aspects of heritage significance, which not only allows for a unique identity but also promotes a sense of belonging and sense of place (Gehl, 2006). Heritage and history in a city help to give a campus identity and a unique character. If well planned for the identity can transcend and integrate the campus' unique character with that of the city.
Safety is another crucial aspect of university design more importantly in the 21st century. Dovey (1998) argues that the built environment shapes social behaviour, and it is this social behaviour that determines the safety of an area. This alludes to the way the built environment is determined as being the way people will organize themselves in terms of interaction with the spaces, leading to degrees of safety or lack thereof.

Passive security measures that ensure security of the street are important aspects to consider especially when dealing with city campus design. The idea is not to fortify campuses but rather allow them to have a sense of security while still be permeable. Passive security as highlighted by Jacobs (1961) and more critically by Jeffrey (1971) in Crime Prevention Through Environmental Design (CPTED) have proven a great deal in creating open safe urban environments.

This approach has also been adopted by countries including South Africa through numerous organizations that encourage CPTED. These design strategies include; natural surveillance, natural access control, territorial reinforcement and maintenance. Natural Surveillance strategies provide observation of a place in order to prevent crime in an area. It can be as simple as allowing for well-planned street trading in empty streets in order to generate activity, strategic placement of cameras to observe the street or extending trading hours.

With regard to urban design, spatial organization takes precedence. This includes but is not limited to careful design of the physical environment in order to allow for a safe maximum use of the spaces between buildings (Crowe, 1991; Newman, 1972). Careful designing of streets, privacy gradients through access control and building positioning are all taken into account through this approach.

The macro and micro scales should be able to resonate with each other and be able to work with all the design informants. This notion suggests that campus planning should follow the same tenets of National, Provincial, Regional and Precinct spatial frameworks (Carmona and Tiesdell, 2007). The macro and micro scales of the planning should resonate and not contradict with each other. This in turn aids in identifying areas for opportunity and growth.

Water, energy and non-motorized connection routes are necessary structuring elements that may be used for place making in cities. If well utilized, these become vital place making elements that define and give presence to a space. (Dewar and Louw, 2018) emphasize the maximum use of local resources as much as possible and as important structuring elements for public spaces. It is such public places that link the campus to the city with important built forms such as libraries as the background. The definition of public spaces offers a ripple effect of informal learning places, thus forming a hierarchy of spaces without necessarily using fences and boundary walls to define public and private spaces. (Bentley et al, 1985). The ability to use public spaces as a hierarchy of private and public spaces is highly encouraged in urban design.

This chapter dealt mainly with the complexities that arise when dealing with campus design. The complexities in this regard pointed to observing the university as a city in itself, with numerous layers such as infrastructure, services, public and private spaces, green network, public open space and movement patterns. When designing a university, all these things including the design vision are taken into consideration.

2.4 The Town and Gown experience.

The chronology of the relationship between the city and the campus, also known as the town and gown, can be traced before the middle ages when universities in Europe and Africa started taking shape (Coulson, 2011; Elliot 2004). Whereas the first universities started as small communities of scholars and students interacting through learning, the neighbouring villages gained from this through establishment of eating spaces and residential spaces used by scholars and their lecturers (Coulson et al, 2015). The symbiotic relationship between the university and the city took shape in this way and, combined with other factors including population growth and need for university expansion, led to greater growth of cities. The dynamic of this relationship changes when the Vice Chancellors and other university leaders attempt to convert the universities' mission and vision into built form (Nampala et al, 2017). In most cases, these transformations lead to spatial qualities that are more often than not biased to the campuses and secluded to the city.

Universities and campuses having evolved over the years, require well defined places wherever they are occupied. Such defined spaces lead to the universities' identity and uniqueness (Edwards, 2000). The relationship between the city and the campus is quite vital since each campus desires to express its academic qualities and ensures the transfer of this knowledge trickles to the community (Mayfield, 2001). This relationship can also be explained through equity of access in the universities and the city (Bank et al, 2018). Equity of access in this scenario implies not only to the ability of the universities to share resources but also to ensure its built form positively contributes to the city. It also aludes to the ability of the pedestrians, Both students and the public to move freely as pedestrians.

Since the establishment of the modern university typology in the middle ages, there has been an undisturbed connection between the evolution of society and the evolution of higher education. Coulson et al (2015) gives examples of which include the red bricks of nineteenth century as result of the industrial age in Britain, which gave rise to establishment of laboratories and specialized learning spaces to cater for the industry demands and the desire of Simon Fraser University to shift from the traditional colleges to introduction of recreational spaces integrated with learning spaces in one mega structure that took the form of a linear spine (Coulson et al, 2015). The above instances show us that each period in history combined with societal norms and priorities have determined how a university should be, grounded by their philosophies, practical

implementation and funding. This determines the physical manifestation (Cloete et al, 2005).

The university context as discussed in the earlier paragraphs plays an integral part of integrating universities with the city. Quite a number of issues pertaining to their location and establishment have been discussed and a clear linkage between the society, in this case the city, and the university itself has been demonstrated. This shows that there have been deliberate attempts to integrate the university with the city but it has not been without challenges. Swillin et al (2012) argue that spatial planning, inadequate land reforms and lack of proper social cohesion are some of the challenges facing the relationship between universities and the cities in South Africa. The manifestation of universities' mission and vision into physical form has also brought about various challenges with regards to interaction with the city that include, access control, movement and funding (Parmet, 2011).

The next part looked at city universities in South Africa based on the town and gown experiences as discussed earlier.

A comparative analysis of universities in South Africa, more precisely city campuses show spatial qualities that are more introverted in nature than ones that contribute to the city. A selection of University of the Witwatersrand, East and West campus, Stellenbosch university main campus and TUT Arts and Arcadia campuses show how that the relationship between the universities' growth and their introverted nature is inversely proportional. This has in turn offered a negative impact of the city universities in South Africa. The choice of only three campuses was done due to the limited time required to complete this research and as also due to their proximity to the city centre and similarities in city structure services utilized by the city.

University of the Witwatersrand in Johannesburg which started as the Transvaal University College in 1910 was fully established with the general purpose of bringing together students from all over South Africa (Murray, 1982). By 1930, the college had evolved into a full university with teaching blocks for Electrical, Mechanical and Mining Engineering as shown by figure 34. As the university grew, the relationship between the university and the city began to deteriorate with the university's incremental plan due to demand which brought about challenges of security, resulting in closing itself physically from the city through access control measures as shown in the figure ground on figure 33.

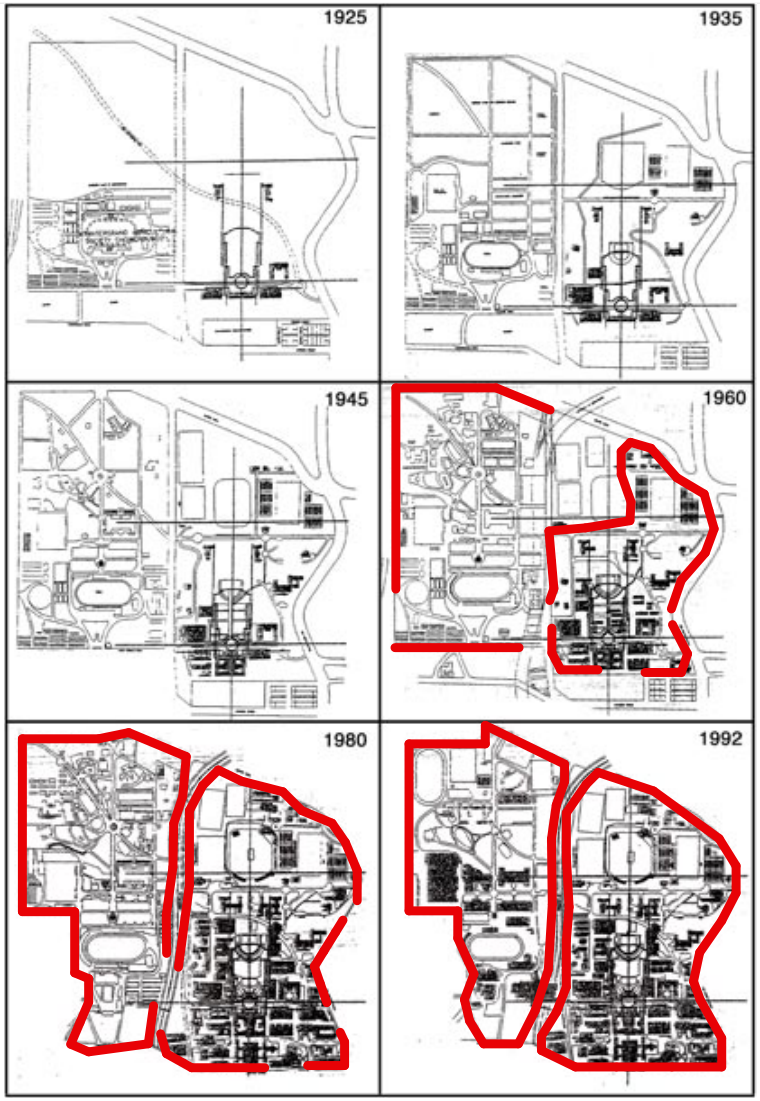

Figure 10: University of The Witwaters-rand figure ground showing how the university has grown over the years. Source: (Dewar et al, 2009)

University of the Witwatersrand East campus

Legend:

Academic | Student Centres | **Recreation** | **Library**
Administration | Support services | Conference
Housing | Sport | Cafeteria/Dining

Building footprint | **Security fence**

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Figure 11: University of The Witwatersrand figure ground showing how the university has been closed off over the years. Source: Author (August, 2019).

This trend can also be observed in other city campuses such as Stellenbosch University in Cape town and Tshwane University of Technology in Pretoria. The issue of closing off campuses due for security purposes contradicts frameworks such as SPLUMA and in the case of the TUT instance, the IDP where it intends to provide an open, honest and safe environment for all city residents. This statement is not meant to be a literal contradiction of the frameworks but rather a reflection of the current trends in city campuses in South Africa.

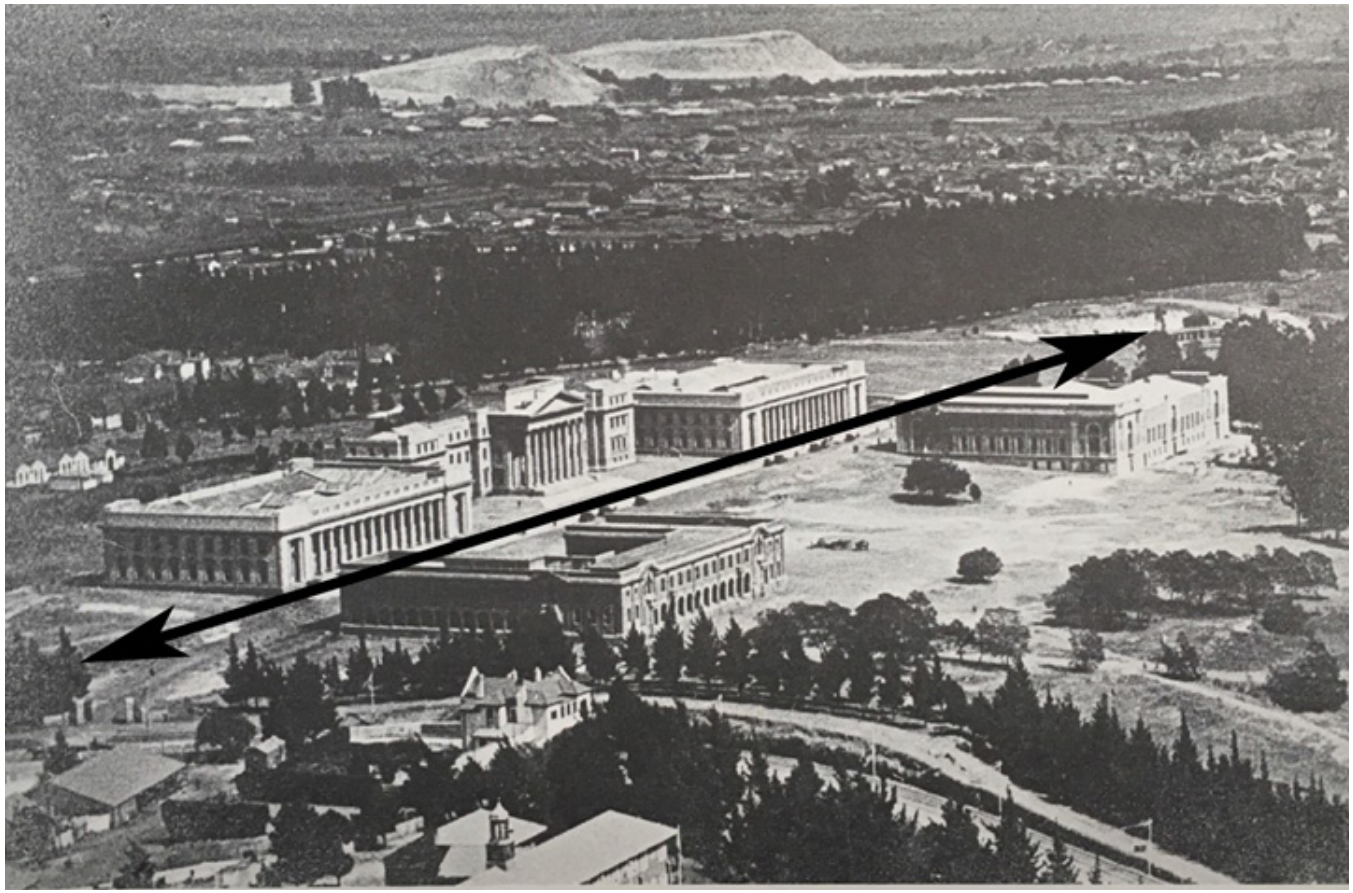


Figure 12: Image of University of The Witwatersrand showing how the university was open and vehicular movement was permitted from Jan Smuts Avenue to Yale road. Source (Murray, 1982).

Figure 13: Figure ground of Stellenbosch University showing similar accessibility barriers yet it is located in a very rich urban setting. Source: Drawn by author from Google maps.

Figure 14: Figure ground of TUT showing similar accessibility barriers located at the edge of the city. Source: Re drawn by the author from Ludwig Hansen Architects and Urban Designers (2019).

This chapter painted a contextual picture of the relationship between universities and the cities. A further analysis was done with the TUT Arts and Arcadia campuses in relation to the city of Pretoria, tracing the history of the city, universities and the current state of the campuses. There is a poor relationship between the university and the city in terms of privacy, built form, bulk infrastructure and intellect yet the campuses exhibit capacity to do so with support from the government through entities such as. DHET.

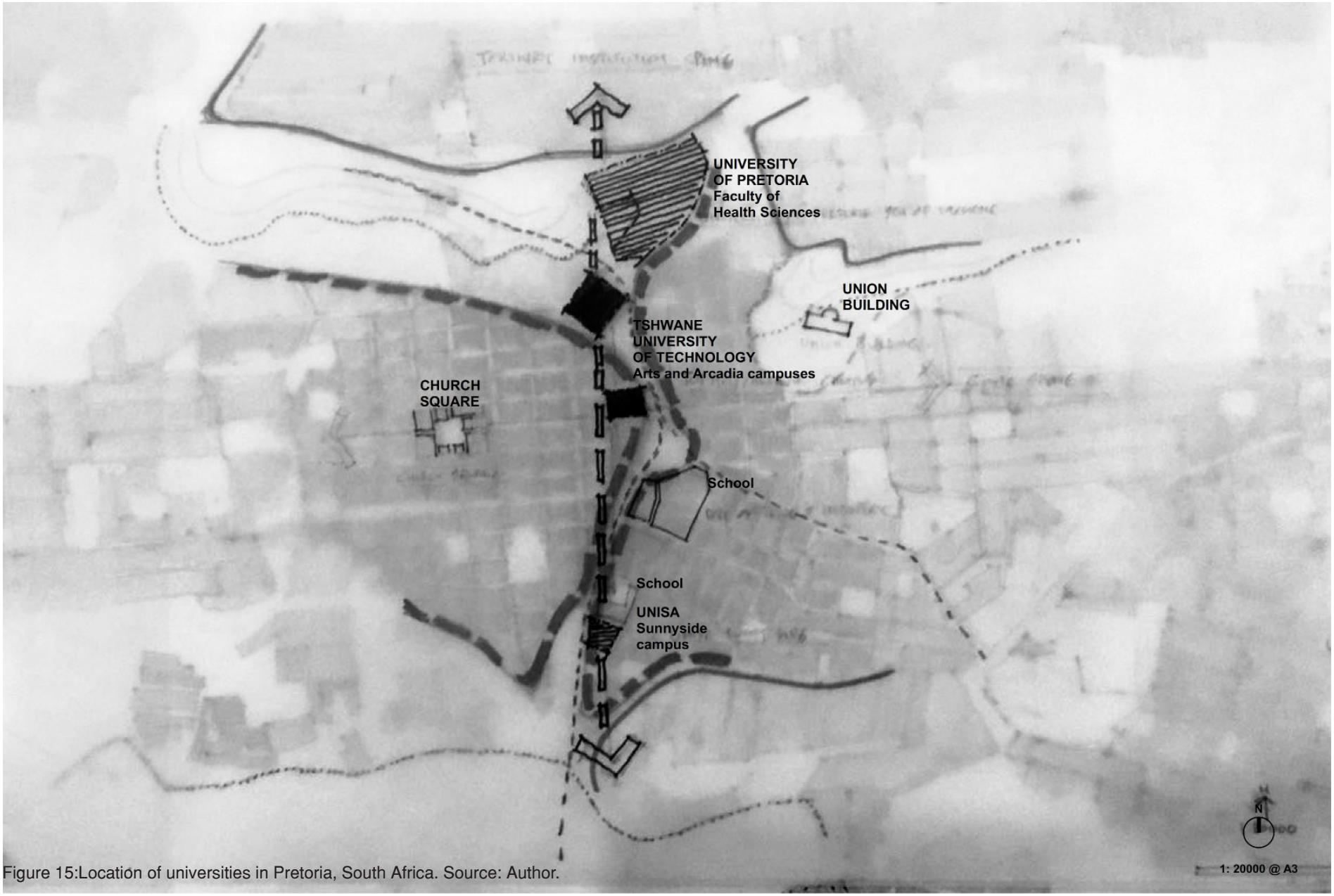


Figure 15:Location of universities in Pretoria, South Africa. Source: Author.

CHAPTER 03

RESEARCH METHODOLOGY

3.1 Research by Design.

Various principles, when critically engaged, lead to a positive environment that links, both students and the public. This particular study required critical engagement due to the nature of urban design which embraces knowledge from various disciplines (Murray et al, 2007). The approach needed to be holistic, from an urban design perspective and not just architectural. Flexibility of design and infrastructure are also crucial in that the spatial planning and framework needs to be flexible enough to allow for uncertainties that might develop in future (Dewar and Louw, 2017).

The nature of this research is that it took the form of a research by design process that questioned the role of campus in cities through a research by design approach. Research by design interrogated the problem statement through a series of analyses of the context, sketches, presentations and criticism of the entire process in order to come up with a framework for the proposal (Murray, 2013). It also reviewed the spatial frameworks that exist in South Africa, the province of Gauteng and the city of Tshwane as a way to ensure all interventions were in line with what is enshrined in the National, provincial and municipal frameworks.

3.2 Research methodology

The research employed a case study method, (Yin, 2003), through the use of TUT Arts and Arcadia campuses located in the Pretoria CBD. This involved a survey of the study area through questionnaires issued to various street users that included, business owners, public transport operators and general street users with the aim of getting unbiased opinions of the study area. Observation of the area and its contexts was also employed through photography and sketches. Due to time constraints, the observation exercise was only limited to specific areas that were considered critical. These included the areas adjacent to the campuses, areas of heritage significance and public open areas within a 2-kilometre radius. This method was deliberately selected as an approach to a collaborative aim of bringing the urban design profession to the people in order to achieve better success in the findings and research in general.

An important point to consider is that the entire research by design process is a collaborative one that is more of a conversation than a once off presentation. This means that the design process tried to be in line with the university's spatial needs, academic plans and any other goal. With its location, the design needs to pay homage to the his-

torical and heritage significance of the city of Pretoria and also the environment around the site both natural and physical, which in turn gives it a unique identity.

3.3 Survey techniques

The main survey techniques involved in this research focused on the historical analysis of the city, and the city analysis with regards to the university manifestation.

The historical analysis looked at origin of the city of Pretoria and what principles were incorporated to achieve its current status at the time of this research. The city of Pretoria was built through quite a rich history that is evident from the heritage and how it used nature to its advantage.

The city analysis, though complex, was important to have as it gave precedence to how the campuses in the study area positioned themselves in terms of city infrastructure, services, nature, heritage and frameworks. The city analysis involved legibility analysis and a critic of the city through the eyes of responsive environments (Bentley, et al, 2015). More specifically, the city analysis looked at the TUT campuses through principles that constitutes university planning (Elliot, 2004) (Dewar and Louw, 2017) (Edwards, 2000).

A Legibility analysis concerns itself with how users of a city identify themselves with it themselves and find their way around it (Lynch, 1961). Due to the nature of the research, legibility was used in the analysis of the campuses and how campuses spaces manifested themselves in the city.
More importantly, legibility was used to assess the edge conditions of the campuses, street characters, axes and vistas and whether the campuses formed any nodes and landmarks to the city. This helped argue the concept of integration with both the city and within itself through ease of access and safety.

Responsive environments dealt on the ability of the campuses to offer environments and spaces that are easy to interact with, walkable, safe and vibrant. Principles of ease of access, open space integration were tested on the campuses to determine the level of campus integration with the city, if any, was present and how to improve on it. The survey techniques were important because they set a precursor to the strategies to be employed in providing a spatial framework for the campuses.

CHAPTER 04

CONTEXTUAL ANALYSIS

4.1 The Context.

Tshwane University of Technology (TUT) Arts and Arcadia campuses are integral campuses within the city of Pretoria, South Africa, now known as Tshwane. This is not only for the value of education that they contribute to the university but also for the spatial opportunities they present to the greater city. City of Tshwane is the largest municipality in South Africa and according to the 2011 Census, is home to approximately 2.9 million people, though this number has increased (Statistics SA, 2019). Apart from TUT university, the city is host to a number of universities and colleges that include University of Pretoria and University of South Africa.

The location of the site study area forms a spine of institutions starting with the University of Pretoria, Prinshof campus to the North, TUT Arts and Arcadia campuses closer to the Central Business District, University of South Africa (UNISA) and the University of Pretoria Groen Kloof to the South as shown by figure 19.

Figure 16: A scaled map of the city of Tshwane drawn by the author from Google maps.

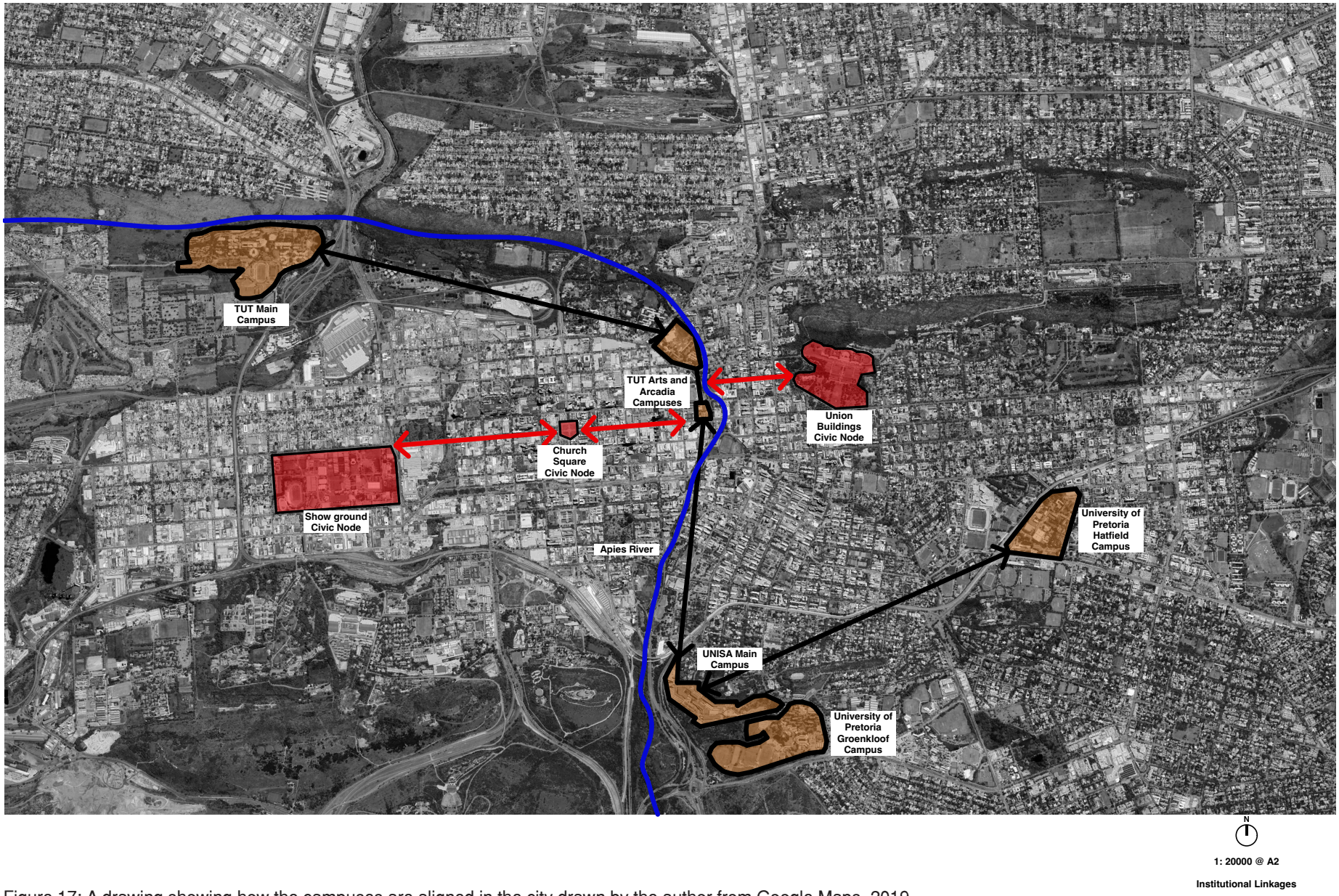


Figure 17: A drawing showing how the campuses are aligned in the city drawn by the author from Google Maps, 2019.

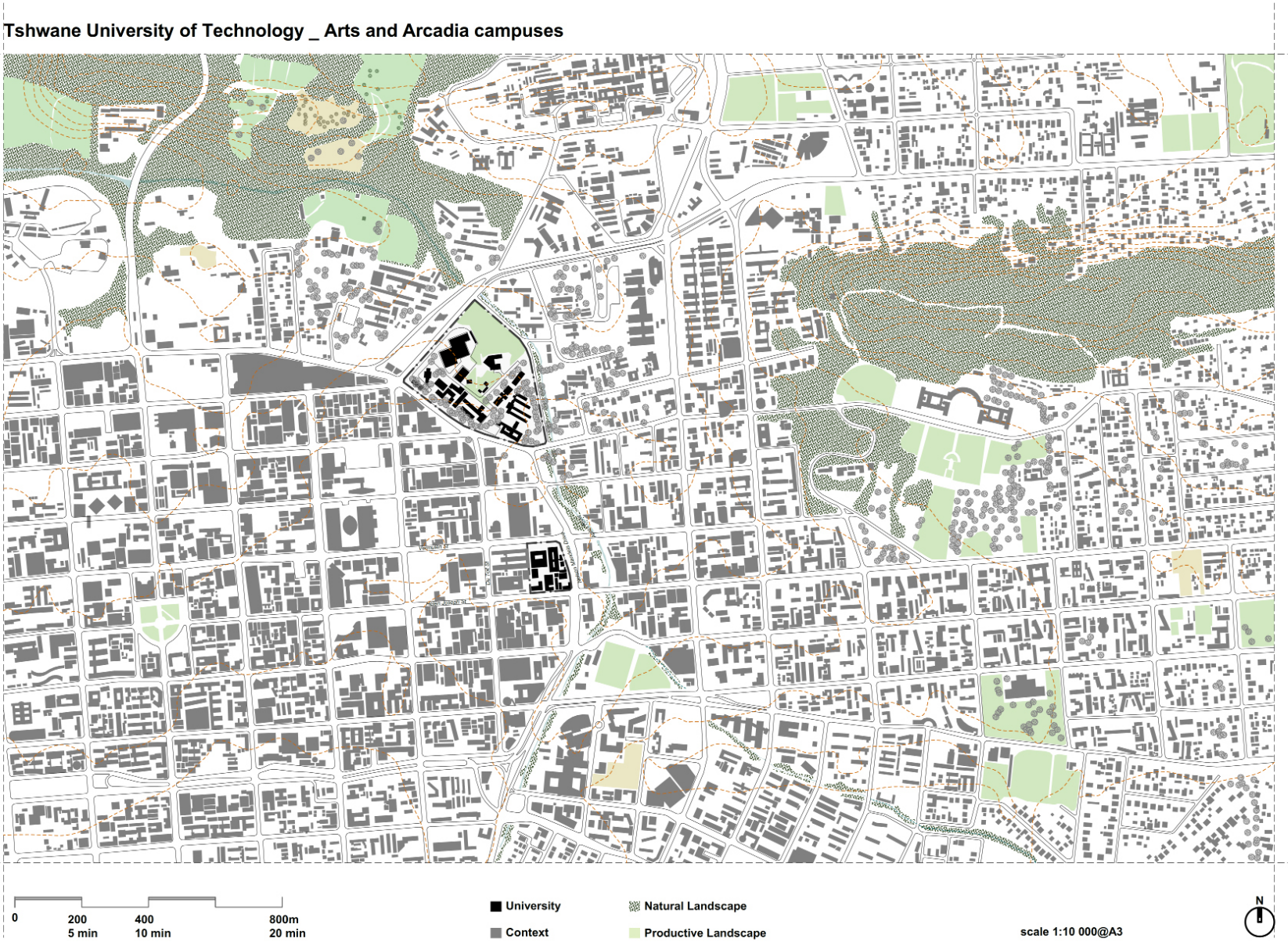


Figure 18: Arts and Arcadia campuses and how they are positioned within the city. Source: Re drawn by the Author from Ludwig Architects and Urban Designers (2019).

The study area is located at the edge of the city which is defined by Apies river. Apies river forms a natural edge of the city (Lynch, 1961) which divides the city as per the profile of the river. This in turn divides the city in to two. The division of the city into two offers the opportunity of the institutional spine to act as a transition space between the Eastern, central business district and, Western more residential part of the city.

Figure 19: Images showing the residential and student housing Eastern part of the city of Pretoria. Source: Author. (September, 2019).

Figure 20: Images showing the central business district Western part of the city of Pretoria. Source: Author. (September, 2019).

4.2 Justification.

The proposed site is situated within the city centre and its edge with good infrastructure and services provided by the city. The site and its immediate context are composed of various other universities and educational institutions, thus providing an opportunity to develop an educational precinct. There are proposals by the government in conjunction with TUT to expand its campus due to a shortage of housing facilities in order to accommodate capacity for its growing number of students in campus (Tshwane, 2019). The site also sits on an edge between two urban regions, divided by nature which provides an opportunity to link them using urban design. The rich history of the city also provides an opportunity for giving the design a unique identity. The city in its Integrated Development Framework (IDP) pillars for strategic development provides for pillars that allow

the city to be recognized as world class city and these resonate with the aims of this research. These include economic growth, a city that encourages inclusive spaces, a conscious awareness and protection of the environment and safe open vibrant environments (Tshwane, 2019). The city's IDP goes hand in hand with the aims and objectives of this research through the use of various design principles in order to ensure permeability, connectivity, robustness and variety of integrated campuses.

4.3 A brief history of Pretoria

Pretoria was originally occupied by the Ndebele people in the 1600's before the Afrikaans occupied it in the 1840's. It was officially named Pretoria by Marthinus Pretorius after his father in memory of the Voortrekker battle with the Zulu people (Jordaan, 1989), (Pretoria, 2019). The city grew from Church square and integrated the nature around it to create an interesting urban fabric with a

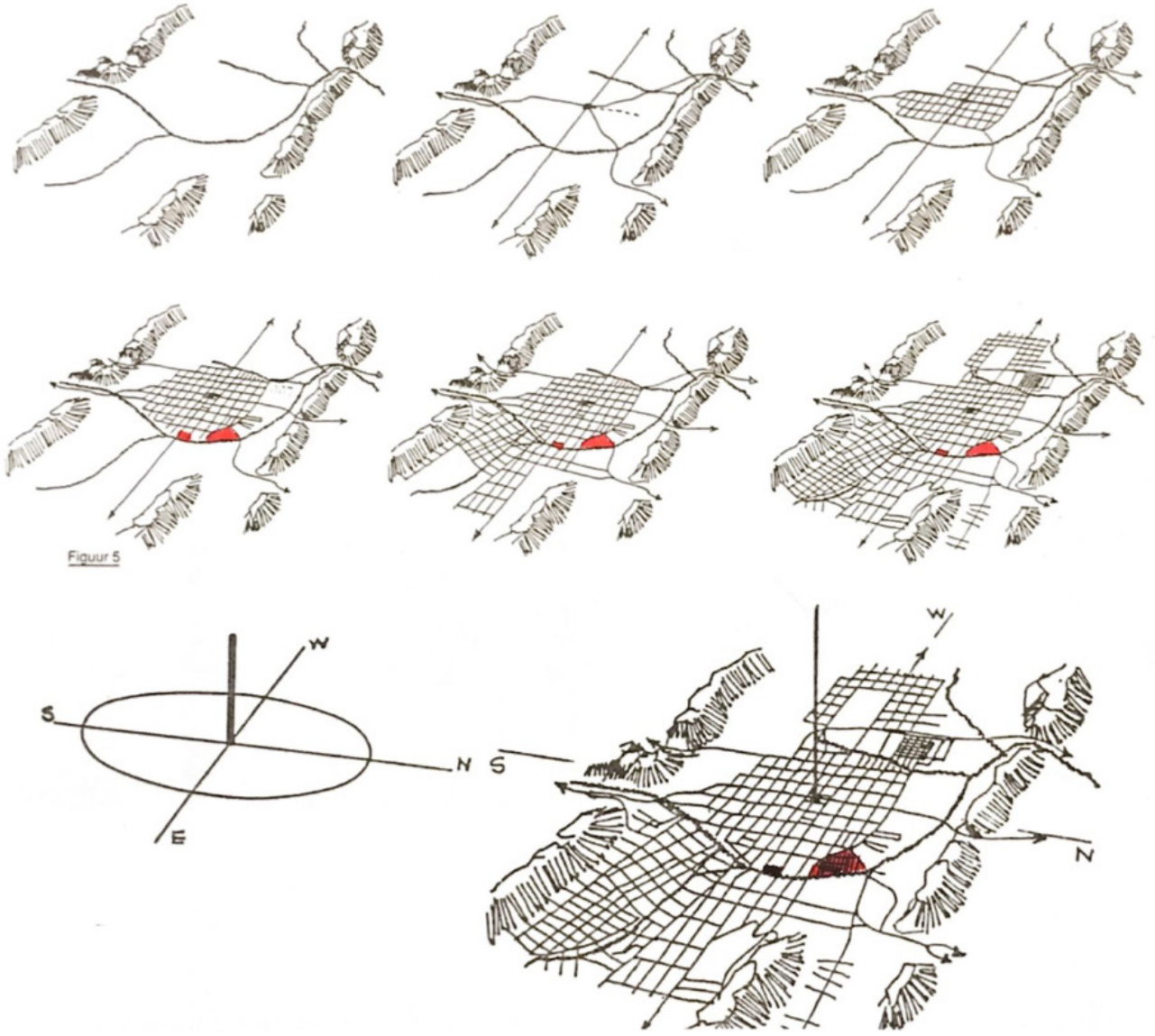


Figure 21: Image showing how Pretoria grew from the Church Square in the 1800's with the two TUT campuses highlighted in red. Source: Redrawn by author from (Jordaan, G. 1986) in Architecture SA, 1986: 2.

rich cultural heritage, similar to Philadelphia in the United States of America (Jordaan, 1989).

Pretoria's central business district (CBD) sits at the lowest point of the region, surrounded by the highland areas to the North and South respectively. The choice of locating the city at the lowest point gives a strategic advantage of the use of water provided by the Apies river and its two streams as shown in image 27 above (Dippenaar, 2013). The use of nature in place-making is an integral part of the city and has been used all over the world where is it combined by other principles such as the iron grid (Jordaan, 1987). The iron grid is an element that holds a significant heritage aspect not only for Pretoria but also in the world, from the streets in Alexandria in Egypt from 47BC, the Roman empire period and cities such as Savannah, Philadelphia and Manhattan in the United States of America (Martin and March, 1972). Historically, it was used subdivide land and control development, a tenet that occurs to date thus it becomes quite an integral planning element. The combination of these principles gives rise to a city that is sensitive to natural elements, in this case the hilly areas and Apies river, and placement of buildings, use and services which include universities, civic centres and public spaces.

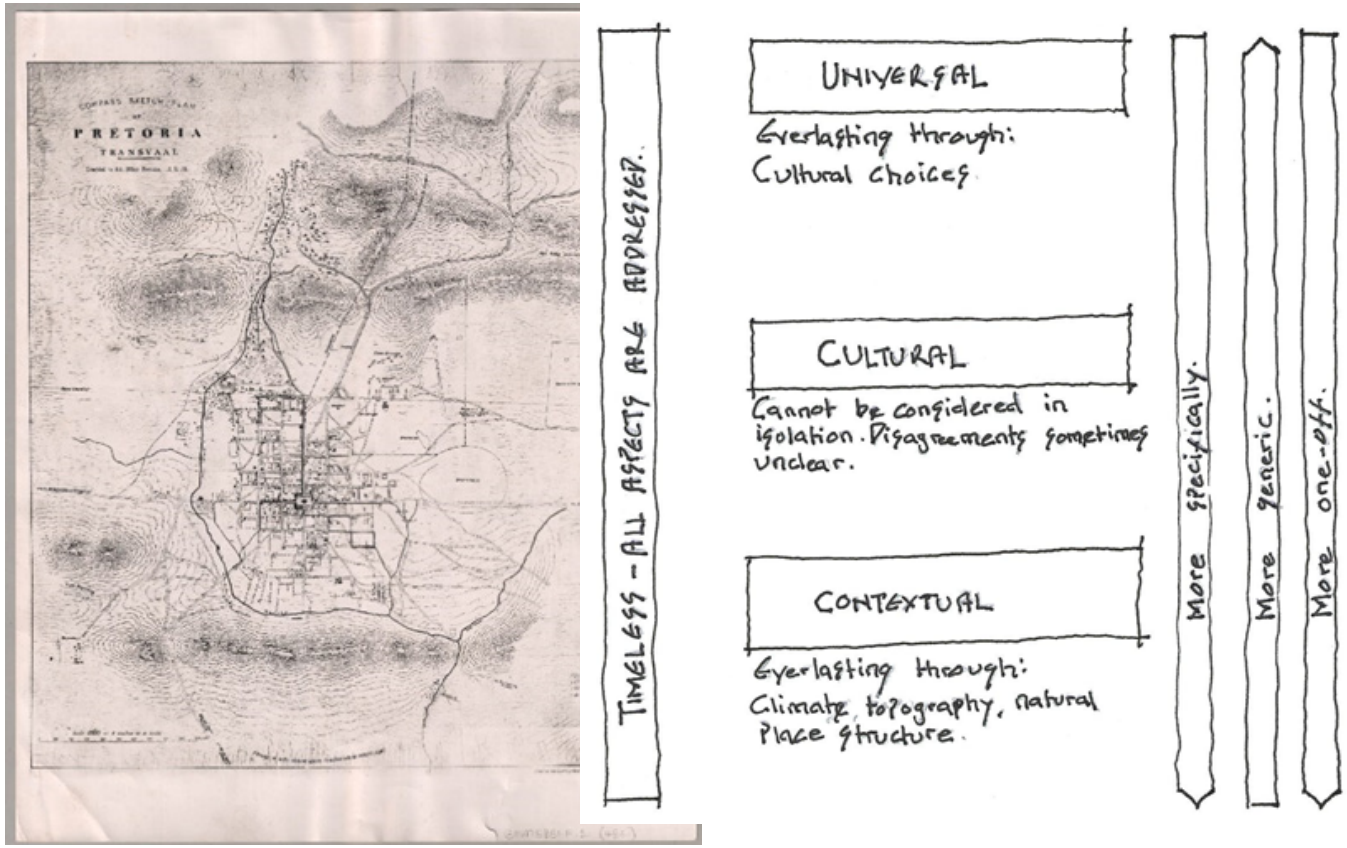


Figure 22: Map of Pretoria as drawn by the Great Britain military in 1880. Source: African historical maps, University of Cape town. A summary of place making within the city of Pretoria that followed three distinct aspects; universal, cultural and contextual. Source: (Jordaan, 1986) in Architecture SA 1986: 29.

A critical study of the relationship between the city and universities traces establishment of the first university in Pretoria in 1903 with the establishment of the Transvaal Technical Institute in Johannesburg which later became Transvaal University College (TUC) in 1908. It was the first tertiary institution in the Transvaal province. The institution later moved to its present location in Hatfield in 1930 (Murray, 1982). The planning of the city with regard to the gold route can be seen to divide the city according to how the route would operate which divides the city into various parts and forms an edge around the central business district as shown in image 30. This would later be come to be known as Musanda, a green belt ring around the city that give the central business district its edge (Arup, 2012).

While it is not precise as to why the two campuses are located adjacent to the route, what is certain is that they are positioned along the Apies river which can be assumed to be the reason for the gold route as shown in figure 27.

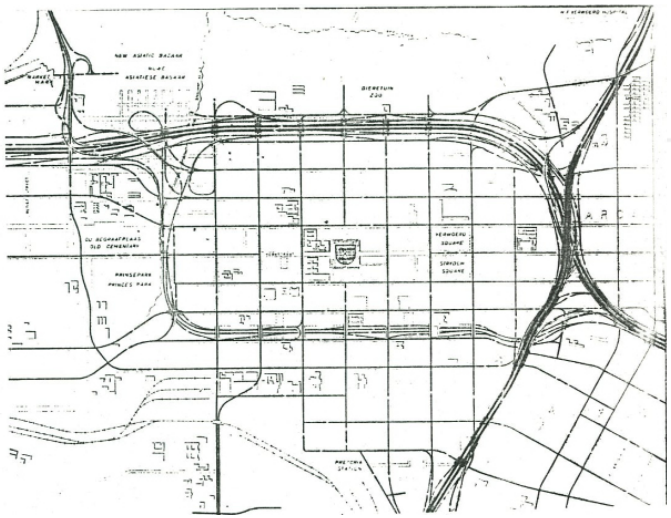


Figure 23: Map of Pretoria and Rustenburg showing the gold route drawn in 1887 by Wielligh, V. Source: (Jordaan, 1986) in Architecture SA 1986: 29. Map of Pretoria showing the Musanda that connects all the green public open space in the city. Source: Formatted from (Arup, 2012).

Tshwane University of Technology (TUT) falls under the category of University of technology, one of the three types of universities in South Africa. The other two types are conventional and comprehensive universities respectively (Ekhuruleni, 2017). The primary role of TUT is to offer vocational and practical contact training with students graduating with diplomas and technical degrees (Ekhuruleni, 2017). TUT was established on 1st January 2004 when Technikon Gauteng, Technikon North West and Technikon Pretoria merged to form Tshwane University of technology. An important aspect of the institution was that the Technikons had been in existence since 1900 with the Technikon Pretoria being the oldest, though it was known as Irene Technical School and later Pretoria Technical College (Insight, 2011).

TUT consists of nine campuses namely; Arcadia, Arts, Emalahleni, Ga-Rankuwa, Mbombela, Polokwane, Pretoria West, Soshanguve North and Soshanguve South. The Arts and Arcadia campuses offer arts and sciences diploma and degree courses respectively. The Arts campus is made up of purely art-based degree and diploma courses that include, performance arts, music, painting and sculpturing (TUT, 2017). The courses offered in the campus provides an opportunity for it to celebrate such arts with the city through strategic urban principles as will be discussed in detail in the next chapter.

In order to comprehend the integration of campuses in to the 21st century city, it is important to first understand the context in which the study area sits and the role it plays in the research by design approach. Dewar and Louw (2017) put it that the location of a campus should be observed through the regional and national microscope. This should be further combined with the role of the university in the city. While Dewar and Louw (2017) argue that there are quite a number of issues relating to the location of a university, this research will attempt to explore the city campus and the role the university's mission, vision and values play in ensuring a harmonious balance of spatial design and university functions within the city. The two strategies above can further be emphasized by the city's natural landscape, heritage, infrastructure and services. An image study of the area 01 as per figure 29 show the TUT Arts campus and the area adjacent to it. The boundary wall all over the campus is perceived as a security measure to safeguard the campus from theft and vandalism. This measure forces the campus to be introverted in nature which in turn secludes itself from the city and forms an unwanted edge condition that is unattractive, very unsightly to walk and unsafe due to no activities at the street edges.

Figure 24: Contextual study extents. Source: Redrawn by the author from Ludwig Hansen Architects and Urban Designers (2019).

Figure 25: Images showing the area adjacent to the TUT Arts campus. Source: Author. (September, 2019).

Figure 26: Images showing the area adjacent to the TUT Arcadia campus. Source: Author. (September, 2019).

The area adjacent to the Arcadia campus is characterised by open spaces to the North of the campus, Tshwane North College to the West of the campuses, commercial and religious centres to the North and West of the Arcadia campus respectively. The vacant open spaces have given the taxi public transport to colonize the area and create unplanned taxi ranks that have not been sanctioned by the municipality. The area is also characterised by low rise commercial developments and buildings without any architectural or urban design merit. This leaves unsightly building edges that do not respond the street user through a variety of building edges.

The Eastern part of the Arts campus is characterised by Bloed street. A street that encourages pedestrians and vehicular movement to interact. The heavy presence of the taxi form of public transport in the area renders the presence of private vehicular movement quite difficult.

Figure 27: Images showing the area adjacent to the TUT Arts campus and Bloed street. Source: Author. (September, 2019).

CHAPTER 05

DESIGN

5.1. Case study

5.1.1 Precedence. The case of Massachusetts Institute of Technology, East Campus.

The Massachusetts Institute of Technology (MIT) engaged a professional team to redesign its East Campus located at Kendall Square in Cambridge within the Boston metropolitan area in the United States of America. The brief was to develop a framework that shifts away from the isolated campus buildings secluded from the city, to a more integrated approach of mixed-use spaces that resonate with the urban fabric and promote walk-ability. The goals of this exercise were; To include both new innovative academic initiatives and commercial establishments. To create destination and arrival places with amenities, services and engaging street scape, and to establish a vibrant new gateway and connective link between the campus and the central business district, and the Cambridge community. To create an overall proposal that is economically sound (Scogin et al, 2014: 6). A study of the area was undertaken in order to establish the status quo and areas of opportunity for development.

The design informants within Kendall Square and its greater contexts included; the ecological and environmental aspects such as the Boston river, pedestrian and vehicular movement patterns, sustainability and parking. A number of principles were engaged in order to fulfil the brief. The first one was marrying MIT's mission and vision in order to create a gateway that would be iconic and resonate with the city.
This was done using the historic interaction of MIT with other academic and business conglomerates like Google, and coined in a manner that allowed for the accommodation of MIT's academic, residential and commercial vision. The built form within this area was to have the robustness (Bentley et al, 1985) and adaptability for both the short term 5-year period and longer-term use. The second principle was to use the public spaces as connectors and linkages to the city in a way that embraces the cultural heritage of both MIT and Kendall Square. Other important principles were the ability to create commercially viable mixed-use developments, working with the natural environment through innovative landscaping, and finally creating a campus that still possessed the identity of MIT within the city (Scogin et al, 2014). All these principles were geared through creating a sense of place within the urban fabric which in turn embraces both the campus and the city.

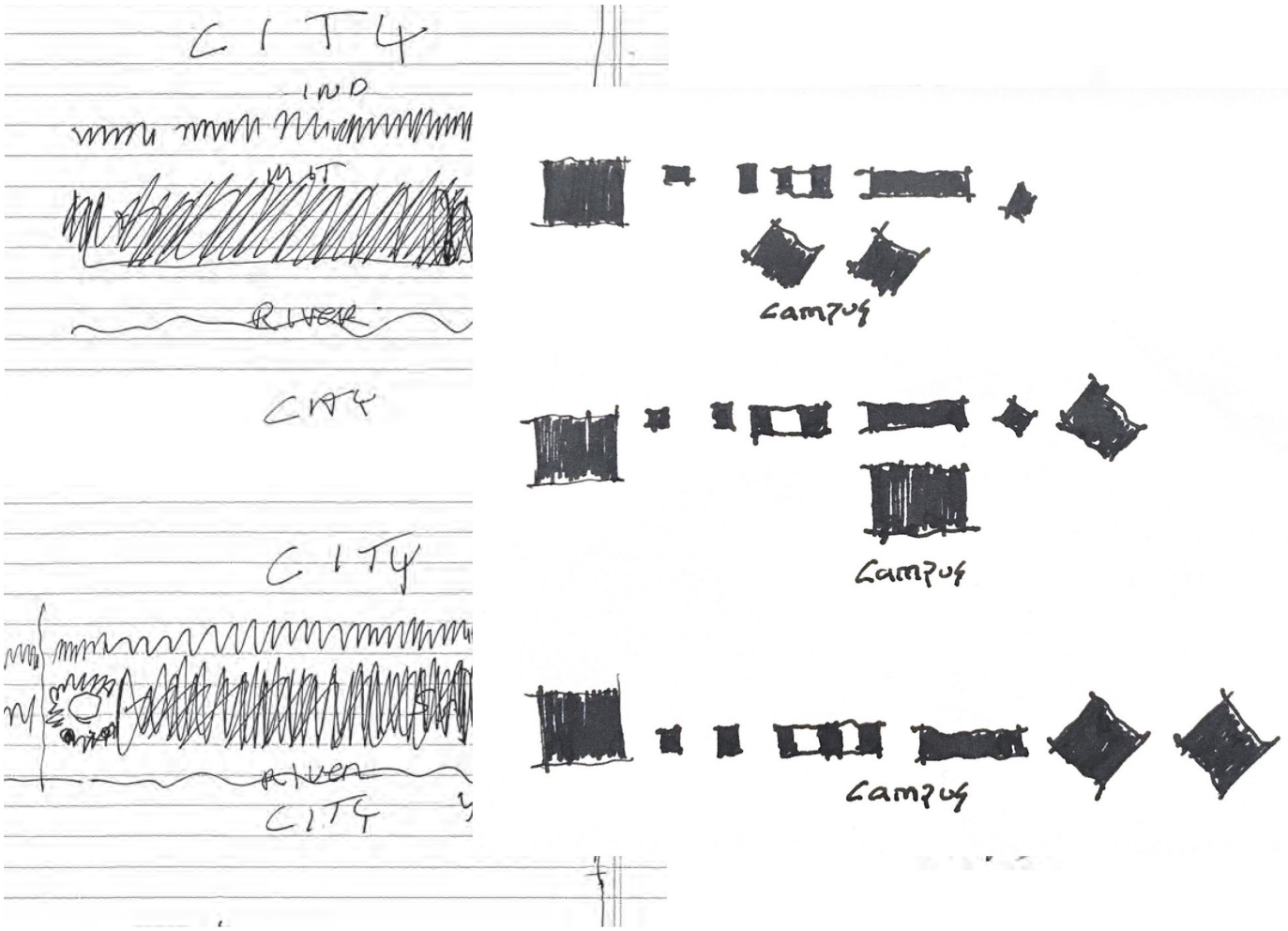
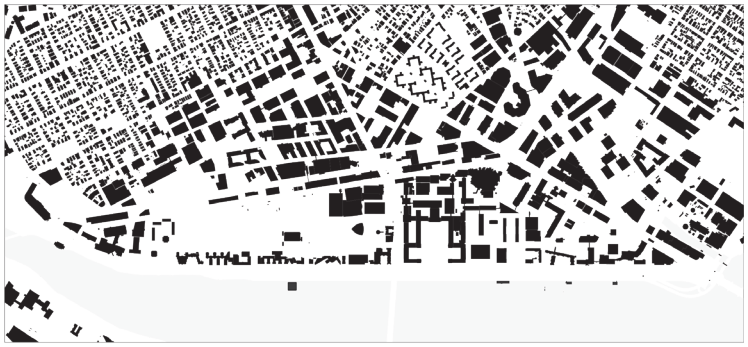


Figure 28:The concept of MIT East Campus. Source: Re-drawn by author from (Scogin et al, 2014).

Urban adjacencies sketch

Porosity diagram sketch

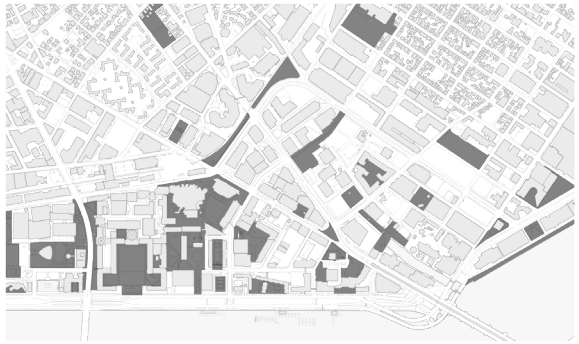
Figure 29: The proposed site and its context. Source: (Scogin et al, 2014). The mapping out of green spaces as a guiding principle. Source: Reformatted by author from (Scogin et al, 2014).



Campus as City Fabric:
The south edge of East Campus is well defined by Memorial Drive and Charles River. But along the northern edge, the definition of campus fabric is slowly evolving into the fabric of Cambridge across Main and Vassar street.

MIT Buildings:
The diagram illustrates the fragmented expansion of the campus towards the north. It also illustrates the underutilized nature of the East Campus in its existing condition.

Open Space at BioMED Realty



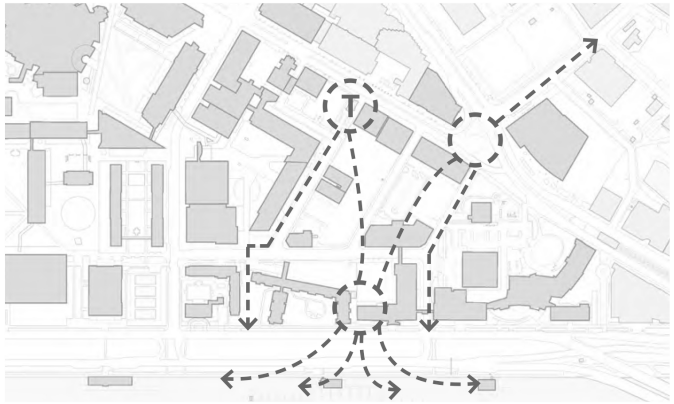
Isolated Island of Open Space: Kendall Square North Plaza

Mack Scogin Merrill Elam Architects | MICHAEL VAN VALKENBURGH ASSOCIATES INC

Point Park

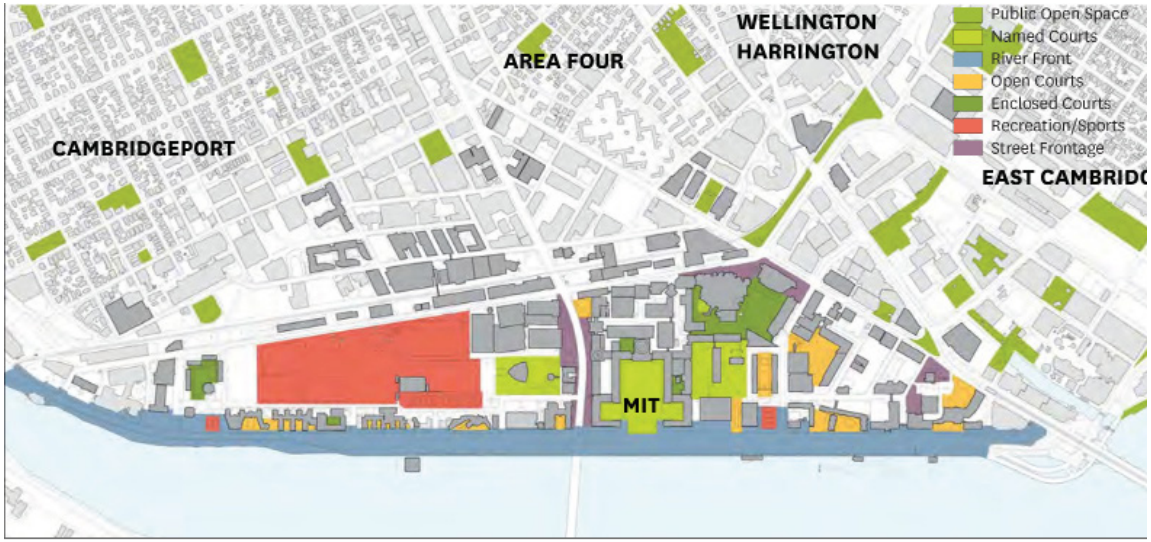
The Charles River and Boston Skyline

2 Centers of Kendall Square: Point Park with E48 and Eastgate beyond

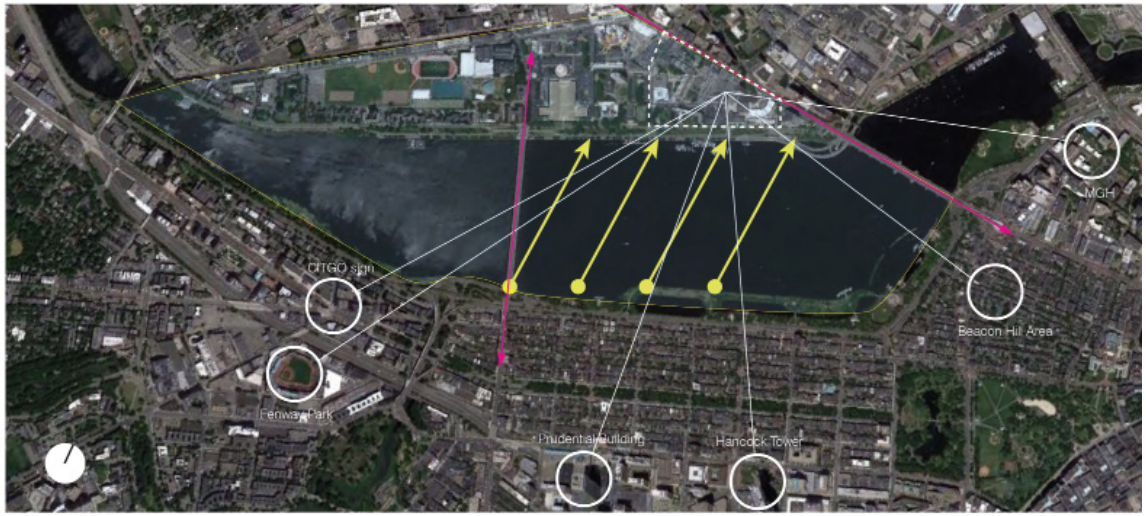


Connect Kendall Square to Charles River: View of Boston skyline from MIT

Figure 30: Axis, vistas and focal points. Source: Reformatted by author from (Scogin et al, 2014).



Campus Landscape Mosaic:
The Charles River boundary and landscape are the connective elements that hold the MIT campus together. Distinguished buildings are in, on o
around a variety of landscapes.



East Campus' Relationship to Boston:
The East Campus is a visual and physical link between Cambridge and Boston. It is optimally situated to receive south light and has uninterrupte
views towards many of the landmarks in Boston.

Figure 31: Images showing the manifestation of. Axis, vistas and focal points. Source: Reformatted by author from (Scogin et al, 2014).

The design and spatial framework proposed both immediate and future interventions as shown in figures 32 and 33 respectively.

The precedent study above shows a distinct way of approaching research by design. The principles and strategies were first aligned to the university's mission and vision. This in turn formed a design strategy that ensured maximum permeability, safety, economic balance and ensured MIT's identity was maintained at the immediate and the future. All this was done while not only maintaining Kendall Square's integrity but also improving on its character and connection to the campus and the Boston river, which is a significant part of the city.

5.1.2 A summary of the principles.

The case study discussed in the last chapter offered precise lessons that can be used for this particular study. It's contextual make up and urban fabric in the CBD and natural design informants such as Boston river resembles the context of the study area chosen for this research in the way it is situated within the city Centre and at the same time by significant natural features such as the Apies river. Places of heritage and historical significance represented by Church Square and the Union buildings respectively also form axes and vistas to the study area. By taking a very deliberate stand from the beginning, through the goals of the framework, and using the mentioned principles, the proposal is able to marry the design strategy with

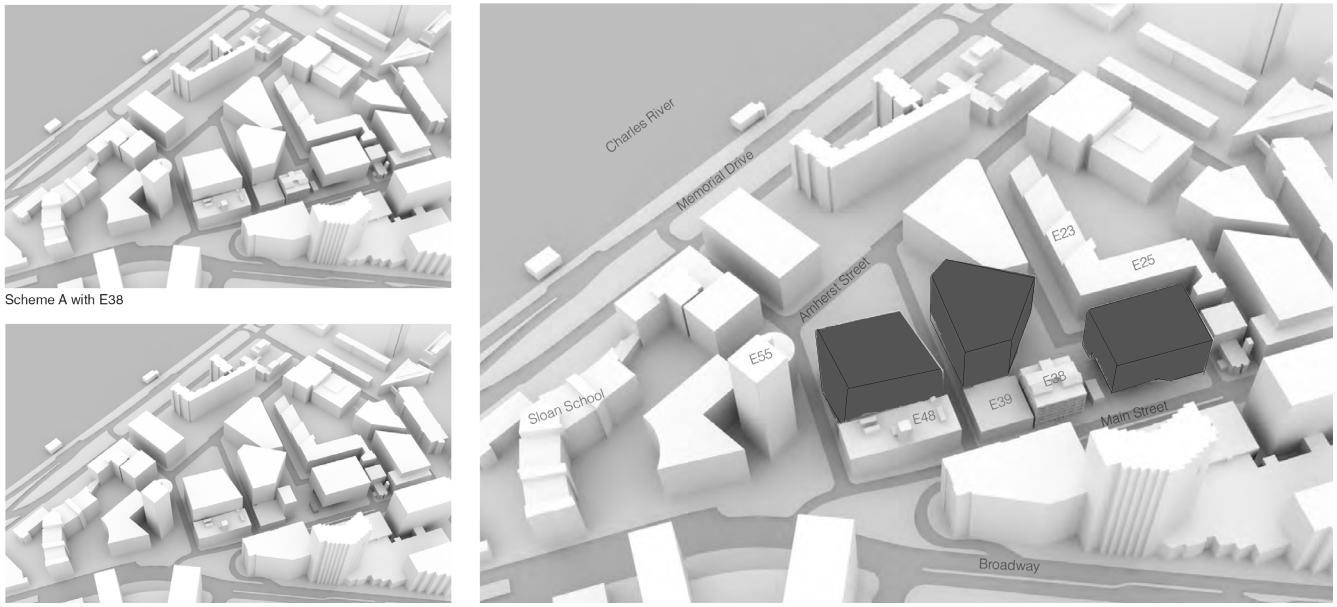


Figure 32: Design proposal introducing mixed use buildings that complement the street character. Source: Reformatted by author from (Scogin et al, 2014).

MIT's vision in order to come up with both short-term and long-term opportunities. This approach not only allows for collaboration between the professionals and stakeholders to take place but also allows for a minimum input design strategy that will allow for maximum output in terms of addressing the goals for the area and for development of the campus and greater Kendall Square neighbourhood.

Specific design principles allow for maximum output with minimal intervention. The unapologetic use of public spaces as connectors allows for the celebration of both public and private spaces and creates pockets of opportunity in the development (Gehl and Gamzoe, 2002). This is further aided by the existing design informants such as landscape, movement patterns and city infrastructure in order to create vibrant and enriching active edges that improve on safe-

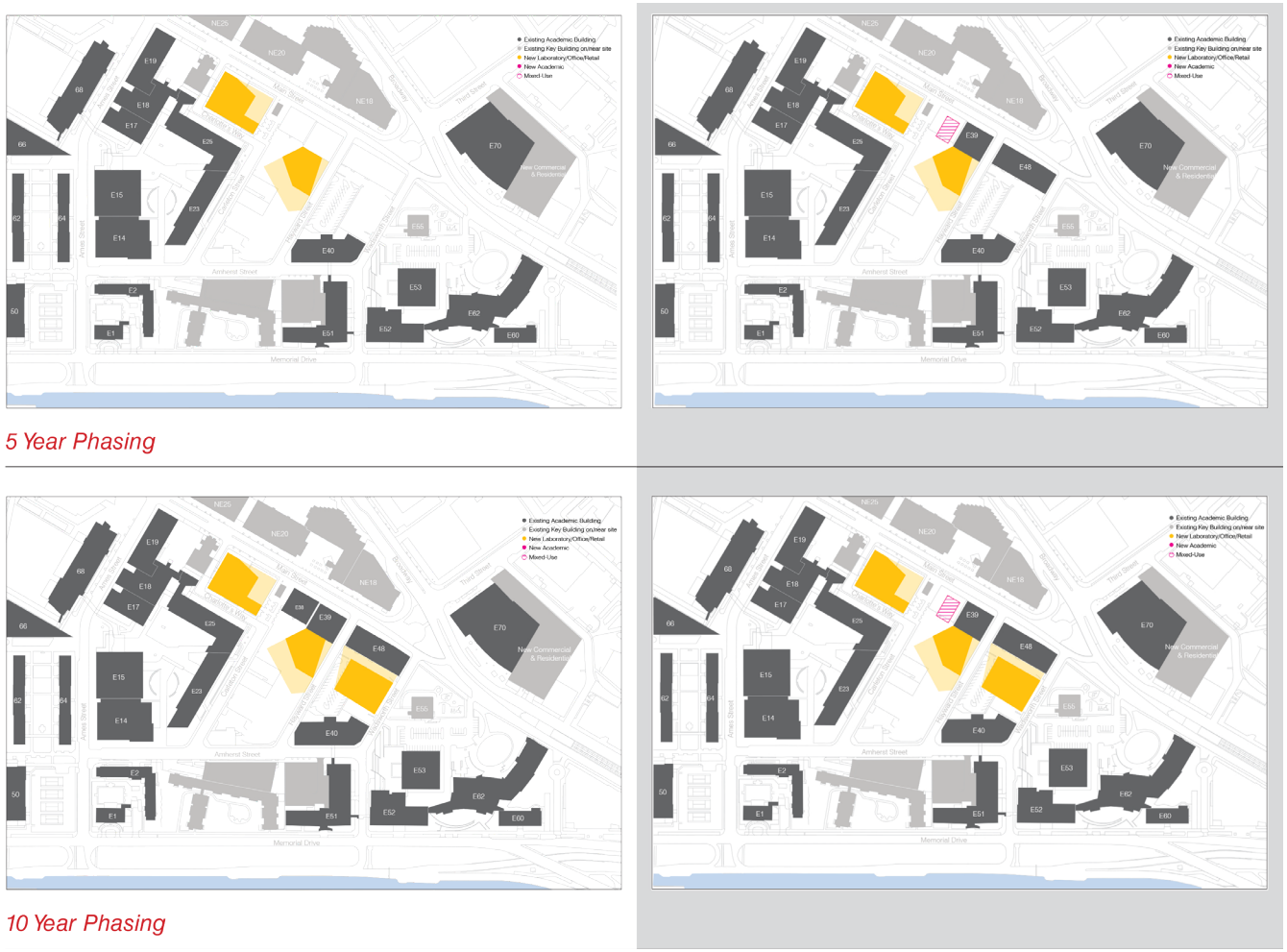


Figure 33: Design proposal that shows development in 5 to 10 years. Source: Reformatted by author from (Scogin et al, 2014).

ty and connectivity.

Another important lesson the study highlights is the flexibility of the framework which allows for uncertainty. An important element when dealing with campus design. The flexibility and robustness of both the built form proposals and street character allows for the campus to expand and adapt at its own pace without negatively affecting the city context.

Figure 34: Design proposal that shows development in the long term. Source: Reformatted by author from (Scogin et al, 2014).

5.2 Nature of the problem in the study area.

5.2.1 Existing conditions, spatial challenges.

Universities in South Africa have been designed and developed using very different contexts, starting from quite urban to peri-urban conditions and finally rural conditions. While these universities exist in very different contexts, they portray quite similar challenges with regards to planning and growth. Hansen (2019), highlights some of these challenges that includes an almost need-to basis of incremental planning when required, which leads to lack of structural and spatial character and clearness. Another challenge that portrays itself is a lack of spatial harmony and identity in most of the campuses which is as a result of demands in growth without careful consideration of building placement. With the case of the suburban campuses, poor public open space occurs quite frequently as a result of the large buildings designed for academic purposes placed in a manner that negates or takes little consideration to the spaces between the buildings. Other challenges that present themselves are poor connections between similar campuses of a university, inadequate integration of campuses with public transport, emphasis on private vehicles as opposed to public transport, and lack of baseline data to help the Department of Higher Education and Training (DHET) in planning for the public universities in South Africa.

The challenges faced by TUT Arts and Arcadia campuses are not different from the ones mentioned above. Firstly, the campuses are de-linked from each other yet they are campuses of the same university. The lack of connections leads to the campuses operating as separate entities with the opportunity of shared services lost. While the campuses share a similar mission and vision as a university, the disconnect does a disservice to the mission of ensuring a high-quality learning experience in a safe, conducive and enabling environment by providing unsafe environments around the campus through the disconnect of the campus.

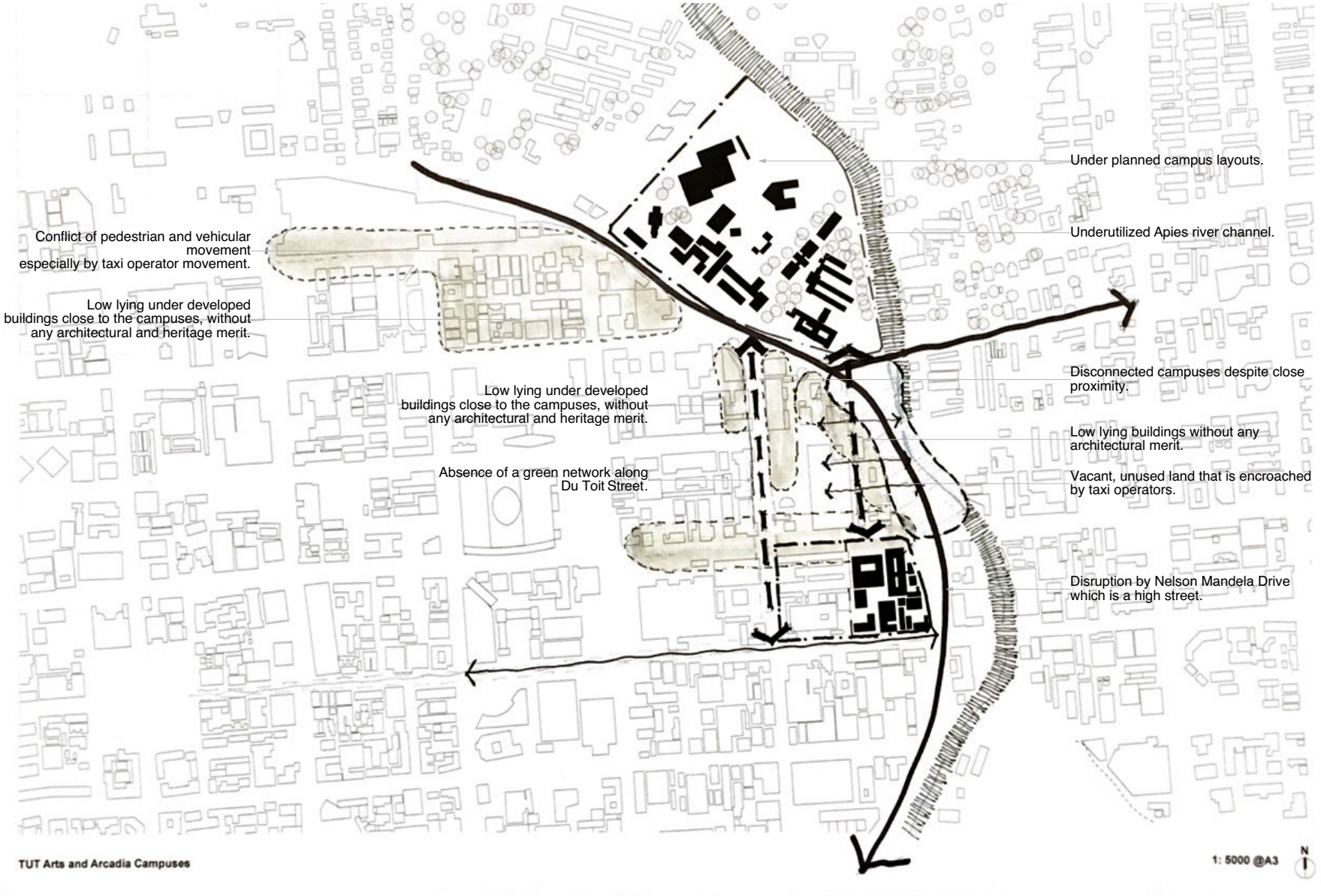


Figure 35: Image showing the challenges faced by the campuses in their current form. Source: Author (September, 2019).

The two campuses are fortified by masonry fencing all round which in turn gives them an introverted nature that is secluded from the city and its environs. While fortifying these campuses ensures the campus is protected internally, the spaces next to the fortification are left blank and unattractive which leads to encroachment.

Figure 36: Images showing existing edge conditions of the Arcadia campus on the left, and Arts campus on the right that show a fortified nature that is only accessible to staff and students.
Source: Author (September, 2019).

Areas adjacent to the campuses also exhibit the same characteristics of blank façades, fortification and unfriendly edge conditions that give opportunity to crime and unsanctioned activities in the street. These edge conditions have no interaction with the street user at all and discourages pedestrian movement in that part of the street. The Arts campus is made up of art-oriented departments. As much as this is the case, the university buildings lack the coherence and harmony that reflect an art based oriented campus.

Figure 37: Images of the streets adjacent to TUT Arcadia campus showing similar edge conditions characterized by blank façades and undesirable edge conditions that do not interact with the street user. Source: Author (September, 2019).

Figure 38: Building use in the TUT Arts and Arcadia campuses respectively. Source: Redrawn by the author from Ludwig Hansen Architects and Urban designers (2019).

The placement of the buildings reflects an introverted and disconnected nature of the campus from the city yet there is an opportunity for the arts-based campus to celebrate its art form with the city. The science-based Arcadia campus shares its facilities with the Tshwane North College yet there exist clear boundaries between the two campuses with each campus exhibiting separate entrances and wall boundaries.

Another challenge faced by the campuses is the lack of public transport integration yet there is a heavy presence of public transport in the vicinity in the form of taxis and buses.

Figure 39:Images of TUT Arcadia campus and Tshwane North College using different entrances yet they border each other. Source: Author (September, 2019).

Parcels of valuable land are vacant and unused close to the two campuses which allows for colonization and encroachment of the land by Taxi operators and ‘non-formal trading’. The term non formal is deliberately used to distinguish an illegal street trading activity from a legal one, but not officially commissioned by the municipality. As much as the activities taking place in the vacant land are not illegal, lack of proper planning paints a chaotic and unsightly picture of the area making it unappealing. This scenario also discourages pedestrian movement.

Figure 40: Encroachment of the vacant land by Taxi public transport operators next to the campuses. Source: Author (September, 2019).

The city is known for its well-established green network yet this is absent where the campuses are located. The absence of an elaborate green network of trees and vegetation lining the street takes away user friendliness and variety and allows for the street to be transitional and not a destination.

Figure 41: Images showing absence of vegetation along Du Toit street yet the city is known of its green network. Source: Author (September, 2019).

Dilapidated and architecturally unsound buildings are quite predominant in the area. The buildings are also low lying, made of single two- and three-story typologies yet the land use shows predominantly business areas. The low-lying buildings do not offer sufficient bulk contributions to the municipality and are instead used as non-commissioned car garages. Such characters discourage development in the area and leave the place as a desirable city edge condition.

Figure 42:Images showing the dilapidated and low-lying nature of buildings adjacent to the campus that are unsightly and without architectural merit. Source: Author (June 2019).

Table 01 summarizes the challenges faced by the two TUT campuses with regards to reflecting it with the universities mission and integrating it with the city. The location of the campuses within the city gives them an opportunity to use these challenges as design informants that when strategically utilized, gives a more vibrant campus that respond more positively in terms of permeability, hierarchy, robustness, variety and public open space.

TUT campuses challenges	Very Good	Fair	Poor
Reflection of university's mission and vision on built form.		Fair.	
Campus integration and connection.			Poor.
Built form. Building axes and vistas.			Poor.
Public open space network.			Poor.
Green space network.		Fair.	
Permeability.			Poor.
Public transport integration.			Poor.
Student housing location and positioning.			Poor.
Bulk infrastructure contribution.		Good	
Campus buildings edge conditions and variety of buildings.			Poor.
Robustness.			Poor.
Use of nature, landscape and context.			Poor.

Table 01. A table showing the challenges faced by the campuses generated by the author. The challenges can also be used as opportunities for integrating the campuses with the city.

5.2.2 Opportunities

While the previous paragraphs showed the challenges faces by universities in general and TUT Arts and Arcadia campuses, the following paragraphs show how these challenges can be used as opportunities to strategically integrate the campuses within the city in a vibrant and positive manner.

The use of the university's mission of ensuring learning in a safe, productive and proper environment through promoting innovation and social enterprising can be used as a collective strategy in providing a spatial planning guideline that accommodates the needs of both the campuses and the city. This can be done through allowing for spaces to be shared by both the city and the university in a symbiotic manner which also allow for economic gains through bulk contributions.

The location and positioning of each of the campuses forms an axis from a heritage point of view. TUT Arts campus forms an axis from the Union buildings, which are the seat of power in South Africa while TUT Arcadia campus forms an axis from Church Square, the origin of Pretoria. These two axes provide an opportunity for the campuses to be nodes of development that dictate how development occurs to the East and West of the campuses respectively. The axes also foster edge consolidation that will stitch up and integrate the two campuses together using the North-South grid along Du Toit street and Nelson Mandela drive respectively. The location of the campuses in this case allows integration with the city through the rich heritage the city of Pretoria possesses and allows for its continuation.

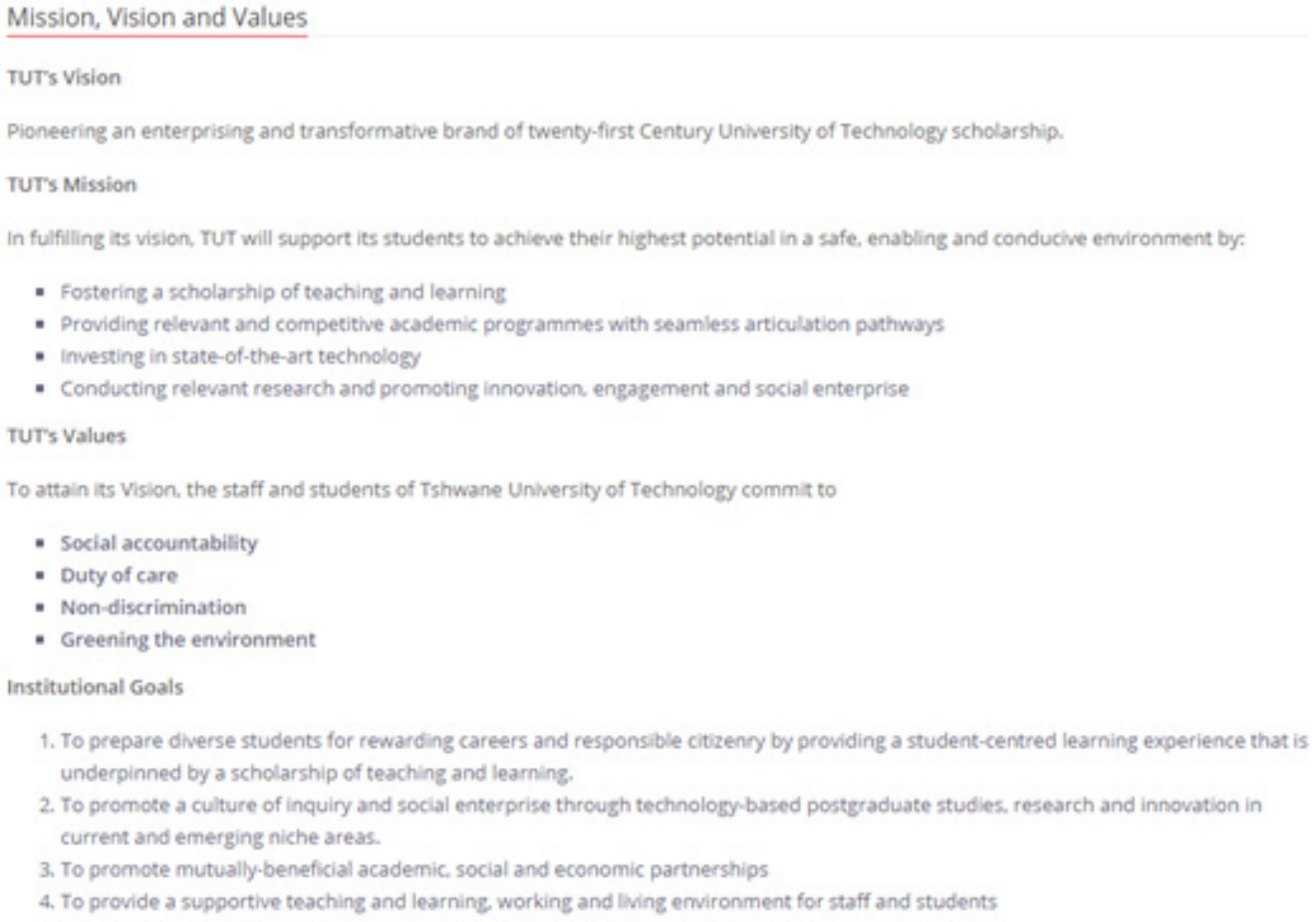
Vacant land adjacent to the campuses gives an opportunity for expansion and allowing mixed use buildings to be erected that serve both the university and the city. Physical consolidation of the land and change in land use can integrate the campuses together and form a more unified institution.

Since the Arts campus is made up of art-based courses, it is possible to re organise the campus functioning in order to place university activities such as performance arts, music and painting courses in a manner that can be celebrated by the public as well. Music festivals and art exhibitions can easily be hosted at public open spaces once the uses are reconfigured. This also gives an opportunity to create a hierarchy of spaces with the more public spaces at public spaces and private spaces placed more internally. This allows for cultural and social integration of the campuses with the city. The proximity of TUT Arcadia campus to Tshwane North College allows for the removal of the barrier separating them thus promoting the sharing

of public spaces, infrastructure and services.

The presence of Apies river that runs along the study area offers an opportunity to integrate the campuses with nature. The river provides and opportunity to link the campuses and the city through recreational water based activities which in turn allows turns the area into a destination.

The disconnected nature of the two TUT campuses offers an opportunity to link them together through a precinct proposal where mixed used university uses are proposed that not only link the universities, but also allows for public interaction. This in turn offers variety in the street which increases pedestrian activity in the street. The opportunities discussed promote integration of the campuses and the city in various ways as will be expounded in the design chapter.



Mission, Vision and Values

TUT's Vision

Pioneering an enterprising and transformative brand of twenty-first Century University of Technology scholarship.

TUT's Mission

In fulfilling its vision, TUT will support its students to achieve their highest potential in a safe, enabling and conducive environment by:

- Fostering a scholarship of teaching and learning
- Providing relevant and competitive academic programmes with seamless articulation pathways
- Investing in state-of-the-art technology
- Conducting relevant research and promoting innovation, engagement and social enterprise

TUT's Values

To attain its Vision, the staff and students of Tshwane University of Technology commit to

- **Social accountability**
- **Duty of care**
- **Non-discrimination**
- **Greening the environment**

Institutional Goals

1. To prepare diverse students for rewarding careers and responsible citizenry by providing a student-centred learning experience that is underpinned by a scholarship of teaching and learning.
2. To promote a culture of inquiry and social enterprise through technology-based postgraduate studies, research and innovation in current and emerging niche areas.
3. To promote mutually-beneficial academic, social and economic partnerships
4. To provide a supportive teaching and learning, working and living environment for staff and students

Figure 43: A summary of TUT's mission, vision and values. Source https//www.tut.ac.za (August, 2019).

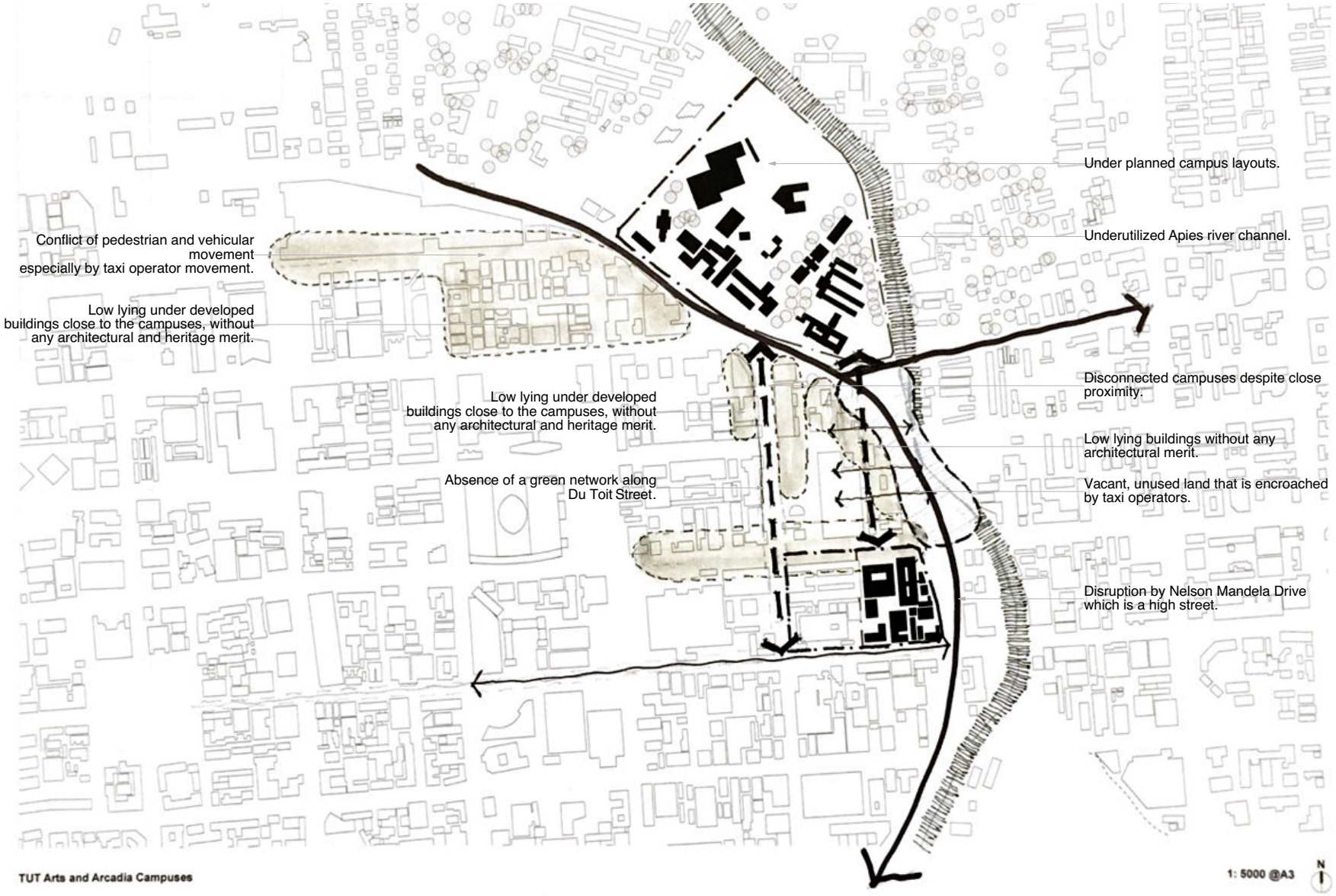


Figure 44: Spatial opportunities that present themselves for strategic improvement of the area. Source: Author (August, 2019).

Summary of SWOT analysis for TUT Arts and Arcadia Campuses.			
Strengths	**Weaknesses**	**Opportunities**	**Threat**
There is well established city infrastructure that consists of city road network, services and water.	The area adjacent to the site suffers from lack of maintenance, dilapidated buildings and garbage disposal areas.	The use of campus land by the university to extend the campuses by providing mixed use buildings.	The city's slow approach to dealing with encroachment and colonisation of vacant land within the CBD.
The city is surrounded by a rich ensemble of natural features that include the Apies river, nature reserves, hill and vegetation.	Poor open spaces and public space network especially adjacent to the campuses.	There is an opportunity to use the natural features to the advantage of the campuses in terms of establishing the campuses and their environs as a destination.	Colonisation of the open spaces and vacant land by taxi operators who are difficult to remove.
A significant cultural landscape made of a heritage of built form and nature.	The CBD perceived edges are made up of unsightly built forms that have no architectural or urban design merit.	With densification, the low-lying building edge conditions of the city edges can be improved.	The city might not consider the city edge as a priority due to lack of proper planning and management.
			Lack of technical know-how to deal with the cam-pus accommodating the growing number of students.

Table 02. A SWOT analysis done on the study area. Source: Author (August, 2019).

5.2.3 Engagement with the end users

The research went further in terms of directly engaging various street users in an attempt to find out their current appreciation of the street and what in their opinion would constitute a comfortable environment for them. This exercise involved informal discussions with three categories of street users. The first category involved traders, business owners and public transport operators within the study area. The second were students and staff in higher education institutions using the streets within the study area and last but not least involved general street users. The choice of these categories summarised all the types of users that use the study area on a day to day basis and for various activities.

An interesting finding cutting across all users was the acknowledgement that the study area was in a dilapidated and unkempt state that discourages walk-ability and street use. The findings on the state of the street does not by any means focus only on the street but it was important to get an unbiased opinion on the space used most both directly and indirectly. The response from the end users emphasizes the futility of design without consultations from the end users.
All of the discussions with the business traders suggested an increase in the variety of activities in the street might lead to more foot traffic, business and safety for them.

This was however a contradict to the views expressed by the public transport operators in that they felt a diversity in the amount of activities led to more crime in the area. Half of the students and staff were more concerned with their safety and well-being than what happens on the street. The other half were of the opinion that safer streets would lead to safer learning environments.

All the responses from the various street users point to the notion and assumed neglect from the government and municipality despite there being policies and spatial frameworks to guide development in the area.
The responses above set a precedence for a design strategy that accommodates the pedestrian before anything else. This would in turn contribute to the integration of the campus to the 21st century city.

5.3 Design strategy

Problem	Theory	Principle	Strategy
Disconnected campuses from the city and each other.	• Dewar and Louw (2017). • Coulson et al (2011). • Bentley et al (1985). • Lynch (1961).	• Macro and micro scale location of a campus. • Permeability. • Variety. • Robustness.	• Utilization of vacant land adjacent to the campus for campus use. • Mixed land use. • Edge consolidation.
University's mission, vision and values are not reflected in the built form.	• Coulson et al (2015). • Dewar and Louw (2018). • Lulat (2012). • Long and Ehrmann (2005).	• Give the campuses a unique identity that resonates with their mission and vision. • Campus integration strategies. • Campus reconfiguration.	• Ensure the mission, vision and values are married to SPLUMA, the city's IDPs, and other spatial frameworks. • Provide a precinct plan for the study area.
Inadequate student housing.	• Spatial frameworks (City of Tshwane IDP, 2019/20, Arup macro framework) • Jeffrey (1972). • Crowe (1991).	• Densification. • Land mix use. • Variety.	• Convert dilapidated buildings into mixed use buildings with retail and recreation on ground floor and student housing on the upper floors.
Conflict of Vehicular and pedestrian movement.	• Behrens and Watson (2014).	• High level of accessibility.	• Use of vegetation to segregate pedestrian and vehicular movement. • Create a hierarchy of street movement. Pedestrian, vehicular and public transport.
De-linked public open spaces.	• Perez and March (2015). • Dewar and Uytenboogardt (1991).	• Additions. • Legibility through establishment of landmarks, nodes and a variety of building edges.	• Consolidate vacant open spaces adjoining the campuses inspired by heritage in the city.

Table 03. A summary of the design process that the research took. Source Author (August 2019).

Problem	Theory	Principle	Strategy
Inadequate green space network in the study area.	• Jordaan (1987). • Dippenaar (2013).	• Green network consolidation.	• Identify areas lacking green infrastructure in the streets and use this to continue the historical green network.
Encroachment of vacant or unused land in the study area.	• Urban city policies and frameworks. • Jacobs (1960). • Jeffrey (1972)	• Create defensible spaces. • CPTED.	• Reinforce polices and guidelines that discourage encroachment of vacant land. • Encourage street trading. • Provide a hierarchy of public and private spaces.
Inadequate Public transport network planning.	• Transit Oriented Development. • Bentley et al (1985).	• Hierarchy.	• Re organise the public transport routes. • Increase lay-bys close to the campuses. • Encourage use of public transport through designated bus lanes.
Inadequate street furniture.	• Gehl (2006).	• Street furniture provision.	• Provide street lighting, dustbins, seating areas and water points at strategic areas.
Neglect of Apies river as a water feature and public connector.	• Bentley et al (1985). • Lynch (1960)	• Water front design consolidation.	• Take advantage of Apies river and create defensible spaces through activating the river as a water front.

Table 03 cont. A summary of the design process that the research took. Source Author (August 2019).

With the summary highlighted by table 03, the design process involved a build-up exercise that emanates from the challenges showcased in study area, its historical and situational transformation. It then identified features and spatial opportunities identified that might help improve the area which in turn leads to integration of campuses within the city.

As mentioned in the previous chapters, university design is a complex process that follows more urban design principles than architectural. In this regard, the proposals presented in this chapter were not meant to offer a design solution but rather to provide strong strategic proposals in form of a frame-work that will form a precursor to integrating campuses within the 21st century city.

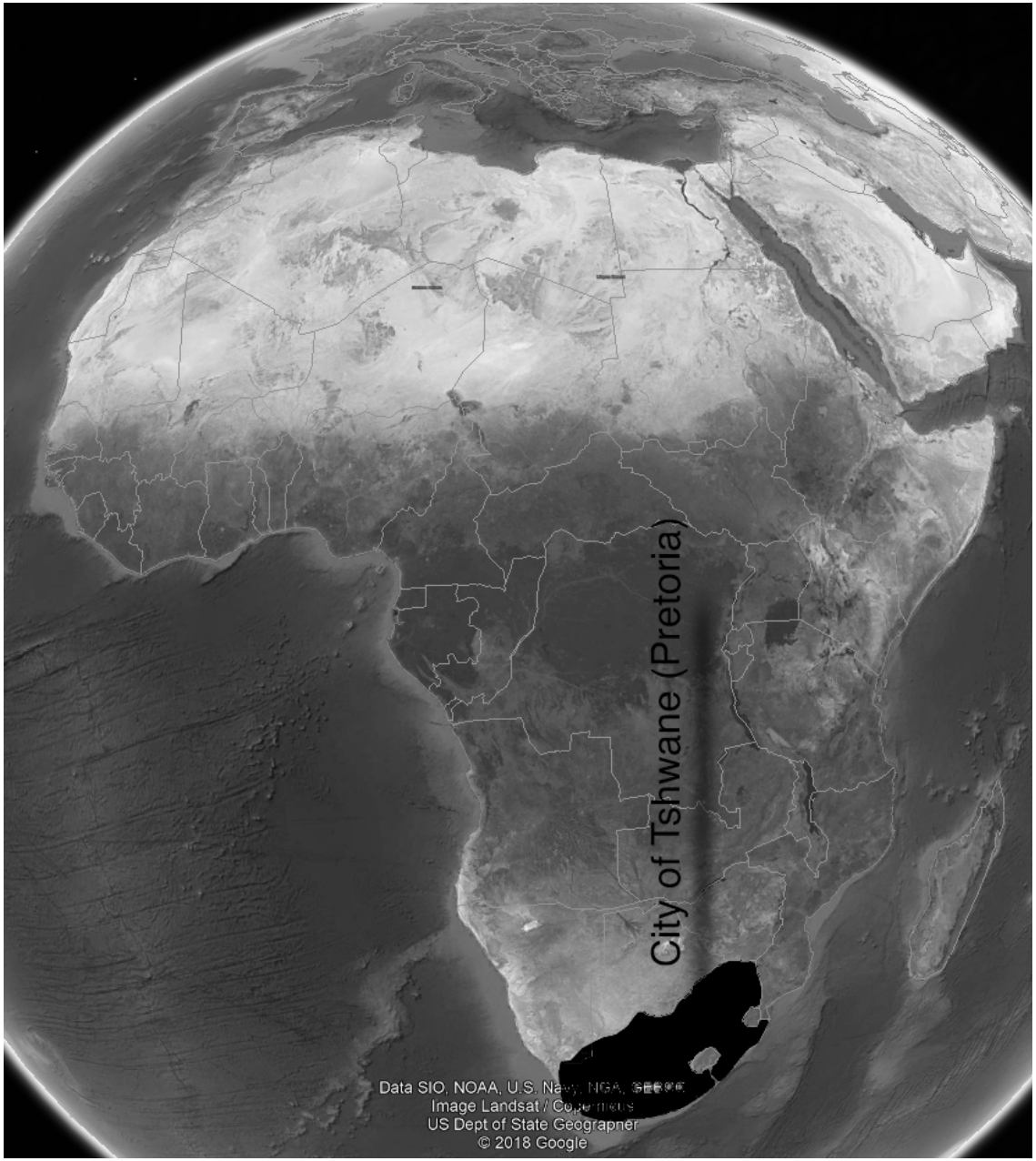


Figure 45: A regional orientation of the study area. Source: Drawn by the author from Google maps.

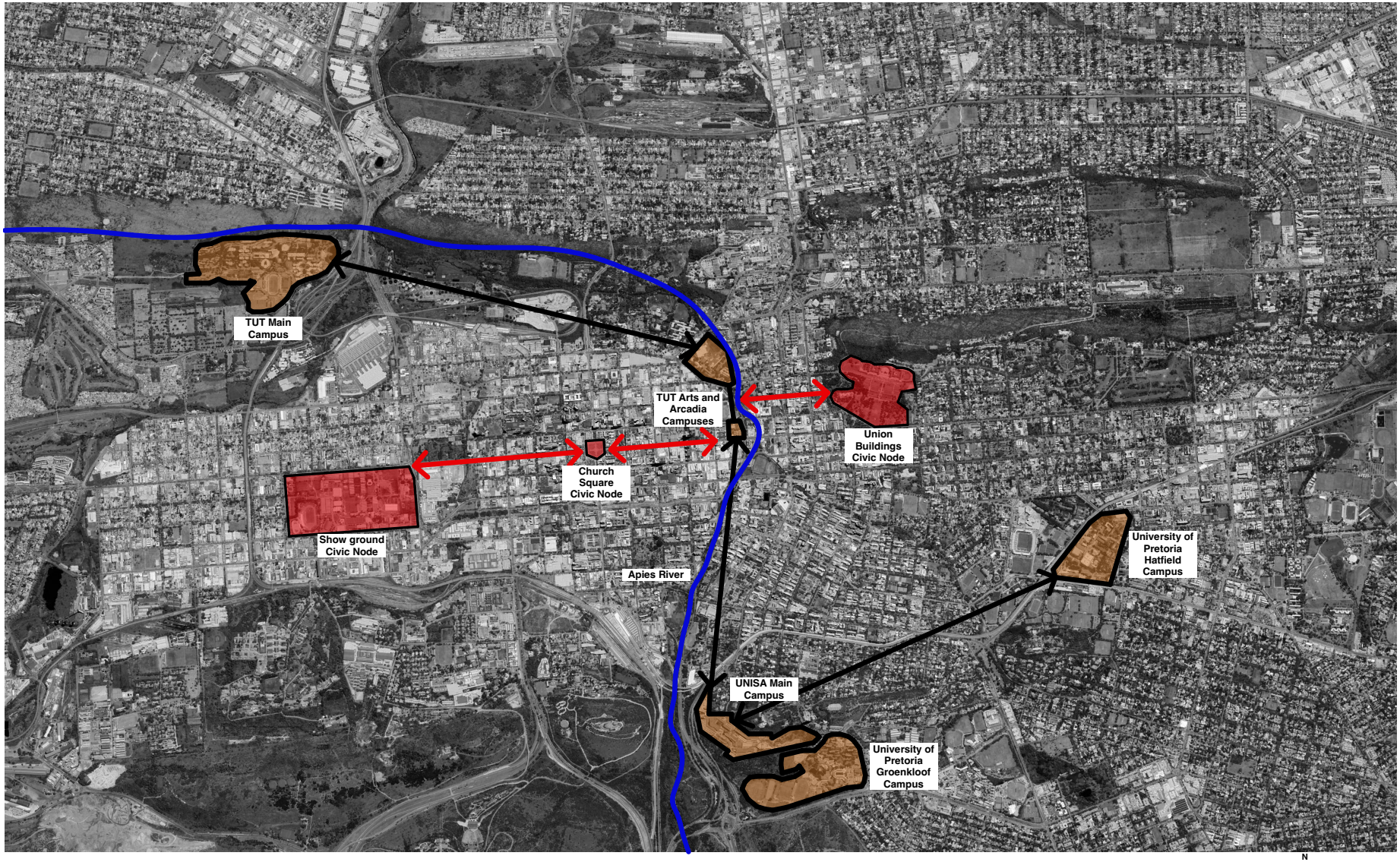


Figure 46: Image Showing how the campuses are related in the city. Source: drawn by the author from Google maps. (June, 2019).

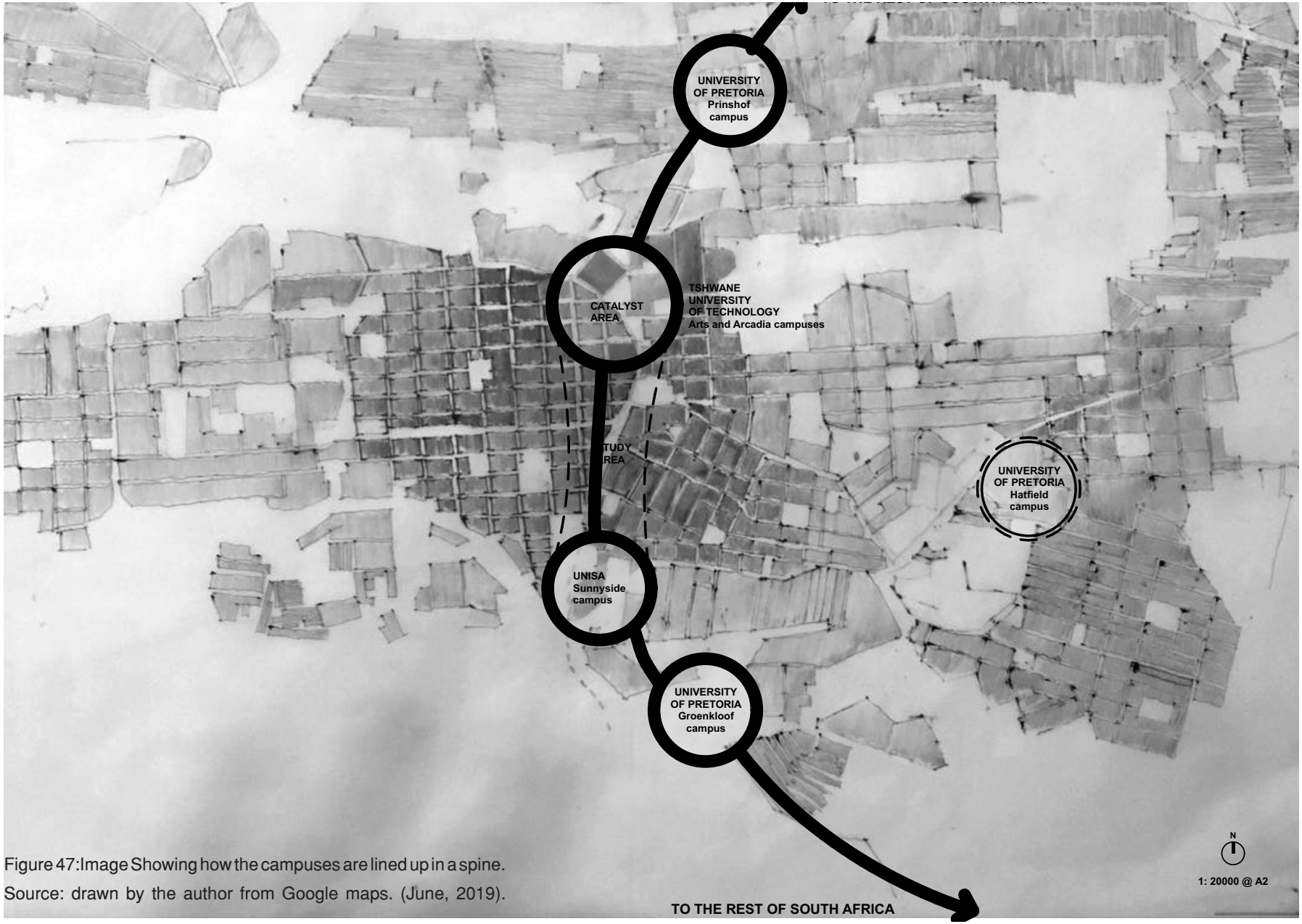


Figure 47:Image Showing how the campuses are lined up in a spine.
Source: drawn by the author from Google maps. (June, 2019).

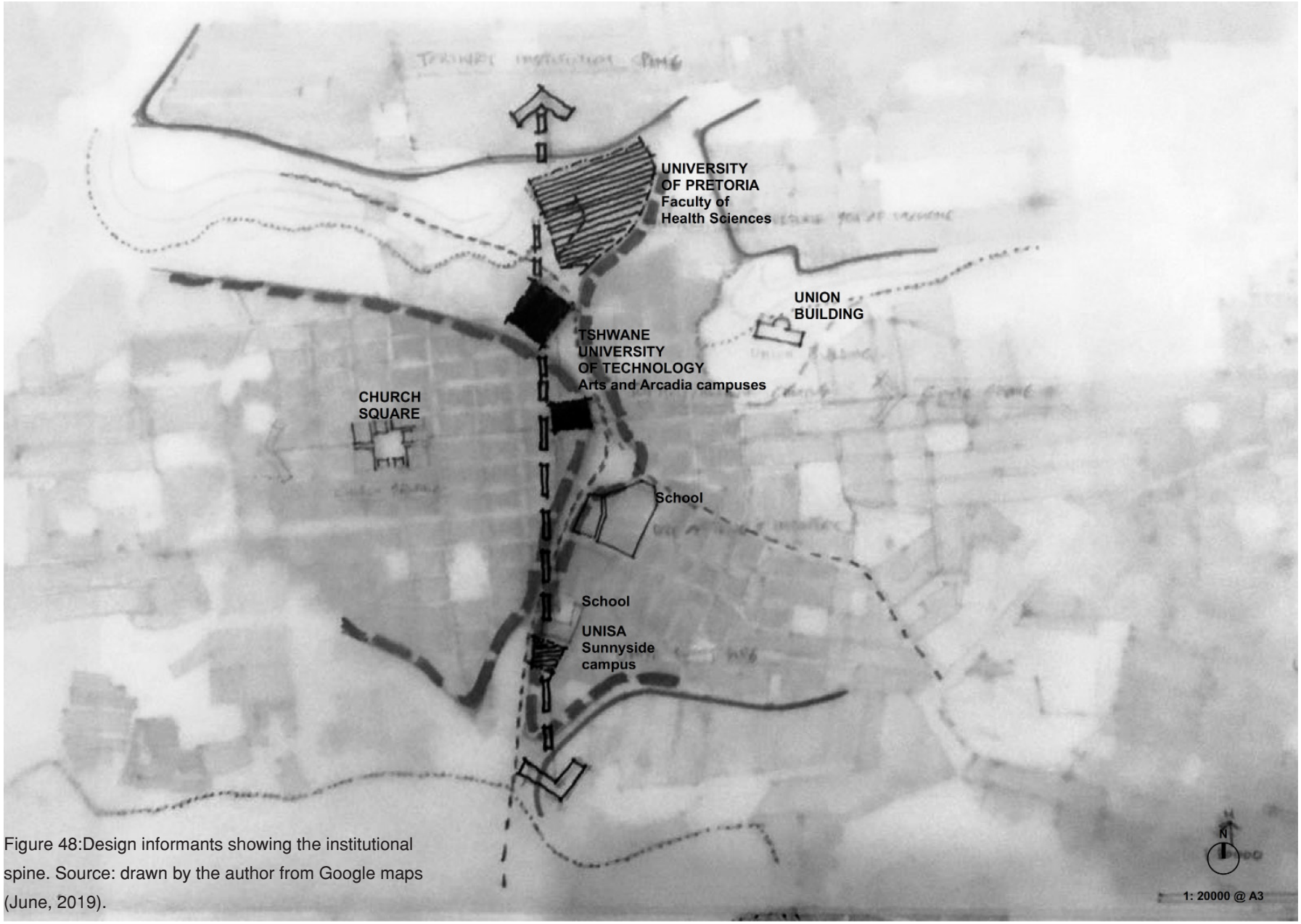


Figure 48:Design informants showing the institutional spine. Source: drawn by the author from Google maps (June, 2019).

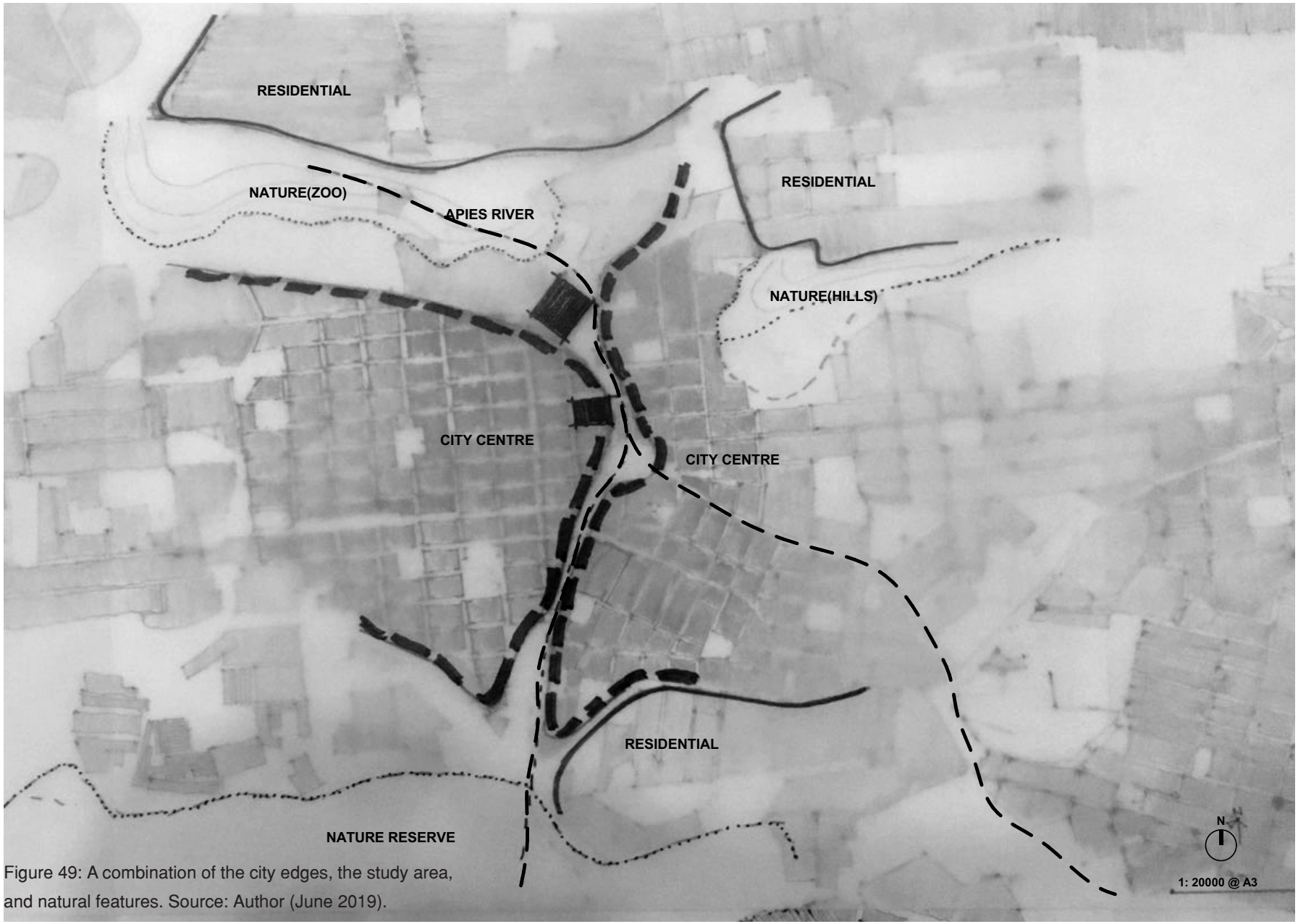


Figure 49: A combination of the city edges, the study area, and natural features. Source: Author (June 2019).

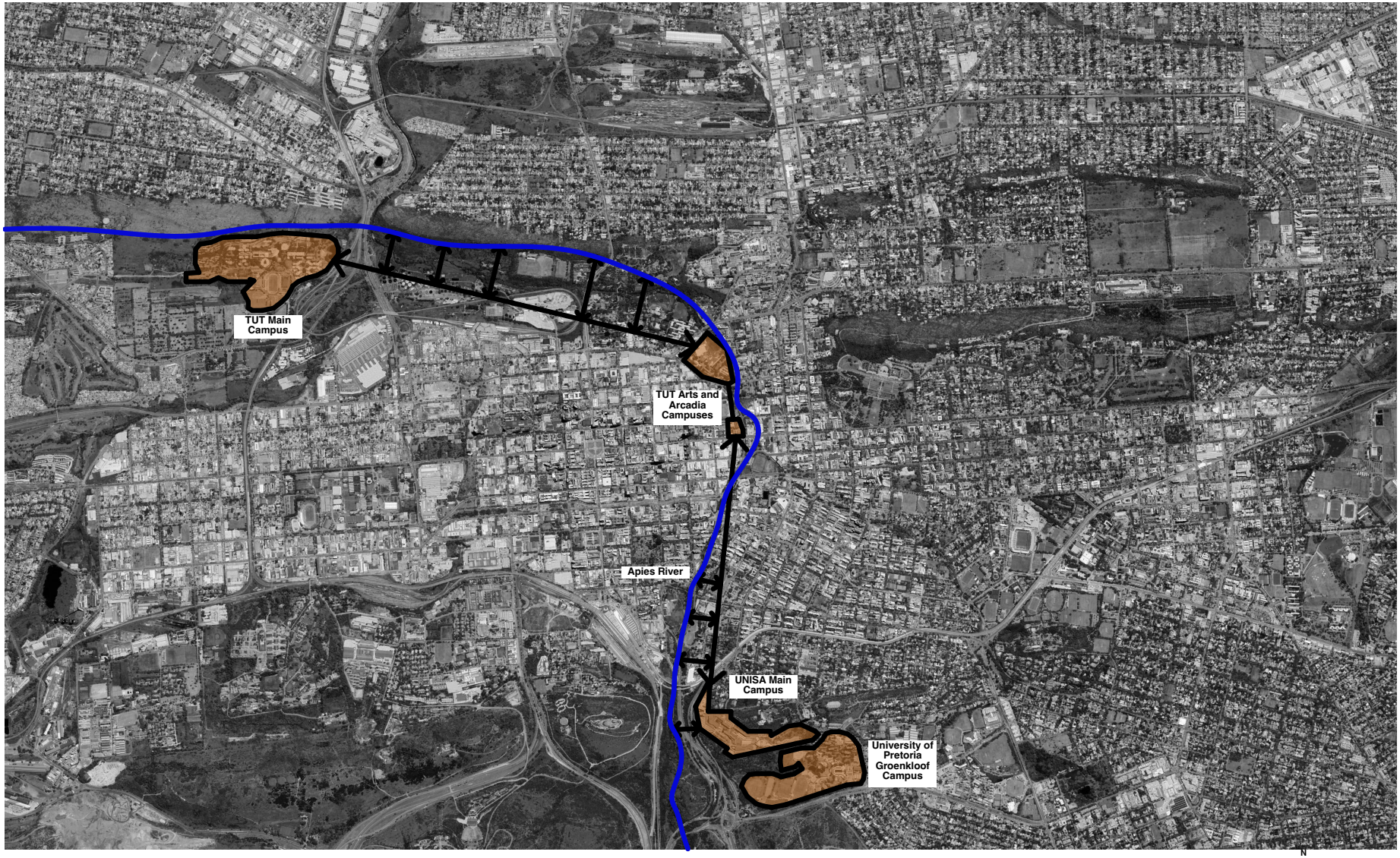


Figure 50: Design informant showing how Apies river links to the various campuses. Source: drawn by the author from Google map (June 2019).

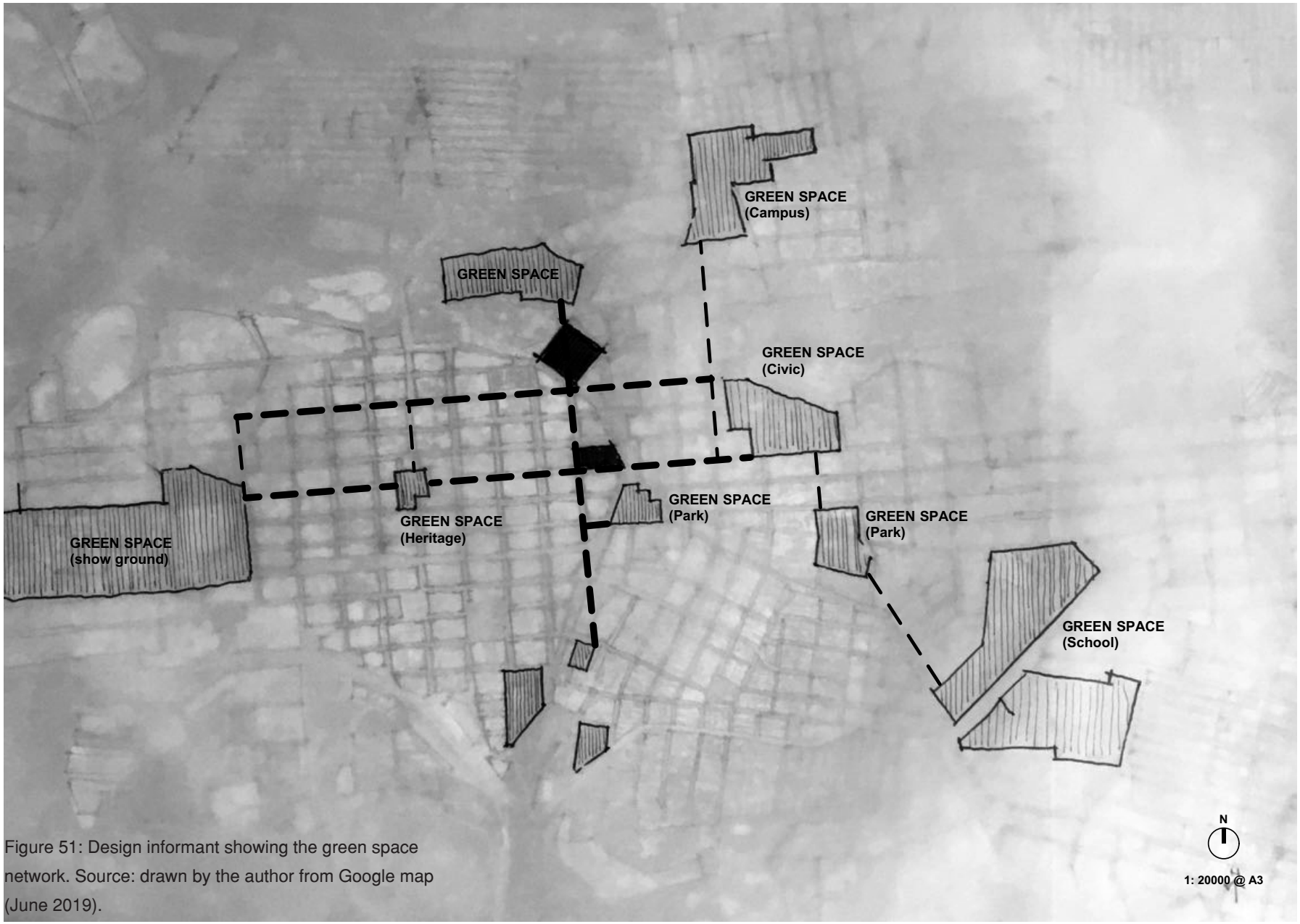


Figure 51: Design informant showing the green space network. Source: drawn by the author from Google map (June 2019).

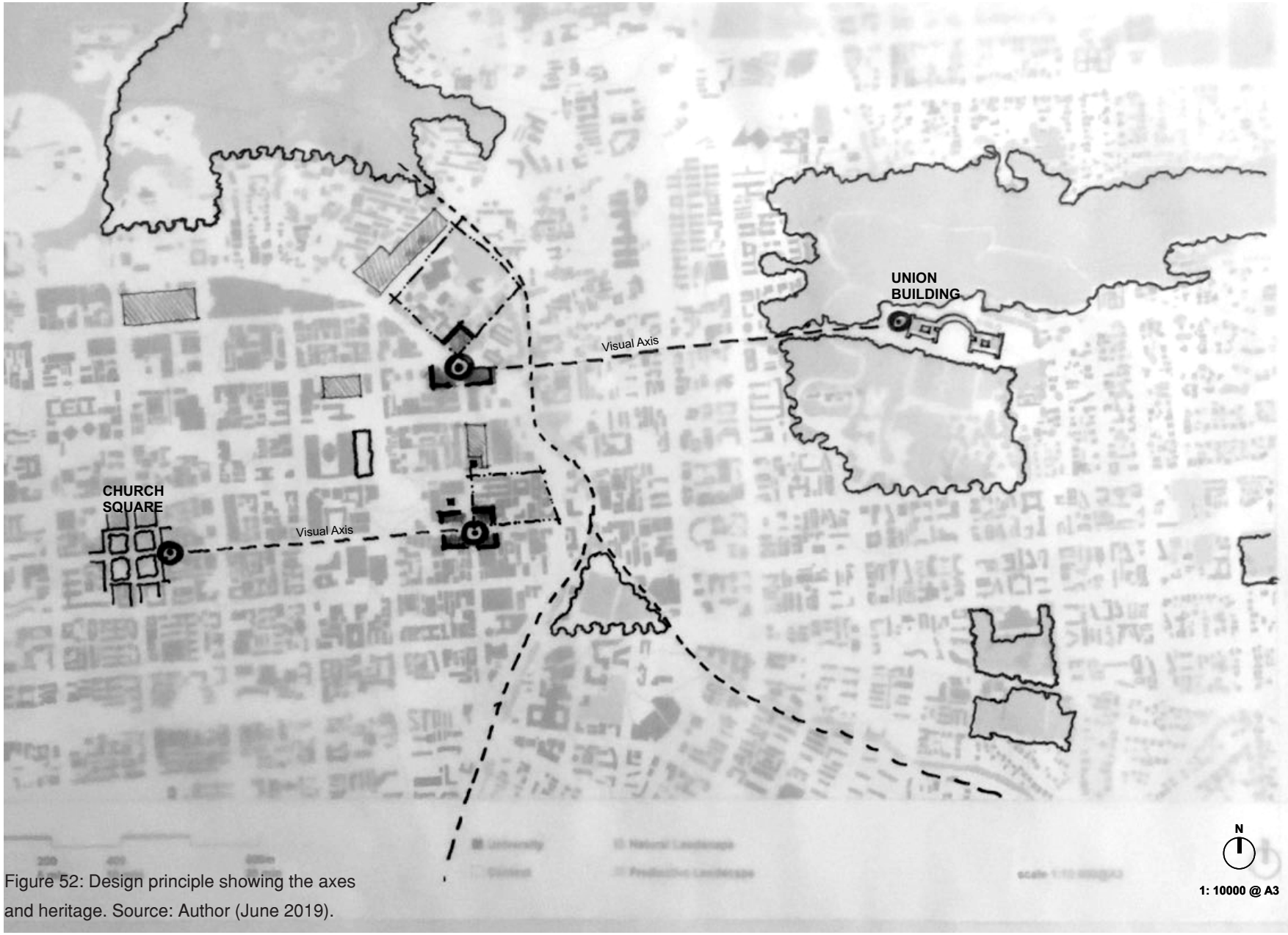


Figure 52: Design principle showing the axes and heritage. Source: Author (June 2019).

With the challenges and opportunities of the study area identified, it was important to identify design informants that might give the study area a significant identity and character and also provide a catalytic approach to the design approach. The area is currently defined by an institutional spine which starts from University of Pretoria in the North to the TUT campuses, the catalyst area to the University of South Africa (UNISA) to the South as shown in figures 47 and 48.

The natural features prevalent in the study area and city in general are significant driving forces as the city was literally formed using the Apies river (Jordaan, 1987). These features include; the natural reserves to the North West and South West of the study area, hilly areas where the union buildings are located and Apies river that runs along the study area. Figure 49 strategically shows how the study area is positioned when the natural features are overlaid. The green network was also a crucial informant due to its ability to enhance street character and vibrancy. An analysis of the existing green network showed an elaborate network that links significant heritage and public spaces together as shown in figure 50. This network was an important aspect of urban regeneration in the area.

Variety which includes public and private public space gradation, street design and building frontage and edge consolidation with regards to development opportunities was also explored.

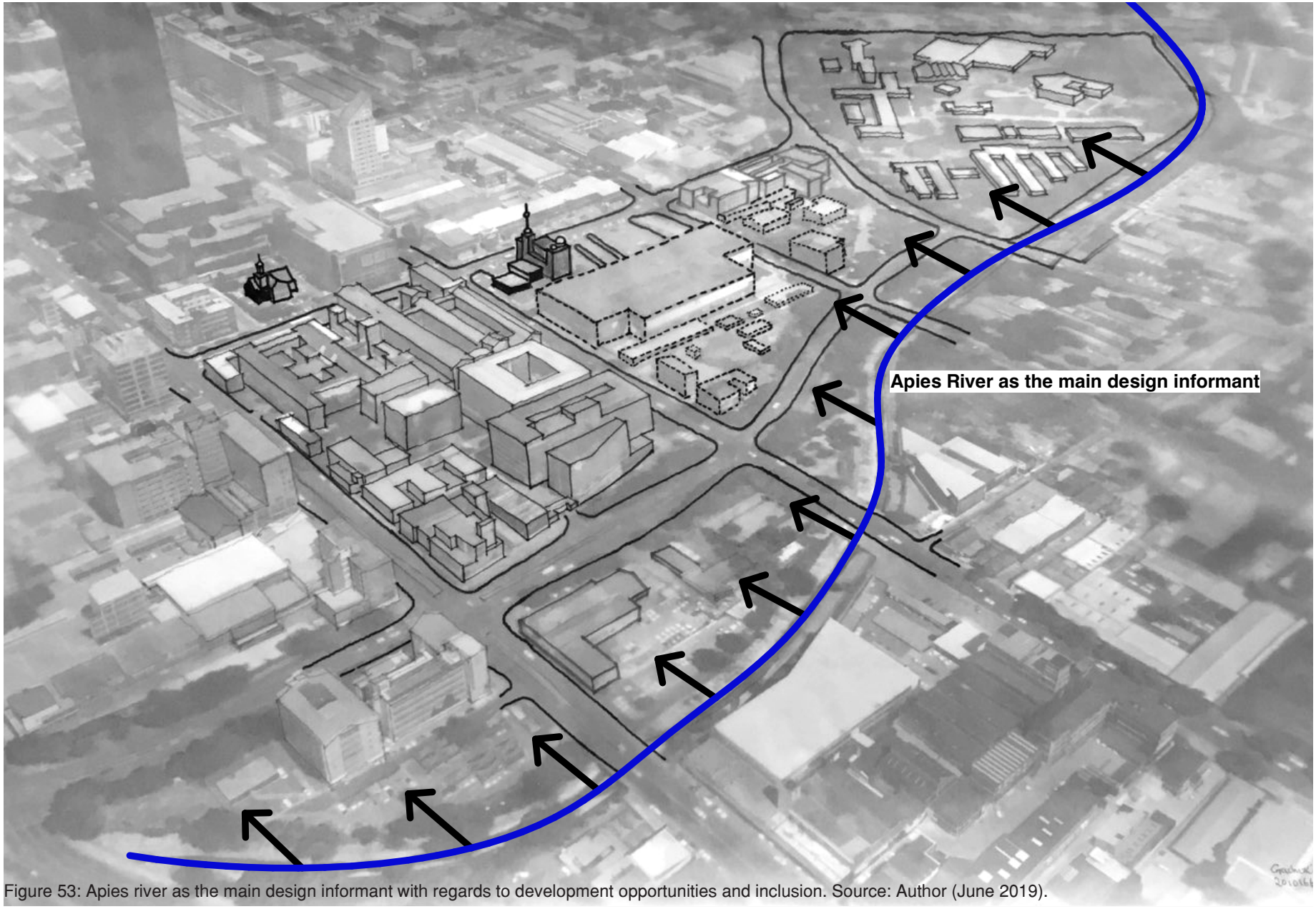


Figure 53: Apies river as the main design informant with regards to development opportunities and inclusion. Source: Author (June 2019).

5.4 Design analysis

This section ensured an analytic approach through media that consist of observation through sketching, photography and videography. Observations were important because they captured the habits of street users in their subconscious nature (Gehl, 2006) thus giving an unbiased data capturing exercise. Great care was taken to avoid direct capture of people's faces when taking photographs and videos. The two mentioned media were important as they capture the real unbiased scenario on the ground. The analysis was captured with a specific focus of using the objectives mentioned in chapter one and the literature review in order to use certain performance criteria for the research. The performance criteria to be employed included walk-able streets that were safe and inviting; a built environment that could accommodate both the students, staff and public in general without necessarily erecting fences; effective and efficient use of public transport within the study area through a redesign of the street; public open spaces that were multifunctional and would resonate with the campuses and building uses around them; configuration of the Apies river and a water feature and for sustainability.

Figure 54: Design principle showing edge consolidation opportunities. Source: Redrawn by the author from Ludwig Hansen Architects and Urban Designers (2019).

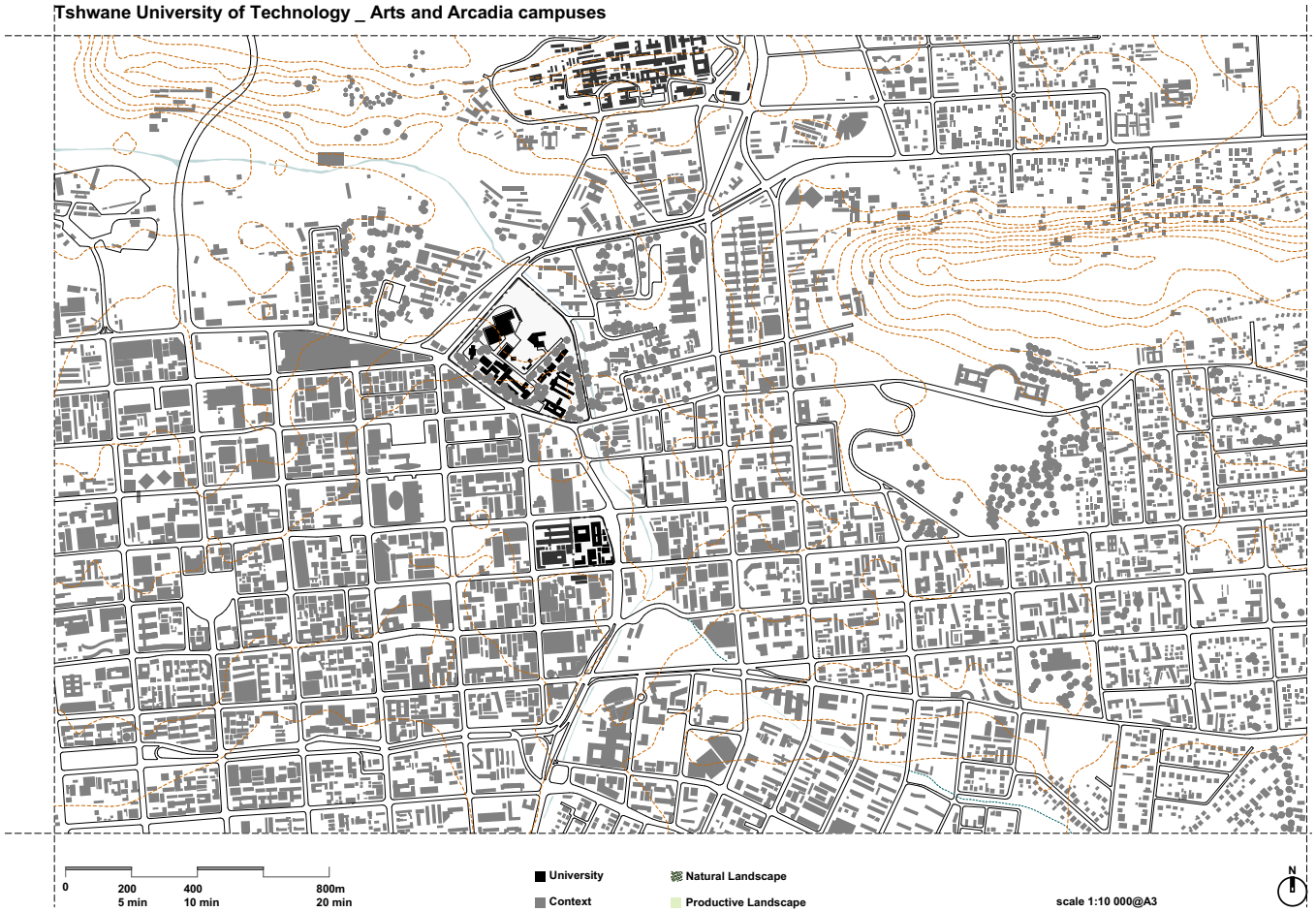


Figure 55: Image showing the building use in the TUT Arts and Arcadia campuses. Source: Re drawn by the author from Ludwig Architects and Urban designers (2019).

Figure 56: Image showing the internal pedestrian and vehicular access control and circulation for TUT Arts and Arcadia campuses. Source: Re drawn by the author from Ludwig Architects and Urban Designers (2019).

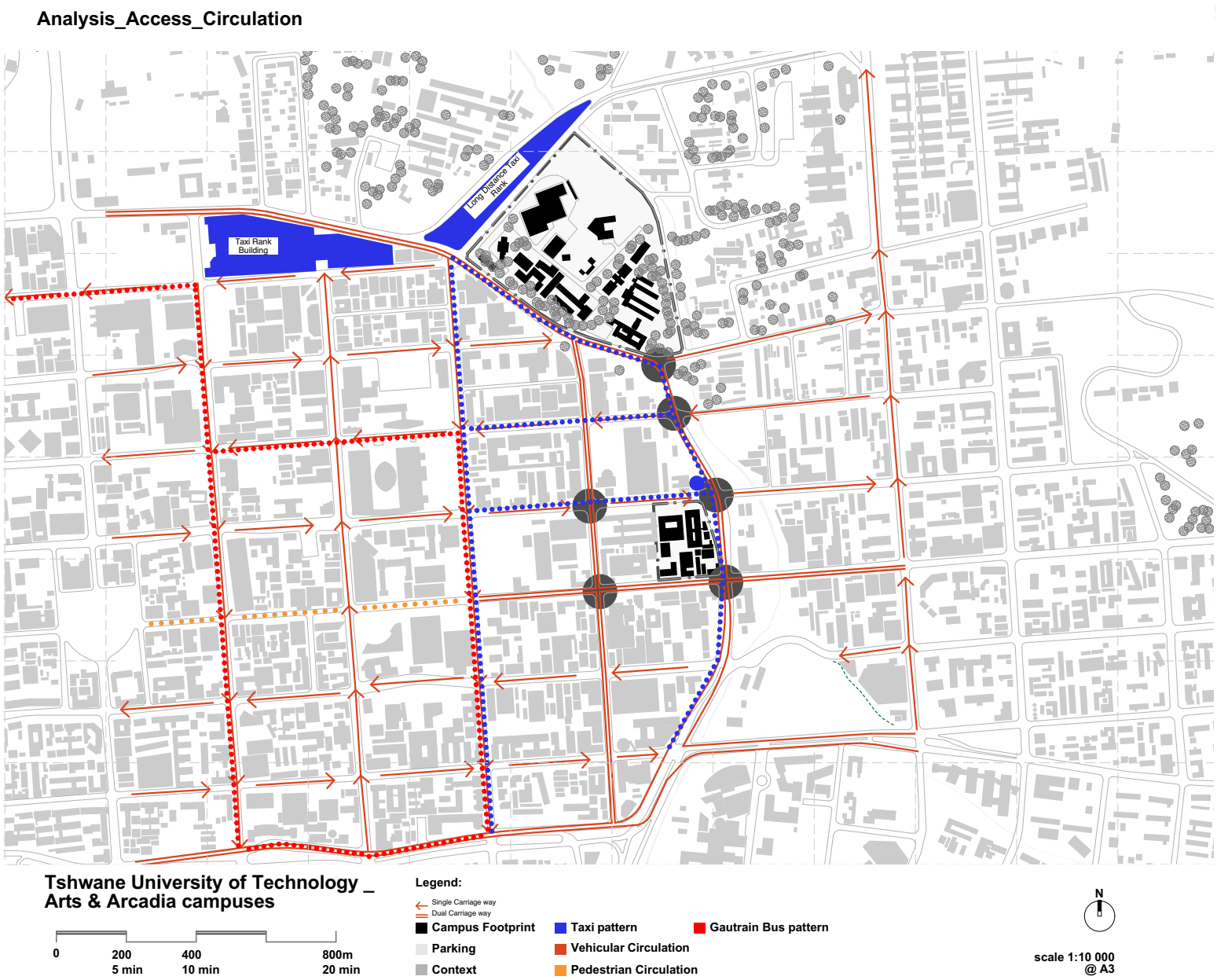


Figure 57: An image showing how vehicular and public transport moves within the CBD. Source: Redrawn by the author from Ludwig Architects and Urban Designers (2019).

How the campuses work

The study area is comprised of TUT Arts and Arcadia campuses respectively. The Arts campus is comprised of art based courses offered at diploma and degree levels , while the Arcadia campus offers science based courses that relate to the natural resources in Pretoria and its environs (TUT, 2019). The inner workings of the campuses indicating working numbers of approximately 20000 students between the two campuses (TUT, 2019). The Arts campus is made up of mostly Art based diploma and degree courses including fine arts, interior design, visual communication and performing arts (TUT, 2019). The Arcadia campus offers diplomas and degree courses in natural sciences that include Environmental sciences, biotechnology, pharmacy, analytical chemistry, food technology, geology, water science and technology, somatic technology and bio medical technology (TUT, 2019).

Student accommodation is located outside the confinements of the existing campuses but they are in close proximity to the campuses. This mean that students have to interact with the city in various aspect as they partake university life.

The drawings and images above show the routes the buses and taxi public transport use on a day to day basis. Whereas the bus movement such as Gautrain use specific routes, the taxi operators move all over the city with no specific route. This issue becomes a challenge when it comes to providing hierarchy of vehicular movement within the city, an issue that needs to be critically addressed by the city of Tshwane traffic guidelines.

Figure 58: Images showing how vehicular and public transport moves within the CBD. Source: Author (September, 2019).

Figure 59: Drawing showing the existing land use in Pretoria CBD: Source Formatted by author from City of Tshwane land use map. (August 2019).

Figure 60: Drawing showing the existing land use in Pretoria CBD: Source Formatted by author from City of Tshwane land use map (August 2019).

TUT Arts and Arcadia campuses_ Proposed Land Use

5.5 Design principles, strategy and implementation

This sub chapter combined the challenges and development opportunities as showcased in the previous chapters and used a theoretical underpinning of principles and performance criteria that would allow for creating a permeable, walk-able, safe and robust area that habits students, staff and general street users in the study area to exist within this urban context.

The vision for the study area was made up of a series of principles that looked into the usability of the study area at both macro and micro scales. The macro scales focused on city planning and regional connectivity of the study area and how it could be improved, while the micro scale focused on principles that allow for accessibility, safety and hierarchy of movement both at pedestrian and vehicular scales without necessarily providing physical barriers such as fences. At macro level, regional and institutional connectivity is important. The natural spine formed by the universities in Pretoria aids in emphasising connectivity which can use institutions to links the city of Tshwane to the rest of South Africa and Africa in general. The spine is further emphasized by Apies river that runs along the study area and provides an opportunity to integrate the campuses to the city through nature.

At a macro scale the principle of connectivity is further emphasized with the use of the iron grid as a planning principle. Pretoria was formed using the iron grid with the major axis following a North South- East West axis (Jordaan, 1987). It is this guiding principle that defines the grid character of the city to date. When combined with nature, the iron grid becomes quite a powerful tool in connectivity and place-making at all scales (Martin and March, 1972). The two campuses easily adapt to this planning principle which in turn opens up space for a square, a heritage element predominant in Pretoria especially Church square, the first public open space in Pretoria.

The grid network structuring principle is reinforced by integration. Integration in this regard happens in various ways; Integration through built form, integration through heritage of the city, integration through socio-cultural aspects, and integration through nature. Integration through built-form occurs when the campuses extend their functions beyond their current confinements. This allows connectivity to take place through placement of buildings that are multifunctional and increase surveillance in the street which improves safety. Integration through heritage happens when the two campuses act as nodes that link Church square and

the Union buildings respectively. This allows development to be improved that links the campuses to the city. Socio-cultural integration happens when the courses offered such as performance arts are allowed to happen in the public open spaces. This gives an opportunity for public open space to be the organising structural element for socio cultural integration. Apies river also promotes the use of public open space and pedestrian movement through linking the river to recreational activities along it.

Integration in this aspect becomes quite an important principle that allows the precinct to be developed while allowing for safety.

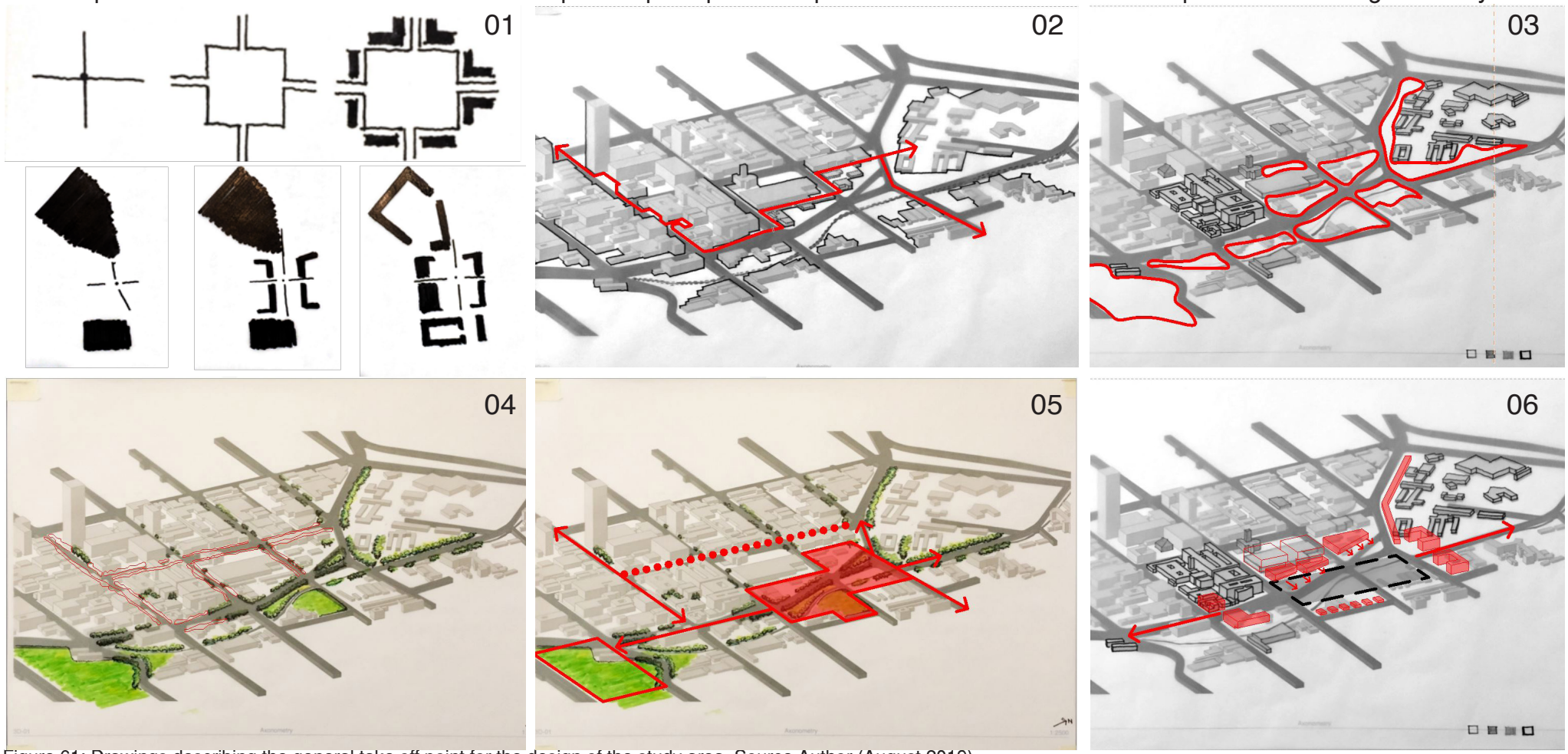


Figure 61: Drawings describing the general take off point for the design of the study area. Source Author (August 2019).

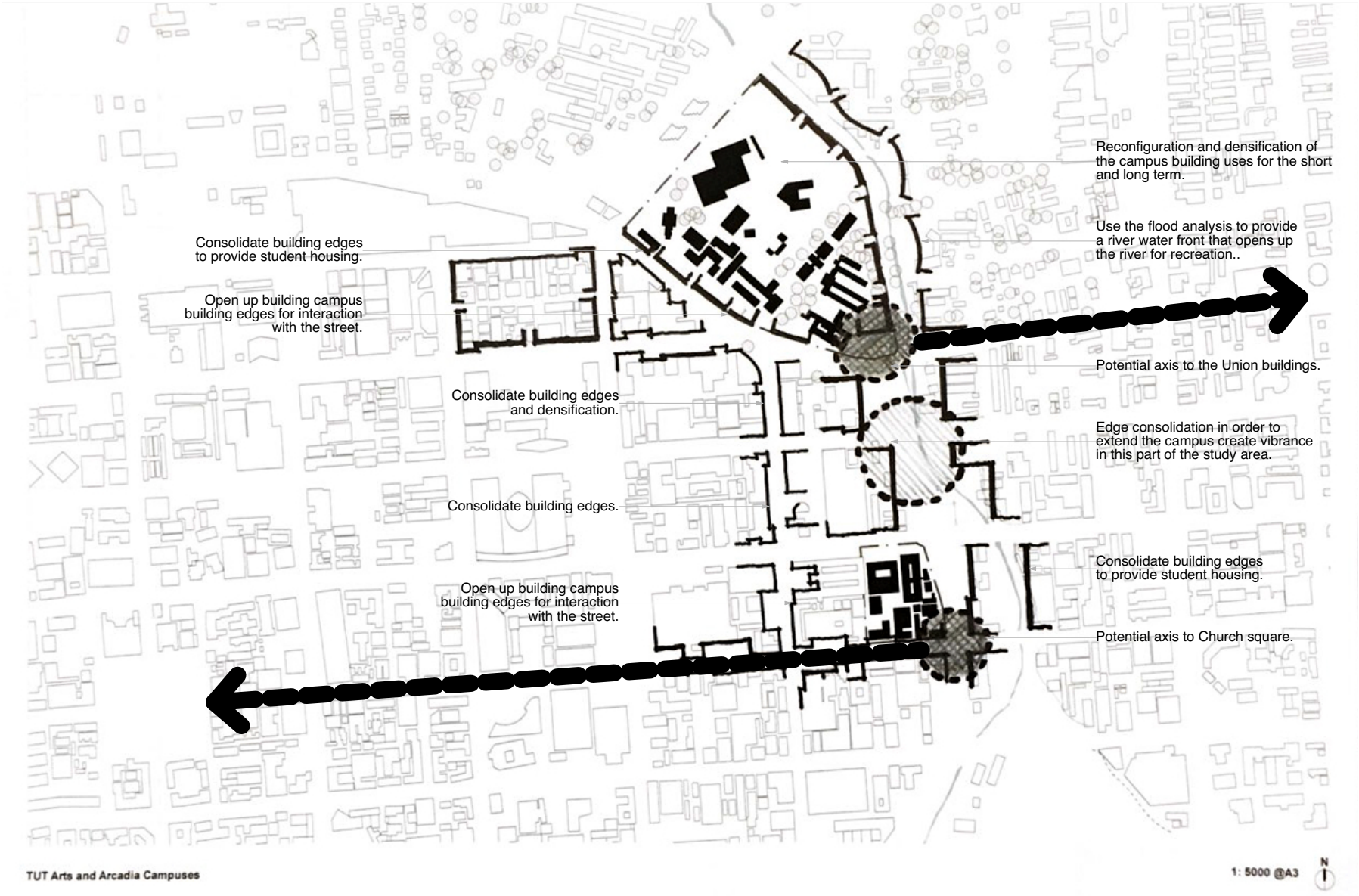


Figure 62: Drawing linking the concept to the opportunities presented by the study area. Source Author (August 2019).

With regard to campus planning and building use, Dewar and Louw (2017) give a scenario of an ideal campus situation that addresses issues of permeability, hierarchy of building use and open space and interaction of the campus spaces with public spaces as highlighted by figure 63. The same planning concept can be employed to the study area to show areas of improvement, densification, edge consolidation and hierarchy which in turn abolishes fencing of property through deliberate building placement. And definition of public/private space.

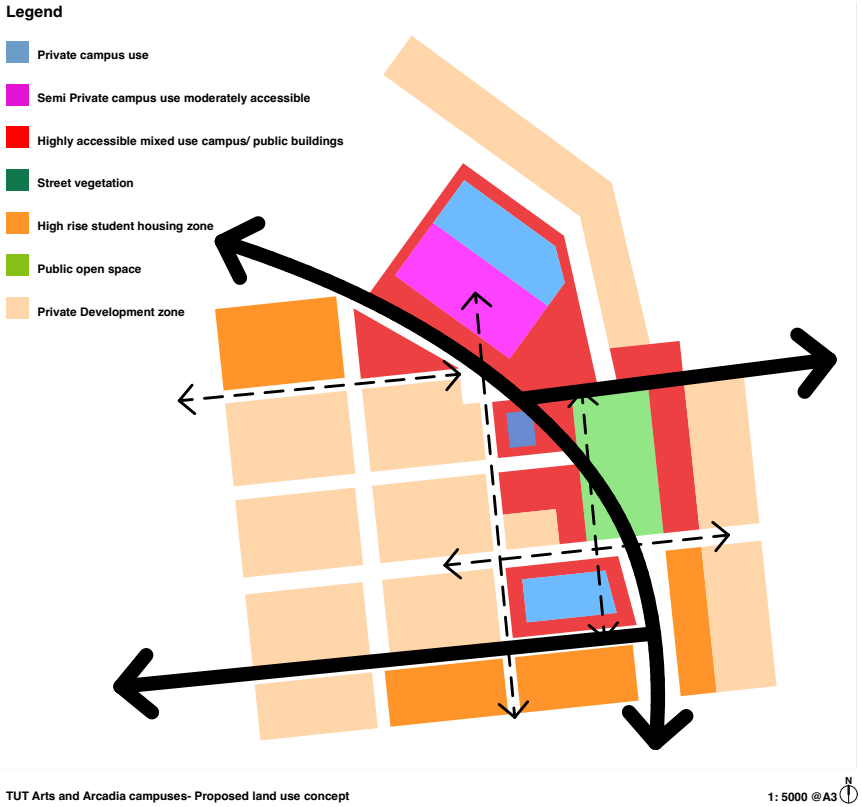
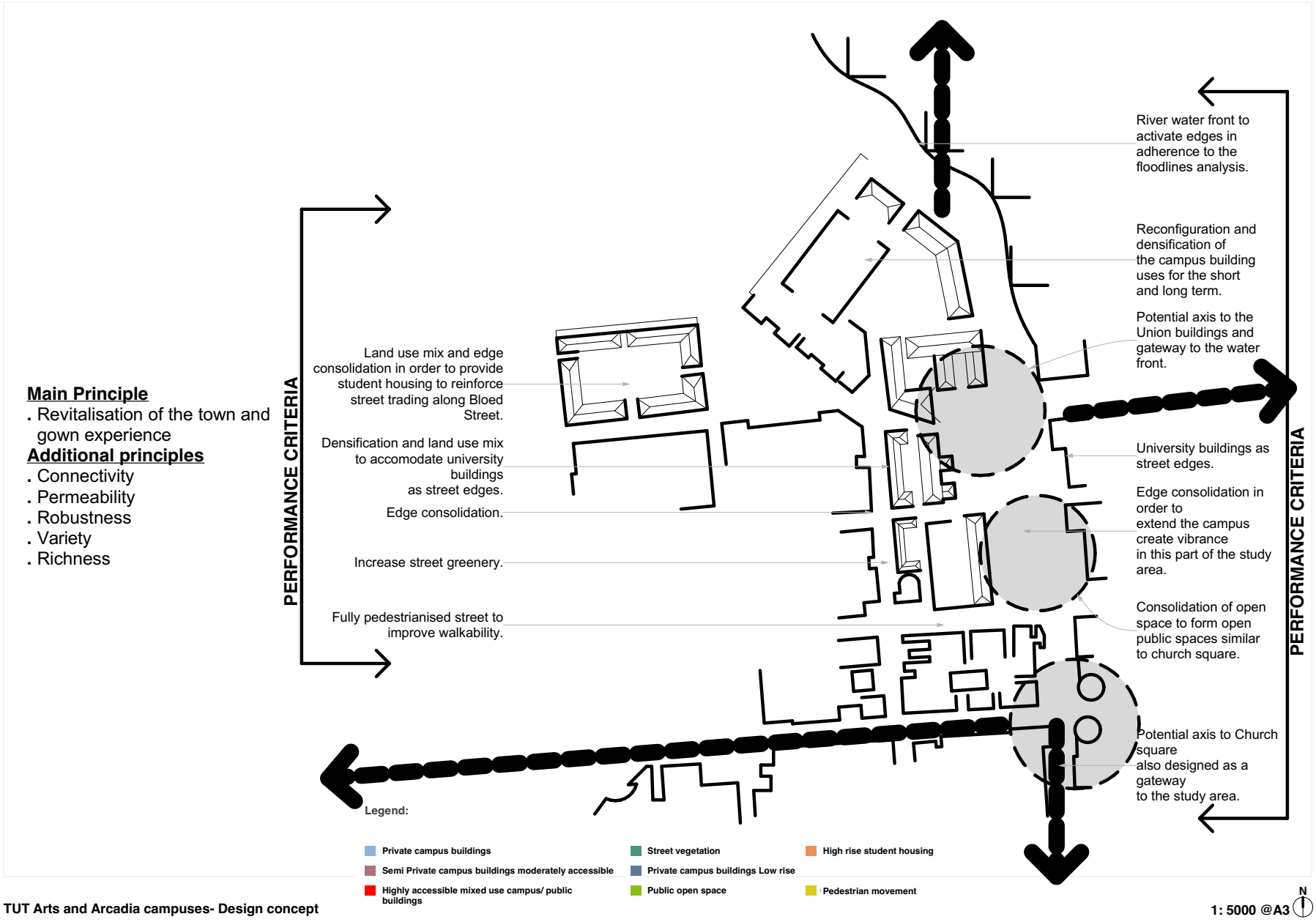


Figure 63: An image showing the ideal campus plan, showing building placement and use. Source (Dewar and Louw, 2017).
Figure 64: A drawing showing the ideal campus plan based on the works by (Dewar and Louw, 2017). Source Author (August, 2019).

Figure 65: General concept diagram based on the principles, design informants and performance criteria in the previous chapter. Source Author (August, 2019).



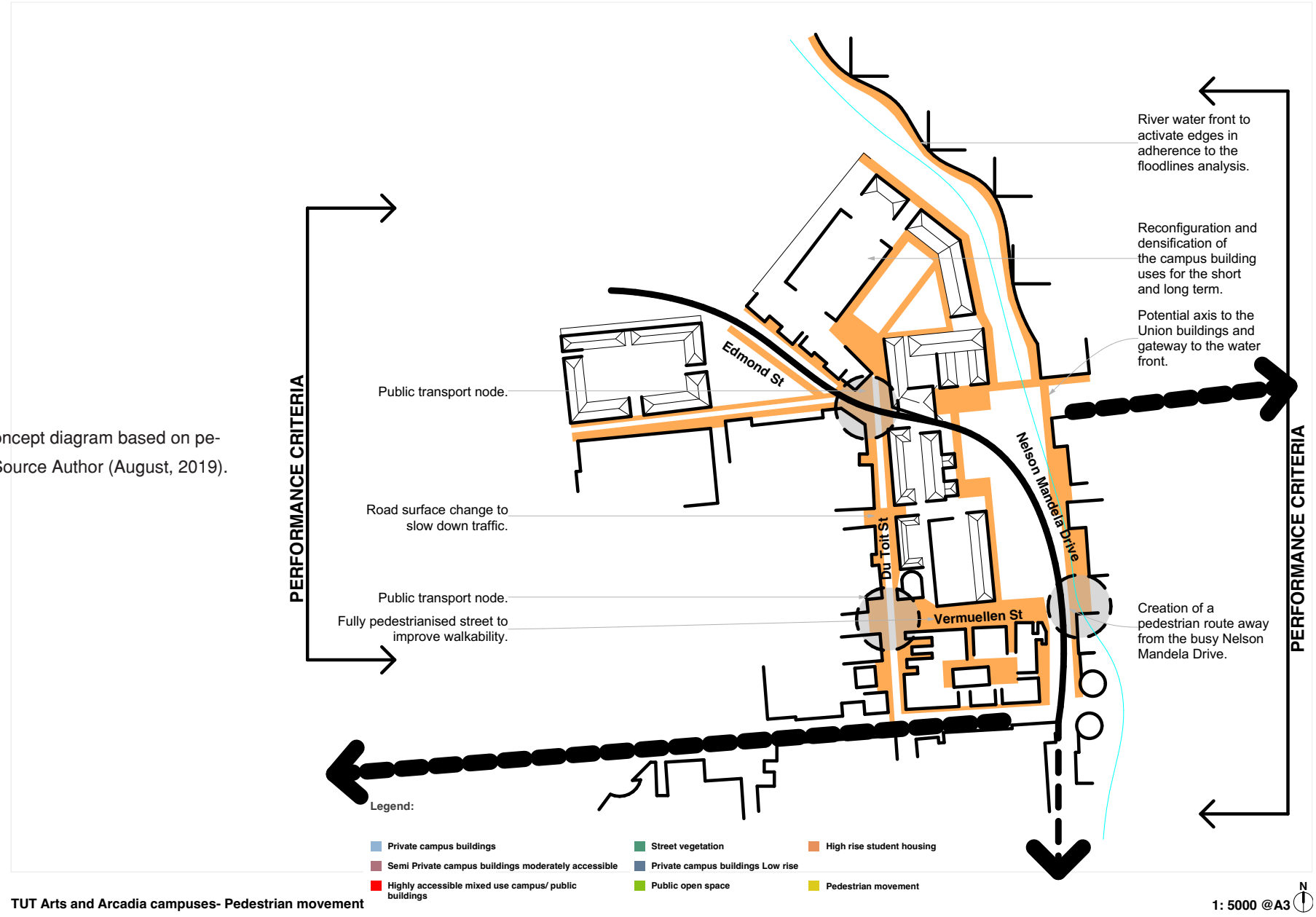
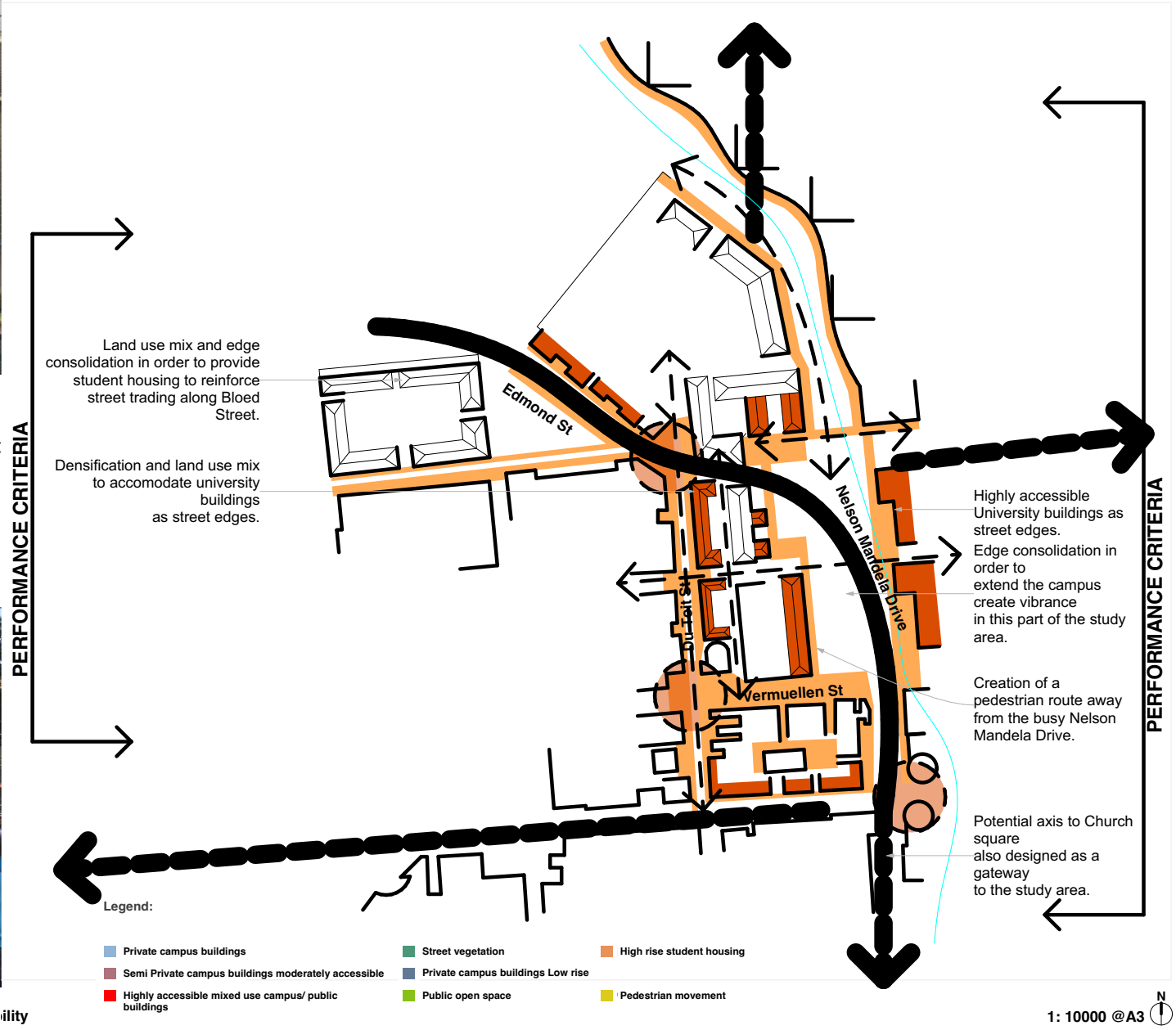


Figure 66: General concept diagram based on pedestrian movement. Source Author (August, 2019).

Figure 67: General concept diagram based on the principle of permeability showing how pedestrian movement can be increased through strategic placement of highly accessible buildings while addressing privacy gradients. Source Author (August, 2019).



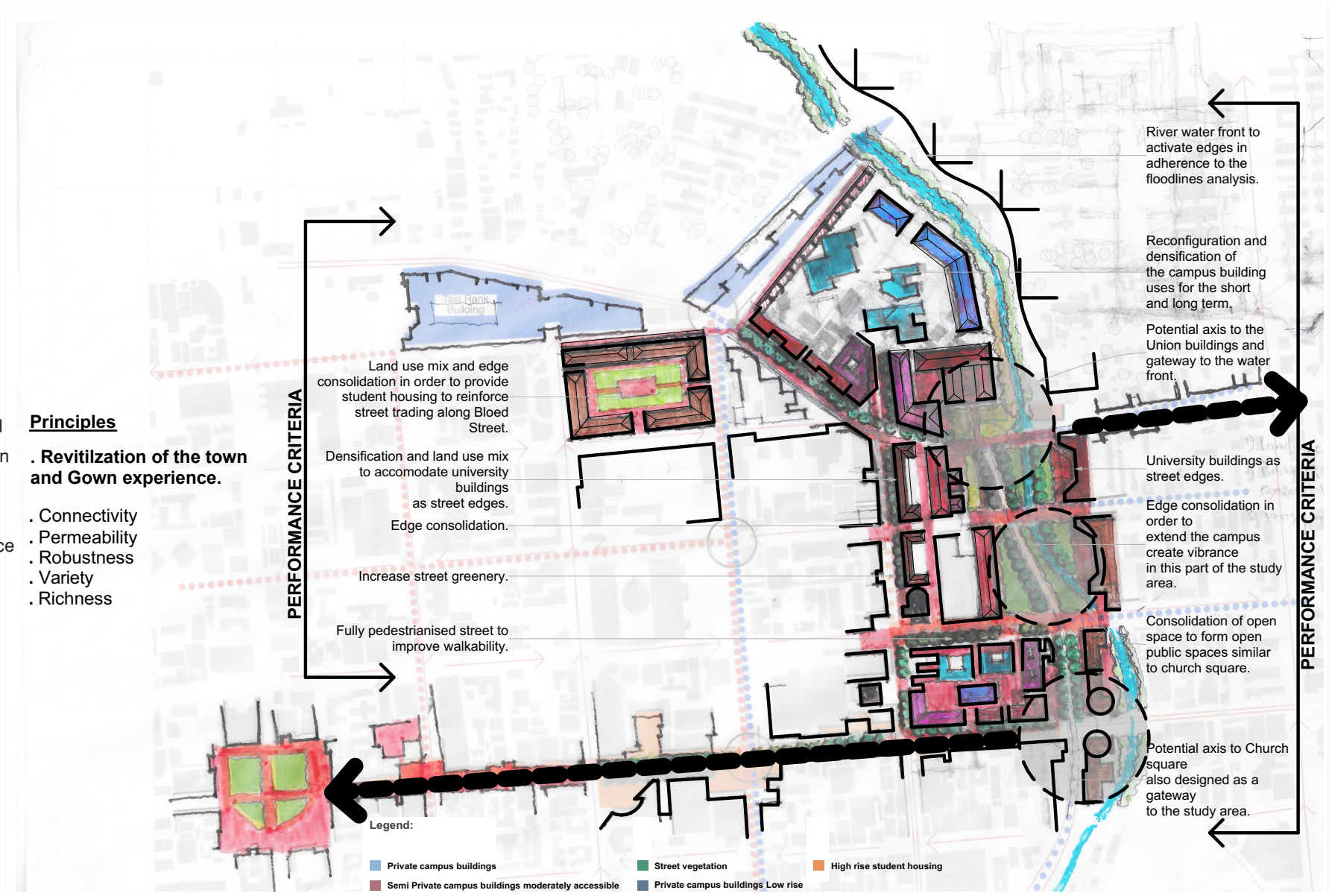


Figure 68: General concept diagram based on the principles, design informants and performance criteria in the previous chapter. Source Author (August, 2019).

An amalgamation of the principles and performance criteria leads to an elaborate design proposition that strategically allows for the relationship between town and gown as it was during the medieval period, but looked at with a 21st century perspective. The principles employed included connectivity, permeability, robustness, variety and richness.

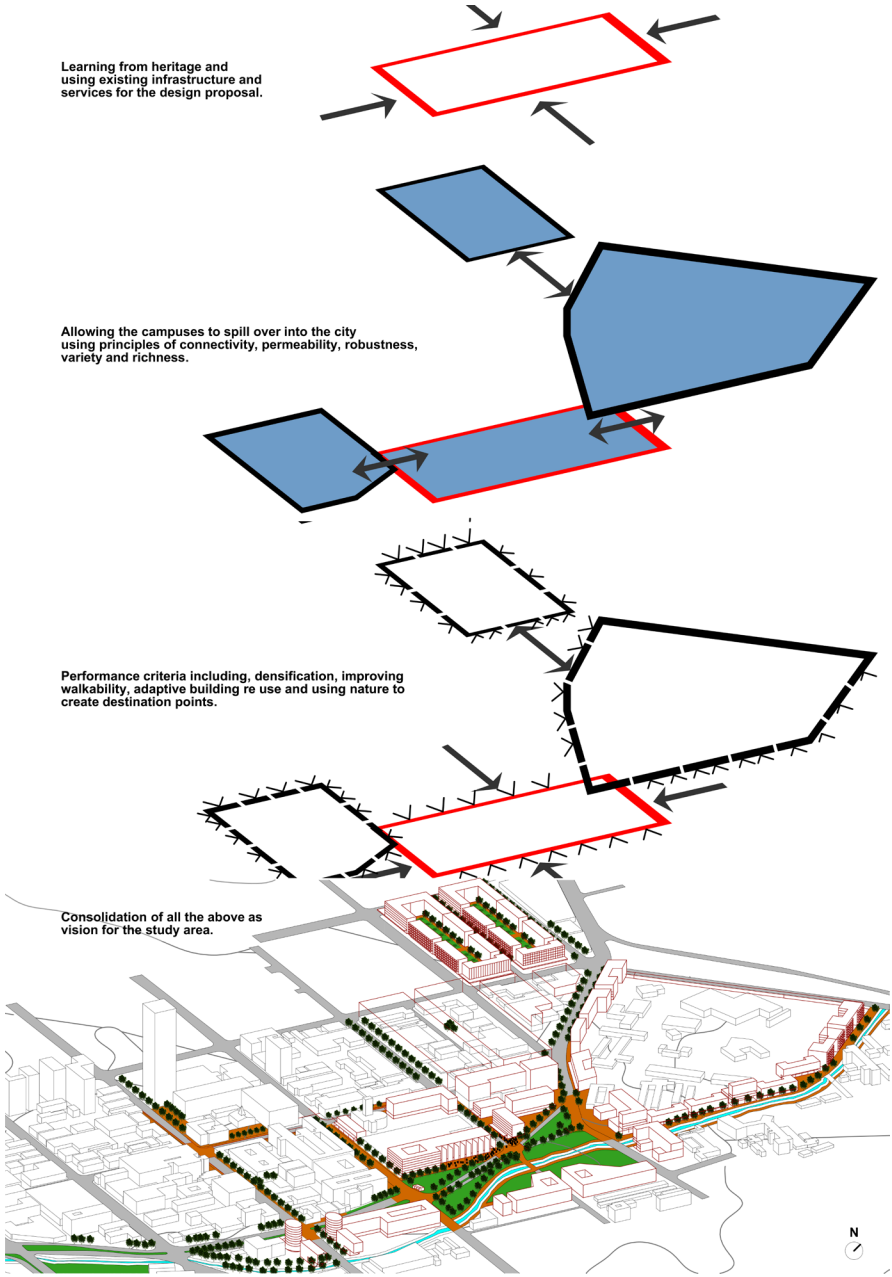


Figure 69: A three-dimensional concept diagram based on the principles, design informants and performance criteria in the previous chapter. Source Author (August, 2019).

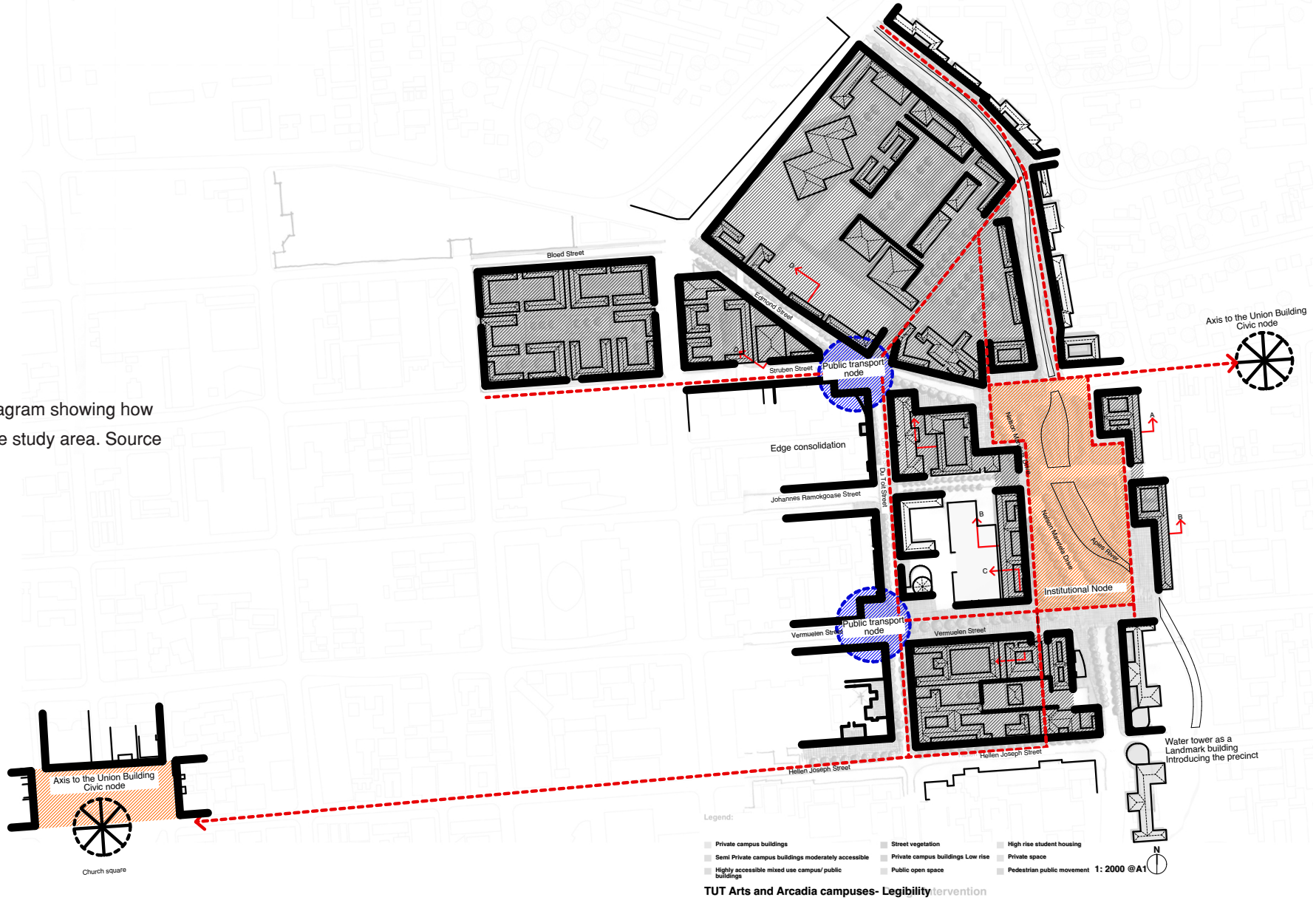


Figure 70: A concept diagram showing how legibility works within the study area. Source Author (October, 2019).

Figure 71: A more detailed drawing showing how the pedestrian movement works in the design . Source Author (August, 2019).

Figure 72: A diagram showing the general spatial concept of the study area. The concept integrates the two campuses by providing interfaces of campus buildings that are also public in nature. Source: Author (2019).

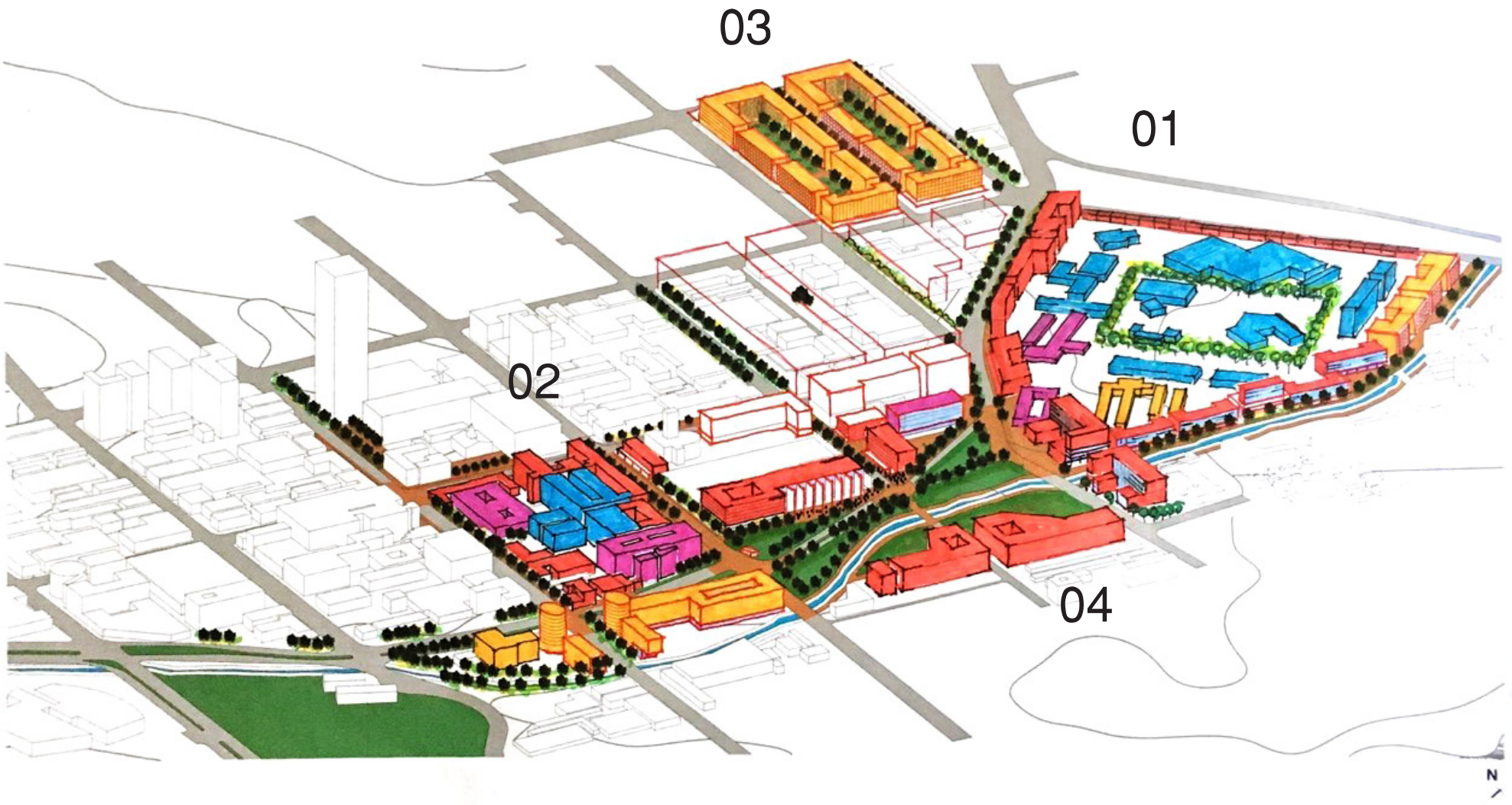


Figure 73: A three-dimensional concept diagram showing the vision of the study area based on the principles, design informants and performance criteria as discussed in the previous chapter. Source Author (August, 2019).

5.5.1 Connectivity.

Connectivity is achieved through opening up the campus buildings and strategic placement of the campus buildings in a hierarchical manner that allows for segregation of space for campus and city use without necessarily erecting fences that lead to negative edge conditions, blank façades and opportunities for crime. It is also imperative that the campus spills over its use beyond its current extents in order to spread its outreach to the public through different public/ campus use mix.

The building typologies do not necessarily have to follow the style as shown in but should adhere to the principle of allowing connectivity without creating fences. Connectivity is one of the most crucial principles because it not only affects building placement but also routes of movement. The proposal suggests increasing of pedestrian movement and interaction in the streets and establishment of public transport movement nodes. The objective for this is improvement of pedestrian movement in the area while at the same time discouraging private vehicular movement.

The streets suggested for this intervention in the study area are Du Toit Street, Vermeulen Street, Edmond Street and Nelson Mandela Drive. Vermeulen Street is to be fully pedestrianized as a strategy for improving connectivity and continuity of campus activity without the hinderance of vehicles cutting across the street. Du Toit Street will not necessarily be fully pedestrianized rather it the strategy is to increase the size of pavements, as a way to reinforce the performance criteria of walk-ability, cycling which in turn gives an opportunity for activating the street edges due to heavy pedestrian movement. Once pedestrian movement is encouraged, public transport nodes becomes easier in that drop off and pick up zones can be created where the roads intersects which takes advantage of the existing infrastructure as discussed in the previous chapters in order to improve connectivity. It is important to emphasize that the nature of integrating these principles is to offer a guidance into improving the study area and not to follow the building footprints to the core.

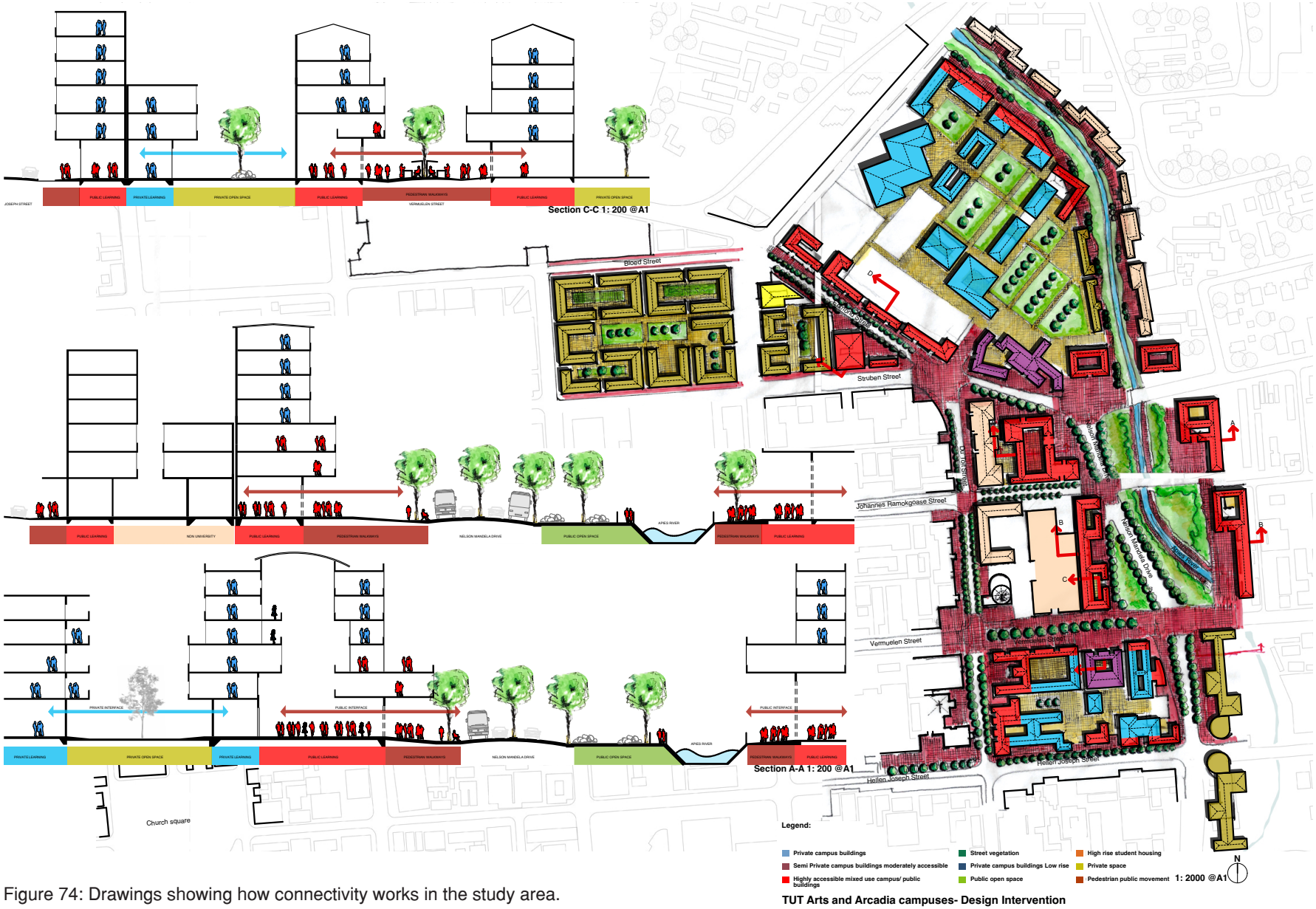


Figure 74: Drawings showing how connectivity works in the study area.
Source Author (August, 2019).

5.5.2 Permeability.

Pretoria CBD's existing city infrastructure in its current state allows for permeability once measures are put in place to allow for this. Permeability in this case means the ability of people, students, staff and public street users to freely move about without too many hindrances (Bentley et al, 1985). The first strategy is to reinforce the policies set out by City of Tshwane (CoT) on freedom of movement in the streets. This should not be mistaken by the fact that there needs to be control of movement into private buildings that have specific uses and also some of the public spaces.

A reinforcement of the existing policies goes a long way in allowing for campuses to strategically open up their buildings and grounds for public use as well. Policies allow for control and order in a society if well adhered to. In this regard, the principle of permeability is further elaborated in the design by campuses extending their buildings beyond their existing areas in the study area. This requires land use consolidation to take place. Consolidation can happen through taking advantage of the vacant and underutilized parcels of land and convert the current land use to institutional use.

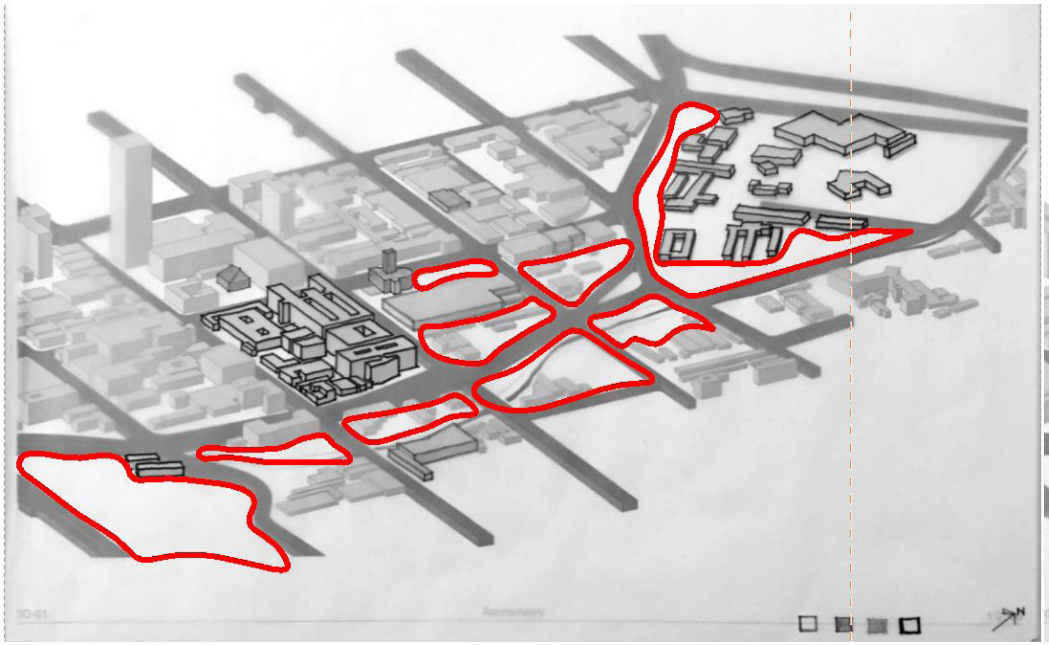
The use of the consolidated land needs to take into consideration both campus and public use. This can happen through locating courses in the Arts based campus that can be appreciated by the public as well. These include courses such as music, sculpturing and painting. Public lectures can also take place in the public open square created by the mixed-use buildings. The porosity of the mixed-use buildings also goes a great length in emphasizing permeability and a right to the city.

5.5.3 Robustness.

Achieving robustness in the study area goes a great way in ensuring maximum utilization of space in the city. Due to the costly nature of land in the CBD it is important to ensure spaces are utilized and can morph into various functions as needs arise.

Pretoria boasts of a rich history and heritage and this is evident in the built environment especially in the study area with buildings such as Tshwane North College and the religious institutions in the study area. Robustness in the study area will be interrogated in two ways, the use of heritage for adaptability and built form adaptive re use. The first strategy is to identify the buildings in the study area that have a heritage significant and convert them to mixed use buildings that are utilized by both the students and the public. This exercise ensures the heritage of the city is maintained but adaptive re use is engaged without significant alterations to the built environment. The use of heritage in urban design ensures the city maintains its unique identity while allowing for built form to respond to different uses as the need arises. This not only applies to the buildings but to public open space as well.

The adaptive use of public space allows for people to greet each other in the street, sit on a bench and enjoy a book, listen to or watch a public show or just pass through while enjoying the visual continuity of space. It is important to allow for maximum adaptability of space use because of the safety and reliability it creates in a space. The safer a space is, the more usable it is (Carmona, 2019). Robustness, especially in public open space should not be just a creation of open space with a building as a backdrop. If done this way, chances of people not understanding the threshold where they can and cannot tread becomes confusing (Carmona et al, 2010). They should be able to accommodate people especially at different times of the day such as lunch hour and days of the weeks such as weekends where families can meander in the spaces freely, holidays and days with special occasions such as performances and public lectures. This next section will show how robustness can be achieved through land use consolidation in the study area.



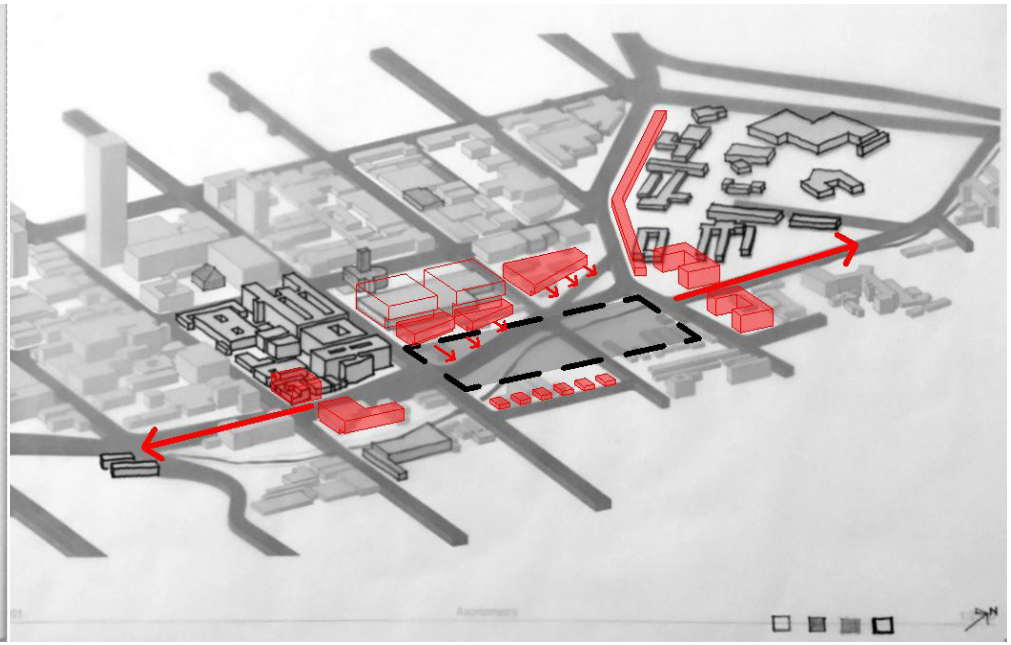
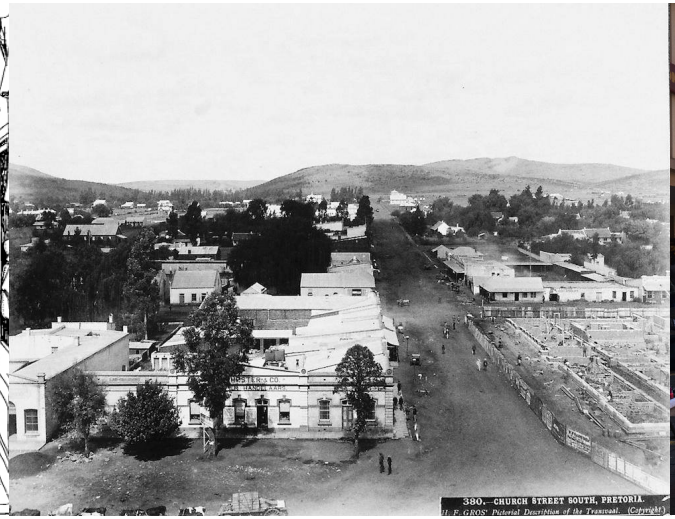


Figure 75: General concept diagrams based on the principle of robustness. It starts with identification and consolidation of areas with opportunity, then ensuring adaptive re use of the building takes the fore front. Source Author (August, 2019). Below. How robustness can happen in the street for the long term as is the case in Pretoria. Source: (Bentley et al, 1985)(Author 2019).



5.5.4 Variety and Safety.

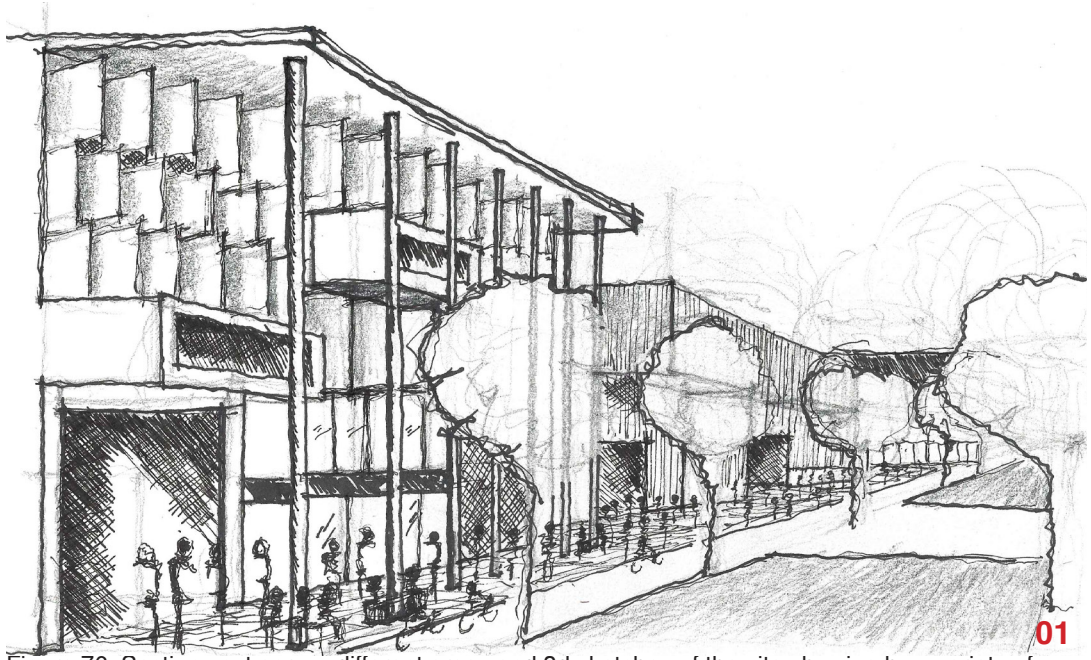
The use of variety as a principle adheres to the ability to offer an array of activities in the streets and built form within the study area. The focus on the study area is intentional in that it is meant to trigger regeneration and offer a ripple effect to the rest of Pretoria. Variety emanates from the creation of different uses and different levels of interactions between street users and building edges. This not only gives people options in how to move and what to do, but also increases the activities and surveillance in the streets which is a safety measure.

The main objective of variety and safety in this research was to be able to trigger different reactions of street users at different times of the day, month and year through a variety of activities. The first exercise was to identify areas that had potential to explore this principle. It is also important to point out that variety in this exercise was done with a bias for campus and public use integration and it was imperative that the campus use for the two buildings be extended beyond their existing constraints for a more comprehensive study. The ability to give street users choice in whether to eat at a specific restaurant, to buy artefacts from various street traders or to listen to a public art lecture are desirable traits that make a place lively while sticking to certain theme. When we enter into the realm of institutional design, various complexities arise in the form of the degree of privacy and publicity of an institution.

Variety and safety in this particular aspect can be used to emphasize the public aspect of the campus while the private aspect is left to the institution itself. While dwelling on the public realm, variety also dealt with the choice of mobility through allowing for public transport at various nodes created by the proposal. Providing options for public transport allows for more people to interact with the spaces, especially students and staff and also discourages private vehicular access. In terms of hierarchy, public transport in the study area is given more prominence by designating public transport lanes along Du toit Street, Edmond Street and Nelson Mandela Drive. This promotes variety of mobility as a performance criterion and gives people more options for mobility.

Variety is also looked at in terms of choices created by the activated street edges. The activated edges in this research take cognisance of the type of users who are a combination of mostly students and staff of Arts and Arcadia campuses and other general street users. With this in mind the edge conditions need to be in a manner that appeals to the various types of users in a harmonious way. Book shops, art stores, public

libraries and sculpture display areas can be interesting edges that attract students while a combination of restaurants, gaming areas and shopping areas can integrate as well to offer vibrant activated edge conditions.



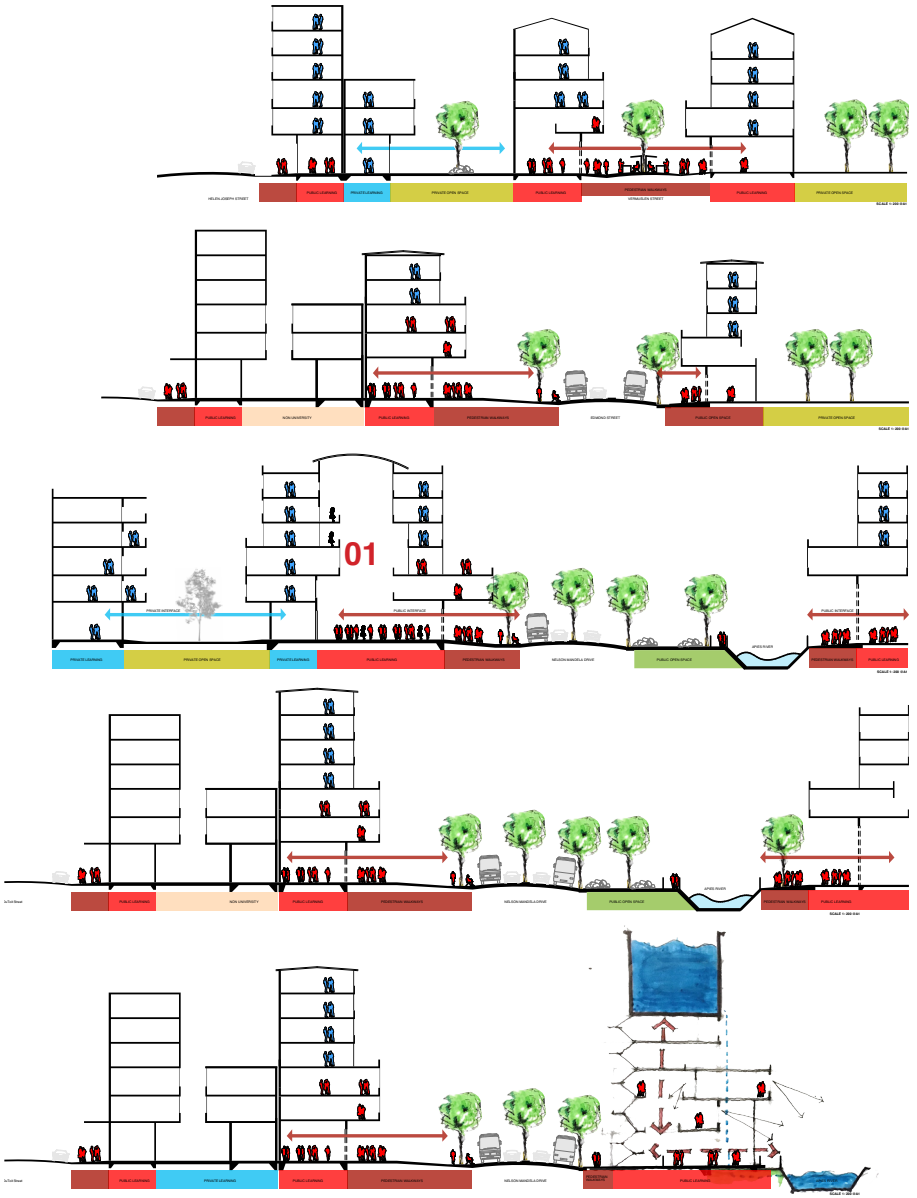


Figure 76: Sections cut across different areas and 3d sketches of the site showing how variety of building typologies affects safety, privacy gradients and variety .Source Author (2019).

5.5.5 Richness.

All the principles mentioned above become obsolete if the area is not loaded with an array of visually appealing areas. Using place making as a performance criterion, strategic placement of markets, public open spaces, open market spaces, open vistas and axes and recreational areas can sub consciously lead street users to have numerous experiences that enrich their experiences in an urban environment. Such experiences leave a lasting mark on the pedestrian and makes the place memorable and a destination.

The location of the Arts and Arcadia campuses is advantageous due to the opportunity to create development and visual axes to heritage places namely the Union buildings and Church Square respectively. The Union buildings are the seat of power in South Africa and hold most of the Government seats while Church Square is the focal point that lead to the establishment of Pretoria and CoT in general.

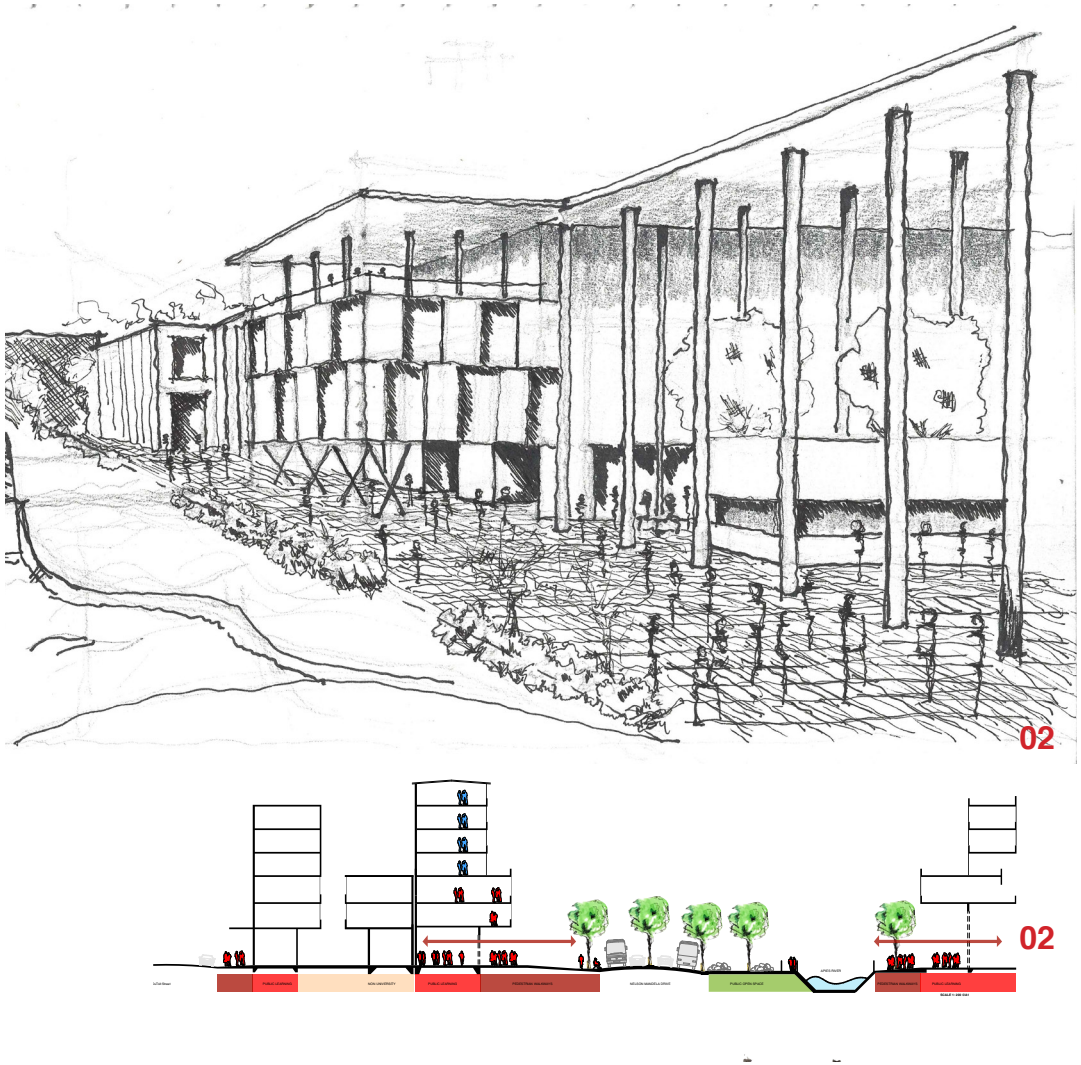


Figure 76: Sections cut across different areas and 3d sketches of the site showing how variety of building typologies affects safety, privacy gradients and variety. Source Author (2019).

5.6 Design with water.

This section explored the use of nature in planning and design of cities. As discussed in the previous chapters, Pretoria was established from Apies river and the strategic use of its tributaries (Jordaan, 1987; Dippenaar, 2013). The fact that the same rivers runs along the Arts and Arcadia campuses provides an opportunity for integrating nature with the city. Extending the use of nature in design ensures that public space is reinforced and enables the use of nature in design to transcend into the 21st century design of cities.

The current state of the river is of a dilapidated and run down nature. The river also experiences flooding in some areas in Pretoria during the rainy season. The run down nature of the river gives opportunity for encroachment by the homeless and other unsanctioned activities that lead to crime and pollution.

Pretoria CBD sits at the lowest point of the confluence of hilly areas to the North and South respectively. These natural elements as design informants offer an opportunity to combine all the urban design principles mentioned previously. Using the river as a unifying element, the design strategy proposes a water front design that allows for pause points where the campuses are located and in turn convert those areas into public spaces with different magnitudes and experiences such as restaurants arranged in spine or large open spaces for theatrical performances and more importantly a water collection point in form of water towers that also functions as a gateway into the study area. The design strategy proposes damming the river where the campuses are located which in turn offers the opportunity to consolidate public open space and introduce recreational activities in the area.

Figure 77: Images showing the dilapidated current state of Apies river. Source: Author (August, 2019).

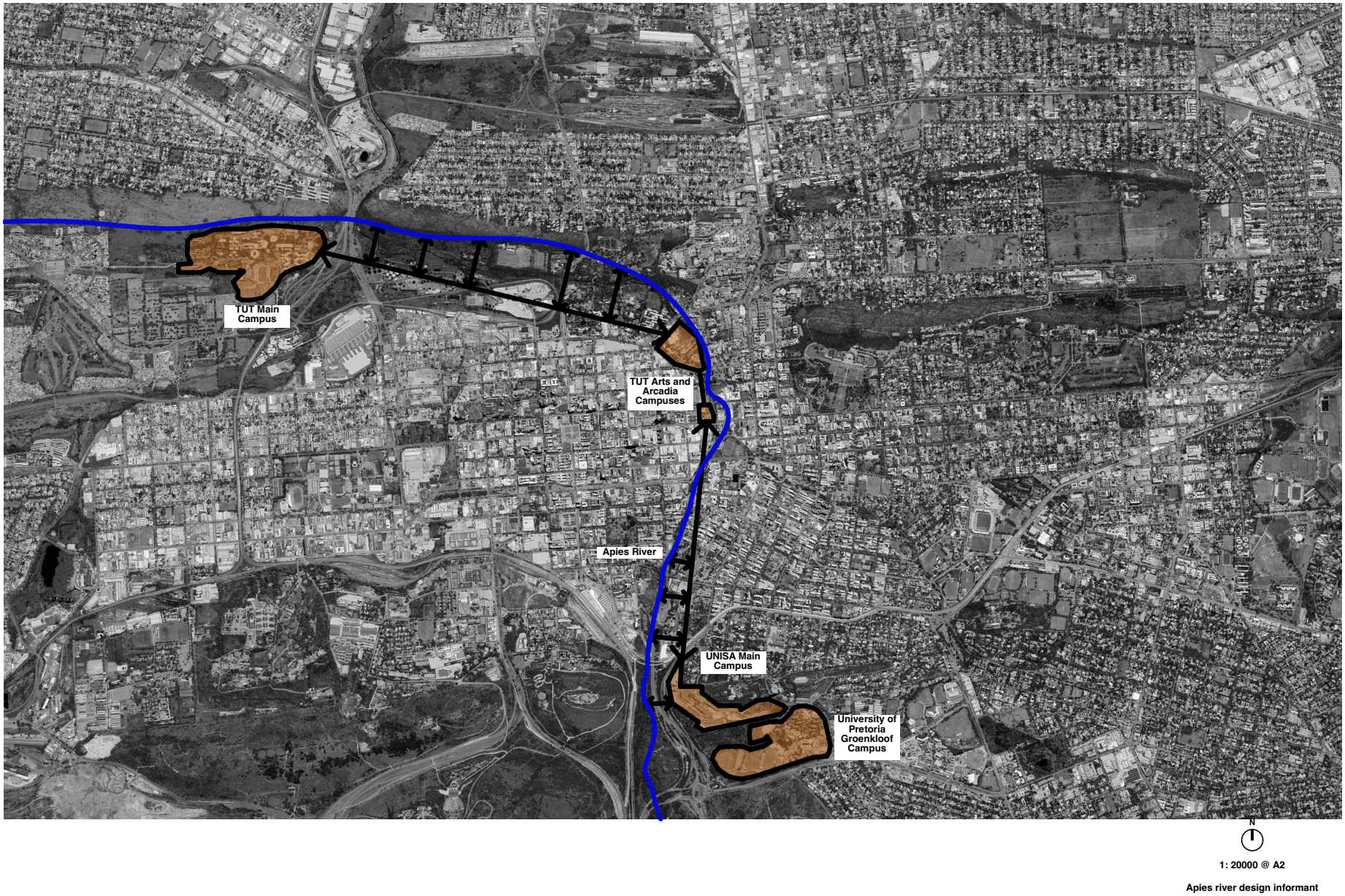


Figure 78: A drawing showing how Apies river is linked to the campuses. Source: Drawn by the author from Google Maps (September, 2019).

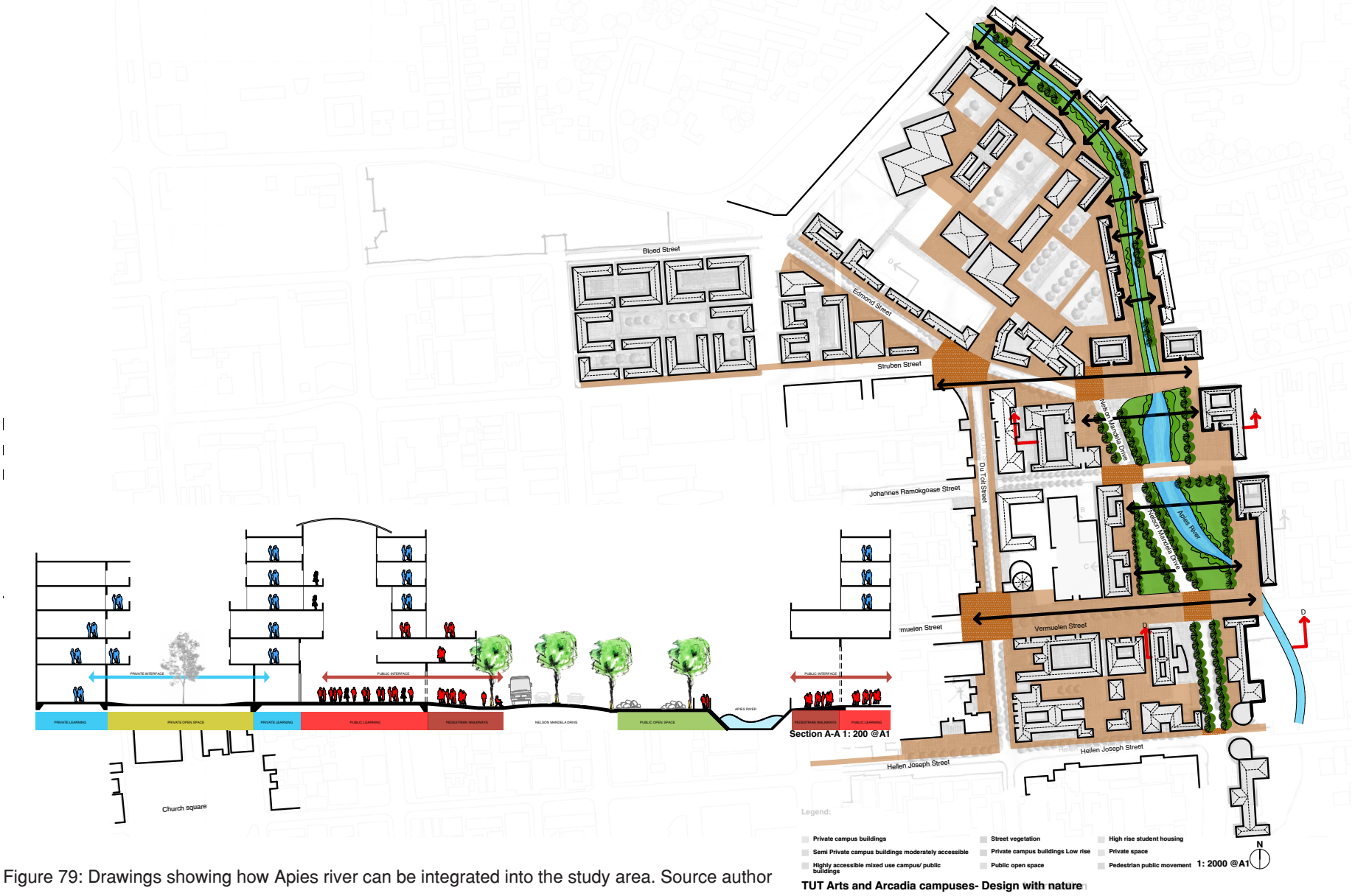


Figure 79: Drawings showing how Apies river can be integrated into the study area. Source author (2019).

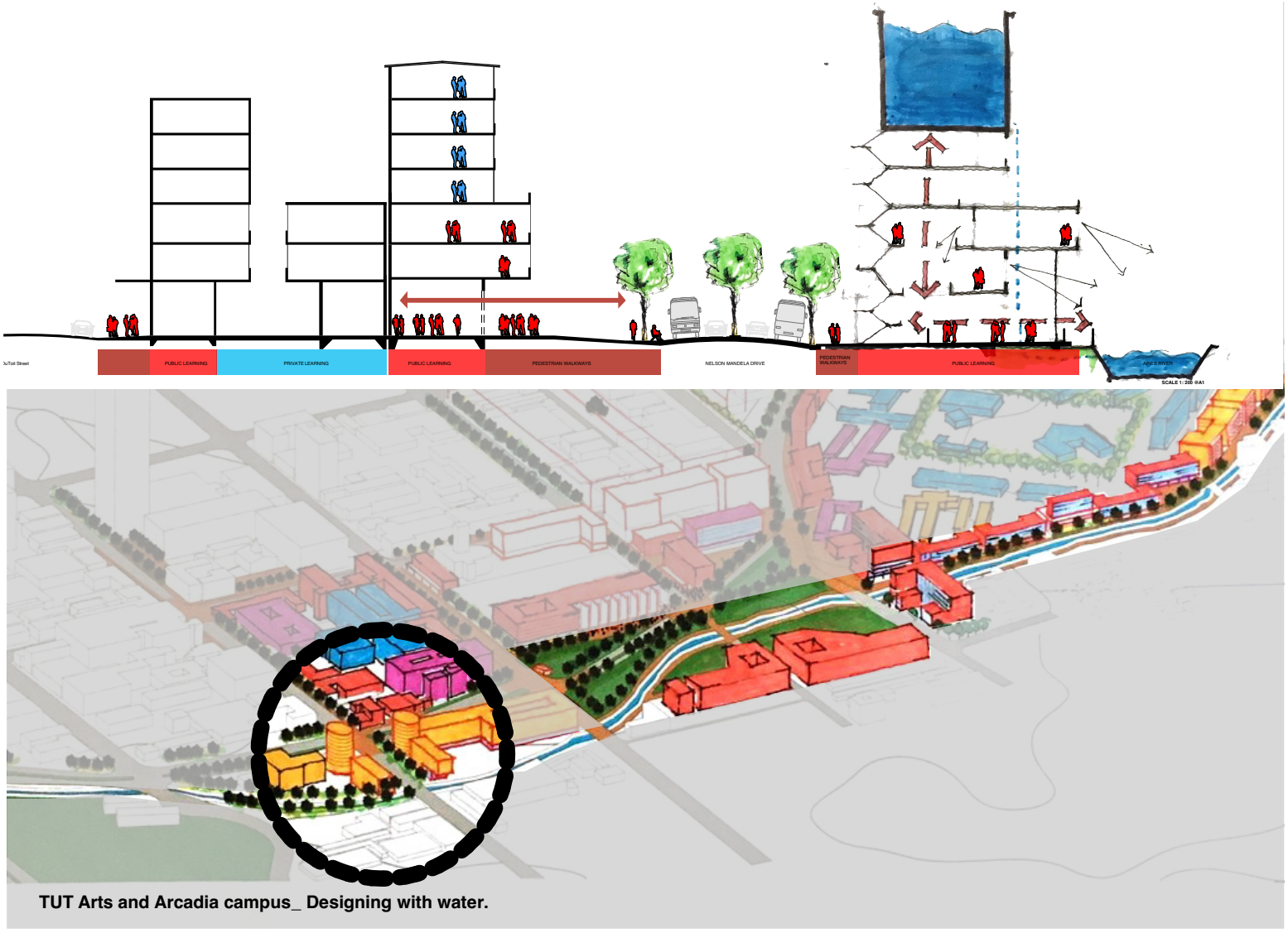


Figure 80: Additional drawings showing how Apies river can be integrated into the study area. Source author (2019).

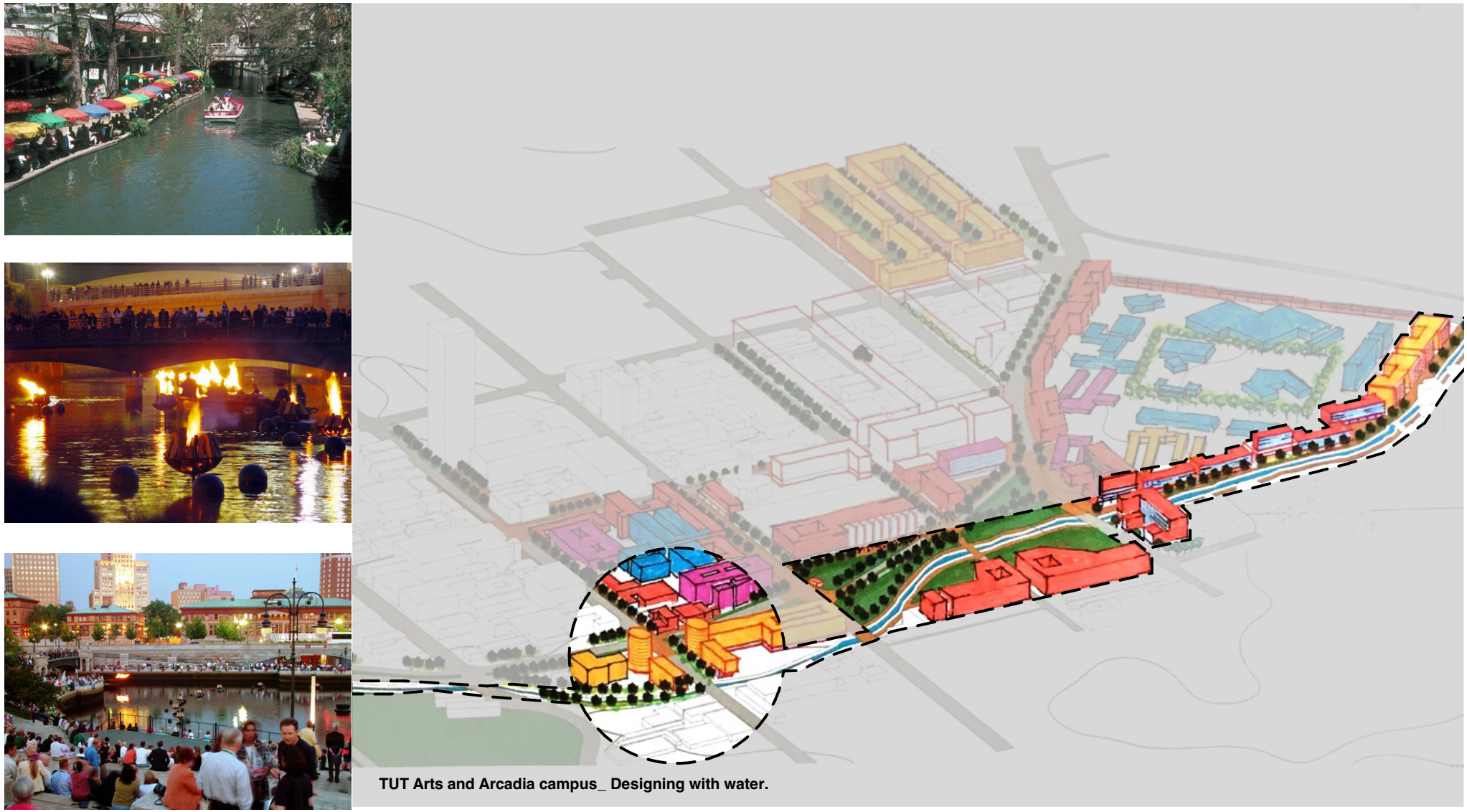


Figure 81: Images showing the intervention of water by revitalizing Apies river to trigger activities in the study area. Source: Author (September, 2019) (https://www.pps.org/river/walk) as at September 2019.

CHAPTER 06
RECOMMENDATIONS AND CONCLUSIONS

6.1 General structure.

University design especially in the 21st century has been observed to be an integral part of the city. This is an observation that has been evolving for thousands of years as observed in earlier chapters.

Tracing from the history of universities in Africa and Europe, what was evident is that there exists a very strong relationship between the city and the university. This relationship also known as the town and gown experience paints a picture of the relationship between the city and the campuses and how the relationship has deteriorated as the years have progressed due to the city campuses having an introverted nature and secluding themselves from the city as a way to reinforce security and privacy. While the issue of addressing security and privacy concerns seems like a noble issue, the negative impacts of this go against issues of a right to the city (Lefebvre, 1960; Huchzermeyer, 2014) and create undesirable building edge conditions that promote crime and safety issues as opposed to promoting a safe, interactive and environment for the students, staff and pedestrians in general.

The research focused on how to integrate universities into the 21st century city using urban design principles and performance criteria as a strategy. Using the research question , the objectives put forward were more of a design manifesto that set out to use specific urban design approaches that could be used to integrate campuses into the city. The principles identified in the objectives included connectivity, permeability, robustness, variety and richness. A case study approach was the ideal in this research as it grounded the research within a city in South Africa. Pretoria CBD which falls under the City of Tshwane (CoT) Municipality in Gauteng Province was the study area while Tshwane University of Technology (TUT) Arts and Arcadia campuses were selected as the catalyst areas. The choice of the case study was deliberately chosen due to the city's rich history and heritage and also as the capital of South Africa. The city also harbours quite a number of higher education institutions, apart from the especially within the CBD which formed an interesting precursor for the research.

Literature review for this research was divided into three categories namely; a brief history of the town and gown experience, trends in university design in the 21st century city and a precedent study of university design in the 21st century. A brief history of the university design focused on the origin

of the university design in Europe and Africa and how the relationship between campus and city came to be. An interesting revelation showed that higher education institutions existed earlier in Africa compared to Europe though the documentation on European universities was more. The findings also revealed that the courtyard typology was consistent in both Europe and Africa and this typology prevailed for more than five hundred years before variations of the same started to appear.

The bulk of the literature review focused on trends in university design and their status within various cities in the world and in South Africa as well. This included the way university design had developed over the years, their typology and metabolism and how they are situated in the cities. These typologies included the rectilinear(courtyard), radial, connected and city campus. Due to the urban design nature of the research, the focus was more on the city campus and the principles required for a successful campus design. The city campus was an ideal take off point due to the ability to share infrastructure, services and policy guidelines with the city. Of equal importance was the understanding of the complex nature of university design and the status of university design in South Africa. A brief study on this established 26 public universities in South Africa with approximately a million students.

Despite these large intakes, the universities face numerous challenges that include lack of capacity to plan for the growth of these universities, challenges in planning for these universities in both spatial and non-spatial aspects, inadequate capacity to plan for safety and security for staff and students and inadequate housing for students. Despite these challenges faced by universities in South Africa numerous studies and design interventions show that some of these challenges can be addressed through urban design. With the complexities faced by universities and with the trends addressed in the rest of the world, various design strategies have been put in place to aid in well-connected, pedestrian friendly, rich campus environments.

The theories selected on this research focused on the ability to understand the complexities of university design and how to integrate them into 21st century cities. A constant thread across all the theories revealed that the best way to design universities is not to impose design ideas but rather to allow room for collaboration between the university team and design professionals. The principles selected for this research deliberately focused on a manifesto for integrating campuses in to the city. These in-

cluded theories on connectivity, permeability, robustness, variety and richness. The aim of these principles was not to impose a design solution but rather offer an argument through research by design which will be discussed further in the next chapter. It was also vital to explore theories on a right to the city and ideal campus design strategies. Site selection, whether stand alone or city integrated were choices the university needed to have in mind and the regional and precinct impact they would have.

Degrees of hierarchy also contribute significantly to access control and placement of campus buildings in a way that offers a sense of security without necessarily setting up barriers such as fences. Also, of necessity was the interventions put forward by Crime Prevention Through Environmental Design (CPTED). This has been a design strategy used in residential communities all over the world for decades and it was important to understand these theories as it would contribute to the security and vigilance of the campuses through the application of the urban principles of vigilance and creation of vibrancy as passive security measures. All the theories discussed in the second chapter offered a precursor to the design process for the TUT Arts and Arcadia campuses and paved the way for the design chapter.

A summary of the literature review chapter heavily focused on theories for integration, campus design in the 21st century city and how public space can be reconfigured to accommodate student life and public use while still allowing for a privacy gradient. The theories also revealed that campus design is more effective if it is interrogated from an urban design perspective than from an architectural one.

An understanding of the complexities that come from university design help a lot in responding to the design through site location, allowing for collaboration between all stakeholders; university staff, students, design professionals and the respective government authorities. When specific design principles are infused with the above and structured in form of an argument, chances of achieving successful integrated campuses become quite high.

6.2 A summary of the design process.

Part of the research by design also looked at a precedent study that offered similar design approaches that would help in triggering a vibrant campus environment within the study area in Pretoria. The precedent study was an intervention proposal for Massachusetts Institute for Technology (MIT) East Campus in Boston, United States of America. The brief was required an intervention on the

study area that would allow for more pedestrian friendly, activated edges and improve connections with the existing Boston river. The intervention began with a status quo and SWOT analysis of the study area as a way of identifying challenges and development opportunities. The intervention further infused specific urban design responses that allowed for walk-ability and activating edges in order to create pause points and improve vibrancy in the area. The intervention also looked at development in both the short term and long term in terms of five- and ten-year interventions respectively. The five-year plan suggested strategic placement of campus building with a mixed-use angle that would cater for both campus activity and street use. The short-term plan also suggested pedestrianisation of some streets in the area for improvement of pedestrian activities. Long term strategies in the development area attributed for conversion of entire blocks into full campus precincts celebrated by campus use buildings that have allow for public interaction on ground floor and campus-oriented activities on the upper floors.

The research followed a research by design approach through identification of TUT Arts and Arcadia campuses as the case studies within the Pretoria CBD. The choice for the case study allowed for a more grounded research approach that is within the confinements of South Africa. The urban nature of the campuses at the heart of the CBD allowed for more urban design strategies due to the existing urban nature of the city centre itself.

The history of Pretoria reveals quite a rich history and the use of nature in establishing a city. When combined with powerful design elements such as the grid iron system, the city possesses a unique identity which can be used as a powerful design tool. Other design informants included the heritage axes; Union buildings and Church square, which form straight visual axes from each of the campuses. This gave an opportunity to form gateways into and out of the study area. The existing infrastructure and services in the other and also vacant and unused land were other additional design informants in the study area as well.

Challenges in the area included the low-lying dilapidated nature of the buildings surrounding the campuses, encroachment of the vacant and unused land by taxis and unregulated traders, Nelson Mandela Drive that divides the campuses into two and forms a harsh pedestrian environment, inadequate planning and campus building placement, inadequate student housing and weak reinforcement of spatial policies and guidelines

by City of Tshwane. The table below summarises the challenges and opportunities in the study area.

Summary of SWOT analysis for TUT			
Strengths	**Weaknesses**	**Opportunities**	**Threat**
There is well established city infrastructure that consists of city road network, services and water.	The area adjacent to the site suffers from lack of maintenance, dilapidated buildings and garbage disposal areas.	The use of campus land by the university to extend the campuses by providing mixed use buildings.	The city's slow approach to dealing with encroachment and colonisation of vacant land within the CBD.
The city is surrounded by a rich ensemble of natural features that include the Apies river, nature reserves, hill and vegetation.	Poor open spaces and public space network especially adjacent to the campuses.	There is an opportunity to use the natural features to the advantage of the campuses in terms of establishing the campuses and their environs as a destination.	Colonisation of the open spaces and vacant land by taxi operators who are difficult to remove.
A significant cultural landscape made of a heritage of built form and nature.	The CBD perceived edges are made up of unsightly built forms that have no architectural or urban design merit.	With densification, the low-lying building edge conditions of the city edges can be improved.	The city might not consider the city edge as a priority due to lack of proper planning and management.
			Lack of technical know-how to deal with the cam-pus accommodating the growing number of students.

Table 02. A SWOT analysis done on the study area. Source: Author (August, 2019).

Problem	Theory	Principle	Strategy
Disconnected campuses from the city and each other.	• Dewar and Louw (2017). • Coulson et al (2011). • Bentley et al (1985). • Lynch (1961).	• Macro and micro scale location of a campus. • Permeability. • Variety. • Robustness.	• Utilization of vacant land adjacent to the campus for campus use. • Mixed land use. • Edge consolidation.
University's mission, vision and values are not reflected in the built form.	• Coulson et al (2015). • Dewar and Louw (2018). • Lulat (2012). • Long and Ehrmann (2005).	• Give the campuses a unique identity that resonates with their mission and vision. • Campus integration strategies. • Campus reconfiguration.	• Ensure the mission, vision and values are married to SPLUMA, the city's IDPs, and other spatial frameworks. • Provide a precinct plan for the study area.
Inadequate student housing.	• Spatial frameworks (City of Tshwane IDP, 2019/20, Arup macro framework) • Jeffrey (1972). • Crowe (1991).	• Densification. • Land mix use. • Variety.	• Convert dilapidated buildings into mixed use buildings with retail and recreation on ground floor and student housing on the upper floors.
Conflict of Vehicular and pedestrian movement.	• Behrens and Watson (2014).	• High level of accessibility.	• Use of vegetation to segregate pedestrian and vehicular movement. • Create a hierarchy of street movement. Pedestrian, vehicular and public transport.
De-linked public open spaces.	• Perez and March (2015). • Dewar and Uytenboogardt (1991).	• Additions. • Legibility through establishment of landmarks, nodes and a variety of building edges.	• Consolidate vacant open spaces adjoining the campuses inspired by heritage in the city.

Table 03. A summary of the design process that the research took. Source Author (August 2019).

Problem	Theory	Principle	Strategy
Inadequate green space network in the study area.	• Jordaan (1987). • Dippenaar (2013).	• Green network consolidation.	• Identify areas lacking green infrastructure in the streets and use this to continue the historical green network.
Encroachment of vacant or unused land in the study area.	• Urban city policies and frameworks. • Jacobs (1960). • Jeffrey (1972)	• Create defensible spaces. • CPTED.	• Reinforce polices and guidelines that discourage encroachment of vacant land. • Encourage street trading. • Provide a hierarchy of public and private spaces.
Inadequate Public transport network planning.	• Transit Oriented Development. • Bentley et al (1985).	• Hierarchy.	• Re organise the public transport routes. • Increase lay-bys close to the campuses. • Encourage use of public transport through designated bus lanes.
Inadequate street furniture.	• Gehl (2006).	• Street furniture provision.	• Provide street lighting, dustbins, seating areas and water points at strategic areas.
Neglect of Apies river as a water feature and public connector.	• Bentley et al (1985). • Lynch (1960)	• Water front design consolidation.	• Take advantage of Apies river and create defensible spaces through activating the river as a water front.

Table 03 cont. A summary of the design process that the research took. Source Author (August 2019).

The table above summarises the research by design approach. The combination of the challenges, theories and application was the main undertaking for the research. The design also set up a manifesto that used a specific number of principles to achieve integration of campuses into the city. These included connectivity, permeability, robustness, variety and richness. Connectivity was combined with the edge consolidation as a way to activate building edges and land use mix that would allow for campus and public use buildings to resonate with the pedestrian life and improve walk-ability.

Permeability was explored through the densification of the area and discouragement of erecting fences and instead provide cleverly designed privacy gradients where campus buildings existed, which would in turn discourage the public from accessing these areas. Robustness took advantage of the underutilized developments in the study area by converting them into either mixed-use building with activated and pedestrian biased edge conditions or student housing with recreational facilities on ground floor.
Suggestions for vacant land were that any development that was to be put up would have to be adaptable and cognisant of the growing number of students and the needs that arise out of that. Robustness in public space was also ideal in that the public open spaces configured would have to allow for activities such as art performances form the Arts campus and exhibitions from the Arcadia science-based campus. This means that adaptability and spatial configuration would have to play a great role in achieving robustness.

Variety and richness dealt strongly with the choice the pedestrian has on the street. Strategic configuration of public transport and establishment of public transport nodes, a mix of activities such restaurants, public libraries, book stores and public open space played a vital role. Public open space in this regard not only act as areas of relaxation but also learning areas through allowing for lectures to take place which allows for multiple functions.
Lastly, Apies river formed a critical design informant in the design process. This is because the river and its tributaries were instrumental in forming the city of Pretoria. This historical significance was a precursor for using the same river as a natural element used to integrate the campuses with the city. The design proposed damming the river where the campuses were located which would reinforce open public space and create spaces that can be used by the university for performance arts, public lectures and displays. At the same time these spaces could be open to the public for other recreational activities as well.

The principles summarized above tried to answer the research question through a systematic process that could be later reinforce the policies and guidelines that govern development within the study area and the City of Tshwane in general.

6.3 Way forward: Recommendations.

University design, as much as it has evolved for thousands of years all over the world still remains a complex notion that requires an argumentative research by design approach. Research by design allowed for a systematic approach to the research and guided by the research question.

As much as this is looked at from an urban design perspective, the approach opens up avenues for greater discussions with the Municipality and university leaders and tackles all areas of an urban environment at a macro scale and also micro scales should the need arise. With this in mind, more ground in terms of university design tends to be covered through a collaborative approach that sensitizes the importance of a right to the city while still giving an opportunity for contribution from all stakeholders.

All proposals and design strategies are futile if consistent discussions with municipalities, the provincial government, national government and universities on the reinforcement and constant improvement of spatial frameworks do not take place. This not only allows for a collaborative process to take place but also allows the design professionals to sensitize the government and universities on best practices on how to create vibrant, safe, rich, walk-able environments that takes into consideration the rights of every user.
A recurrent contribution to this research was the notion of looking at university design as a mini city. With this approach, the design process allows the resolution of spatial quality at both macro and micro scale. Macro scale design of universities allow for resolving issues of connectivity and improvement of transport-oriented design while the micro scale design resolves issues of pedestrian movement and safety. These aspects equally apply to university design in terms of how the universities are connected regionally and at precinct level. An urban design approach is more holistic and tends to resolve more issues as opposed to high level architecture that only focuses on the precinct level.

The findings in this research also lead to the resolution that with regard to university design in the urban setting, the minimum input for maximum output approach is more ideal. This is due to the high level of complexities in integrating public and private university space while ensuring as much activation of vibrant and safe space as possible.

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APPENDICES

Participant Information Sheet: General street user

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Good day,

My name is **Jerry Munene Gachuki** and I am a Masters student in **Urban design** at the University of the Witwatersrand in Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating **the role universities play in the growth of cities in the 21st century.** The aim of this research project is to find out **how to integrate universities into the 21st century city through the relevant and appropriate urban design principles**.

As part of this project, I would like to invite you to take part in an interview on the above mentioned. This activity will involve a brief discussion on how you engage with this part of the city as a general public street user on a daily routine and how this particular street affects your activities. This will take place along Du Toit street, Pretoria and will last around 10 minutes. With your permission, I would also like to record the interview using a recording device and later take photographs of your daily routine.

You will not receive any direct benefits from participating in this research, and there are no disadvantages or penalties for not participating. You may withdraw at any time or not answer any question if you do not want to. The interview will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation in my final research report. If you experience any distress or discomfort at any point in this process, we will stop the interview or resume another time. The use of photography and video-taping will be used with your permission. All information recorded is undertaken solely for academic purposes.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you (optional). If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrec-medical.researchoffice@wits.ac.za

Yours sincerely,
Mr. Jerry Munene Gachuki.

Researcher:
Mr. Jerry Munene Gachuki,
2010166@students.wits.ac.za

Supervisor:
Mr. Christos Daskalakos
Christos.Daskalakos@wits.ac.za

Participant Information Sheet: Taxi operator

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Good day,

My name is **Jerry Munene Gachuki** and I am a Masters student in **Urban design** at the University of the Witwatersrand in Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating **the role universities play in the growth of cities in the 21st century.** The aim of this research project is to find out **how to integrate universities into the 21st century city through the relevant and appropriate urban design principles**.

As part of this project, I would like to invite you to take part in an interview on the above mentioned. This activity will involve a brief discussion on how you engage with this part of the city as a Taxi operator and how this particular street affects your daily routine. This will take place along your Taxi rank along Du Toit street, Pretoria and will last around 10 minutes. With your permission, I would also like to record the interview using a recording device and later take photographs of your daily routine.

You will not receive any direct benefits from participating in this research, and there are no disadvantages or penalties for not participating. You may withdraw at any time or not answer any question if you do not want to. The interview will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation in my final research report. If you experience any distress or discomfort at any point in this process, we will stop the interview or resume another time. The use of photography and video-taping will be used with your permission. All information recorded is undertaken solely for academic purposes.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you (optional). If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrec-medical.researchoffice@wits.ac.za

Yours sincerely,
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2010166@students.wits.ac.za

Supervisor:
Mr. Christos Daskalakos
Christos.Daskalakos@wits.ac.za

Participant Information Sheet: Business operator

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Good day,

My name is **Jerry Munene Gachuki** and I am a Masters student in **Urban design** at the University of the Witwatersrand in Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating **the role universities play in the growth of cities in the 21st century.** The aim of this research project is to find out **how to integrate universities into the 21st century city through the relevant and appropriate urban design principles**.

As part of this project, I would like to invite you to take part in an interview on the above mentioned. This activity will involve a brief discussion on how you engage with this part of the city as a business operator and how this particular street affects your business. This will take place at your business premise along Du Toit street, Pretoria and will last around 10 minutes. With your permission, I would also like to record the interview using a recording device and later take photographs of your business.

You will not receive any direct benefits from participating in this research, and there are no disadvantages or penalties for not participating. You may withdraw at any time or not answer any question if you do not want to. The interview will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation in my final research report. If you experience any distress or discomfort at any point in this process, we will stop the interview or resume another time. The use of photography and video-taping will be used with your permission. All information recorded is undertaken solely for academic purposes.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you (optional). If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrec-medical.researchoffice@wits.ac.za

Yours sincerely,
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Christos.Daskalakos@wits.ac.za

Consent Form: General street user

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Title of project

The 'UniverCITY': Integrating University design into 21st century South African cities. A case of Pretoria, South Africa.

Name of researcher
Mr. Jerry Munene Gachuki

I, …….., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I have been informed of:

☐ the reasons why I was selected to participate in the research project.

☐ the nature of my participation in the form of an interview.

☐ the place and duration of the interview.

☐ the voluntary nature, refusal to answer, and withdrawing from the interview.

☐ no payment or incentives.

☐ no loss of benefits or risks.

☐ my identity will be kept anonymous.

☐ the information I provide will be kept confidential.

☐ how the information will be used and disseminated.

I **AGREE / DO NOT AGREE** to participate by undertaking the interview.
I **AGREE / DO NOT AGREE** to audio-recording of the interview.
I **AGREE / DO NOT AGREE** to my surroundings being photographed.
I **AGREE / DO NOT AGREE** to my surroundings being video-taped.

_____ _____
Participant's name signature Date

_____
Participant's signature

Consent Form: Taxi operator

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Title of project

The 'UniverCITY': Integrating University design into 21st century South African cities. A case of Pretoria, South Africa.

Name of researcher
Mr. Jerry Munene Gachuki

I, ……., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I have been informed of:

☐ the reasons why I was selected to participate in the research project.

☐ the nature of my participation in the form of an interview.

☐ the place and duration of the interview.

☐ the voluntary nature, refusal to answer, and withdrawing from the interview.

☐ no payment or incentives.

☐ no loss of benefits or risks.

☐ my identity will be kept anonymous.

☐ the information I provide will be kept confidential.

☐ how the information will be used and disseminated.

I **AGREE / DO NOT AGREE** to participate by undertaking the interview.
I AGREE / DO NOT AGREE to audio-recording of the interview.
I AGREE / DO NOT AGREE to my surroundings being photographed.
I AGREE / DO NOT AGREE to my surroundings being video-taped.

_____ _____
Participant's name signature Date

_____
Participant's signature

Consent Form: Business operator

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Title of project

The 'UniverCITY': Integrating University design into 21st century South African cities. A case of Pretoria, South Africa.

Name of researcher
Mr. Jerry Munene Gachuki

I, ……., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I have been informed of:

☐ the reasons why I was selected to participate in the research project.

☐ the nature of my participation in the form of an interview.

☐ the place and duration of the interview.

☐ the voluntary nature, refusal to answer, and withdrawing from the interview.

☐ no payment or incentives.

☐ no loss of benefits or risks.

☐ my identity will be kept anonymous.

☐ the information I provide will be kept confidential.

☐ how the information will be used and disseminated.

I **AGREE / DO NOT AGREE** to participate by undertaking the interview.
I AGREE / DO NOT AGREE to audio-recording of the interview.
I AGREE / DO NOT AGREE to my premises being photographed.
I AGREE / DO NOT AGREE to my premises being video-taped.

_____ _____
Participant's name signature Date

_____
Participant's signature

Consent Form: Verbal

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Title of project

The 'UniverCITY': Integrating University design into 21st century South African cities. A case of Pretoria, South Africa.

Name of researcher
Mr. Jerry Munene Gachuki

I, ……., agree to verbally participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I have been informed of:

☐ the reasons why I was selected to participate in the research project.

☐ the nature of my participation in the form of an interview.

☐ the place and duration of the interview.

☐ the voluntary nature, refusal to answer, and withdrawing from the interview.

☐ no payment or incentives.

☐ no loss of benefits or risks.

☐ my identity will be kept anonymous.

☐ the information I provide will be kept confidential.

☐ how the information will be used and disseminated.

I **AGREE / DO NOT AGREE** to participate by undertaking the interview.
I AGREE / DO NOT AGREE to audio-recording of the interview.

_____ _____
Participant's name signature Date

_____
Participant's signature

Interview Schedule: General street user

Background Information

I am planning to interview street users along Du Toit street in Pretoria central business district. These will be business owners, public transport operators and general street users.

I will interview them in the street and at their respective business premises. There might be a few interruptions from the street activities, but this will give me an opportunity to observe how they manage distractions.

Interview Schedule

Opening

Hi. (Smile and handshake.) Thanks for making some time to let me interview you. You have a pretty nice setup here.

As I mentioned, I'm doing this interview for my Urban design Masters at University of the Witwatersrand. I want to find out more about how you interact with the street.

There are three topics I'd like to ask you about this morning: some facts about the business, what your relationship with this area of the city is like, and how this location affects your life.

Do you have any questions before I start?

Body

Facts about your movement in the street:

1. How often do you use this street? (Primary, Open)

2. Why do you prefer this street? (Primary, Open)

Relationship with the street:

1. Please describe an average day of walking in this area? (Primary, Open)

How this area affects you:

1. What do you like most about this area? (Primary, Open)

-What do you like least about this area? (Secondary, Open)

2. Would you prefer walking in another area of the city and why? (Primary, Open)

Clearinghouse question: The interviewee's turn

1. Is there anything I haven't asked about that you think I should know? (Primary, Open)

2. Is there anyone else you would recommend I speak to? (Primary, Bipolar)

Closing

Thank him/her for their time.

I have really learned a lot.

Handshake, good bye.

Interview Schedule: Business operator

Background Information

I am planning to interview street users along Du Toit street in Pretoria central business district. These will be business owners, public transport operators and general street users.

I will interview them in the street and at their respective business premises. There might be a few interruptions from the street activities, but this will give me an opportunity to observe how they manage distractions.

Interview Schedule

Opening

Hi. (Smile and handshake.) Thanks for making some time to let me interview you. You have a pretty nice setup here.

As I mentioned, I'm doing this interview for my Urban design Masters at University of the Witwatersrand. I want to find out more about how you interact with the street.

There are three topics I'd like to ask you about this morning: some facts about the business, what your relationship with this area of the city is like, and how this location affects your life.

Do you have any questions before I start?

Body

Facts about the business:

1. Why did you choose to start this business? (Primary, Open)

2. How did you get started in this profession? (Primary, Open)

Relationship with the street:

1. Please describe an average day of work for yourself in this area? (Primary, Open)

How this area affects you:

2. What do you like most about this area? (Primary, Open)

-What do you like least about this area? (Secondary, Open)

2. Would you prefer operating in another area of the city and why? (Primary, Open)

Clearinghouse question: The interviewee's turn

2. Is there anything I haven't asked about that you think I should know? (Primary, Open)

2. Is there anyone else you would recommend I speak to? (Primary, Open)

Closing

Thank him/her for their time.

I have really learned a lot.

Handshake, good bye.

Interview Schedule: Taxi operator

Background Information

I am planning to interview street users along Du Toit street in Pretoria central business district. These will be business owners, public transport operators and general street users.

I will interview them in the street and at their respective business premises. There might be a few interruptions from the street activities, but this will give me an opportunity to observe how they manage distractions.

Interview Schedule

Opening

Hi. (Smile and handshake.) Thanks for making some time to let me interview you. You have a pretty nice setup here.

As I mentioned, I'm doing this interview for my Urban design Masters at University of the Witwatersrand. I want to find out more about how you interact with the street.

There are three topics I'd like to ask you about this morning: some facts about the taxi business, what your relationship with this area of the city is like, and how this location affects your life.

Do you have any questions before I start?

Body

Facts about the Taxi operation:

1. Which route do you operate on a daily routine? (Primary, Open)

2. How did you get started in this profession? (Primary, Open)

Relationship with the street:

1. Please describe an average day of work for yourself in this area? (Primary, Open)

How this area affects you:

3. What do you like most about this area? (Primary, Open)

-What do you like least about this area? (Secondary, Open)

2. Would you prefer operating in another area of the city and why? (Primary, Open)

Clearinghouse question: The interviewee's turn

3. Is there anything I haven't asked about that you think I should know? (Primary, Open)

2. Is there anyone else you would recommend I speak to? (Primary, Open)

Closing

Thank him/her for their time.

I have really learned a lot.

Handshake, good bye.