Landscapes that Facilitate Learning

Outdoor spaces that improve learner performance in Atteridgeville schools

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Abstract

Low learner performance is one of the greatest challenges that confront South Africans in this post-apartheid era. Despite valiant efforts on the government's part to improve the education system every year, successful learners are not coming through the ranks in sufficient numbers.

In the case of Atteridgeville, an old township near the Pretoria Central Business District, the phenomenon of low learner performance is reflected in the quality of schoolyards and the behavior of learners. Schoolyards are degraded, learners lack confidence, they are not enthusiastic about their schools, they do not interact with the communities around their schools, and they do not venture into the physical landscape outside their schools.

The question arises whether the landscape *outside* the classroom is not, in fact, contributing to the problem. If this is so then a way must be found to manipulate the landscape so that obstacles to learner performance are removed and learning is facilitated.

This thesis explores the notion that the outdoor landscape in Atteridgeville can play a role in helping learners reach their potential. Therefore Atteridgeville will be the departure point for the investigation. The investigation will result in a project location which will be further investigated to identify its inherent opportunities and constraints. The design response to these opportunities and constraints, coupled with both theoretical and conceptual backing, will inform the project at master plan and detail design level.

Methods must be found to unlock the didactic and experiential potential of the schoolyard and surrounding landscape in a township where open green spaces are under threat and physical and social obstacles to learner performance exist.

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Samevatting

In Suid Afrika verteenwoordig swak leerderprestasie een van die grootste uitdagings onder die huidige bedeling wat aangespreek moet word. Ten spyte van verskeie moedige pogings deur die regering om die onderwys-stelsel jaarliks te verbeter, lewer die openbare onderwys-instansies steeds nie genoeg suksesvolle leerders nie.

In die geval van Atteridgeville, ‘n dorpsgebied naby Pretoria-sentraal, word die verskynsel van swak leerderprestasie weerspieël in die toestand van skoolterreine en in leerders se gedrag. Skoolterreine is verinneweer; leerders se selfvertroue is laag; hulle is onentoesiasties oor hul skole; hul interaksie met die gemeenskap is swak, en hulle beweeg nie buite hul skole om die buitelewe te ervaar nie.

Die vraag ontstaan of die landskap *buite* die klaskamer nie dalk bydrae tot die probleem nie. Indien dit die geval is, moet daar ‘n manier gevind word om die landskap te manipuleer sodat struikelblokke ten opsigte van leerderprestasie uigeskakel en leer bevorder word.

Hierdie tesis ondersoek die gedagte dat die buitelug-landskap in Atteridgeville ‘n rol kan speel om leerders te help om hul volle potensiaal te bereik. As sulks begin die ondersoek met Atteridgeville. Die ondersoek sal lei tot die seleksie van ‘n spesifieke area in Atteridgeville waar inherente moontlikhede geidentifiseer sal word. Die vorm van die projek sal onstaan uit hierdie moontlikhede, bygestaan deur teorie en ‘n konsep.

Metodes moet gevind word om die leer- en ervaringspotensiaal van skoolterreine en nabygelëe ruimtes te ontwikkel in ‘n dorpsgebied waar natuurlike ruimtes bedreig word en waar sosiale en fisiese struikelblokke ten opsigte van leerder-prestasie voorkom.

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Glossary of terms

Social sustainability

Social sustainability refers broadly to the cultural appropriateness of any new intervention. If a new intervention respects the cultural values of the community it services, and supports the use of cultural activities of that community, then the intervention will be viable in the long term and is thus sustainable.

Economic sustainability

Economic sustainability refers to the economic longevity of any new intervention. Any intervention that contributes towards recovering its own construction and management costs, and also provides income and job opportunities for community members will remain economically viable for a long period of time and is thus sustainable.

Environmental sustainability

Environmental sustainability refers broadly to the ability of a new intervention to minimize degradation of the natural environment and maintain biodiversity. Any new intervention should aim to protect nature.

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Chapter 1: Introduction

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1.1 Introduction: The problem in context

1.1.1 Learner performance in South Africa

Children have the right to education. Sub-section 29 of South Africa's Constitution states that: *"Everyone has the right to a basic education, including adult basic education; and to further education, which the state, through reasonable measures, must make progressively available and accessible"* [Constitution 1996, 1257].

In post-apartheid South Africa, it is important that access to these rights must be provided for communities that were denied them in the past. National government allocates about 20% of total state expenditure towards education [www.SouthAfrica.info]. Local government provides funding and support services to schools in old townships and previously excluded communities. Funding and support services aim to erase the legacy of a racially divided and unequal education system and to bridge physiological barriers to education such as insufficient nutrition and long travel distances between schools and residences.

However, despite all these efforts to advance education, the reality is that the public education system still fails to produce enough successful learners. Currently, only 87% of school aged children reach secondary level education institutions. Only 20% of these learners reach tertiary level institutions after matric and of this number only 15% graduate from said tertiary institutions [The Human Sciences Research Council, as cited in Ramdass and Kruger, 2009].

According to research done at the University of Stellenbosch, the bulk of the learner performance disparity in South African schools occurs between the top 20% richest schools and the rest of the schools. Excluding these rich schools, almost all schools, irrespective of the socio-economic status of their learners, struggle with low learner performance. This is reflected in the large disparity in literacy and numeracy scores between the top 20% and the other 80% of schools [van der Berg, 2008].

According to an article in the Mail & Guardian, when ranked by the performance of the poorest 25% of learners, South Africa was being outperformed by countries such as Malawi, Mozambique, Lesotho, Uganda, Zimbabwe and Namibia [www.mg.co.za].

Considering the fact that learner performance is by far the lowest in schools in poor, previously disadvantaged communities, and that these schools generally also spend the least amount of time and finances on beautifying and managing their schoolyards, the question of how learner performance is being affected by the landscape outside the classroom deserves further consideration.

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1.1.2 Defining the landscape outside the classroom

The landscape outside the classroom can be subdivided into three environments that have an effect on learner performance (See Fig. 1):

1. *The school environment (Physical spaces between school buildings)*

2. *The community environment (Community social gathering spaces along the school edges)*

3. *The natural environment (Physical landscape directly outside the school)*

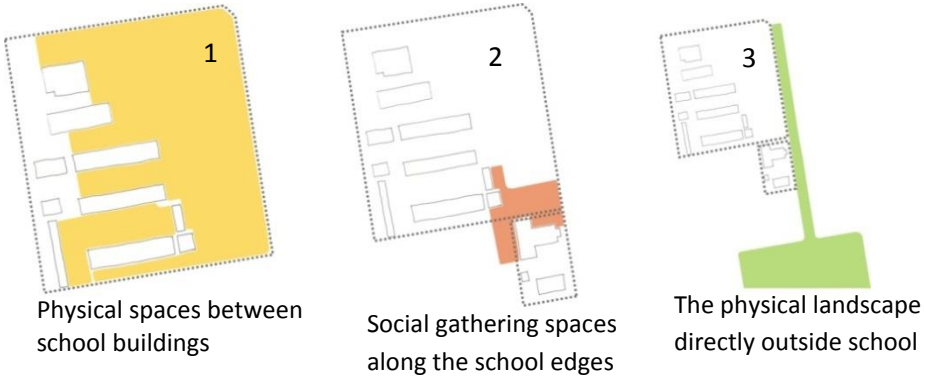

Fig. 1 The landscape outside the classroom subdivided into three environments

Learner performance is negatively affected by problems that exist in these three environments outside the classroom. The problems are different for each community and are most prevalent in schools in poor, previously disadvantaged communities in old townships and rural areas.

1.1.3 Low learner performance in Atteridgeville

Atteridgeville is a township ten kilometers to the west of the Pretoria Central Business District. This township struggles with the issue of low learner performance. In schools in Atteridgeville the landscape outside the classroom negatively affects learner performance in the following ways:

Under-designed schoolyards

The under-designed open spaces on the school property contribute towards low motivation among learners. Learners are not dedicated to their education. They stay away too often and late-comings are common. A school environment must provide enough stimulation, enough spaces for relaxation and must satisfy the educational needs of 21st century learners in order for them to enjoy their school experience and to provide them with incentives to stay in school. Environmental psychology, urban design theory, and current best practice in schoolyard design will be studied to provide the solution for this problem.

No supplementing of the national curriculum

The national curriculum taught inside the classroom is not being supplemented outside the classroom. Analyses have revealed that learners learn everywhere in and around schoolyards, not just in class.

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Outdoor spaces between classrooms have much potential to facilitate and supplement the formal curriculum taught within the classroom. Unfortunately this opportunity has been largely missed by school management bodies in old townships like Atteridgeville. The theoretical fields of active learning and experiential learning will provide the body of knowledge from which solutions to this problem are drawn.

Separation from the community

Schools do not interact with the communities around them. In old townships like Atteridgeville the school governing bodies shield their learners from the surrounding communities during school hours for fear of undesirable elements in the communities. Although well justified, this approach to education discourages learners from finding ways to communicate with community members safely, and productively. A real opportunity exists for schools in Atteridgeville to reach out to community centers such as churches and crèches situated around them, and become involved in what these community centres are doing. Learners can learn important community and social skills during this process. Environmental sustainability strategies, community sustainability strategies, and urban agriculture will be researched to solve this problem.

Separation from nature

Schools are disconnected from nature. Learners avoid natural areas because these are dangerous. They are rugged, have dangerous obstacles, and villainous characters that dwell in them. But learners are missing out on a real opportunity to learn environmental awareness and sensitivity, environmental knowledge, environmental stewardship, and environmental skills in nature. The ability of exposure to nature to improve learners' concentration in class is another reason why learners should connect with nature. Schools should focus on taking learners out into nature. Best practice in the field of outdoor learning, environmental education as well as attention restoration theory will be researched to solve this problem.

Landscape architecture (manipulation of the landscape) can combat low learner performance by solving problems that negatively affect learner performance in the landscape outside the classroom.

In the case of schools in Atteridgeville a landscape intervention that supplements the national curriculum, facilitates environmental education, facilitates social skills learning, and also improves the overall condition and learner-friendliness of the spaces outside the classroom, will improve learner performance.

This statement will be tested in a primary school in Atteridgeville.

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1.3 Problem identification

1.3.1 Problem statement

The author will be studying the problem of how the outdoor environment can be manipulated so that it improves learner performance in a school in Atteridgeville.

Emphasis will be placed on creating and identifying landscape strategies that make the schoolyard more learner-friendly, strategies that allow for spaces outside the classroom to facilitate learning of the national curriculum, strategies that allow learners to gain social skills from community members and strategies that allow for environmental education to be facilitated in the natural landscape outside the school.

1.3.2 Hypothesis

Manipulation of the landscape can create a learner-friendly outdoor learning environment that supplements the national curriculum, facilitates social skills learning as well as environmental education, and thereby improves learner performance.

1.3.3 Research questions

- What is the relationship between learners and the outdoor environment?
- What role does the outdoor environment play in improving learner performance?
- What landscape strategies can be used to make schoolyards more learner-friendly and satisfy learner needs?
- What landscape strategies can be used to make the environment outside the classroom facilitate different forms of learning?

1.3.5 Aims of this project

In order to improve learner performance, landscape architecture must provide solutions to problems in the landscape outside the classroom.

This landscape intervention will aim to:

- Counter low learner motivation by creating spaces that provide stimulation and incentives to stay in school and also satisfy the needs and expectations of 21st century learners.
- Improve learners' grasp of the curriculum by creating spaces that facilitate learning aspects of the curriculum outside the classroom.

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- Improve social skills among learners by creating social spaces that facilitate social skills exchange between learners and community members.
- Improve environmental skills among learners by facilitating environmental education in a natural environment.

1.4 Possible client

The legal client is the Department of Education, Tshwane South District (D4) who will co-ordinate the project and ensure that it fits into their framework. The project must, however, be initiated by the school governing body. The school governing body must generate funding and sponsorship for the project from corporations and organizations.

1.5 Design process

The design process for this project will essentially consist of:

1 Identification of theoretical strategies for improving learner performance and possible locations for them.

2 Identification of environmental aspects of the national curriculum and possible locations for them.

3 Overlay 1 and 2 to develop a program.

4 Identify a site.

5 Analyze the site to identify the opportunities and constraints it holds.

6 Overlay the program and the opportunities and constraints that the site presents.

7 Add a concept to create the final design.

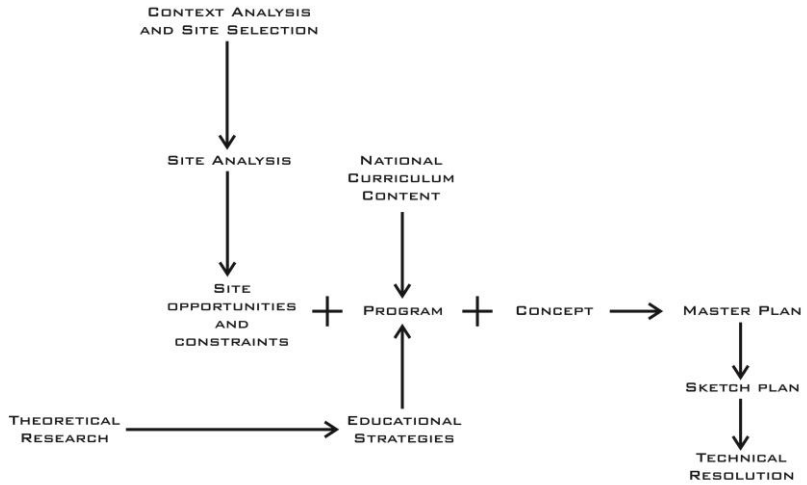

Fig. 2 showing the design process for the proposed landscape intervention

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Chapter 2: Theory

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2.1 Introduction

This thesis focuses on the potential of the environment outside the classroom to assist in improving learner performance.

For this reason the research conducted includes, firstly, an exploration of the relationship between the outdoor environment and learning. Research will also be conducted into the role that the outdoor environment plays in improving learner performance, with emphasis on improving learner comfort, supplementing the curriculum outdoors, facilitating contact with the community and facilitating contact with nature. The research will culminate in a list of strategies for improving learner performance outside the classroom and ideas on where to employ them.

2.2 Relationship between the outdoor environment and learning

2.2.1 Ecological psychology

Ecological psychology is a faction within the field of environmental psychology that defines the physical environment as having a direct impact on a person's behavior.

Ecological psychology premises that a school functions similarly to an ecological system in that; in an ecological psychology sense a school environment is comprised of multiple ecosystems that call forth particular behavior in the learner based on expectations and requirements of both the learner and the environment. As learners move through their ecological environment, they are both a product of and a producer of change. This is how learners interact with their school environment [Veich and Arkkelin, 1995].

The school outdoor environment shapes behavior and learning

The environment around school buildings has a definite impact on students' ability to learn. The environment affects behavior and this in turn affects learning, therefore the school environment must affect learning [Tanner, 1999].

When investigating the role that school outdoor spaces play in improving learner performance, two theoretical directions can be followed.

The first direction involves studying how the outdoor environment can improve learner comfort. If the outdoor environment shapes behavior as explained above, then a comfortable outdoor environment that matches learners' abilities and inclinations will influence learning in a positive way.

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The second direction involves studying how the outdoor environment can facilitate learning**. See sections 2.3.1** and **2.3.2** respectively for a further explanation of the research conducted regarding improving learner comfort and facilitating learning of the curriculum.

2.2.2 Symbolic interaction theory

In the field of social psychology, *symbolic interaction theory* is often used to describe the relationship between the individual and society, and how the community influences a person's behavior. Important premises of the symbolic integrationist approach to social psychology are that:

- Human beings act toward things on the basis of the meanings that they have assigned to them and these meanings arise in the process of interaction between people.
- It is through interaction with each other that humans develop a concept of larger society and also of self.
- This understanding of society and one's role in society affects behavior [LaRossa and Reitzes, 1993].

Contact with the community shapes social knowledge and skills

Learners are shaped by the community in the following way; as the learners converse socially with other people, they develop an understanding of how to adapt their own behavior to suit the societal norms and values that they discover in those people they interact with. Interaction with community members improves and adds to learners social skills sets.

When investigating the role that the community plays in improving learner performance, it is important to maximize this educational opportunity found in interaction between learners and community members, and to study theory regarding how best to facilitate safe, sustainable contact between learners and the community. **See section 2.3.3** for further research regarding facilitating contact with the community.

2.2.3 Evolutionary preference

Numerous studies have illustrated that children enjoy being in natural outdoor environments. According to Wells and Evans (2003), childrens' preferred environments include a predominance of natural elements. Exposure to nature is generally considered advantageous to human health and wellbeing due to the fact that humans display many built-in positive responses towards nature, including reduced stress, improved concentration, positive emotional states and improved creativity [Kellert and Wilson, 1993].

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Contact with nature supports learning

Since contact with nature relieves stress, improves concentration and improves creativity as explained above, exposure to nature should therefore influence learning positively.

When investigating the role that nature plays in improving learner performance, emphasis must be placed on studying theory regarding the best ways to facilitate contact between learners and nature. **See section 2.3.4** for further research regarding facilitating contact with nature.

2.3 The role of the outdoor environment in improving learner performance

2.3.1 Improving learner comfort

2.3.1.1 Environmental psychology

In the field of environmental psychology, the term 'learning environment' is mostly used to describe space directly surrounding the learner. Most of the research focuses on the insides of classrooms, school corridors and insides of school buildings. Only some of the principles of improving learner are therefore applicable outside the classroom. Barrett and Zhang (2009) proposed the following principles for improving learner comfort that were more applicable spatially.

- School spaces should contain natural elements because humans have basic needs for light, air and safety, and natural elements satisfy this need. Humans intuitively find natural elements to be nurturing and sustaining.

- School spaces should provide learners with some level of variety, flexibility and choice because all people perceive the world differently and, accordingly, they act differently.

- While spaces should not detract from the ability to focus, they can provide sensory stimulation that influences learners' experience, and thus learning.

2.3.1.2 Urban design theory

Schoolyards are semi-public spaces and the relationships between the different school spaces are similar to relationships in urban areas. Tanner (1999) discusses the merits of having a pattern language for schools similar to Christopher Alexander's pattern languages. In this approach there are certain spatial principles that are applicable to schoolyards. These principles include:

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- A sequence from larger public to smaller private spaces, giving the effect of drawing people into a specific area.
- Views from smaller spaces into larger spaces.
- Outdoor spaces close to the school building where trees, grass or gardens may be seen, but cars or roads are hidden from view.
- Outdoor rooms designed to function like extensions of the classrooms, but with the added benefits of natural elements.
- Entrance areas that are inviting and highly visible for learners and visitors, and that evoke a "welcome" feeling [Tanner, 1999].

Marcus & Francis (1997) propose the following principles for large semi-public places with free-standing buildings where open views, freedom of movement, durability and robustness are required (e.g. university campuses or large school campuses):

- Define spaces directly in front of learning halls that function similarly to front porches – welcoming visitors in and providing space to gather in front of the learning hall entrances.
- Define large open spaces in front of buildings that function similarly to front yards – allowing learners to sit comfortably on lawn areas where they can eat and socialize.
- Define smaller areas behind buildings that function similarly to backyards – allowing only small groups of learners for more privacy or quiet learning.
- Define large, semi-public spaces near the entrances and important administrative buildings that function similarly to plazas – welcoming visitors to the site and providing for large amounts of movement.

2.3.2 Facilitating learning of the curriculum

Most approaches that promote learning of the curriculum outside the classroom are opposed to traditional classroom-based learning in that traditional learning has always been considered ineffective due to its top-down approach. In a traditional classroom setting information is transmitted from the teacher to the learner in one direction only, resulting in the learner being fed exterior stimuli only. Many theorists now claim that true learning cannot happen in this way because true learning originates within the learner in the form of curiosity, and that learning is driven from a personal desire within. Outdoor open spaces are generally considered to be advantageous for true learning because they allow for learners to move freely and to choose their own areas of interest. Outdoor spaces also contain infinitely more potential stimuli than classrooms, allowing them to capture learners' interest for longer periods.

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2.3.2.1 Active/experiential learning

Active learning is defined as "learning in which the child, by acting on objects and interacting with people, ideas and events, constructs new understanding" [Hohmann and Weikart, 1995, 17].

History of active learning

The notion of active/experiential learning stems from the work of educational psychologists Jean Piaget and Lev Vygotsky. In the 1920s Piaget was the first to propose the idea of different stages of cognitive development amongst young learners, opposing the widely-held belief of the time that learners were like blank slates just waiting to be crammed full of information. Vygotsky supported Piaget's views but differed in opinion regarding the rigidity of the Piaget's stages of development and the role that social interaction played in cognitive development. Piaget and Vygotsky's work eventually diverged into two different schools of cognitive theory, both of which consider learning to be intrinsically motivated.

Key principles of active/experiential learning

Later work developed by David Kolb proposes that learning happens in a continuous cycle. The four stages of the cycle are:

- **Concrete experience** of something (e.g. riding a bike).
- **Reflection** on that experience on a personal basis.
- **Abstract conceptualization** leading to the ideation of ways to improve the next occurrence of the experience.
- **Active experimentation**, leading in turn to the next experience, this time slightly improved [Learning and teaching website].

Hohmann and Weikart (1995) describe the active/experiential learning process as containing the following components: direct action on objects, reflection on actions, intrinsic motivation and invention, and problem solving.

It is clear from the above that learning, especially amongst young learners, is active, experimental and experiential. This new understanding has orchestrated a change in the role of the teacher. Teachers thus become facilitators of experiences. The practicality of active/experiential learning is that when it is used to supplement traditional learning in the form of the school curriculum, it allows for teachers to bring learners into physical contact with those aspects of the curriculum embodied in vegetation, landscaping and animal life present on the school grounds.

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2.3.2.2 Learning through play

Learning through play is especially popular amongst young learners. It is linked to stronger social skills and increased creative development.

Play is a process through which children learn about themselves and the world around them. They learn through experimenting, taking risks, undertaking challenges, and testing their limits [Foster et al, 2006].

A landscape intervention that maximizes all opportunities for creating play spaces outside the classroom will aid in learner development. Amouzegar et al. (2010) propose guidelines for creating places for outdoor play. These guidelines suggest that in order to achieve experiential learning, designers should focus on creating spaces that improve motor movement, improve cognitive skills, improve social skills, improve affective (touch-related) skills and improve emotional skills.

2.3.2.3 The national curriculum

The national curriculum lends itself to experiential learning. Many of the study themes have content that can be expanded upon outside the classroom. The study themes most applicable to learning outside the classroom are those that draw their content from real world issues. These include *Natural Sciences and Technology, Social Sciences,* and *Life Skills.*

2.3.3 Facilitating contact with the community

2.3.3.1 Improving safety

The concept of safety, both inside and around the school property, has long been considered to be an important factor influencing learner performance.

"In-depth inquiry requires an ambience in which children can 'lose' themselves… in the sense of feeling safe from attack, intrusion and exposure, which makes them self-conscious about their performance" [Olds, 1979 as cited in Rivlin and Weinsten, 1984, 358].

A passive approach to safety

In his book *Defensible Space: Crime Prevention for Urban design,* Oscar Newman proposes that the perceived safety of any environment is dependent on:

- The capacity of the environment to create zones of territorial influences.
- The capacity of the environment to provide surveillance opportunities for residents and their agents.
- The capacity of the environment to influence people's perception of its uniqueness, isolation, and stigma [Newman, 1973].

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2.3.3.2 Urban agriculture

Defining urban agriculture

Urban agriculture can be defined as "the growing of plants and the raising of animals within and around cities" [www.ruaf.org]. Urban agriculture is integrated into the urban economic and ecological system. Urban agriculture promotes, among other things, the following:

- The use of local urban residents as laborers.
- The use of urban organic waste as compost and urban wastewater for irrigation.
- Connecting with urban consumers [www.ruaf.org].

Why urban agriculture in Atteridgeville?

In Atteridgeville, households with an adult equivalent income of less than R1 400 per month spend on average 40% of their income on food [van Averbeke, 2007]. Farming families in Atteridgeville use most of their produce for subsistence purposes, allowing them to spend less of their income on food. Urban agriculture therefore contributes to food security in Atteridgeville.

In Atteridgeville, schools provide valuable open space in which urban agriculture can be practiced. A school-initiated urban agriculture project will definitely attract community interest and participation in Atteridgeville, thereby connecting schools and communities.

2.3.3.3 Improving social and economic sustainability

Defining sustainability

One of the simplest and most widely used definitions for sustainability is: "*Meeting the needs of today's population without diminishing the ability of future populations to meet their needs*" [Thompson and Sorvig, 2000, 2].

In order to be truly sustainable, any new intervention must be socially sustainable, environmentally sustainable and economically sustainable. **See Glossary of terms** for definitions of these three terms. Designing for social and economic sustainability will be discussed in this section because these two aspects of sustainability are most applicable to facilitating the connection between learners and the community.

Achieving social and economic sustainability

In the relatively young field of service design, *community service design* focuses on increasing the sustainability of community projects by managing the relationship between community projects and potential clients. The aim of community service design is to manage the public exposure of community projects by maximizing community interest and participation, as well as maximizing buyer interest. Community service design involves strategies such as: branding of community services, designing for a sense of ownership amongst community members,

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designing for a sense of responsibility amongst community members and managing volunteer participation [www.servd.us].

Most schools have the ability to initiate community projects such as vegetable gardens or art galleries. All of these community service design strategies are perfect for improving community participation in a school initiated project.

2.3.4 Facilitating contact with nature

2.3.4.1 Outdoor learning

Outdoor learning does not have a clear definition but it is essentially experiential learning that takes place outdoors and focuses on educating children about nature. Outdoor learning is suited to but not restricted to schoolyards.

> *"Educators have used the outdoors for teaching, gardening and physical education for more than 100 years. Today, as suburban and urban living becomes ever more the norm and computers dominate as the focus of social interaction, children are becoming distanced from nature. Along with the looming threat of worldwide degradation of our natural resources, there is a heightened international awareness of the importance of environmental stewardship. Part of that is heightened attention to outdoor learning"* [Wagner and Gordon, 2010, 1].

Outdoor learning has been in practice in England and Germany since the late 19th century. Some of the earliest examples of outdoor learning programs are the Nature Study Movement in 19th century England and the Salem School of Kurt Hahn in Germany in the 1920's. These early institutions influenced the structure of many of the newer outdoor learning institutions, for example, Kurt Hahn's thinking helped to shape the principles of the Outward Bound Trust, one of the largest existing outdoor learning institutions [Tarran, 2010]. Today outdoor learning retains its initial focus on supplementing the curriculum with field work and field trips, but has also expanded greatly to include, among others, the concepts of environmental education and outdoor adventure education [Sanders, 2004].

Some of the key principles of outdoor learning, as put forward in the objectives of the Outward Bound Trust are:

- **Self-development** – Developing self-awareness, confidence and motivation. Understanding and assuming personal responsibility.
- **Social development** – Increasing social awareness and communication skills. Understanding how to create effective relationships and how to function as part of a team.

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- **Values** – Consideration of your own and other peoples' values.
- **Environment** – Experiencing education in, about and for the environment. This includes natural and urban environments.
- **Service** – Experiencing and understanding what it means to be of service to others [The Outward Bound website].

A properly structured didactic experience of the environment outside the classroom such as can be achieved through outdoor learning, could play an important role in guiding learner development.

2.3.4.1 Environmental education

Environmental education is a form of outdoor learning that focuses on taking learners into a natural landscape and teaching them environmental awareness and sensitivity, environmental knowledge, environmental stewardship, and environmental skills.

"Bringing the student and his teachers into direct contact with the continuum of natural events in familiar surroundings, may be the most efficient way of ensuring a knowledgeable and informed concern for the larger environment. It may also be the most relevant basis for environmental education" [Young and Ngale, 1996, 7].

2.3.4.2 Attention restoration theory

Attention Restoration Theory, a part of the field of environmental psychology, forwards the notion that exposure to nature restores people's mental resources. It is particularly applicable in school situations, for example: analysis in a university setting showed that compared to university dormitory residents with less natural views from their windows, those with more natural views scored better on tests of directed attention and their attentional functioning was discovered to be more effective [Tennessen and Cimprich as cited in Berto, 1995].

When concentrating, learners employ directed attention. Directed attention allows learners to focus on a specific task by inhibiting the urge to respond to possible distractions. This form of attention takes energy to sustain, and can become depleted. The only way to restore directed attention is to not use it. According to *Attention Restoration Theory,* exposure to nature allows directed attention to rest and recover from use. This rest and recovery is due to *four characteristics* ascribed to natural environments:

Fascination

Nature's tendency to draw one's attention effortlessly (involuntary attention) allows for the inhibitory mechanisms that underlie directed attention to rest.

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Being Away

Being away from one's daily concerns permits a mental vacation.

Extent

The *extent* of the environment provides a scope or depth in which one can become immersed.

Compatibility

A setting that is *compatible* or well-matched with one's inclinations allows attention to rest [Berto, 1995].

2.4 Conclusion: Broad educational goals

Mentioned below are six broad design goals derived from the theoretical research. These goals must be achieved by the proposed landscape intervention in order for it to improve learner performance. An outdoor environment has the potential to improve learner performance when:

1. It encourages improved and increased interaction between learners and the school outdoor spaces.
2. It facilitates learning of environmental aspects of the curriculum outside the classroom.
3. It encourages increased interaction between learners and the community.
4. It facilitates social skills exchange between learners and community members.
5. It encourages improved and increased interaction between learners and the natural landscape outside the school.
6. It facilitates learning of environmental education in the natural landscape outside the school.

2.4.1 Summary of strategies to be used

The six broad design goals can be broken up into different strategies that should be employed together to improve learner performance. These strategies are summarized below.

2.4.1.1 Improving and increasing learner/outdoor space interaction

1) Learner friendly spaces

University campus landscapes are made to be robust and flexible, and to represent the ethos of the institution. They must also accommodate high traffic volumes. Schools in Atteridgeville have similar high traffic volumes and also lack clearly defined spaces outside the classroom. Successful university space typologies must be applied at a school in Atteridgeville in order to improve circulation,

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orientation and overall learner comfort directly adjacent to classrooms.

The four campus space typologies that would be beneficial for schools in Atteridgeville are:

Front porch spaces Can accommodate seating, individual and group studying, waiting for class, and socializing.

Front yard spaces For eating, socializing and relaxing in small or medium sized groups.

Backyard spaces For individual studying by learners and for small private gatherings at break times.

Plaza spaces For large gatherings and orientation.

2.4.1.2 Supplementing the curriculum outside classroom

2) Outdoor classrooms

The England Department of Skills and Education sets out guidelines for creating outdoor classrooms. Outdoor classrooms must:

- Be near enough the school to use easily but far enough away not to disturb other classes.
- Be next to a natural or man-made feature that is frequently studied.
- Provide shade and shelter at different times of the year.
- Fulfil a particular purpose (not multi-functional).
- Be appropriate for the age of learners they accommodate
- Be clearly defined.
- Be able to accommodate a whole class or smaller numbers.
- Use the topography of the site.
- Have a focal point [Foster et al, 2006].

3) Experiential learning spaces (play spaces)

Outdoor play is especially popular amongst young learners. It is linked to stronger social skills and increased creative development [Miller, Trichota and White, 2009].

Through play, children can learn about themselves by:

- Experimenting
- Taking risks
- Undertaking challenges
- Testing limits

Play spaces should contain varying surfaces that stimulate all the senses, encourage motor movement and dialogue. A landscape intervention that maximizes all opportunities for creating play spaces outside the classroom, will improve learner/school environment interaction and aid in learner development at the same time.

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2.4.1.3 Improving and increasing learner/community interaction

4) Defensible spaces for all school access points

The physical and social landscape around Atteridgeville schools needs to be made safer for learners. The danger that the undesirable elements in the community pose must be mitigated if learners are to spend more time interacting with the public social community outside the school.

A landscape intervention can employ defensible space strategies to improve and increase learner/community interaction.

Defensible space proposes passive design strategies for crime prevention such as **territoriality** and **natural surveillance** that work best in a street setting.

5) Spaces that advertise school activities

Advertising of the school sport activities, school functions, school/ community collaborations and general school information can be a good way of strengthening the relationship between the school and the community. If the school has a computer lab, it can generate its own advertising. A landscape intervention can be used to display this advertising in spaces outside the school property through which both learners and community members pass.

6) Physical connection between school and community centre

Landscape architecture can improve interaction between learners and the community environment by creating a landscape intervention that acts as a social and physical interface between the school and a community centre.

In Atteridgeville there are numerous existing halls and places of community gathering with which schools can interface, for example, the Evangelical Church situated adjacent to the south-east corner of Seaparankwe Primary School.

The school and the community centre must be connected through a landscaped space. Movement must be allowed between the school and the community centre.

2.4.1.4 Facilitating learner/community skills exchange

7) Learner/community skills exchange spaces

Learners in poor and previously disadvantaged areas like Atteridgeville lack social skills with which to service their community.

Through manipulation of the landscape, spaces can be created on the edge between the school property and a community centre where

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social skills can be exchanged between learners and community members working together around a central theme.

An example of such a central theme would be to combine the feeding scheme of the school with that of the community centre. This will allow for community and social skills regarding food preparation, food etiquette and kitchen hygiene to be exchanged between learners and community members.

2.4.1.5 Improving and increasing learner/nature interaction

8) Connection between the school and nature

A walkway must be created that connects the school to the natural areas around it.

2.4.1.6 Facilitating environmental education in nature

9) Environmental education spaces

Spaces that facilitate learning of the four components of environmental education must be created in the natural areas close to the school.

Environmental awareness and sensitivity

Take learners to the natural ridge to explore. Explain to them that natural areas are being threatened and how to behave in a sensitive manner when visiting natural areas.

Environmental knowledge

Explain to learners the ecological role that this ridge plays, and identify ecosystems on the ridge.

Environmental stewardship

Explain to learners the impact that man has had on the ridge, the effects of that and how learners can respond to that through conservatory action.

Environmental skills

Teach learners how to identify plants on the ridge and some traditional uses of these plants.

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Chapter 3: Context Analysis and Site Selection

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3.1 Context Analysis

3.1.1 The purpose of this analysis

The purpose of this context analysis is to become familiar with the general physical and social character of the study area Atteridgeville (See Fig. 3) before selecting a project site.

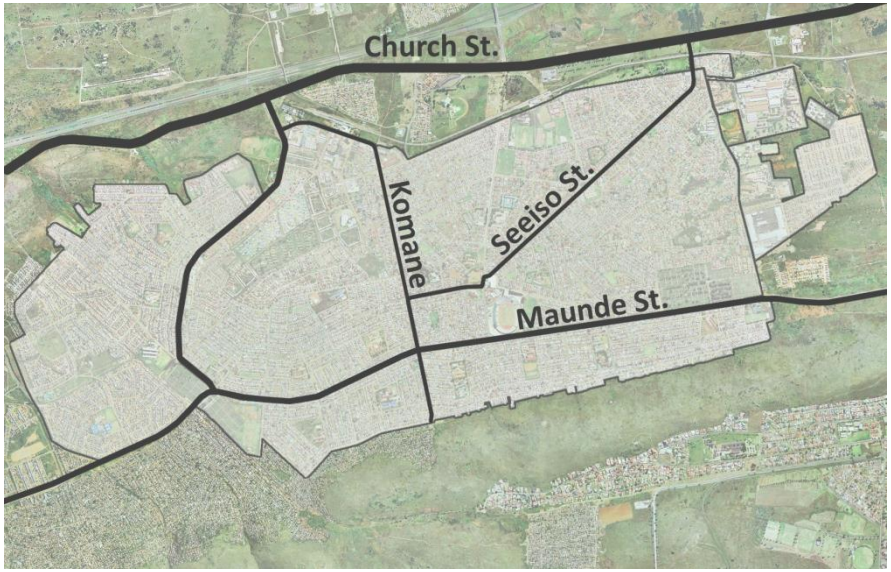

Fig. 3 showing Atteridgeville as the study area

3.1.2Atteridgeville General Information

3.1.2.1 Location

Atteridgeville is located about 10km west of the Pretoria CBD. It connects to Pretoria CBD through Church Street, the N4 freeway to the north the Pretoria-Saulsville railway system, and Kenneth Maunde Street.

Atteridgeville lies between the Kwaggasrantridge to the south, and the Daspoortrand ridge to the north. The Township is also situated on a watershed. The Skinner Spruit starts in the Kwaggasrand ridge south of the township and drains to the east. The Mogwane Spruit drains towards the Hartbeespoort dam to the west.

3.1.2.2 Founding

Atteridgeville was established as a Dormitory Town in 1939. It was the second declared black area under the 1923 urban areas act. The spatial fabric of Atteridgeville reflects apartheid urban planning strategies. It was located and designed to be separated from the Pretoria CBD by an industrial buffer strip. It was designed to be completely residential. Different races were grouped in different sectors [City of Tshwane, 2011].

3.1.2.3 Demographics

Atteridgeville and Saulsville have a combined occupy an area of 18.5 km², and a population of approximately 169, 600 people. 99% of the population is classified as Black African [www.census2011.adrianfrith.com]. The unemployment rate is 48.6%.

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3.1.3 Atteridgeville Physical Context

3.1.3.1 Ridges

Atteridgeville lies along the north-facing foothills of the Kwaggasrant ridge (See Fig. 4). The ridge vegetation is mostly grassland with some scattered trees (See Fig. 5 and 6). The ridge has a servitude running across the north-facing slope. The north-facing slope has many footpaths and can be described as lightly disturbed. The Kawaggasrant is a sensitive class 2 conservation area.

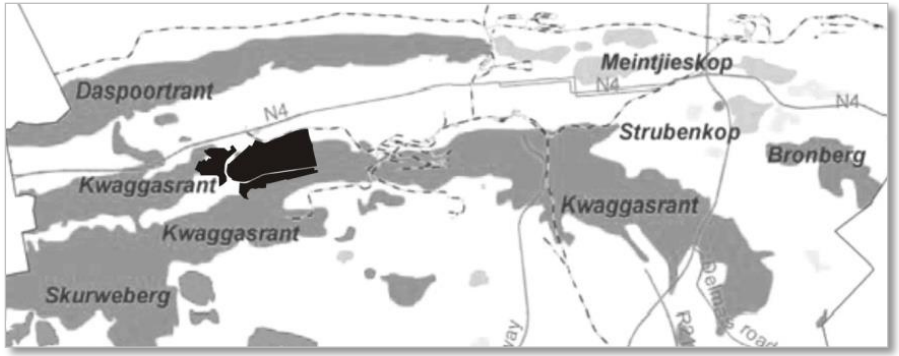

Fig. 4 Atteridgeville along the Kwaggasrant north-facing foothills [City of Tshwane, 2005]

Fig. 5 Kwaggasrant in summer [Author, 2012]

Fig. 6 Kwaggasrant in winter [Author, 2012]

3.1.3.2 Geology

The Kwaggasrant ridge contains Quartzite, Atteridgeville contains Andesite and Gabbro. The general soil character across the study area is as follows:

Soil Description	=	Rock with limited soils.
Soil Depth	=	< 450 mm.
Clay Content	=	>= 15% and < 35%.
Leaching type	=	Eutrophic soils.
Soil Class	=	GA [www.agis.agric.za].

3.1.3.3 Fauna

Animal species residing on the Kwaggasrant include Guinue-fowl, small rodents, and doves.

3.1.3.4 Veld-type

The Kwaggasrant is part of the Bankenveld [www.agis.agric.za].

3.1.3.5 Vegetation type

Atteridgeville falls within a transition between rocky Highveld grassland and mixed bushveld [www.agis.agric.za]. Some of the plant species prevalent in the area include: *Themedatriandra, Diheteropogon amplectens, Trachypogon spicatus, Acacia caffra, Acacia rubescens, Acacia tortilis, Rhus leptodictya, Dombeya rotundifolia* [www.ngo.grida.no/soesa/].

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3.1.3.6 Hydrology

The Kwaggasrant ridge acts as a watershed. The Skinner Spruit (See Fig. 8) starts in the Kwaggasrand ridge south of the township and drains to the east. The Mogwane Spruit drains towards the Hartbeespoort dam to the west (See Fig. 7).

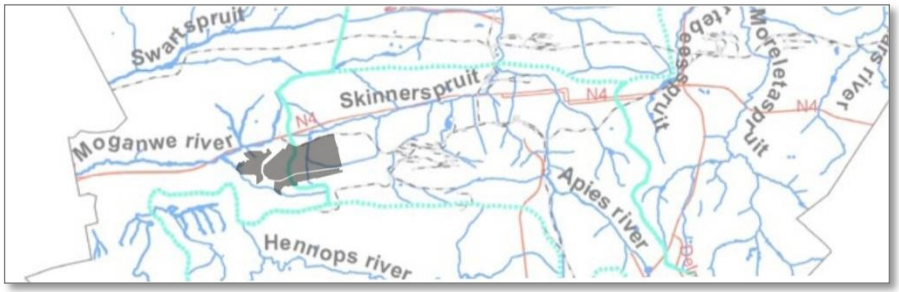

Fig. 7 The major watercourses in and around Atteridgeville [City of Tshwane, 2005]

Fig. 8 Skinner Spruit in winter [Author, 2011].

Fig. 9 Skinner Spruit emerging from Atteridgeville at Komane Street

3.1.3.7 Transport

The main transport routes in Atteridgeville are Church Street, Seeiso Street, Maunde Street, and Komane Street. Church Street transports people moving in and out of Atteridgeville. Most of these people either work in Pretoria or attend schools in Pretoria. Seeiso and Maunde Streets transport mostly learners to and from school. Komane Street transports people moving to and from Saulsville Station.

The Saulsville – Pretoria CBD railway line also transports a large number of people daily. Atteridgeville residents access the railway line through:

1. Saulsville Station
2. Atteridgeville Station
3. Kalafong Station (See Fig. 10).

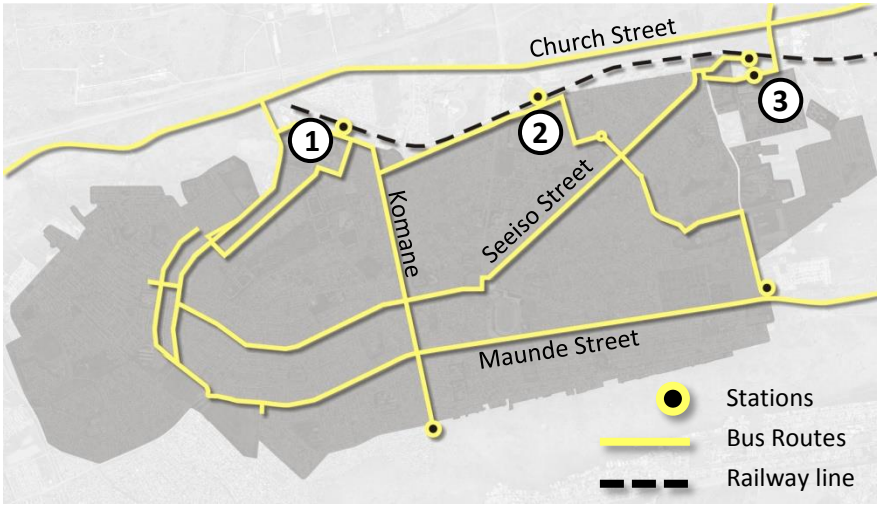

Fig. 10 Transport infrastructure in Atteridgeville

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3.1.4 Atteridgeville Social Context

3.1.4.1 Informal Settlements

Large informal settlements occur along the south-west edge of Atteridgeville (See Fig. 11). These informal settlements have been growing at a rate of just under 12% per annum for the last decade [City of Tshwane, 2011]. The trend seems to be that younger families with school-aged children generally reside in the informal settlements because of the lower rent and property rates, and older families reside inside Atteridgeville itself. Most of the learners in Atteridgeville reside in informal settlements.

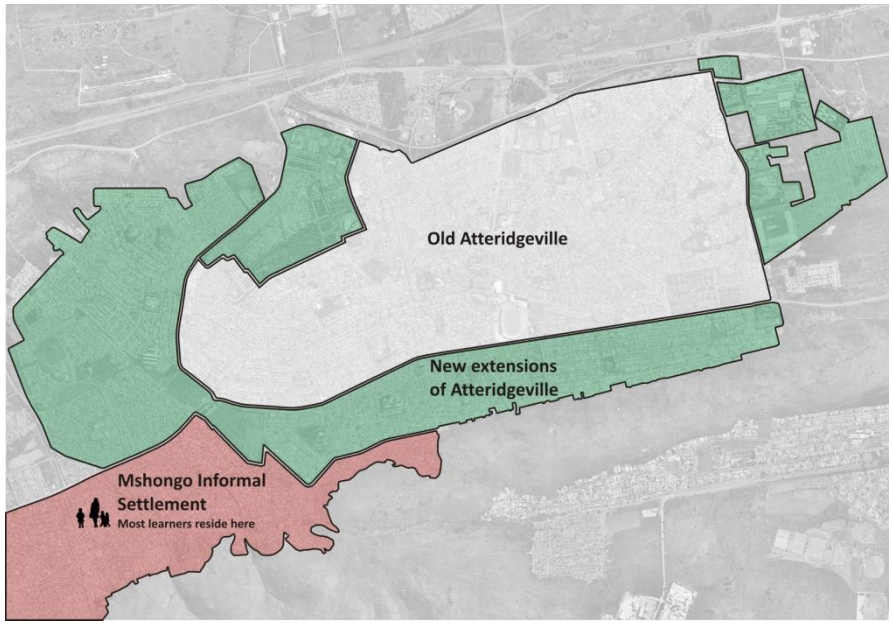

Fig. 11 Atteridgeville and Mshongo informal settlement

3.1.4.2 Important community facilities in Atteridgeville:

The most visited places in Atteridgeville include:

1. Lucas Moripe Football Stadium
2. Attlyn Shopping Center
3. Kalafong Regional Hospital
4. Mbolekwa Sports Complex
5. Saulsville Swimming Pool and Sports Complex
6. Saulsville Arena
7. Atteridgeville Plaza (See Fig. 12).

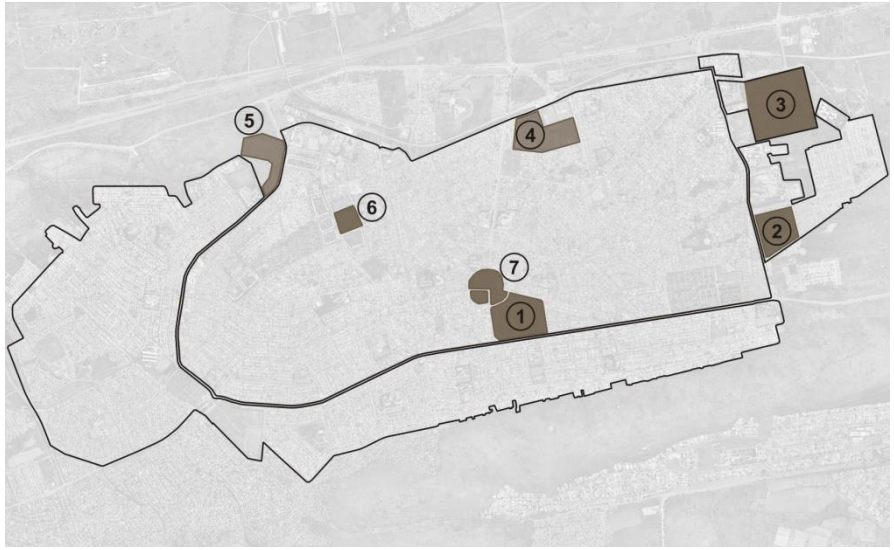

Fig. 12 Important community facilities in Atteridgeville

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3.2 Site Selection

3.2.1 The purpose of this section

This landscape intervention will focus on combatting low learner performance in the school environment, community environment, and natural environment. Therefore, a site must be chosen that combines all three these environments (See fig. 13). The site selection process involves the following:

1) Identification of all the schools in Atteridgeville (See section 3.2.3).
2) Identification of all the community centers in Atteridgeville (See section 3.2.4).
3) Identification of all the natural areas in and around Atteridgeville (See section 3.2.5).
4) Comparison of those locations where schools, community centers and natural areas are closest together (See section 3.2.6).
5) Selection of one of these locations as the project site (See section 3.3).

3.2.2 Comparing the potential locations

The following criteria are used to compare the potential locations:

- Are there many obstacles which must be crossed to move between the school, community center, and natural area (e.g. roads)?
- Are there open green spaces between the school, community center, and natural area?
- Is the community center close enough to the school to be integrated with it?
- Is the community center appropriate for the school and vice versa?
- How degraded is the natural area?
- Is there man-made infrastructure that intrudes on the natural area?
- How noticeable are these intrusions (e.g. roads are more noticeable than power lines)?

Each potential location is given a score between 0 and 3 for each of the criteria. The location with the highest overall score is selected as the project site (See Fig. 18).

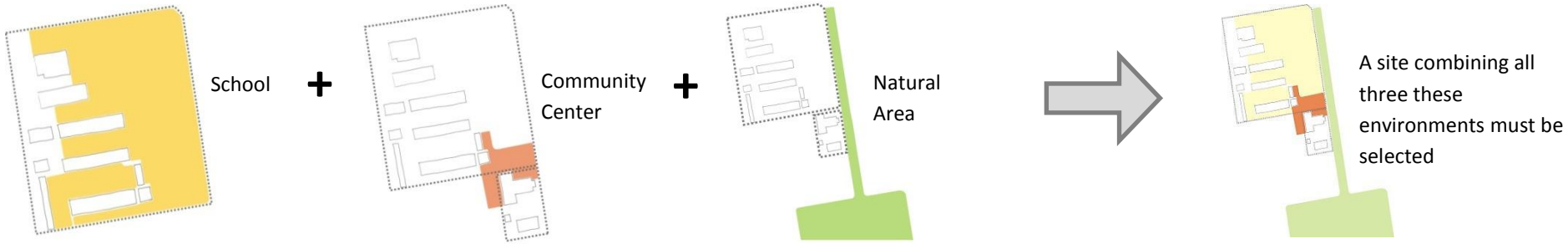

Fig. 13 showing the site selection process

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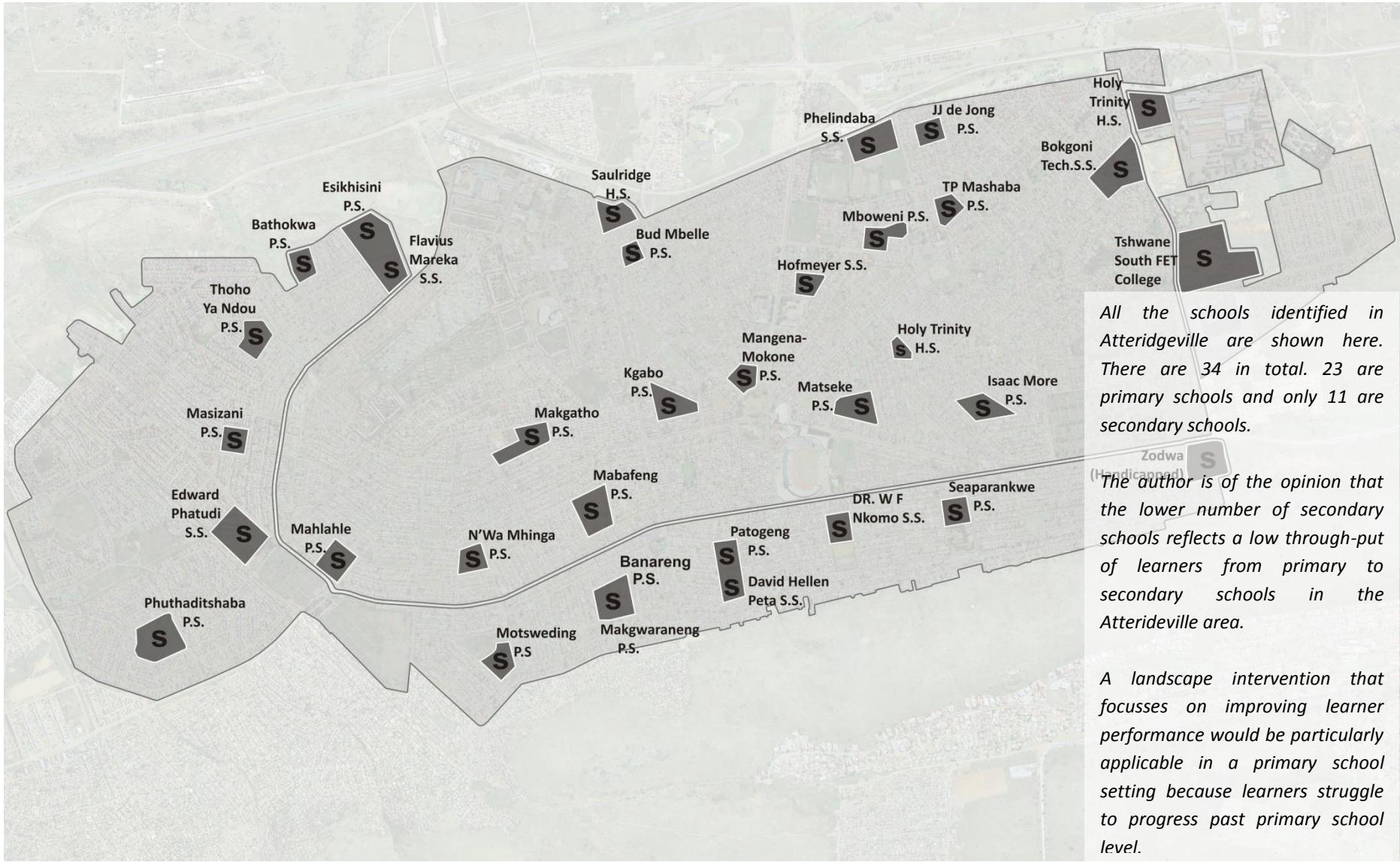
3.2.3 Schools in Atteridgeville



All the schools identified in Atteridgeville are shown here. There are 34 in total. 23 are primary schools and only 11 are secondary schools.

The author is of the opinion that the lower number of secondary schools reflects a low through-put of learners from primary to secondary schools in the Atterideville area.

A landscape intervention that focusses on improving learner performance would be particularly applicable in a primary school setting because learners struggle to progress past primary school level.

Fig. 14 All the schools identified in Atteridgeville

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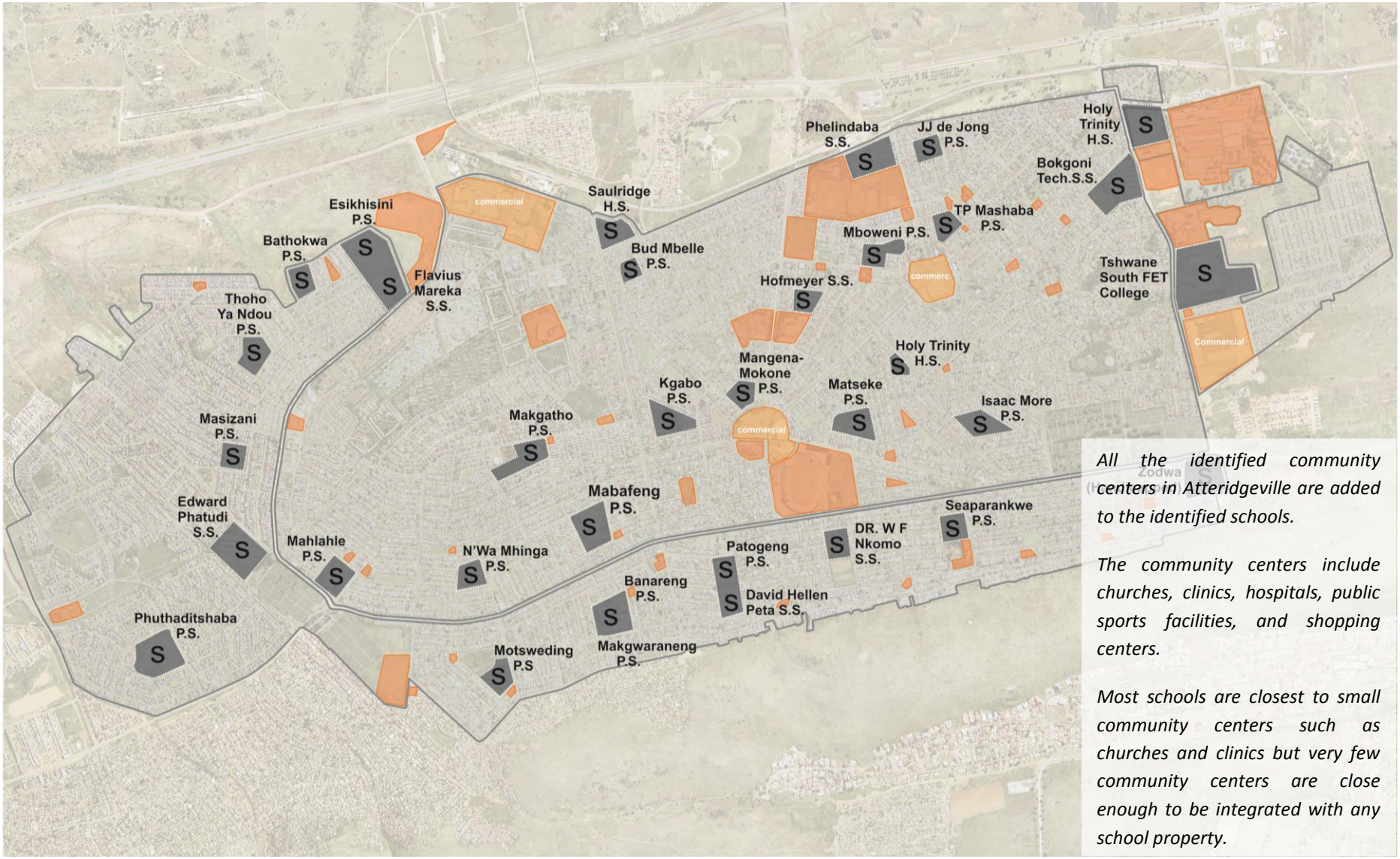
3.2.4 Schools and community centers in Atteridgeville



All the identified community centers in Atteridgeville are added to the identified schools.

The community centers include churches, clinics, hospitals, public sports facilities, and shopping centers.

Most schools are closest to small community centers such as churches and clinics but very few community centers are close enough to be integrated with any school property.

Fig. 15 All the schools and community centers identified in Atteridgeville

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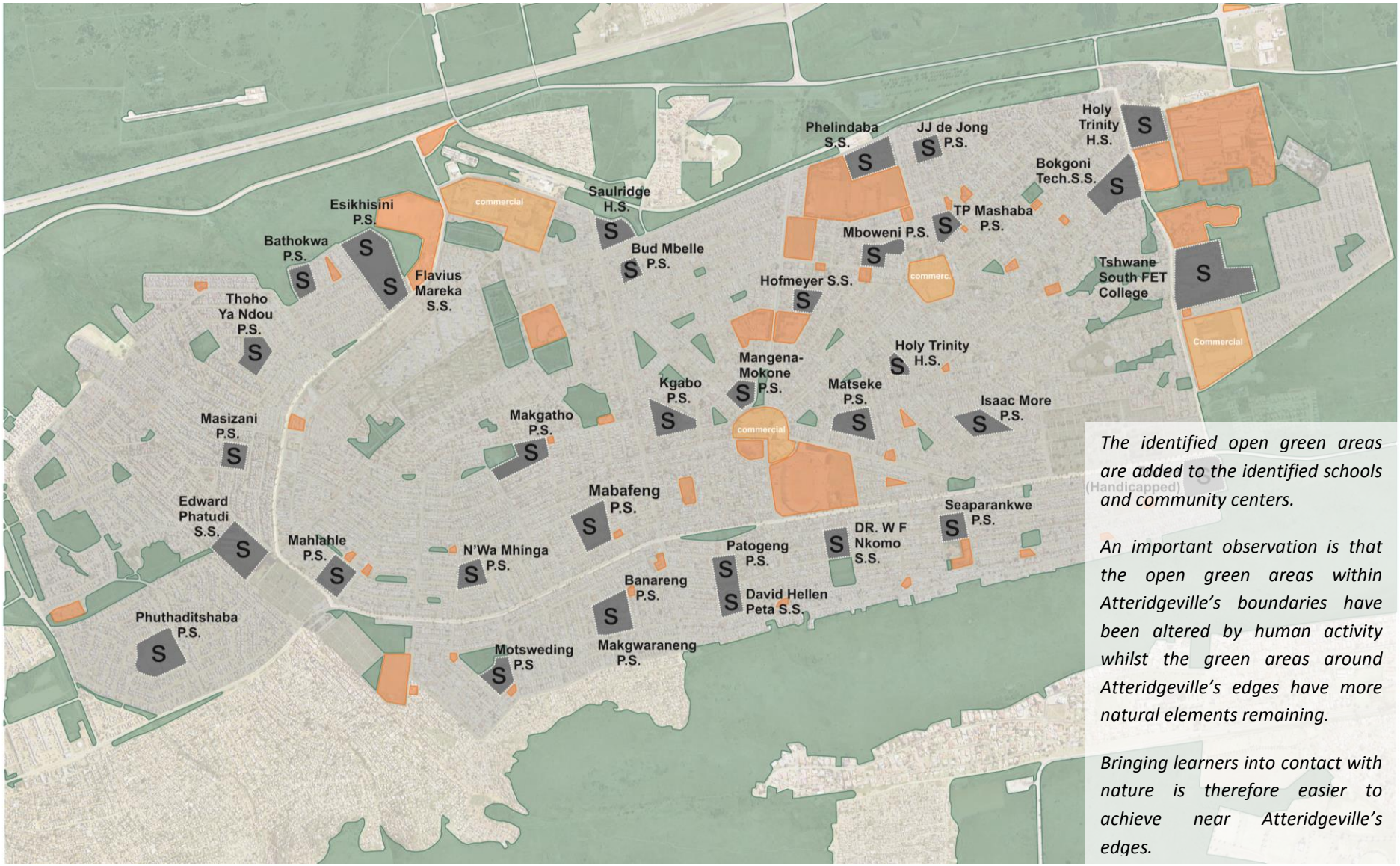
3.2.5 Schools, community centers, and green open areas



The identified open green areas are added to the identified schools and community centers.

An important observation is that the open green areas within Atteridgeville's boundaries have been altered by human activity whilst the green areas around Atteridgeville's edges have more natural elements remaining.

Bringing learners into contact with nature is therefore easier to achieve near Atteridgeville's edges.

Fig. 16 All the schools, community centers, and natural areas identified in Atteridgeville

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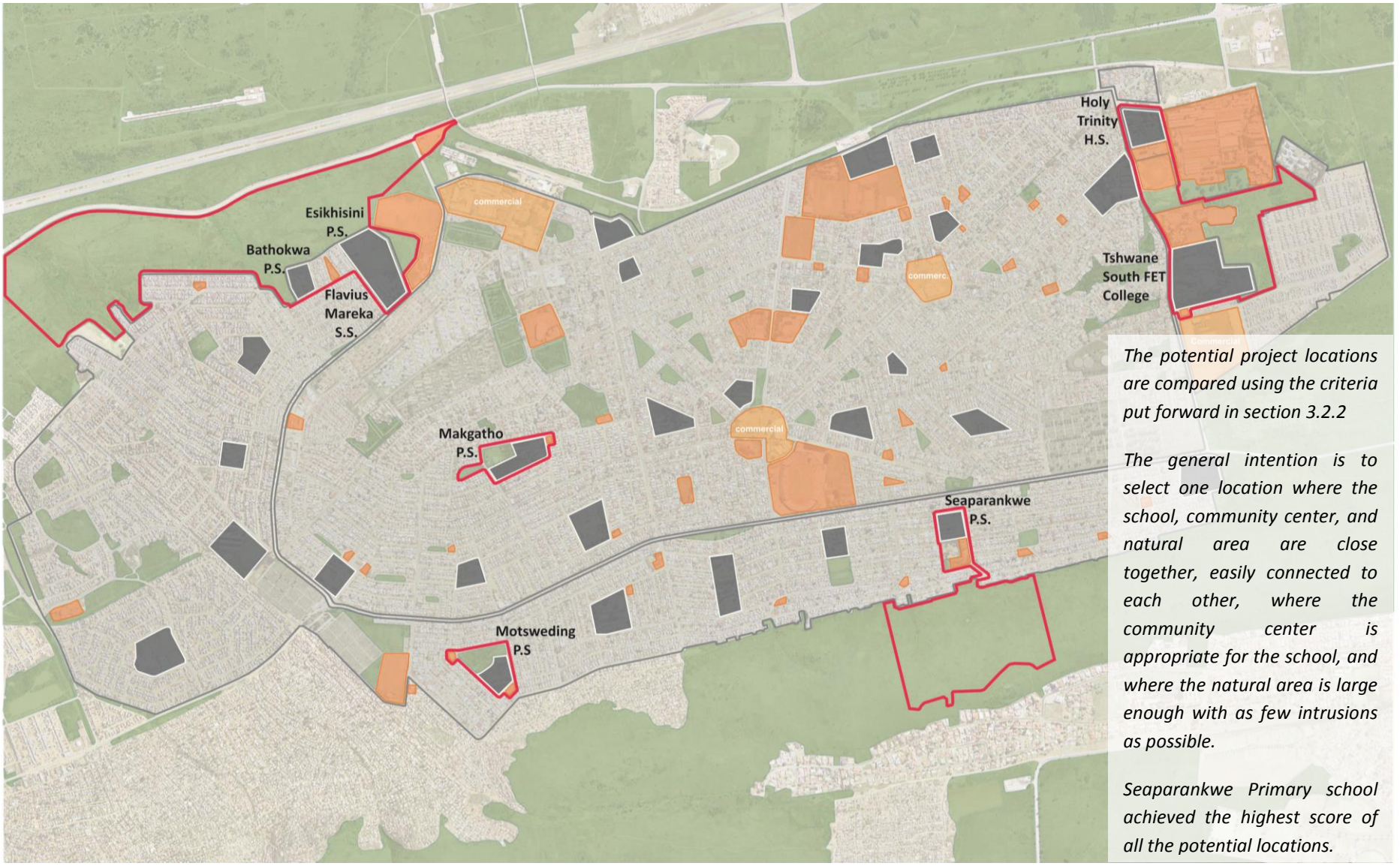
3.2.6 Potential locations for the project in Atteridgeville



The potential project locations are compared using the criteria put forward in section 3.2.2

The general intention is to select one location where the school, community center, and natural area are close together, easily connected to each other, where the community center is appropriate for the school, and where the natural area is large enough with as few intrusions as possible.

Seaparankwe Primary school achieved the highest score of all the potential locations.

 Fig. 17 The potential locations for the project in Atteridgeville

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Criteria	Bathokwa P.S	Makgatho P.S.	Motsweding P.S.	Seaparankwe P.S.	Tshwane South F.E.T.	Comments
Must many obstacles (e.g. roads) be crossed to move between the school, community center, and natural area?	**2**	**3**	**2**	**2**	**3**	The fewer obstacles there are between the three environments the better. The relative closeness of the environments, as well as the distance of the route that needs to be travelled between them is also important.
Are there open green spaces between the school, community center, and natural area?	**3**	**2**	**2**	**2**	**3**	The existence of green open spaces in-between the three environments is beneficial because these green spaces can be used as rest stops, gateway sites, or to help connect the three environments to each other.
Is the community center close enough to the school to be integrated with it?	**1**	**2**	**1**	**3**	**3**	In the case of Seaparankwe P.S. the community center is on the same city block as the school, and also touches part of the schoolyard. This makes it easier to establish the connection between the two locations.
Is the community center appropriate for the school and vice versa?	**3**	**3**	**3**	**3**	**3**	The question whether the activities of the community center could logistically take place in the schoolyard is raised here, as well as the cultural compatibility of the school and community center.
How degraded is the natural area?	**1**	**1**	**0**	**2**	**1**	Degradation refers mostly to trampling, littering, and damaging of vegetation.
Is there man-made infrastructure that intrudes on the natural area?	**2**	**0**	**0**	**2**	**0**	The two best natural areas, namely to the south near Seaparankwe and to the north-west near Bathokwa, have roads, powerlines, and buildings on or near them. The others are completely surrounded by residences and therefore don't come across as being part of nature.
How noticeable are these intrusions (e.g. roads are more noticeable than power lines)?	**1**	**0**	**0**	**2**	**0**	The natural area near Seaparankwe P.S. has visible powerlines and a reservoir. These are less intrusive than the roads and buildings located on or near the other natural areas.
Total	**13**	**11**	**8**	**16**	**13**	Seaparanwe P.S.'s community center is closest to the school and its natural area has the least intrusions.

Fig. 18 Comparison of the potential locations

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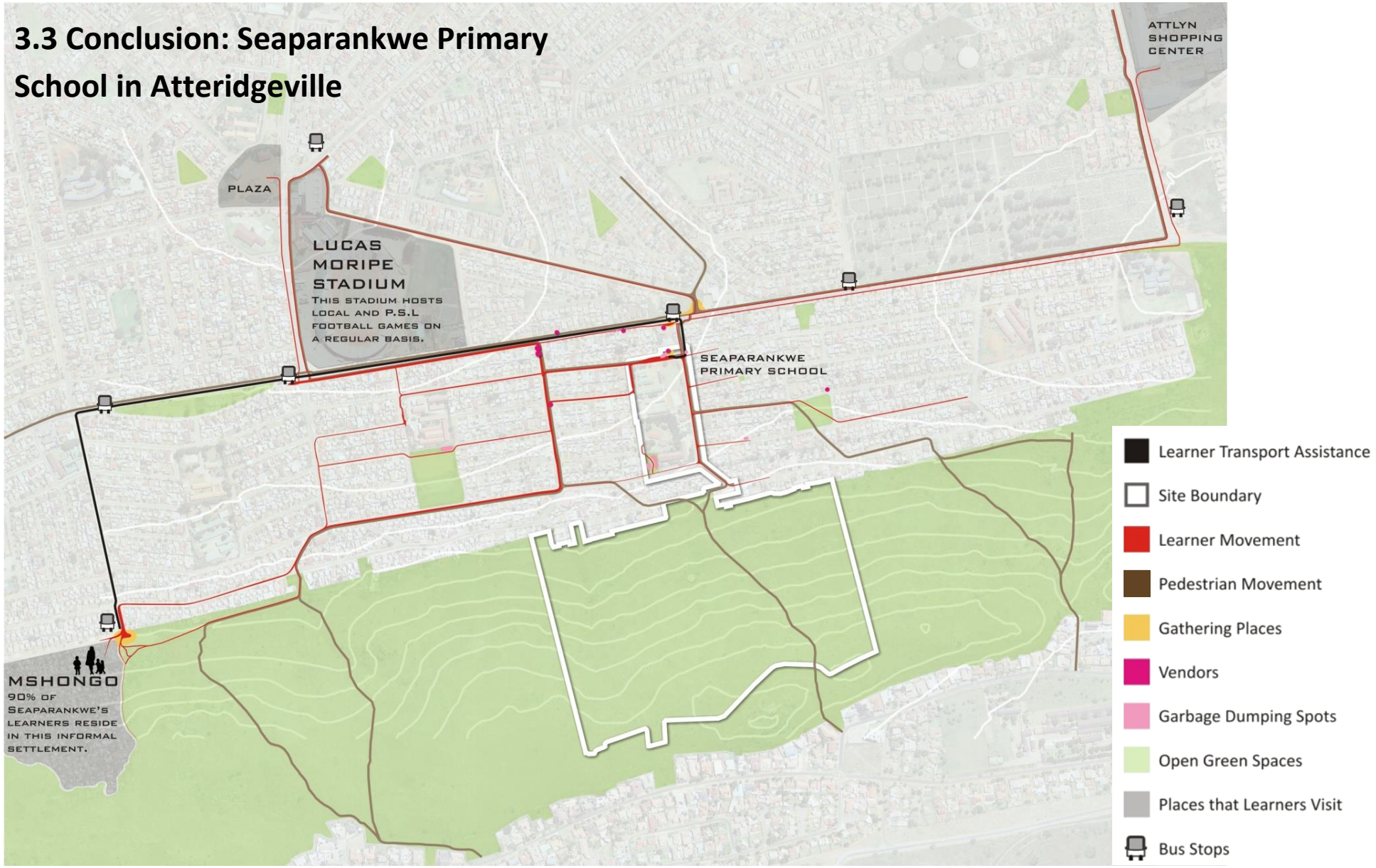

 Fig. 19 showing the selected site Seaparankwe Primary School

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Chapter 4: Site Analysis and design response to site issues

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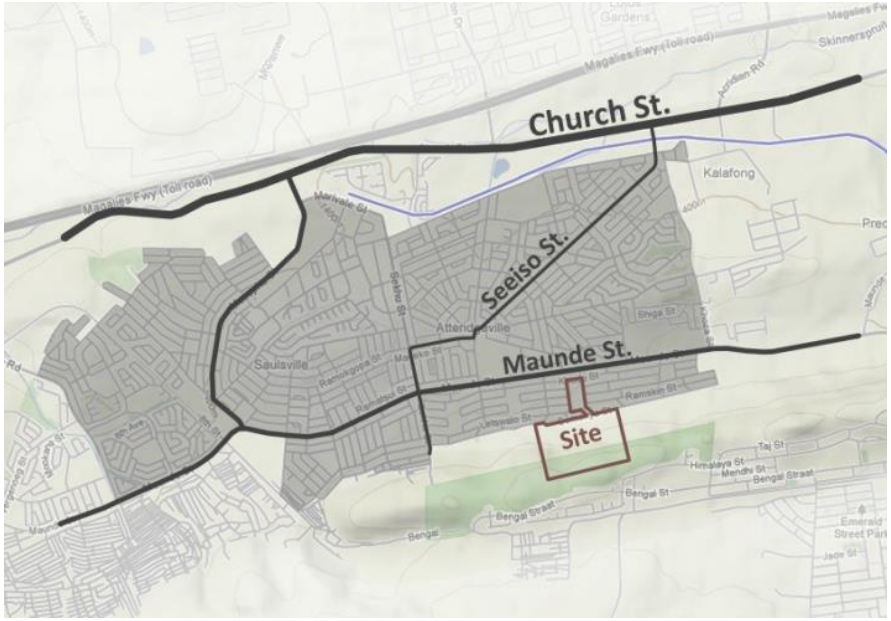
4.1 Project Area (Site)

The project area will stretch from Maunde Street to the Kwaggasrant ridge in a north–south direction. It will stretch from the eastern-most road reserve of Mokgatle Street to the road reserve adjacent to the school property on the west side. The project area includes the school buildings, the Evangelical Church in Mokgatle Street, the Church of Jesus Christ and the Latter-day Saints in Mokgatle Street, and Itumeleng Preschool. The project area borders on numerous properties and many of them contain small business enterprises.



Atteridgeville and site location

4.1.1 Seaparankwe Primary School General Information

4.1.1.1 Location

Seaparankwe Primary School is situated in the south-east part of Atteridgeville, a township 10 km to the west of the Pretoria CBD. Atteridgeville lies between the Kwaggasrant ridge (a sensitive class 2 conservation area) to the south, and the Daspoortrant ridge to the north.

4.1.1.2 Educational Information

Seaparankwe Primary School is a public primary school with approximately 900 learners between grade-R and grade-7, spread across 19 classrooms. The school's 27 teachers and 5 general attendants are paid for by government. The school benefits from the government feeding scheme and other government support services such as the government security program and government assisted transport.

Although Seaparankwe does partake in sports such as soccer, rugby, and netball, the school property has limited space for sport activities and therefore the school is more education centered. Seaparankwe attracts learners mainly from the informal settlement of Mshongo to the south-west of Atteridgeville. The learners reflect the cultural diversity within the Atteridgeville area with many different ethnic groups being represented. The learning mediums are Sepedi and English.

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4.1.1.3 Educational Context

There are 27 primary schools and 11 Secondary schools in Atteridgeville. Seaparankwe Primary School is the focus of this project. Other schools near Seaparankwe Primary are; Zodwa Special School, Dr. WF Nkomo Secondary, Petageng Primary, Banareng Primary, and David Hellen Peta Secondary. All the schools in this area qualify for government support services. Banareng Primary is the one school in the vicinity that manages to utilize its outdoor spaces for education. This school has developed numerous projects including a vegetable and herb garden and community participation in school maintenance.

4.1.2 The schoolyard at Seaparankwe

There are definite problems in the landscape outside the classroom at Seaparankwe Primary School. Some problematic characteristics of the school grounds include:

A. Overcrowding (See Fig. 20)
B. Degraded spaces (See Fig. 21)
C. Bare minimum of facilities (See Fig. 21)
D. Old infrastructure (See Fig. 22)
E. Old architecture (See Fig. 23)

(Fig. 20) A
900 learners and 32 staff on this 100 X 110m site

(Fig. 21) B C
In Atteridgeville, school outdoor spaces were designed with minimum embellishment. This has not changed much since Apartheid

(Fig. 22) D

(Fig. 23) E
Almost all of Atteridgeville schools are between 50 and 30 years old. this architecture is not conducive to 21st century learning

4.2 Site Analysis

4.2.1 Purpose of this site analysis

The purpose of this site analysis is to identify the issues that need to be addressed on site within the context of the six original goals set out in section 2.4. The site analysis starts with a site introduction and visual exploration, then moves on to the issues identified and the design response to them.

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4.2.2 Site Introduction and visual exploration

EXISTING PICK-UP AND DROP-OFF POINT

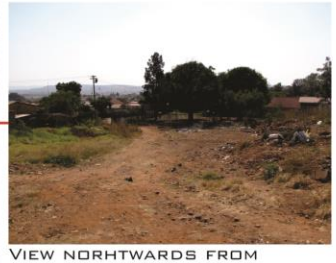
MAIN SCHOOL ENTRANCE FROM THE INSIDE.

QUIET SPACE BETWEEN CLASSROOMS.

MAIN SCHOOL MOVEMENT ROUTE.

EVANGELICAL CHURCH IN MOKGATLE STREET.

MOKGATLE STREET FACING SOUTH TOWARDS THE MOUNTAIN.


VIEW NORHTWARDS FROM LETSWALO STREET.

THE KWAGGASRANT

Fig. 24 shows a visual exploration of the site

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4.2.3 Vegetation

Fig. 25 showing the site vegetation issues

ISSUES TO BE ADDRESSED:

1 **ISSUE:**

The spaces in front of the classrooms are bare and hard. No vegetation is used to make these spaces more comfortable and no shade is provided here (See Fig. 26).

DESIGN RESPONSE:

Creation of green spaces in-front of classrooms (See Fig. 27).

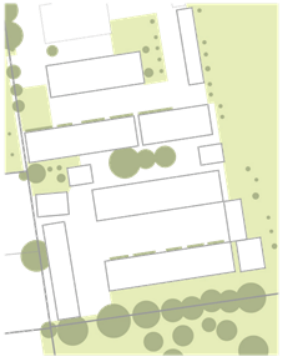

Fig. 26 showing the existing situation

Fig. 27 showing the proposed design response

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4.2.4 Hydrology

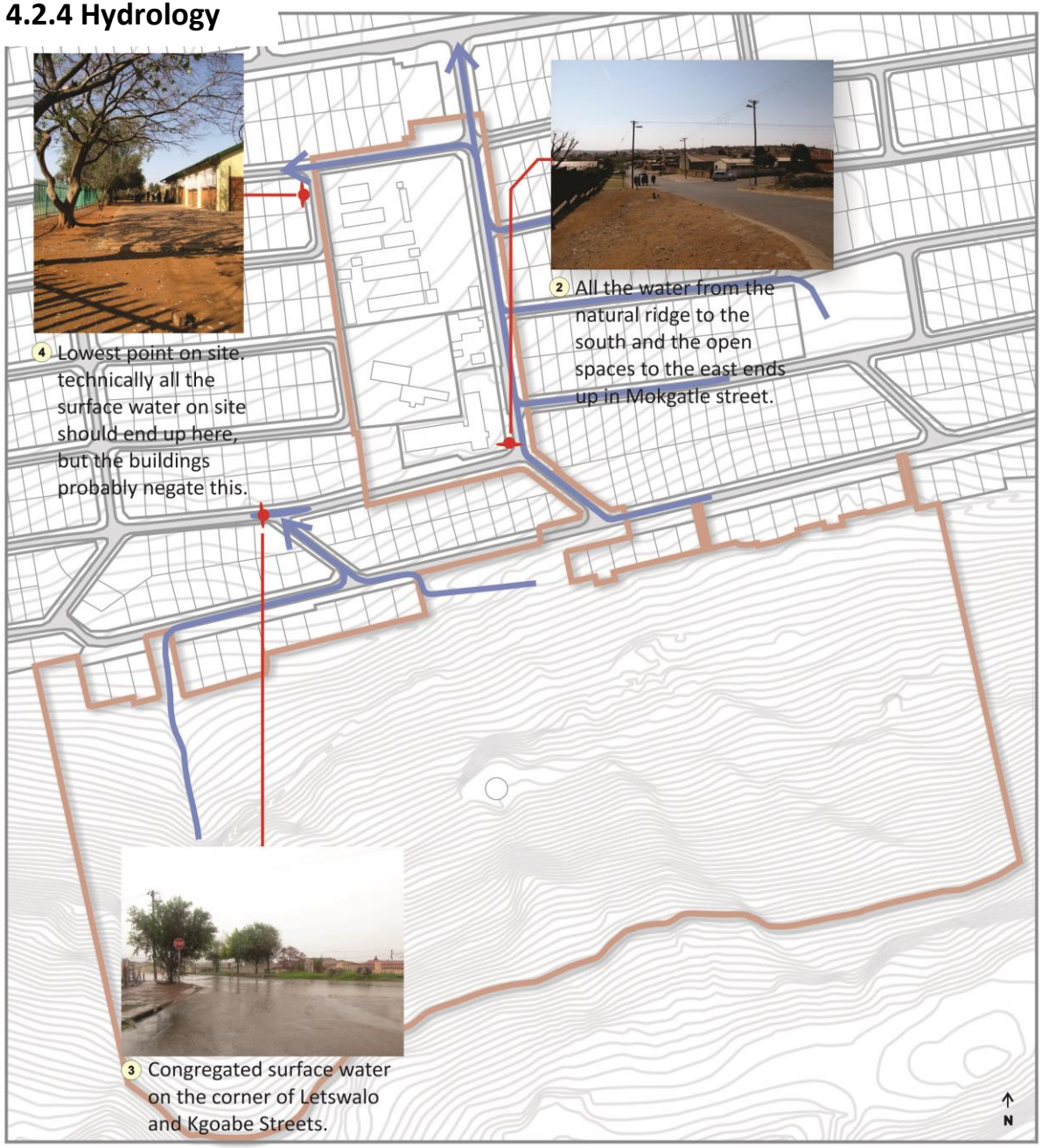

Fig. 28 showing the site hydrology issues

ISSUES TO BE ADDRESSED

2 ISSUE:
All the surface water from the east and south-east ends up in Mokgatle street. This street deflects surface water around the school property.

3 ISSUE:
All the water from the natural ridge in the southern part of the site ends up in Letswalo street. Here it congregates and becomes static before slowly trickling towards the west.

4 ISSUE:
The lowest point of the site should collect all the surface water from the school property. However, the way the school buildings are structured and the current treatment of surface water in the school property results in all this water flowing into the municipal underground stormwater system, contributing to erosion downstream etc... and none of the water from the site is saved for the school.

DESIGN RESPONSE:
Water is brought into the site and collected on site for irrigation purposes (See Fig 30).

Fig. 29 showing the existing situation

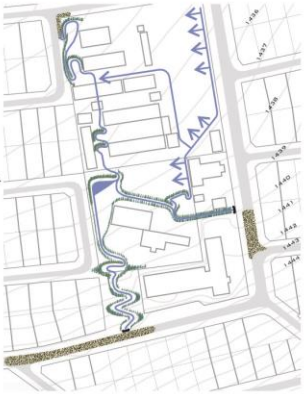

Fig. 30 showing the proposed design response

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4.2.5 Access

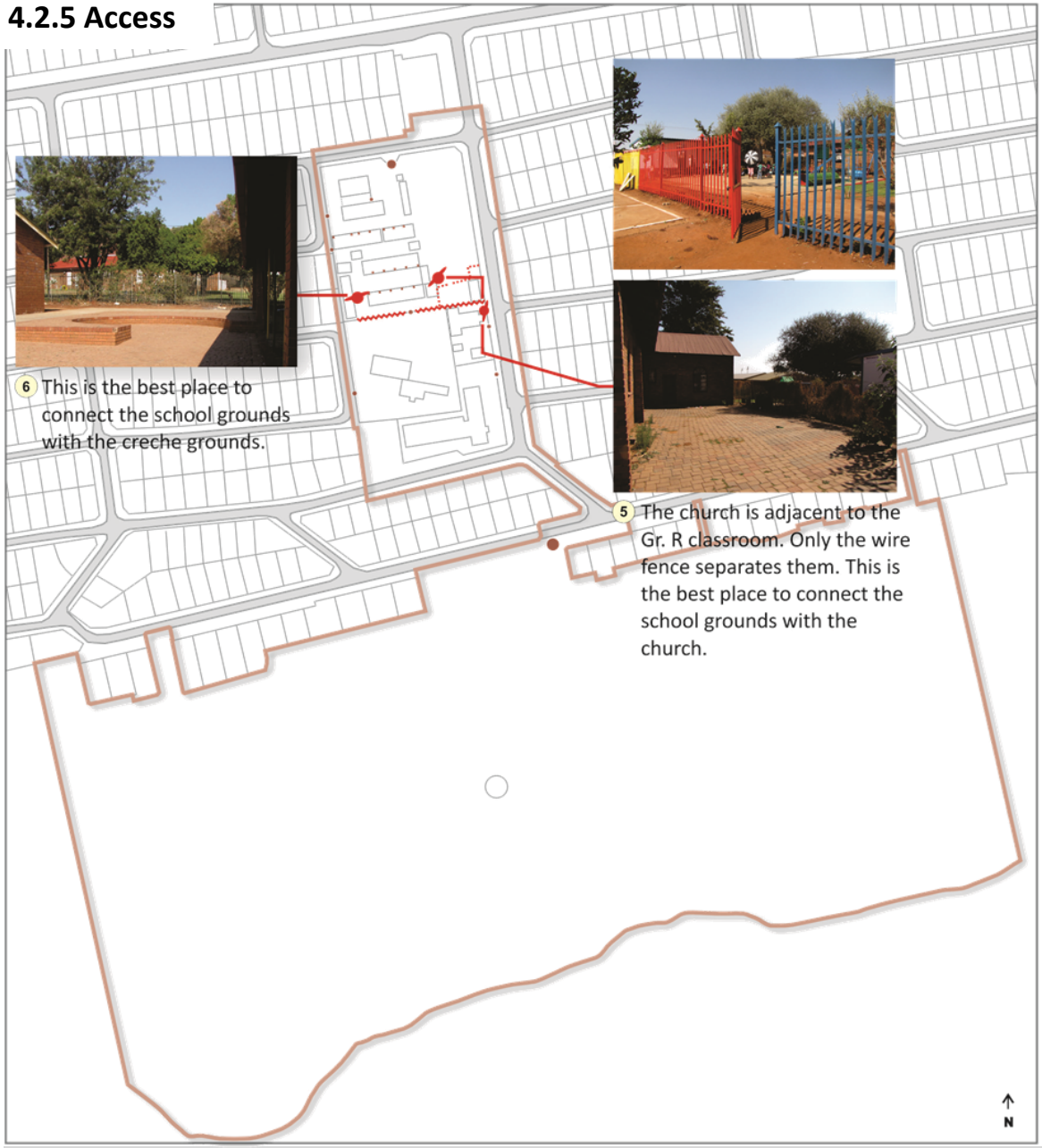

Fig. 31 showing site access issues

ISSUES TO BE ADDRESSED:

5 ISSUE:
The school is isolated from the community church. If learner/community interaction is to be improved, these two places must be connected.

6 ISSUE:
The creche has a large unused play-area to its north. the school needs this space to combat its own over-crowding problems. A fence separates the school from the creche.

DESIGN RESPONSE:
The schoolyard boundaries are extended into the pre-school property, and the Boundary between the church and the school is removed (See Fig. 33).

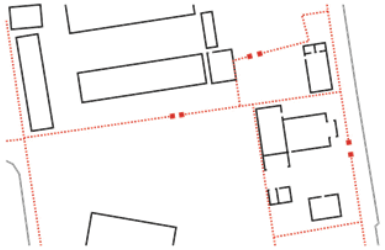

Fig. 32 showing the existing situation

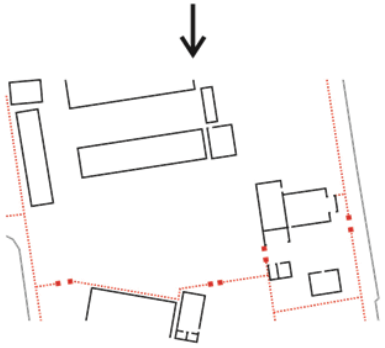

Fig. 33 showing the proposed design response

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4.2.6 Learner and pedestrian movement

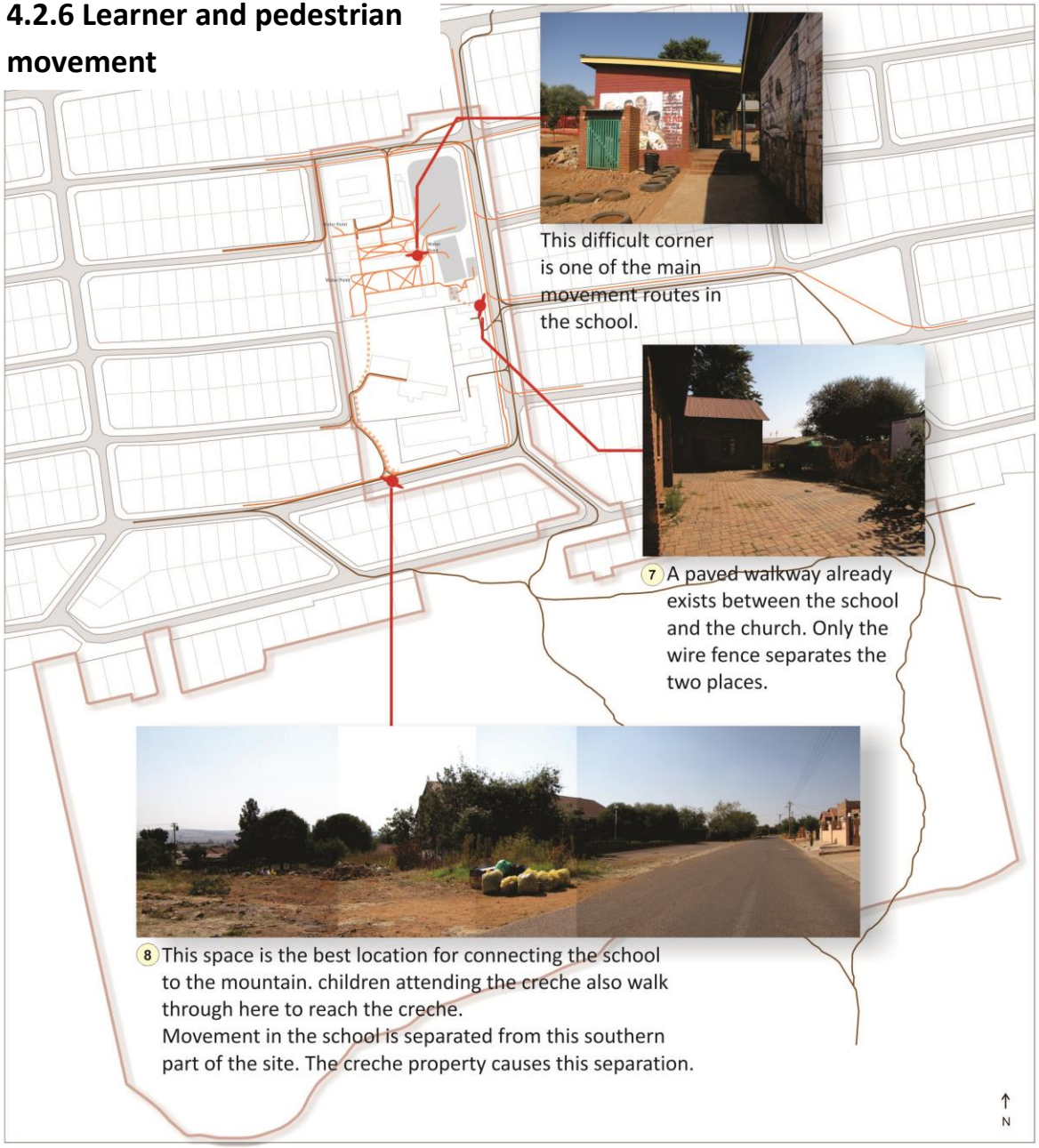

Fig. 34 showing site access issues

ISSUES TO BE ADDRESSED:

7 ISSUE:
Learner movement must be extended into the church property, and community members must also be able to access the school property. This connection between the community and the learners already exists because there are already paved surfaces on both sides of the fence separating the school and the church.

8 ISSUE:
The open space to the south of the creche is the perfect space from which learner movement can be connected to the natural ridge. But the creche property separates the school from this space.

DESIGN RESPONSE:
Creating a semi-public access belt that allows for controlled and increased access to the site by community members, and a walkway that connects to the natural ridge (See Fig 36).

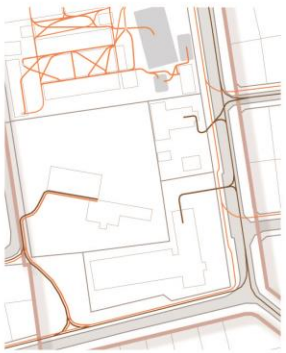

Fig. 35 showing the existing situation

Fig. 36 showing the proposed design response

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4.2.7 Site Elements

Fig. 37 showing existing site elements

ISSUES TO BE ADDRESSED:

9 ISSUE:

Old tyres are used on site for protecting planted vegetation against erosion, exposure, and trampling. this concept must be extended and improved upon. the potential for tyres to be used for slope stabilization, surface runoff attenuation, and vegetation protection must be fully exploited.

10 ISSUE:

This un-used agricultural tunnel is in the wrong location for successful planting. It must be moved to the eastern part of the site where there's more sunlight, and where its closer to the community church because the joint school/community project will include agriculture. it needs a consistent and easily accessible water supply. It must also be refurbished.

DESIGN RESPONSE:

Placement of utilizable site elements such as the agricultural tunnel, near to natural and man-made site features (See Fig. 39).

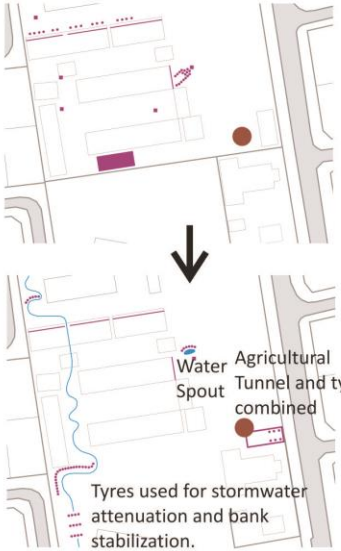

Fig. 38 showing the existing situation

Fig. 39 showing the proposed design response

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4.2.8 Site Use

Fig. 40 showing existing site use

ISSUES TO BE ADDRESSED

11 ISSUE:

There are unused spaces outside the classrooms that could be used for educational purposes. In order to achieve goal no.2 (Teaching environmental aspects of the curriculum outside the classroom), the outdoor space network on the school property needs to be converted into educational zones with themes for each of the zones.

DESIGN RESPONSE:

Proposing new site uses including new educational zones around the classrooms that aid in extending the curriculum into the schoolyard in that elements in these zones are experiential and related to curriculum content (See fig. 42).

Fig. 41 showing the existing situation

Fig. 42 showing the proposed design response

- Proposed Educational Zones
- Entering and leaving, arriving and departing
- Visitor's parking and introduction
- Garbage and building rubble dumping
- Play
- Sports and exercise
- Gathering, waiting for class.
- Commercial
- Heavily used places.
- Community social gathering

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4.3 Conclusion - Design response to site issues

The design response to site issues has been developed from the site analysis. Certain on-site issues were identified that needed to be addressed, and the design response to these issues forms the first informative layer for this design. The design response to site issues focuses on the following elements:

1) Vegetated spaces in front of classrooms.
2) A water collection, conservation, and distribution corridor running along the western side of the school property.
3) Semi-public access belt connecting the main school entrance to the community church. It has a defined semi-public to private transition edge.
4) Educational zones that extend the school into neighboring properties.
5) A walkway following existing pedestrian and learner movement from the natural ridge to the school entrances.

Fig. 41 showing the design response to site issues

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Chapter 5: Program Development for the Site

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5.1 Introduction: Purpose of this chapter

In Chapter 2 theoretical research was conducted and educational strategies were identified that could help to improve learner performance. These educational strategies form the basis of the programmatic requirements for improving learner performance. In this chapter the strategies are allocated locations on site, and combined into a program for the site.

5.1.1 Improving and increasing interaction between learners and school outdoor spaces

5.1.1.1 The need:

Learners must be given incentives to stay in school. They must be comfortable inside the school property, and must have spaces that satisfy their educational needs.

5.1.1.2 Design response:

Stimulating, learner friendly, functional, and clearly defined spaces must be created outside the classroom.

5.1.1.3 Spatial typology used:

(1) Learner-friendly spaces

- Front porch type spaces (See Fig. 43).
- Front yard type spaces (See Fig. 44).
- Backyard type spaces (See Fig. 45).
- Plaza type spaces (See Fig. 46).

5.1.1.4 Programmatic intention of typology (1)

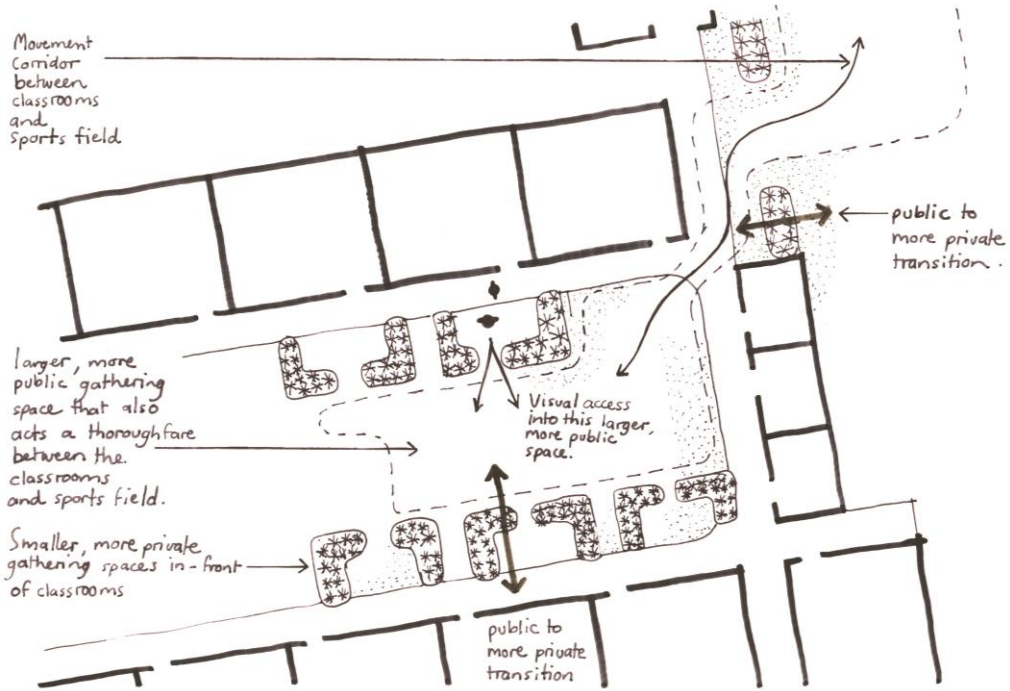

Fig. 42 showing the programmatic vision for learner-friendly spaces

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(1) LEARNER FRIENDLY SPACES

FRONT PORCH SPACES

LEVEL OF STIMULATION:
USE NEUTRAL COLORS FOR NORMAL TONED CONVERSATION. SPACES MUST BE UN-CLUTTERED AND PARTS CLOSER TO CLASSROOMS MUST BE FOR SMALLER GROUPS.

FUNCTION:
FOR SITTING, INDIVIDUAL AND GROUP STUDYING, WAITING FOR CLASS, AND SOCIALIZING. ALSO FOR MOVING IN AND OUT OF CLASS

AGE GROUP:
LEARNERS FROM THE NEAREST CLASSROOM.

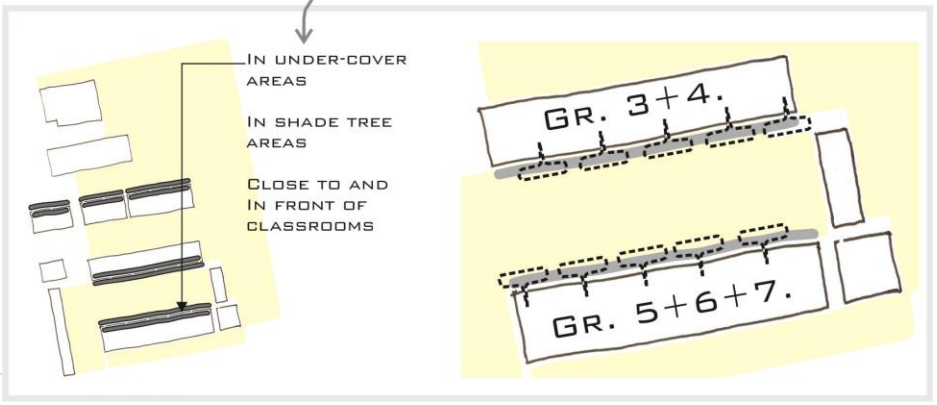
GROUP SIZE:
CLASS GROUP DOWN TO GROUPS OF 3 OR 4.

LEVEL OF LEARNER COMFORT:
LEARNER SIZED SEATING AND LEVEL CHANGE. MITIGATE TEMPERATURE VARIATIONS WITH TREES THAT PROVIDE SHADE IN SUMMER AND LET LIGHT THROUGH IN WINTER.

DEFINED BY:
SHADE ON ONE SIDE, THE CLASSROOM AND A HEIGHT DIFFERENCE ON THE OTHER SIDE.

WHEN:
WHEN WAITING FOR CLASSES, AND IN BREAK TIMES.

ENVISIONED FORM



POSSIBLE PLACEMENT IN A SCHOOL OUTDOOR ENVIRONMENT

	Front Porch Spaces
IN AND AROUND	
Open areas	
Under-cover areas	
Shade tree areas	
Pathways	
Access areas	
Man-made features	
Natural features	
Link to mountain	
Mountain	
CLOSE TO	
Close to staff buildings	
Close to classrooms **Front**	
Close to classrooms **Back**	
Close to school computer lab	
Close to school kitchen	
Close to school edges **Inside**	
Close to school edges **Outside**	
Close to community church	
Close to pathways	
FAR FROM	
Far from staff buildings	
Far from classrooms	

Fig. 43 explaining front porch type spaces

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(1) LEARNER FRIENDLY SPACES

FRONT YARD SPACES

LEVEL OF STIMULATION:
SIMPLE, RESTFUL SPACES WITH NATURAL ELEMENTS FOR A PEACEFUL ATMOSPHERE, BUT OPEN, FLAT, AND SUNNY.

LEVEL OF LEARNER COMFORT:
COMFORTABLE SOFT GREEN SEATING SPACE (E.G. A LAWN). FLAT AND SCALED FOR INFORMAL GROUP SEATING.

FUNCTION:
FOR EATING, SOCIALIZING AND RELAXING IN SMALL OR MEDIUM SIZED GROUPS.

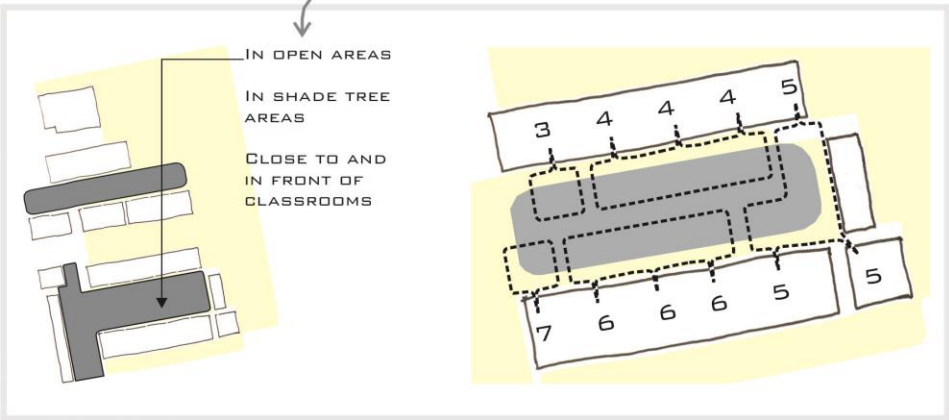
DEFINED BY:
MAIN MOVEMENT ROUTE ON ONE SIDE, SCHOOL BUILDING ON THE OTHER SIDE.

AGE GROUP:
LEARNERS FROM THE NEAREST CLASSROOM.

GROUP SIZE:
CLASS GROUP DOWN TO GROUPS OF 3 OR 4.

WHEN:
WHEN WAITING FOR CLASSES, AND IN BREAK TIMES.

ENVISIONED FORM



POSSIBLE PLACEMENT IN A SCHOOL OUTDOOR ENVIRONMENT

	Front Yard Spaces
IN AND AROUND	
Open areas	■
Under-cover areas	
Shade tree areas	■
Pathways	
Access areas	
Man-made features	
Natural features	
Link to mountain	
Mountain	
CLOSE TO	
Close to staff buildings	
Close to classrooms **Front**	■
Close to classrooms **Back**	
Close to school computer lab	
Close to school kitchen	
Close to school edges **Inside**	
Close to school edges **Outside**	
Close to community church	
Close to pathways	
FAR FROM	
Far from staff buildings	
Far from classrooms	

Fig. 44 explaining front yard type spaces

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(1) LEARNER FRIENDLY SPACES

BACKYARD SPACES

LEVEL OF STIMULATION:
QUIET SPACES WITH COOL COLORS AND MORE SHADE.

LEVEL OF LEARNER COMFORT:
LEARNER SIZED TABLES WITH BENCHES AND COMFORTABLE MICRO-CLIMATE CONTROLLED BY OVERHEAD TREES. PORTS FOR ELECTRONIC GADGETS AND ACCESS TO DIFFERENT FORMS OF INFORMATION TECHNOLOGY.

FUNCTION:
FOR INDIVIDUAL STUDYING AND SMALL PRIVATE GATHERINGS.

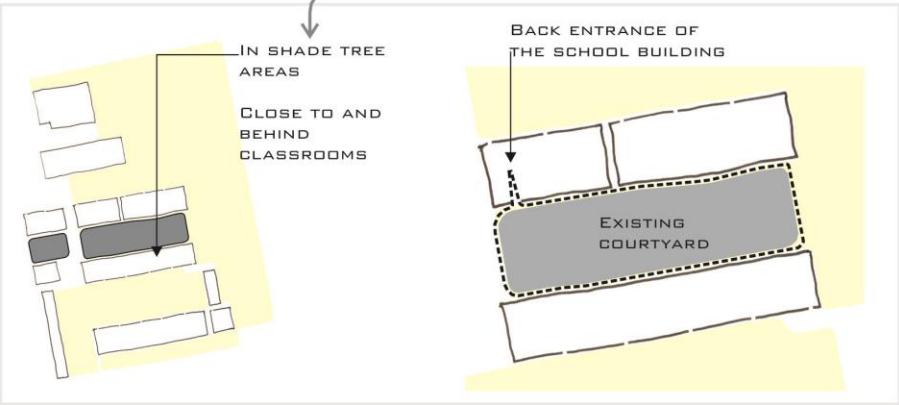
DEFINED BY:
BACK SIDES OF CLASSROOMS ALL ROUND. SMALL PRIVATE SPACES IN COURTYARDS BEHIND BUILDINGS, USUALLY CONNECTED TO THE REAR OPENING OF THE BUILDING.

AGE GROUP:
ALL AGES.

GROUP SIZE:
SMALL GROUPS OF 2 - 3 OR INDIVIDUALS.

WHEN:
FOR SOME ALONE TIME DURING BREAK TIMES, OR WHEN STAYING AFTER SCHOOL FOR STUDYING PURPOSES.

ENVISIONED FORM



POSSIBLE PLACEMENT IN A SCHOOL OUTDOOR ENVIRONMENT

	Backyard Spaces
IN AND AROUND	
Open areas	
Under-cover areas	
Shade tree areas	
Pathways	
Access areas	
Man-made features	
Natural features	
Link to mountain	
Mountain	
CLOSE TO	
Close to staff buildings	
Close to classrooms **Front**	
Close to classrooms **Back**	
Close to school computer lab	
Close to school kitchen	
Close to school edges **Inside**	
Close to school edges **Outside**	
Close to community church	
Close to pathways	
FAR FROM	
Far from staff buildings	
Far from classrooms	

Fig. 45 explaining back yard type spaces

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(1) LEARNER FRIENDLY SPACES

PLAZA SPACES

LEVEL OF STIMULATION:
BUSY BUT FORMAL ATMOSPHERE, LIKE ON A PUBLIC SQUARE.

LEVEL OF LEARNER COMFORT:
PLENTY OF ORIENTATION MATERIAL AND SIGNAGE. A PLACE FOR STANDING AND MOVEMENT.

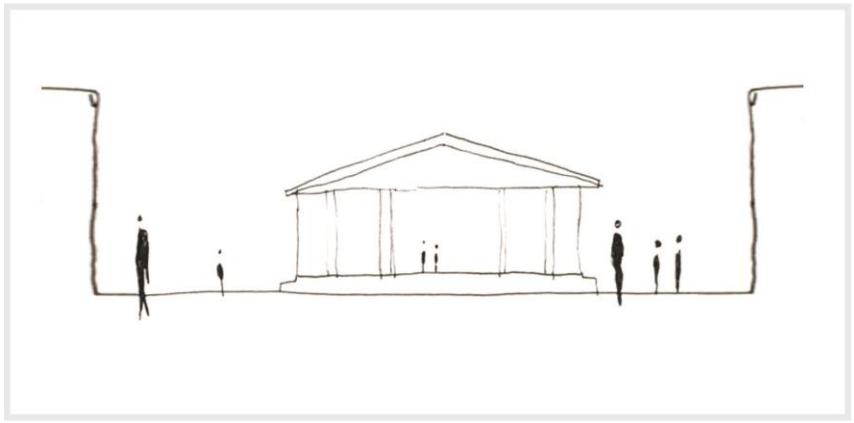
FUNCTION:
FOR LARGE GROUP GATHERINGS, SCHOOL EVENTS, AND ORIENTATION.

DEFINED BY:
SCHOOL ACCESS AREA ON ONE SIDE, STAFF BUILDINGS ON ANOTHER SIDE, AND CLASSROOMS ON A THIRD SIDE.

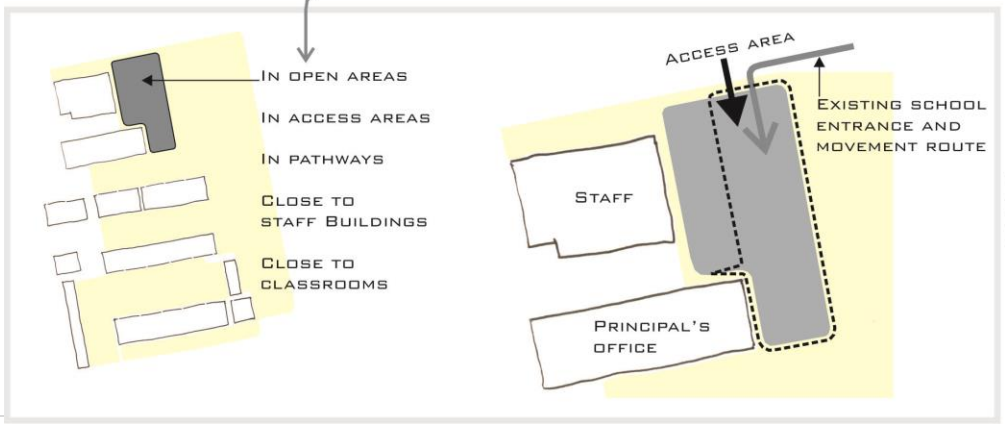
AGE GROUP:
ALL AGES

GROUP SIZE:
ENTIRE SCHOOL OR GRADE.

WHEN:
AT SCHOOL OPENINGS, AND SCHOOL EVENTS.



ENVISIONED FORM



POSSIBLE PLACEMENT IN A SCHOOL OUTDOOR ENVIRONMENT

	Plaza Spaces
IN AND AROUND	
Open areas	
Under-cover areas	
Shade tree areas	
Pathways	
Access areas	
Man-made features	
Natural features	
Link to mountain	
Mountain	
CLOSE TO	
Close to staff buildings	
Close to classrooms **Front**	
Close to classrooms **Back**	
Close to school computer lab	
Close to school kitchen	
Close to school edges **Inside**	
Close to school edges **Outside**	
Close to community church	
Close to pathways	
FAR FROM	
Far from staff buildings	
Far from classrooms	

Fig. 46 explaining plaza type spaces

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5.1.2 Facilitating learning of environmental aspects of the curriculum

5.1.2.1 The need

Learners need to experience environmental aspects of the curriculum outside the classroom. They need spaces outside the classroom to see environmental aspects of the curriculum in action. They need to be able to learn aspects of the curriculum through doing.

5.1.2.2 Design response

Spaces that act as extensions of the classroom must be created. Natural features and man-made features outside the classroom must be used to show aspects of the curriculum in action.

5.1.2.3 Spatial typologies used

(2) Outdoor Classrooms (See Fig. 50, 51 and 52).

(3) Play Spaces (See Fig. 48, 49 and 53).

5.1.2.4 Envisioned spatial quality of typologies (2) and (3)

Figures 48 and 49 showing play spaces [Campbell, 2008]

Figures 50 and 51 showing outdoor classrooms [www.panoramio.com] and [Campbell, 2008]

5.1.2.5 Programmatic intention of typologies (2) and (3)

Fig. 47 showing the programmatic vision for outdoor classrooms and play spaces

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(2) OUTDOOR CLASSROOMS

FUNCTION

FOR EXPERIENCING ENVIRONMENTAL ASPECTS OF THE CURRICULUM IN ACTION. EMPHASIS MUST BE PLACED ON LEARNING THROUGH DOING.

EDUCATIONAL CONTENT

STUDY THEMES OF THE CURRICULUM THAT DEAL WITH:

-PERSONAL AND SOCIAL WELL-BEING
-LIFE AND LIVING
-MATTER AND MATERIALS
-STRUCTURES
-PROCESSING
-PLANET EARTH AND BEYOND
-WATER IN SOUTH AFRICA

GROUP SIZE

FOR CLASS SIZED GROUPS.

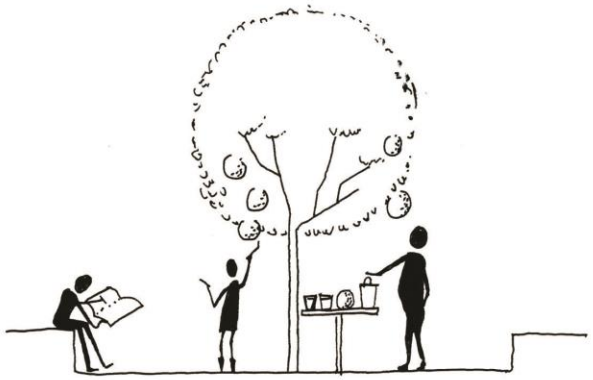
DEFINED BY

A CENTRAL SITE ELEMENT, EITHER NATURAL OR MAN-MADE, WITH THE POTENTIAL TO CONVEY ENVIRONMENTAL ASPECTS OF THE CURRICULUM.

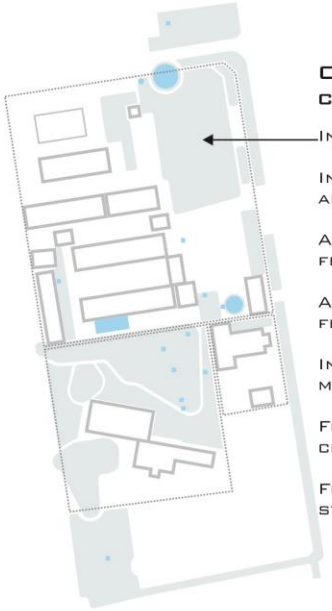
WHEN TO USE

DURING CLASS TIMES, WHEN THE PARTICULAR STUDY THEMES ARE BEING HANDLED.

ENVISIONED FORM



POSSIBLE PLACEMENT IN A SCHOOL OUTDOOR ENVIRONMENT



OUTDOOR CLASSROOMS

IN OPEN AREAS

IN SHADE TREE AREAS

AROUND NATURAL FEATURES

AROUND MAN-MADE FEATURES

IN THE LINK TO THE MOUNTAIN

FURTHER FROM CLASSROOMS

FURTHER FROM STAFF BUILDINGS

	Outdoor Classrooms
IN AND AROUND	
Open areas	
Under-cover areas	
Shade tree areas	
Pathways	
Access areas	
Man-made features	
Natural features	
Link to mountain	
Mountain	
CLOSE TO	
Close to staff buildings	
Close to classrooms **Front**	
Close to classrooms **Back**	
Close to school computer lab	
Close to school kitchen	
Close to school edges **Inside**	
Close to school edges **Outside**	
Close to community church	
Close to pathways	
FAR FROM	
Staff buildings	
Classrooms	

+

Life Skills	Natural Sciences and Technology					Geography
Personal and Social Wellbeing Gr. R - 3	Life and living Gr. 4 - 6	Matter and materials Gr. 4, 6	Structures Gr. 4	Planet Earth and beyond Gr. 5	Processing Gr. 6	Water in SA Gr. 4

(3) PLAY SPACES

Level of stimulation:
Spaces with bright colors and varied surfaces. All the senses must be stimulated, and dialogue and motor movement must be encouraged.

Level of learner comfort:
Play spaces must combine learner sized passive zones with surfaces that challenge learners to climb onto, over, and under them.

Function:
Spaces for play and exploration, experimenting, risk taking, and undertaking challenges. As much activity as possible must be encouraged.

Defined by:
Shade trees overhead and natural or man-made elements in the landscape outside the classroom.

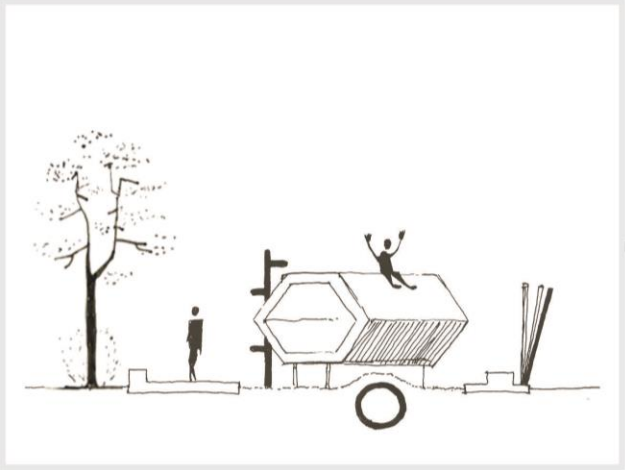
Age Group:
Mostly for Gr. R - 3 learners.

Group Size:
Grade or class size groups, down to individuals.

When:
During creative arts period, physical education period, break times, and before/after school.

Life Skills	
Physical Education Gr. R - 6	Creative Arts Gr. R - 3
Free Play Activities	Free Play Activities

ENVISIONED FORM



POSSIBLE PLACEMENT IN A SCHOOL OUTDOOR ENVIRONMENT

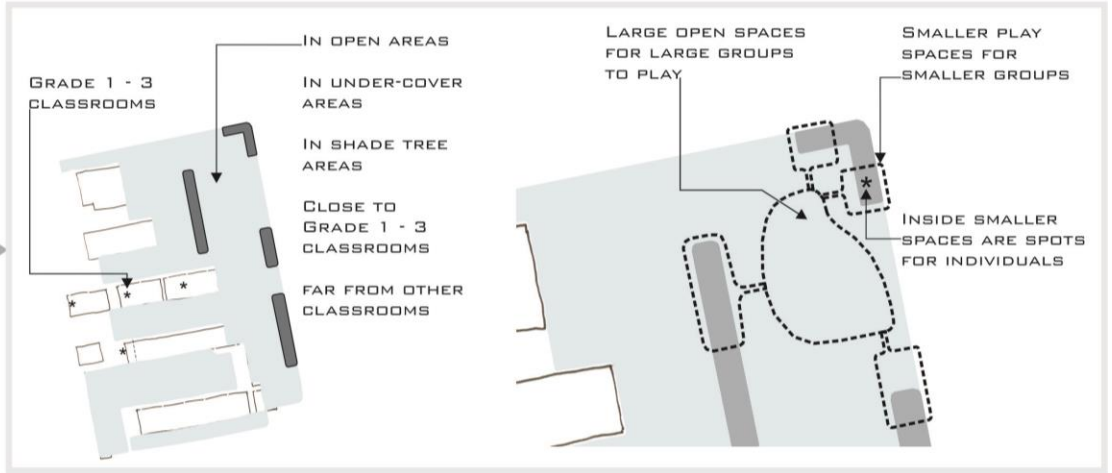


Fig. 53 explaining play spaces

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5.1.3 Encouraging increased interaction between learners and the community

5.1.3.1 The need

Learners need to communicate with and interact with community members. The school and the community must grow closer together, and must learn more about each other.

5.1.3.2 Design Response

Spaces must be created with spaces that advertise school activities in the street outside the school. A space that connects the school to a community centre in the same city block must also be created.

5.1.3.3 Spatial typologies used

(4) Defensible spaces (See Fig. 58).

(5) Spaces advertising school activities (See Fig. 59).

(6) Connection between school and community centre (See Fig. 60).

5.1.3.4 Envisioned spatial quality of typologies (4), (5) and (6)

Fig. 55 [www.gatewaycc.edu]

Fig. 56 [www.mark.space.4goo.net]

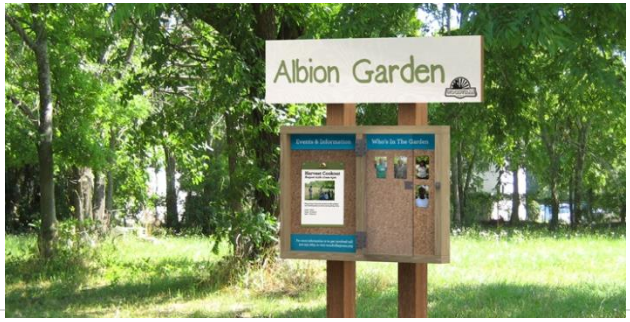

Fig. 57 [www.servd.us]

5.1.3.5 Programmatic intention of typologies (4), (5) and (6)

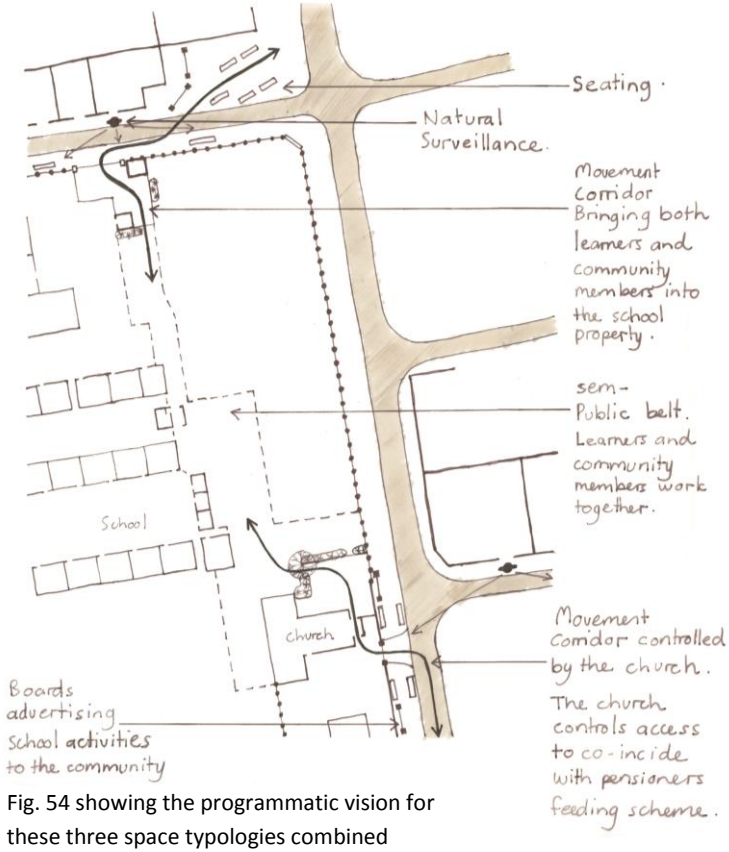

Fig. 54 showing the programmatic vision for these three space typologies combined

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(4) DEFENSIBLE SPACES

FUNCTION:

FOR GATHERING OF LEARNERS AND PARENTS OUTSIDE SCHOOL, FOR DEPARTING AND ARRIVING. FOR WALKING TO AND FROM SCHOOL IN ALL DIRECTIONS. THESE SPACES MUST DEFINE LEARNER TERRITORY, AND PROVIDE SAFETY.

WHEN TO USE:

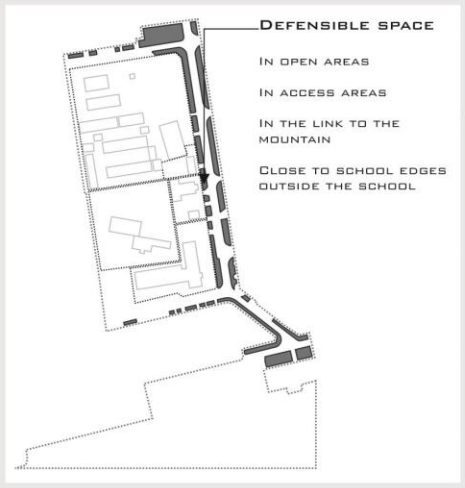
DURING ARRIVING AND DEPARTING BEFORE AND AFTER SCHOOL.

DEFINED BY:

THE STREET ON ONE SIDE AND THE SCHOOL BOUNDARY ON THE OTHER. OPEN SPACES WITH VISUAL ACCESS FROM DWELLINGS AROUND THE SCHOOL.

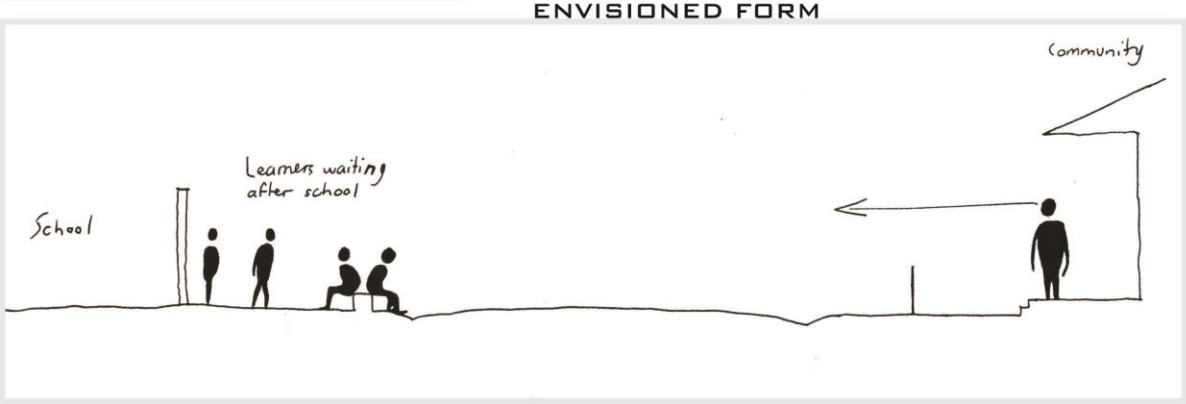
GROUP SIZE:

FOR DIFFERENT GROUP SIZES, FROM LARGE GROUPS BETWEEN CLASSROOM SIZE AND SCHOOL SIZE, TO SMALL GROUPS OR INDIVIDUALS



POSSIBLE PLACEMENT OUTSIDE THE SCHOOL

ENVISIONED FORM



	Defensible Space
IN AND AROUND	
Open areas	
Under-cover areas	
Shade tree areas	
Pathways	
Access areas	
Man-made features	
Natural features	
Link to mountain	
Mountain	
CLOSE TO	
Close to staff buildings	
Close to classrooms **Front**	
Close to classrooms **Back**	
Close to school computer lab	
Close to school kitchen	
Close to school edges **Inside**	
Close to school edges **Outside**	
Close to community church	
Close to pathways	
FAR FROM	
Far from staff buildings	
Far from classrooms	

Fig. 58 explaining defensible spaces

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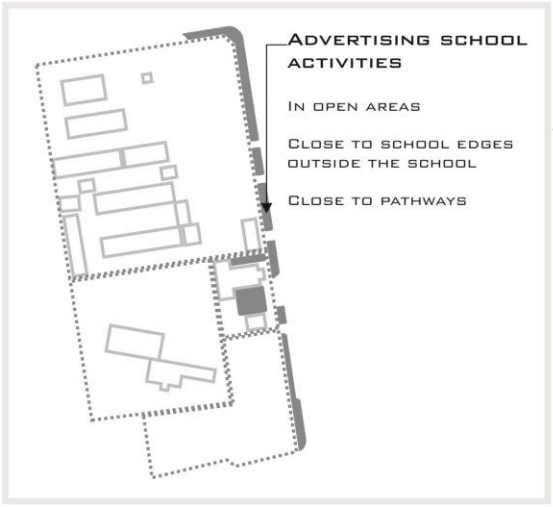
(5) SPACES THAT ADVERTISE SCHOOL ACTIVITIES

FUNCTION:
FOR COMMUNITY MEMBERS AND LEARNERS TO WALK THROUGH, INTERACT, AND GET ACQUAINTED WITH ACTIVITIES TAKING PLACE, OR ABOUT TO TAKE PLACE IN THE SCHOOL.

WHEN TO USE:
LEARNERS CAN USE THE SPACES BEFORE OR AFTER SCHOOL, AND COMMUNITY MEMBERS MUST BE able TO ACCESS THEM ALL THE TIME.

GROUP SIZE:
THE SPACES MUST BE ABLE TO ACCOMMODATE GROUPS OF COMMUNITY MEMBERS OR LEAR NERS UP TO CLASSROOM SIZE (40 PEOPLE).

DEFINED BY:
THE STREET ON ONE SIDE AND AN INFORMATION PANEL/WALL ON THE OTHER SIDE.



POSSIBLE PLACEMENT ALONG THE SCHOOL EDGE

ENVISIONED FORM

	Advertising school activities
IN AND AROUND	
Open areas	
Under-cover areas	
Shade tree areas	
Pathways	
Access areas	
Man-made features	
Natural features	
Link to mountain	
Mountain	
CLOSE TO	
Close to staff buildings	
Close to classrooms **Front**	
Close to classrooms **Back**	
Close to school computer lab	
Close to school kitchen	
Close to school edges **Inside**	
Close to school edges **Outside**	
Close to community church	
Close to pathways	
FAR FROM	
Far from staff buildings	
Far from classrooms	

Fig. 59 explaining spaces that advertise school activities

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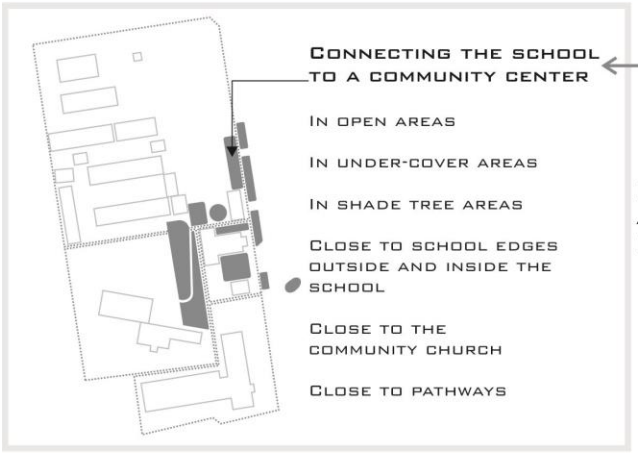
(6) CONNECTION BETWEEN THE SCHOOL AND THE COMMUNITY CENTRE

FUNCTION:
FOR COMMUNITY MEMBERS AND LEARNERS TO SOCIALIZE AND INTERACT AROUND A CENTRAL THEME. FOR GATHERINGS INVOLVING LEARNERS AND COMMUNITY MEMBERS.

GROUP SIZE:
THE CONNECTION MUST BE ABLE TO ACCOMMODATE GROUPS OF COMMUNITY MEMBERS AND GROUPS OF LEARNERS UP TO CLASSROOM SIZE (+-70 PEOPLE).

WHEN TO USE:
ANY TIME THAT THE COMMUNITY CENTER SERVES THE COMMUNITY. IN THIS WAY ACCESS CAN BE CONTROLLED.

DEFINED BY:
THE STREET-FACING PART OF THE COMMUNITY CENTER ON ONE SIDE, AN INTERACTION SPACE WITH A CENTRAL THEME IN THE MIDDLE, AND A SCHOOL BUILDING ON THE OTHER.



POSSIBLE PLACEMENT ALONG THE SCHOOL EDGE

ENVISIONED FORM

	Connecting school to community center
IN AND AROUND	
Open areas	■
Under-cover areas	■
Shade tree areas	■
Pathways	
Access areas	
Man-made features	
Natural features	
Link to mountain	
Mountain	
CLOSE TO	
Close to staff buildings	
Close to classrooms **Front**	
Close to classrooms **Back**	
Close to school computer lab	
Close to school kitchen	
Close to school edges **Inside**	■
Close to school edges **Outside**	■
Close to community church	■
Close to pathways	■
FAR FROM	
Far from staff buildings	
Far from classrooms	

Fig. 60 explaining the connection between the school and the community centre

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5.1.4 Facilitating social skills exchange between learners and community members

5.1.4.1 The Need

Learners need to exchange social skills and knowledge with community members. Learners must learn social skills that they can use at home, and in future in the work place.

5.1.4.2 Design Response

Spaces must be created that facilitate exchange of social skills aspects of the curriculum between learners and community members through working together on a joint community project such as a vegetable garden. Both learners and community members must benefit from this exchange.

5.1.4.3 Spatial typologies used

(7) Learner/Community skills exchange spaces. (See Fig. 62, 63, 64 and 65).

5.1.4.4 Envisioned spatial quality of typology (7)

Figures 62 and 63 showing community urban agriculture [www.westerncape.gov.za] and [Sherman, 2010]

Fig. 64 showing keyhole gardens [www.southafrica.iom.int]

5.1.4.5 Programmatic intention of typology (7)

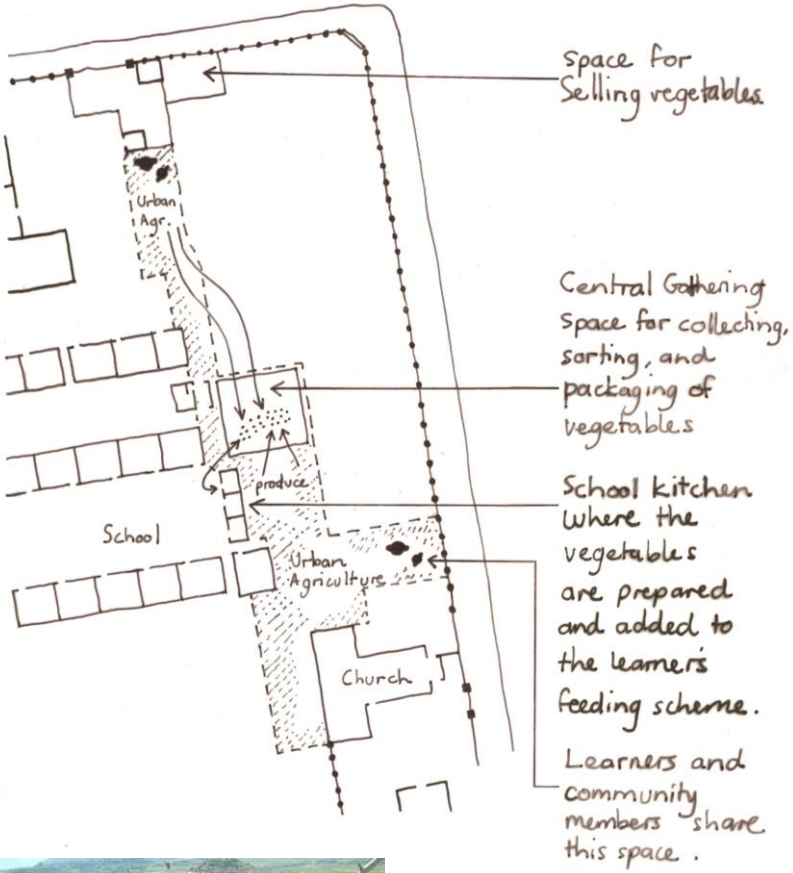

Fig. 61 showing the programmatic vision for learner/community skills exchange spaces

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(7) LEARNER/COMMUNITY SKILLS EXCHANGE SPACES

FUNCTION:
FOR DOING PHYSICAL WORK WITH HANDS IN GROUPS. MUST ALSO ALLOW FOR LEARNERS AND COMMUNITY MEMBERS TO SHARE INFORMATION, SKILLS, AND BENEFITS OF A JOINT PROJECT THAT CORRELATES WITH SOCIAL SKILLS ASPECTS OF THE CURRICULUM.

GROUP SIZE:
THE SPACES MUST BE ABLE TO ACCOMMODATE GROUPS OF COMMUNITY MEMBERS COMBINED WITH GROUPS OF LEARNERS UP TO CLASSROOM SIZE (70 PEOPLE).

WHEN TO USE:
ANY TIME THAT THE COMMUNITY CENTER CAN BE IN CONTROL OF ACCESS FROM THE OUTSIDE, SUCH AS WHEN THE COMMUNITY CENTER IS BUSY SERVING COMMUNITY MEMBERS.

DEFINED BY:
THE SIDE OF THE COMMUNITY CENTER STREET ON ONE SIDE, A WORK SPACE WITH SHADE TREES IN THE MIDDLE, AND A SCHOOL BUILDING ON THE OTHER.

ENVISIONED FORM

POSSIBLE THEME AND SUB-THEMES FOR THESE SKILLS EXCHANGE SPACES

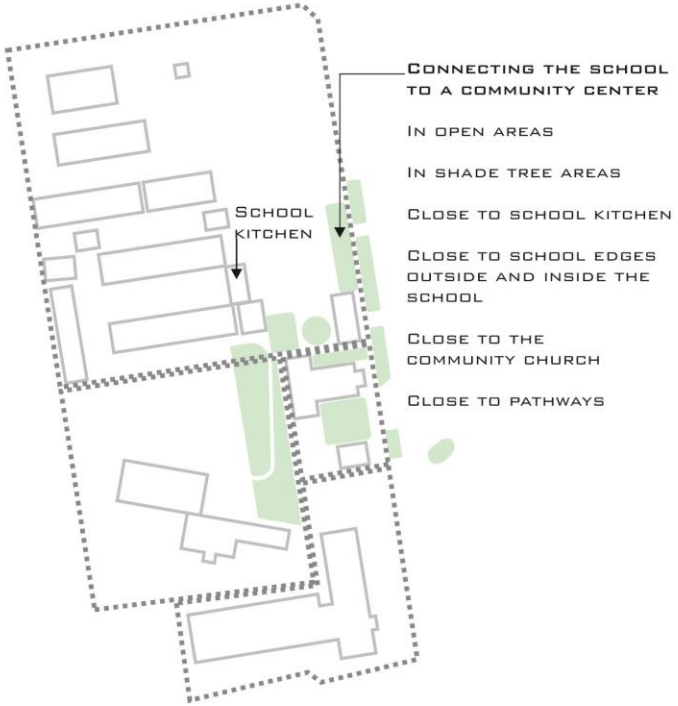
FOOD AND FARMING IN SOUTH AFRICA

- VEGETABLE PRODUCTION
- FRUIT PRODUCTION
- FOOD PREPARATION
- PERSONAL HYGIENE
- FOOD ENJOYMENT WITH OTHERS

EDUCATIONAL VEGETABLE AND FRUIT GARDEN, WHOSE PRODUCE IS SHARED BETWEEN LEARNERS AND COMMUNITY MEMBERS.

LEARNERS AND COMMUNITY MEMBERS PLANT, HARVEST, CLEAN, PREPARE, EAT, AND TALK TOGETHER.

POSSIBLE PLACEMENT IN A SCHOOL OUTDOOR ENVIRONMENT



Geography

	Learner/ community exchange spaces	Food and farming in SA Gr. 4
IN AND AROUND		
Open areas		
Under-cover areas		
Shade tree areas		
Pathways		
Access areas		
Man-made features		
Natural features		
Link to mountain		
Mountain		
CLOSE TO		
Close to staff buildings		
Close to classrooms **Front**		
Close to classrooms **Back**		
Close to school computer lab		
Close to school kitchen		
Close to school edges **Inside**		
Close to school edges **Outside**		
Close to community church		
Close to pathways		
FAR FROM		
Staff buildings		
Classrooms		

Fig. 65 explaining learner/community skills exchange spaces

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5.1.5 Encouraging increased interaction between learners and nature

5.1.5.1 The Need

Learners need to connect with nature. Learners must have a safe environment outside the school that is comfortable and encourages interaction with both community members and the natural areas around the school.

Fig.67 [www.agoda.com]

5.1.5.2 Design Response

Spaces immediately outside the school must be made safe for learners and these spaces must be used to connect the school to a natural area.

5.1.5.3 Spatial typology used

(8) Connection between the school and nature (See Fig. 69).

5.1.5.4 Envisioned spatial quality of typology (8)

Fig. 66 [www.stives-town.info]

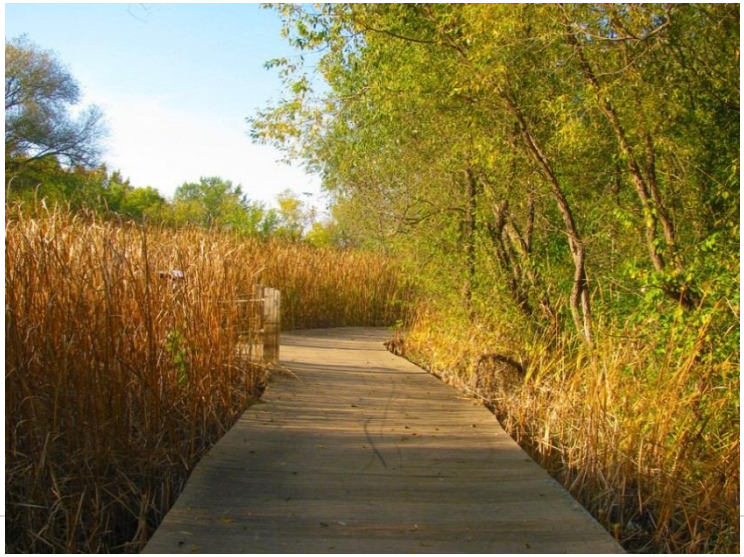

Fig. 68 [www.deviantart.com]

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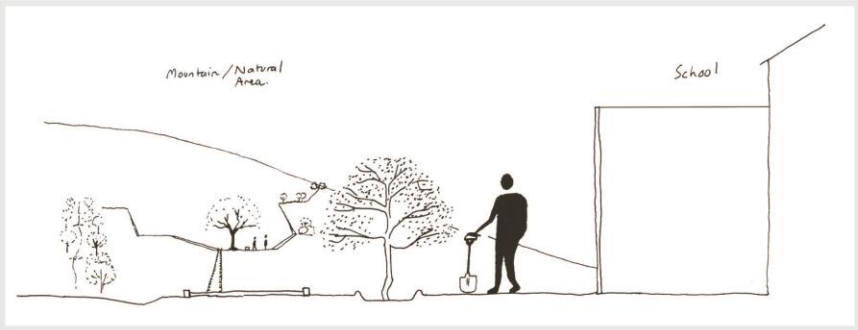
(8) CONNECTION BETWEEN THE SCHOOL AND NATURE

FUNCTION:
FOR ESTABLISHING ENDEMIC PLANTS AROUND THE SCHOOL EDGES. FOR WALKING FROM THE SCHOOL TO A NATURAL AREA AND BACK.

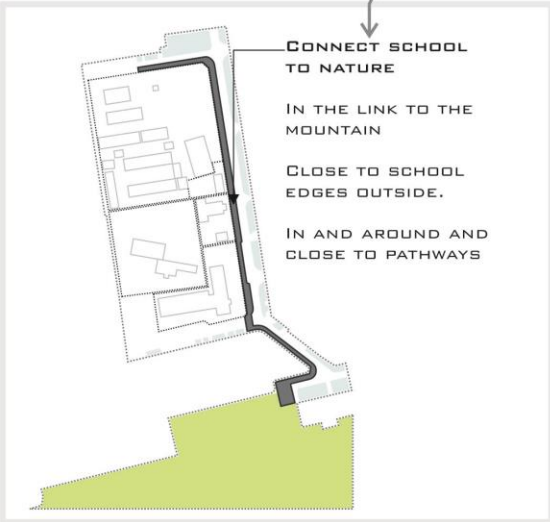
WHEN TO USE:
DURING PLANNED SCHOOL OUTINGS AND BEFORE AND AFTER SCHOOL.

DEFINED BY:
A WALKWAY SURROUNDED BY ENDEMIC PLANTS ON THE SIDEWALKS AND A WALKWAY CONNECTING THE SCHOOL TO A NATURAL AREA.

GROUP SIZE:
DIFFERENT GROUP SIZES, FROM CLASS SIZE GROUPS TO SMALL GROUPS OF 2 OR 3.



ENVISIONED FORM



POSSIBLE PLACEMENT OUTSIDE THE SCHOOL

	Connect school to mountain
IN AND AROUND	
Open areas	
Under-cover areas	
Shade tree areas	
Pathways	
Access areas	
Man-made features	
Natural features	
Link to mountain	■
Mountain	
CLOSE TO	
Close to staff buildings	
Close to classrooms **Front**	
Close to classrooms **Back**	
Close to school computer lab	
Close to school kitchen	
Close to school edges **Inside**	
Close to school edges **Outside**	■
Close to community church	
Close to pathways	■
FAR FROM	
Far from staff buildings	
Far from classrooms	

Fig. 69 explaining the connection between the school and nature

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5.1.6 Facilitating environmental education in nature

5.1.6.1 The Need

Learners need to connect with nature. They need to be educated about the natural environment, and they need to experience the physical features of the region in a large natural area.

5.1.6.2 Design Response

Spaces must be created in the natural area where learners can gather during excursions. These spaces must be appropriately sized and shaped to allow for fairly large groups of learners to hear teachers speaking while disturbing as little of nature as possible.

5.1.6.3 Spatial typologies used

(9) Environmental education spaces (See Fig. 74).

5.1.6.4 Envisioned spatial quality of typology (9)

Fig. 71 [www.adknaturalist.blogspot.com]

Fig. 72 [www.lukewaltz.blogspot.com]

Fig. 73 [www.ilovethefingerlakes.com]

5.1.6.5 Programmatic intention of typologies (8) and (9)

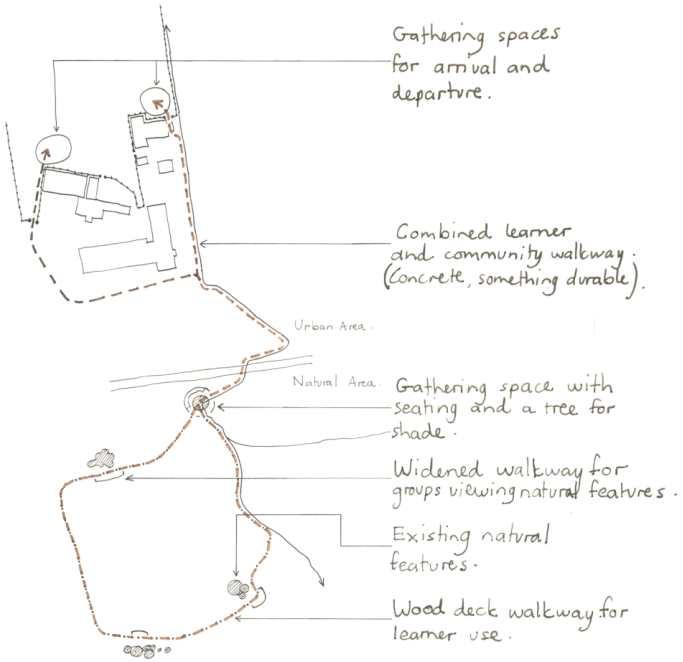

Fig. 70 showing the programmatic vision for the connection between the school and nature and for the environmental education spaces

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(9) ENVIRONMENTAL EDUCATION SPACES

FUNCTION:
FOR SITTING, STANDING AND WALKING IN NATURE. FOR LEARNING AND DISCUSSING INFORMATION ABOUT NATURE.

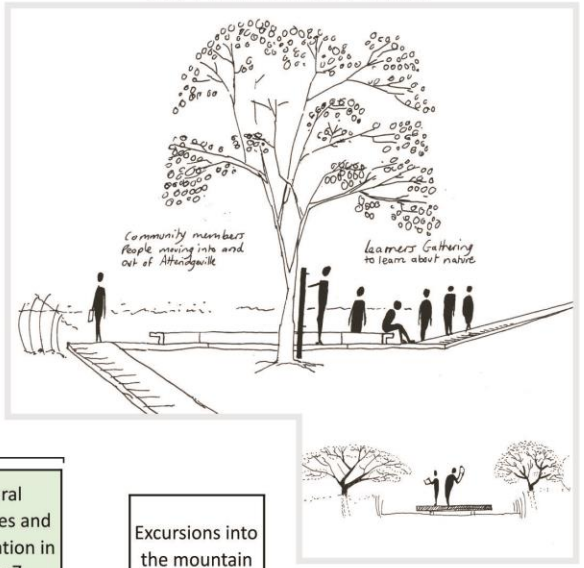
EDUCATIONAL INFORMATION
PHYSICAL FEATURES OF SA, WEATHER, CLIMATE, AND VEGETATION IN SA, AND NATURAL RESOURCES AND CONSERVATION IN SA.

WHEN TO USE:
DURING PLANNED SCHOOL OUTINGS

DEFINED BY:
A WALKWAY WITH OUTLOOK POINTS, AND AREAS WHERE LEARNERS CAN GET OFF AND STAND AND WALK IN A NATURAL AREA

GROUP SIZE:
CLASSROOM OR GRADE-SIZED GROUPS

ENVISIONED FORM



SOCIAL SCIENCES (GEOGRAPHY) GR. 4 - 7

SUMMARY: CONTENT OVERVIEW GEOGRAPHY INTERMEDIATE PHASE

Term	Grade 4	Grade 5	Grade 6	Grade 7
1	Places where people live (settlements)	Map skills (focus: Africa)	Map skills (focus: World)	Map skills (focus: Local maps)
2	Map skills	Physical features of South Africa	Trade (focus: South Africa and world)	Earthquakes, volcanoes and floods
3	Food and farming in South Africa	Weather, climate and vegetation of South Africa	Climate and vegetation around the world	Population growth and change (focus: World)
4	Water in South Africa	Minerals and mining in South Africa	Population – why people live where they do (focus: South Africa and world)	Natural resources and conservation in South Africa

POSSIBLE PLACEMENT OUTSIDE THE SCHOOL

ENVIRONMENTAL EDUCATION

IN AND AROUND AND CLOSE TO PATHWAYS

IN AND AROUND NATURAL FEATURES

IN THE LINK TO THE MOUNTAIN

IN THE MOUNTAIN

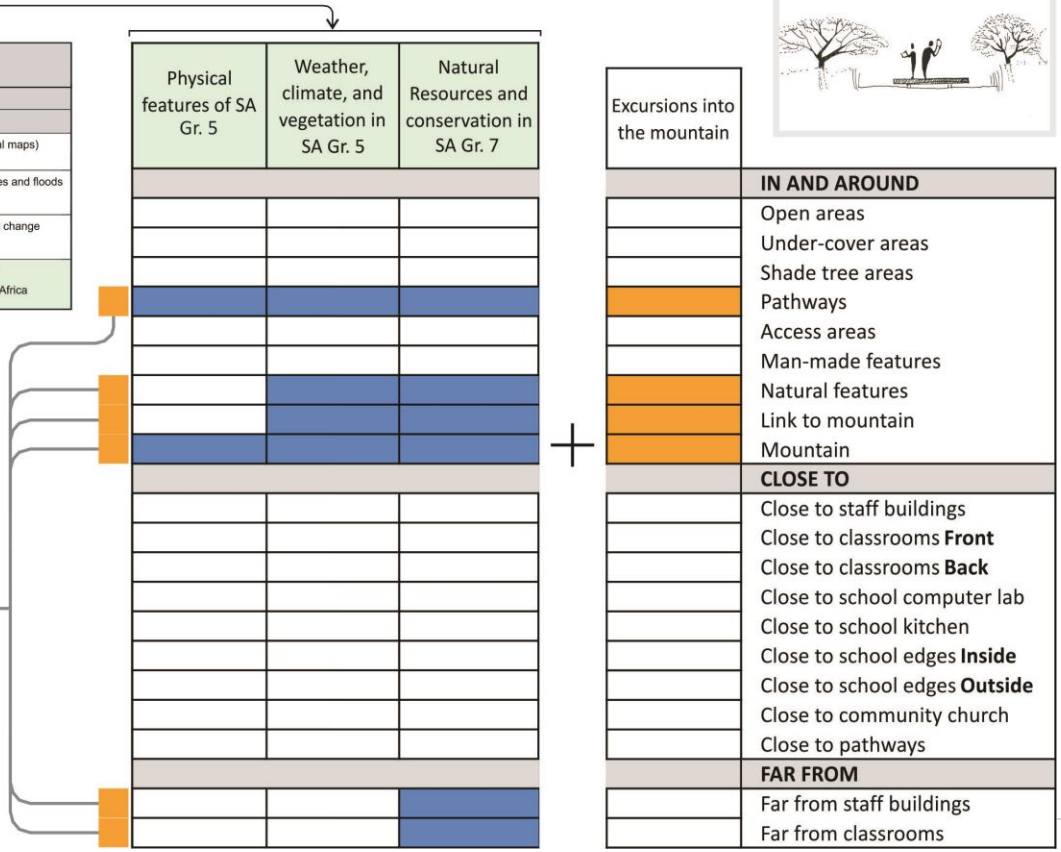


Fig. 74 explaining environmental education spaces

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5.2 Conclusion: Site Program

In this chapter the program for the site was developed from the educational strategies researched. Essentially the main elements of the site program are:

1) A combination of front-yard, front-porch, backyard and plaza type spaces behind and in-front of classrooms, with a transition from semi-public to more private spaces.
2) Outdoor classrooms spaced around the schoolyard with content related to the natural and man-made features closest to them.
3) A Learner/community skills exchange belt that runs from the community church along the eastern edges of the classrooms and houses a shared project between the school and the community.
4) Clustered recreation spaces along the eastern and northern sides of the school property that can be used by both learners and community members for reflection and verbal interaction.
5) Two spaces that advertise school activities to the community. One outside the main entrance, and another outside the community church.
6) An educational walkway extending from the different school access points into the natural ridge, with spaces for viewing and reading environmental features.

Fig. 75 showing the site program

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Chapter 6: Concept Development

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6.1 Introduction

The conceptual layer for the site was inspired by other community/school collaboration projects in the same part of Atteridegville. Most notable among these is the Banareng Primary School Community Participation Project. This project started in 1999 and focusses on enlisting the support of the community in improving the school. This entails; collection of recyclable materials, building of new classrooms, construction of vegetable gardens, and maintenance of the school property [CSIR, 2003].

6.2 Background to the concept – Movement of water

The concept traces the movement of water through the site and how the water is used throughout the site (See Fig. 76).

1) The water originates in the natural ridge as surface run-off.
2) It is collected on site so that it can be used.
3) The water is purified until it is fit for irrigation purposes.
4) The water is combined with garden refuse to create compost for the vegetables. Water is also transported to the vegetable plots.
5) The water and compost are applied to the vegetables to feed their growth.
6) The water left over after vegetable production is used to irrigate the eating areas where the learners and community members sit.

6.3 Site Concept

Water is used by people to improve their lives. On this site, water is converted to food for feeding hungry learners.

This is how it happens:

1) Learners discover the source of the water in the natural ridge.
2) The water is channeled and collected in a reservoir.
3) The water is purified in a wetland.
4) The water is converted into compost and drip irrigation.
5) The compost and drip irrigation are applied to the vegetables to for growth.
6) Learners and community members harvest the vegetables and enjoy eating them together.

…and similar to the water

Information is also used by learners to improve their lives. On this site, information is converted to knowledge that learners can use later in life.

This is how it happens:

1) Leaners discover information in the natural and man-made elements of the schoolyard.
2) The information is collected in learners' brains through experiencing the elements of the schoolyard with all their senses.
3) The information is sorted and added to existing experience through a filtering process in the brain.
4) The information is then used to create tools and technology with a particular problem in mind.
5) The tools and technology are applied to the problem.
6) Learners reflect on how they applied their information to solve the problem and think of ways in which it could be done better. They gain knowledge in the process (See fig. 77).

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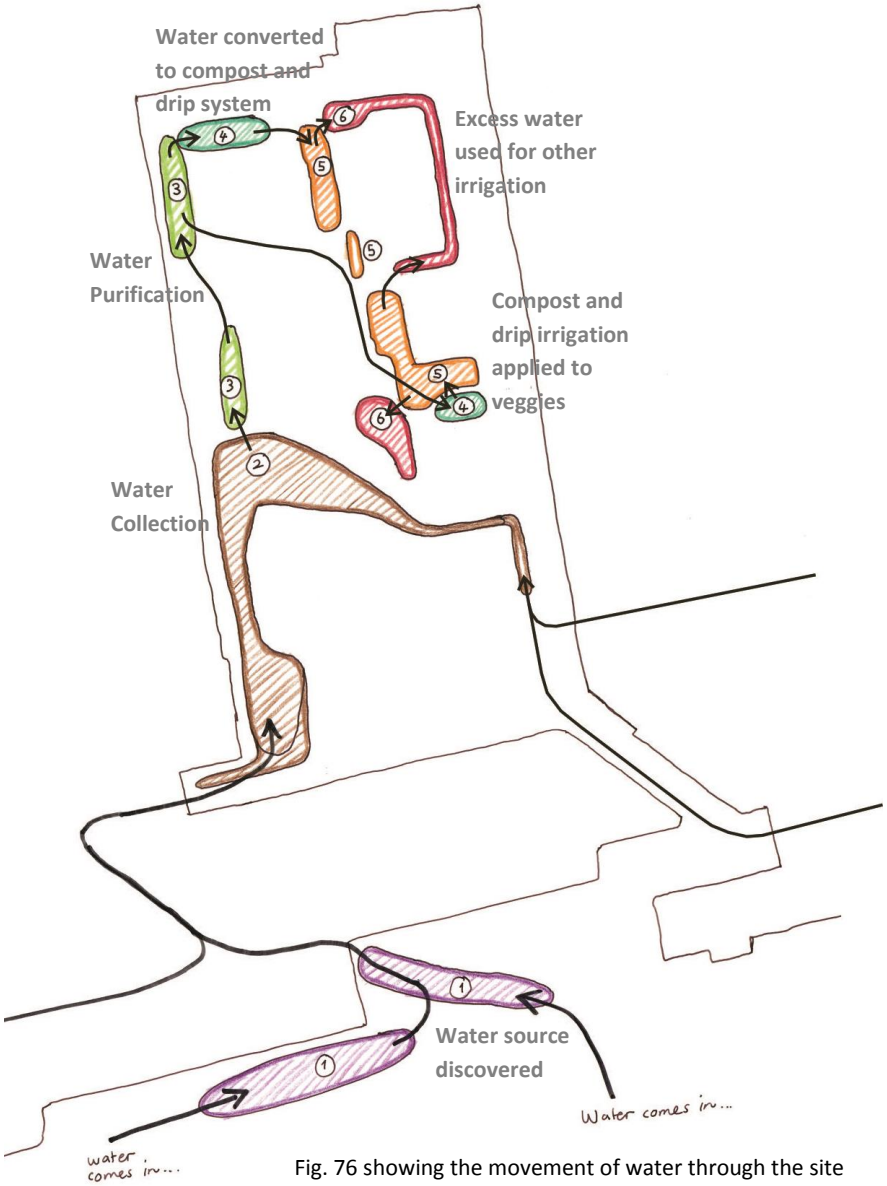


Fig. 76 showing the movement of water through the site

This space contains re-used and converted structures that produce the compost

CONVERSION

ENJOYMENT AND REFLECTION

These spaces become recreation spaces used by learners and community members for eating, sharing and talking.

FILTERING

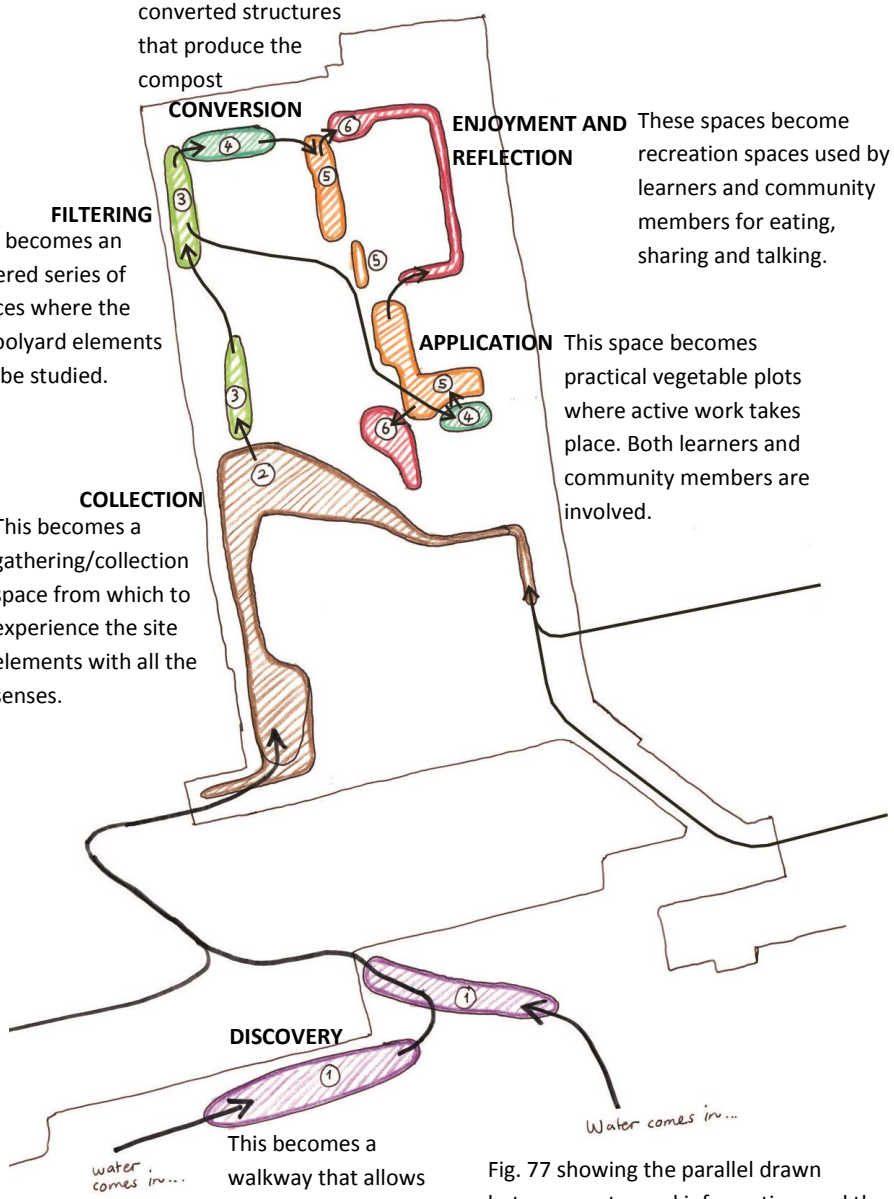
This becomes an ordered series of spaces where the schoolyard elements can be studied.

APPLICATION

This space becomes practical vegetable plots where active work takes place. Both learners and community members are involved.

COLLECTION

This becomes a gathering/collection space from which to experience the site elements with all the senses.



This becomes a walkway that allows visual access to nature.

Fig. 77 showing the parallel drawn between water and information, and the spatial language that results from this

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Chapter 7: Master Plan Development

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7.1 Introduction: Three design layers as a departure point

The design development for this project has three layers of information that shape the master plan; the design response to site issues, the site program, and the site concept. This chapter explains the different components of the master plan.

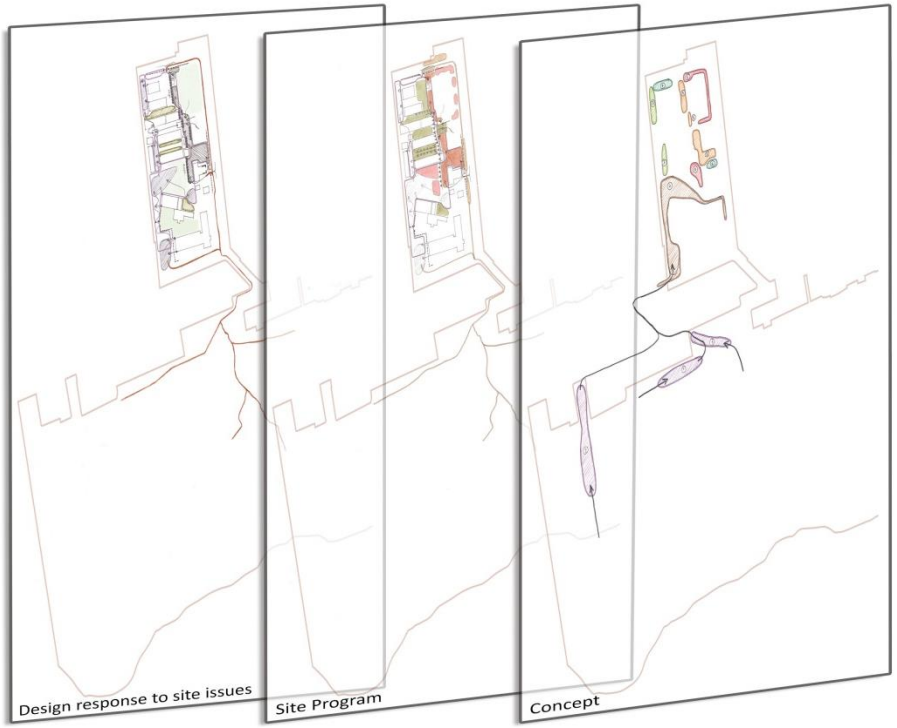

Fig. 78 showing the layering of three sets of information to develop the master plan

7.2 The master plan explained

The master plan will guide design development on the site. The overall objective of the project can be summarized in the six broad educational goals identified in section 2.4 in chapter 2:

1. Encouraging improved and increased interaction between learners and the school outdoor spaces.
2. Facilitating learning of environmental aspects of the curriculum outside the classroom.
3. Encouraging increased interaction between learners and the community.
4. Facilitating social skills exchange between learners and community members.
5. Encouraging improved and increased interaction between learners and the natural landscape outside the school.
6. Facilitating learning of environmental education in the natural landscape outside the school.

These six goals still form the basis for the design and should guide the development of the master plan and the sketch plan design later on.

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7.2.1 The master plan components

The master plan comprises the following components:

- **Proposed pedestrian movement** routes, including separate learner and community movement routes that combine in the semi- public areas where learners and community interact.

- **Proposed boundaries**, including vegetated strips to distinguish between the semi-public learner community collaboration belt and the rest of the site.

- **Proposed Land Use** with educational zones and a transition from semi-public spaces further away to more private spaces closer to the classrooms.

7.2.2 Master plan Key

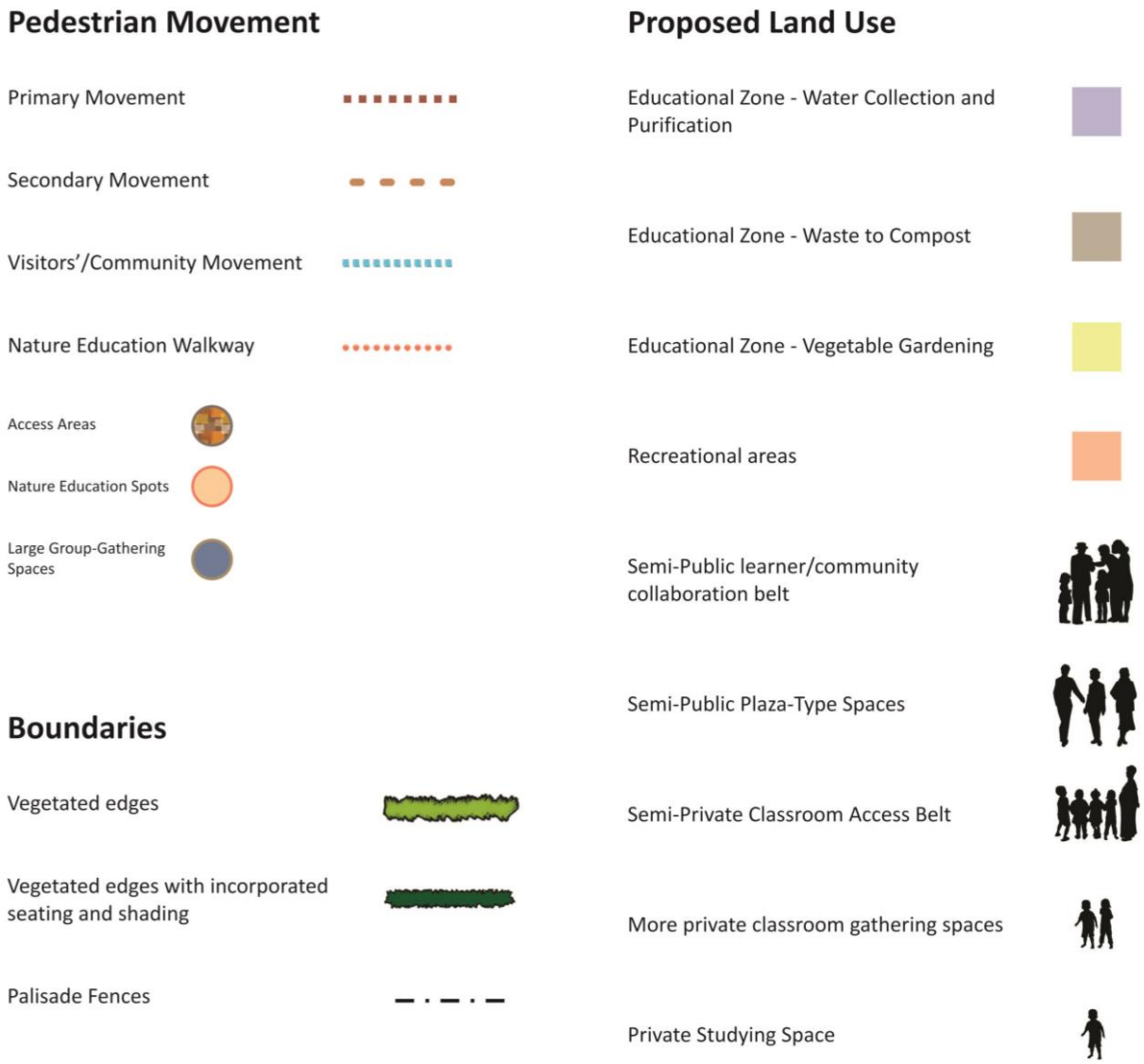

Fig. 79 showing the master plan Key (See Fig. 80).

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7.2.3 Seaparankwe master plan

Fig. 80 showing the master plan

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Chapter 8: Sketch plan and detail design

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8.1 Introduction: Purpose of this chapter

This chapter starts by explaining the spatial character of the design through the use of a sketch plan and elevations. The chapter concludes with a more technical explanation of the design using a ground level plan and section drawings.

8.2 The sketch plan explained

The sketch plan is a refinement of the master plan. It is an extension of the master plan that focusses on describing the spatial quality and character of the different components of the design. The sketch plan comprises the following spaces:

8.2.1 Educational areas

8.2.1.1 Recreation and eating areas (See fig. 82, 92)

Spatial characteristics

The recreation and eating areas are comfortable spaces for eating the vegetables produced in the vegetable garden. They are designed to be shared by learners and community members and are close to the vegetable garden. The recreation and eating spaces are also designed for group discussions and reflection on things learnt while working in the vegetable garden. These spaces are also designed for washing hands and drinking water. One portion of the recreation and eating areas can also be used for selling vegetables. The excess water from these spaces is used to irrigate the sports field.

Curriculum related content – Food enjoyment and hygiene

The recreation and eating areas are related to the national curriculum in that the 'Personal and social well-being' segment of the Life Skills study theme is expanded upon. Each recreation and eating area contains a municipal water tap for hand washing and drinking. Each recreation and eating area also contains plants with cleansing properties such as Aloe Vera whose leaves, when crushed and used as lather on hands, has an anti-bacterial effect. These additions make the recreation and eating areas ideal for learning about the hygiene aspects of enjoying food.

8.2.1.2 Vegetable garden (See fig. 82, 85)

Spatial characteristics

The vegetable garden is a practical space to plant vegetables and feed them compost and water. Attached to the vegetable garden is a small square that can be used to sort, clean, and prepare vegetables for cooking. This square is also close to the school kitchen so that the cooking can take place close to the other vegetable related activities. The vegetable garden is also a semi-public space in which learners interact with old community members associated with the evangelical church. The vegetable garden has been specifically designed to accommodate older

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people in that it contains keyhole gardens which are raised above the ground for easier access by older people.

Curriculum related content – Food and farming

The vegetable garden is related to the national curriculum in that both the 'Food and farming in South Africa' segment of the Social Sciences study theme and the Natural Sciences study theme are expanded upon. The vegetable garden's identity as a space for social interaction about vegetables is reflected in the way seating has been incorporated in the keyhole gardens (See Fig. 81) and in the way that the vegetated seating and pergola edge running along the western side of the vegetable garden has more seating and less shading on the vegetable garden side.

8.2.1.3 Waste conversion area (See Fig. 82)

Spatial characteristics

The waste conversion area is a space in which waste is converted into compost. It is also a compost stockpile. The compost is created by gathering on-site excess plant material and garden refuse from the surrounding community into heaps on a concrete slab. The waste paper produced by the school is shredded and added to the heaps. The compost heaps are wetted with water from the wetland area.

Curriculum content – Waste recycling

The waste conversion relates to the curriculum in that the 'Health and environmental responsibility' segment of the Life Skills study theme is expanded upon. This space uses re-used converted containers to store the equipment used for turning and transporting the compost.

8.2.1.4 Water purification wetland (See Fig. 82, 91)

Spatial characteristics

The water purification wetland is designed as a series of wetlands that progressively purify the water from the main reservoir. The wetlands are placed in series so that an ordered arrangement of outdoor spaces can be created between them and around them. The water purification wetland consists of three wetlands. The upper wetland is a surface flow wetland with added storm water carrying capacity. This wetland's rim is a 450mm high seating wall designed so that learners can look into the wetland and see both shallow growing and emergent macrophytes adjust themselves to the changing water levels. Downstream from the upper wetland is a sub-surface flow reed-bed wetland. This wetland has been designed without a palisade so that learners can access and harvest the reeds growing in the reed-bed. This wetland also has a level adjustment sum at the bottom end which is visible from above. This sump allows for learners to inspect the water flowing out of the reed-bed to check if the correct

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flow rate is being maintained in the wetland system. Downstream from the reed-bed is a surface flow finishing wetland. In this wetland learners will be able to see the improvement in the clarity of the water.

Curriculum content – Water purification

The water purification wetland relates to the curriculum in that the 'Water in South Africa' segment of the Social Sciences study theme is expanded upon. The fact that the rims of the wetlands are generally 450mm above ground level allows for these wetlands to serve as places where learners can sit and learn about concepts such as practices that pollute water, organisms that live in water and wastewater recycling. The way in which the water from the wetland is used to irrigate the site is made as visible as possible around the wetland area through the use of spray irrigation that is raised above the ground.

8.2.1.5 Water collection and runoff attenuation area (See Fig. 82)

Spatial characteristics

The water collection and runoff attenuation area as a whole is designed as an experiential space from which learners can launch their exploration of the schoolyard elements. This space is designed so that learners can experience water in as many ways as possible. In order to mitigate the potential danger associated with this freedom to explore, vegetated barriers and palisade barriers are used to minimise access to water in possibly dangerous areas. The water collection and runoff attenuation area contains water storage reservoirs, a central gathering space, a xerophyte garden, a stream meander and a bio-retention area.

1) **Water storage reservoirs**

   There are three reservoirs in the water collection and runoff attenuation area. The main reservoir collects water from two smaller reservoirs in higher portions of the site. The reservoirs' main objective is to store the water required to irrigate the site. The site requires approximately 504m³ of irrigation water per month and the amount that needs to be stored in the dry months to provide this is about 2200m³. The reservoirs are bottom-drained for maximum storage capability. The rims of the reservoirs are generally surrounded by veld grass that discourages learners from accessing the water, with the only easy access to water being in two locations along the rim of the main reservoir.

2) **Central gathering space**

   The central gathering space is a classroom sized gathering space with a long, curved seating wall on one side. It is designed for outdoor lectures and for gathering before and after exploring the schoolyard elements. The central gathering space is connected to the main learner movement routes.

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3) Xerophyte garden

The xerophyte garden is designed to conserve the use of water while supporting plant life. It is situated along the warm north-facing wall of the crèche building. The xerophyte garden combines water sparing vegetation such as Aloe marlothii with clay pots beneath the soil surface to conserve water. This space responds directly to the 'Water as resource' segment of the Social Sciences study theme by showing learners how to conserve water.

4) Stream meander and bio-retention area

Both the stream meander and the bio-retention area are designed to attenuate water runoff. The stream meander attenuates and aerates water running into the main reservoir by using weirs with rocks. The bio-retention area attenuates and slowly releases the overflow from the main reservoir during large rain events (See Fig. 84, 89). It also supports plants that can handle occasional flooding.

Curriculum content – Water as resource

The water collection and runoff attenuation area relates to the curriculum in that the 'Water as resource' segment of the Social Sciences study theme is expanded upon. Learners' experiences of the elements in this area must bring across curriculum aspects related to water access, uses for water, shapes that water takes in nature and water collection and conservation.

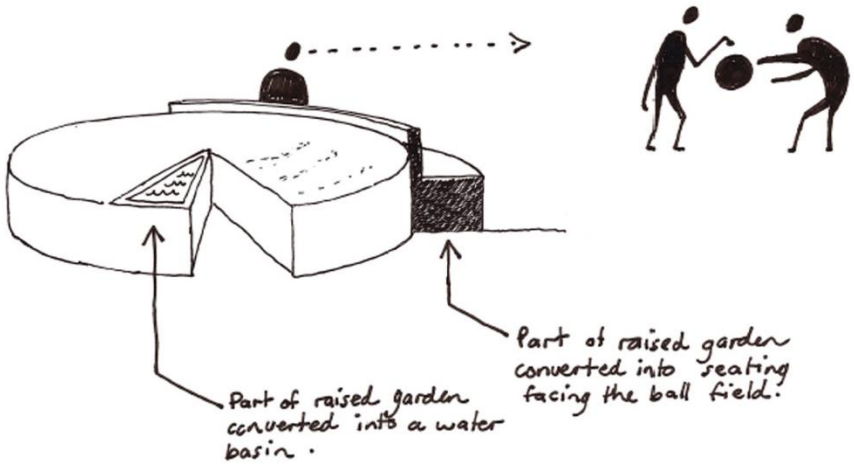

Fig. 81 showing the keyhole gardens with combined seating

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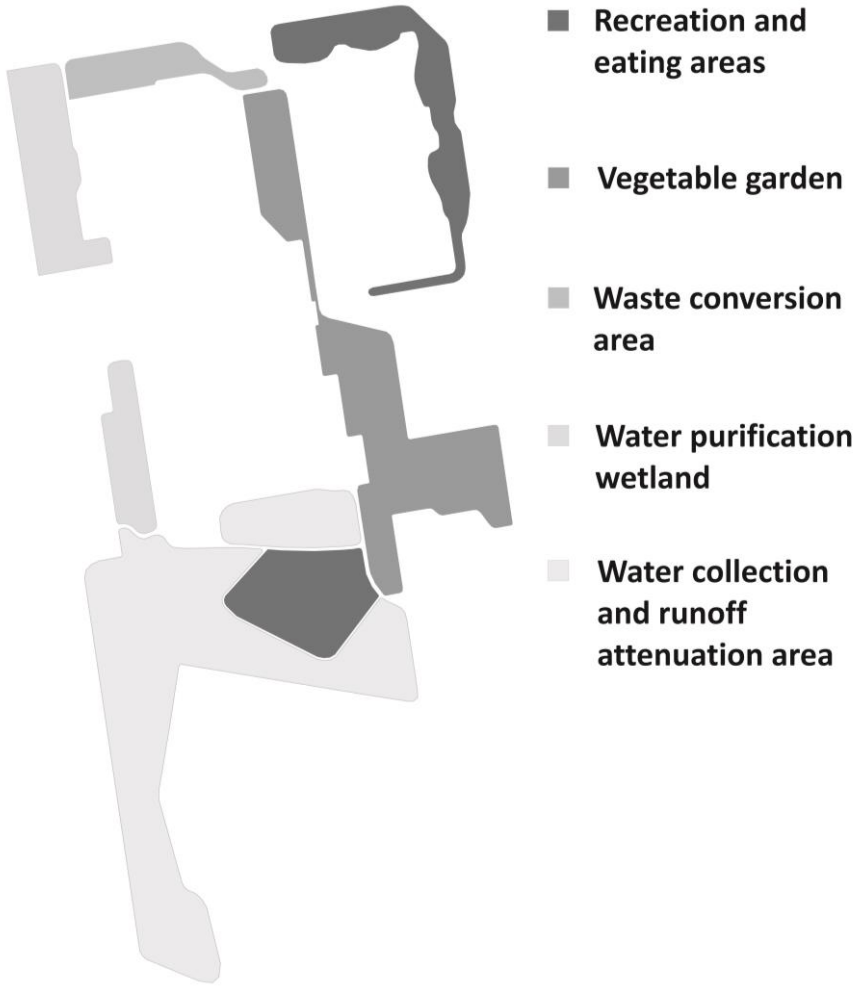

Fig. 82 showing the education areas on site

8.2.2 Clearly defined spaces around classrooms

8.2.2.1 Thoroughfare between classrooms and sports field

(See Fig. 87)

The thoroughfare between the classrooms and the sports field is designed to be both movement space and picnic space. It must be able to accommodate learners that are either walking or sitting on lawn.

8.2.2.2 Small classroom-sized gathering spaces (See Fig. 87, 90)

Spatial characteristics

The gathering spaces in front of the classroom are designed with space definition in mind. The spaces are screened from the rest of the site by plants. A visual opening is created in the vegetation to allow for views from the smaller spaces close to the classroom to the larger space further away (i.e. the thoroughfare).

The ground level around the wooden bench changes to accommodate learners of different ages and sizes. Deciduous trees provide shading during summer. Light shines through in winter, allowing the space to still remain comfortable. All areas in-front of the classrooms are irrigated with rainwater collected from the classroom roofs. Water is stored in JoJo tanks connected to the building gutter.

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8.2.2.3 The plaza space

Spatial characteristics

The plaza space is close to the main school entrance. This square has been designed for high traffic volumes. Its main purpose is to provide access to the principal's office and to guide movement into the schoolyard. The plaza space has signboards that explain the community movement route and important spaces along it. Signboards also explain the learner movement route and important spaces along it.

8.2.2.4 Quiet studying space

Spatial characteristics

The quiet studying space is designed for small groups of learners or individuals. It is located between classroom buildings. The fact that no classroom doors open onto this space make it ideal as a private space. It is proposed that this space be connected to the computer lab via a back door, allowing for easier access to information while studying. The quiet atmosphere identity of this space is reflected in the use of strips of planting all around its edges. The bedding around the three existing trees will be enlarged and raised. Dense planting in this bedding, combined with a large painted wall depicting a natural scene in the east of the space will give the visual illusion of standing in a natural environment. Learners should find this space relaxing and refreshing.

8.2.3 Entrance areas

8.2.3.1 Main school entrance

The main school entrance is design with a threefold purpose in mind. The school main entrance must control learner and community access to the schoolyard, must provide a portal through which community members can bring their garden refuse and must provide space to buy and sell vegetables.

8.2.3.2 Evangelical church entrance

The evangelical church entrance provides controlled access to the schoolyard for pensioners. Pensioners who are already involved in the church feeding and exercise scheme will arrive at the church on weekday mornings. Their food will be provided by the school vegetable garden and contact sessions with learners will be held in the school vegetable garden. The church entrance is closed once the pensioners are inside and the two gates connecting the church to the school are opened.

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8.2.4 Sketch plan

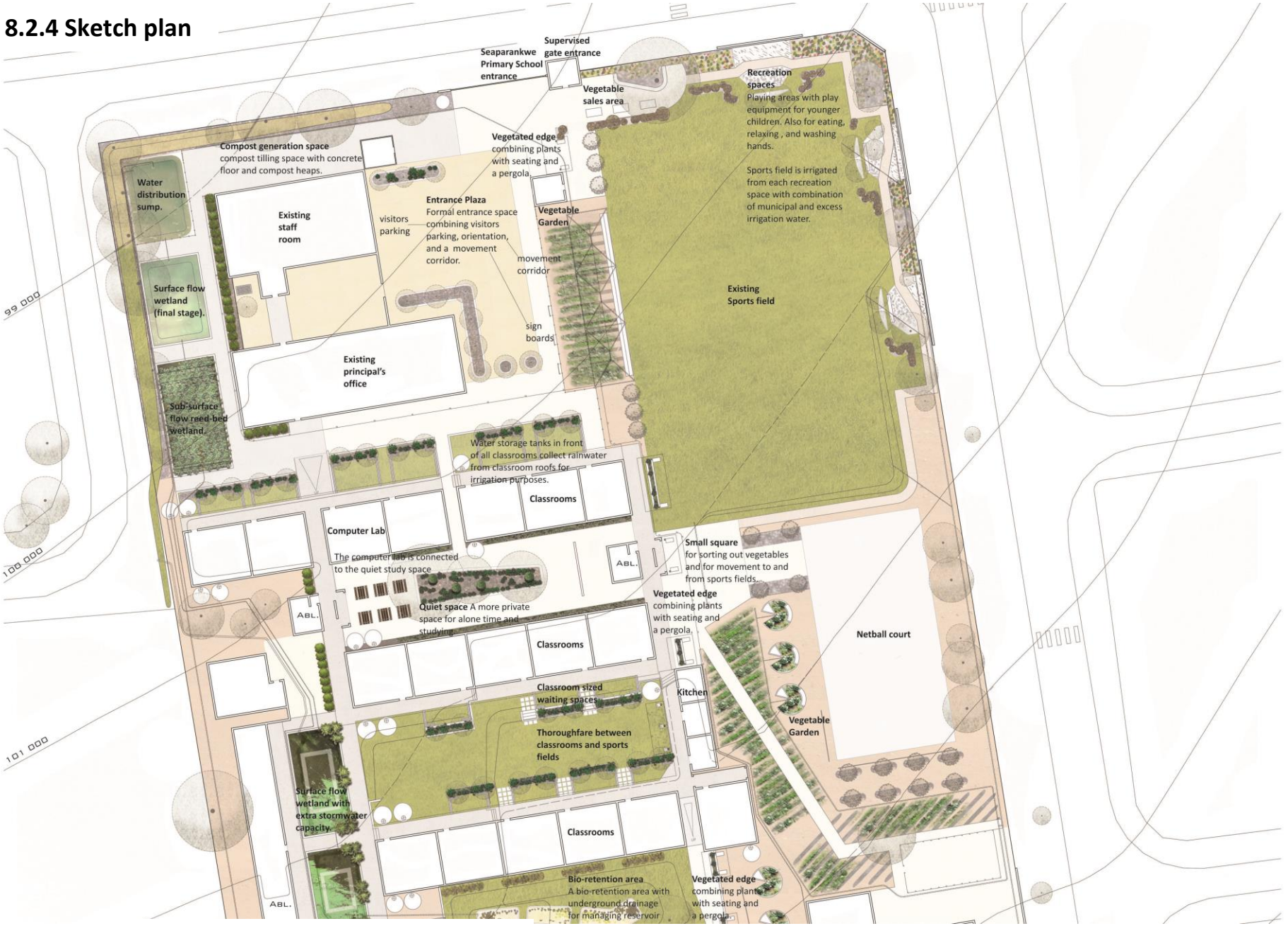

Fig. 83 showing the northern-most part of the sketch plan

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Fig. 83 showing the southern-most part of the sketch plan

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8.2.5 Perspectives

 Fig. 84 showing an elevation of the bio-retention area and surrounds

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Fig. 85 showing an elevation of the vegetable production area

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8.2.6 Ground level plan

Fig. 86 showing the northern-most part of the ground level plan

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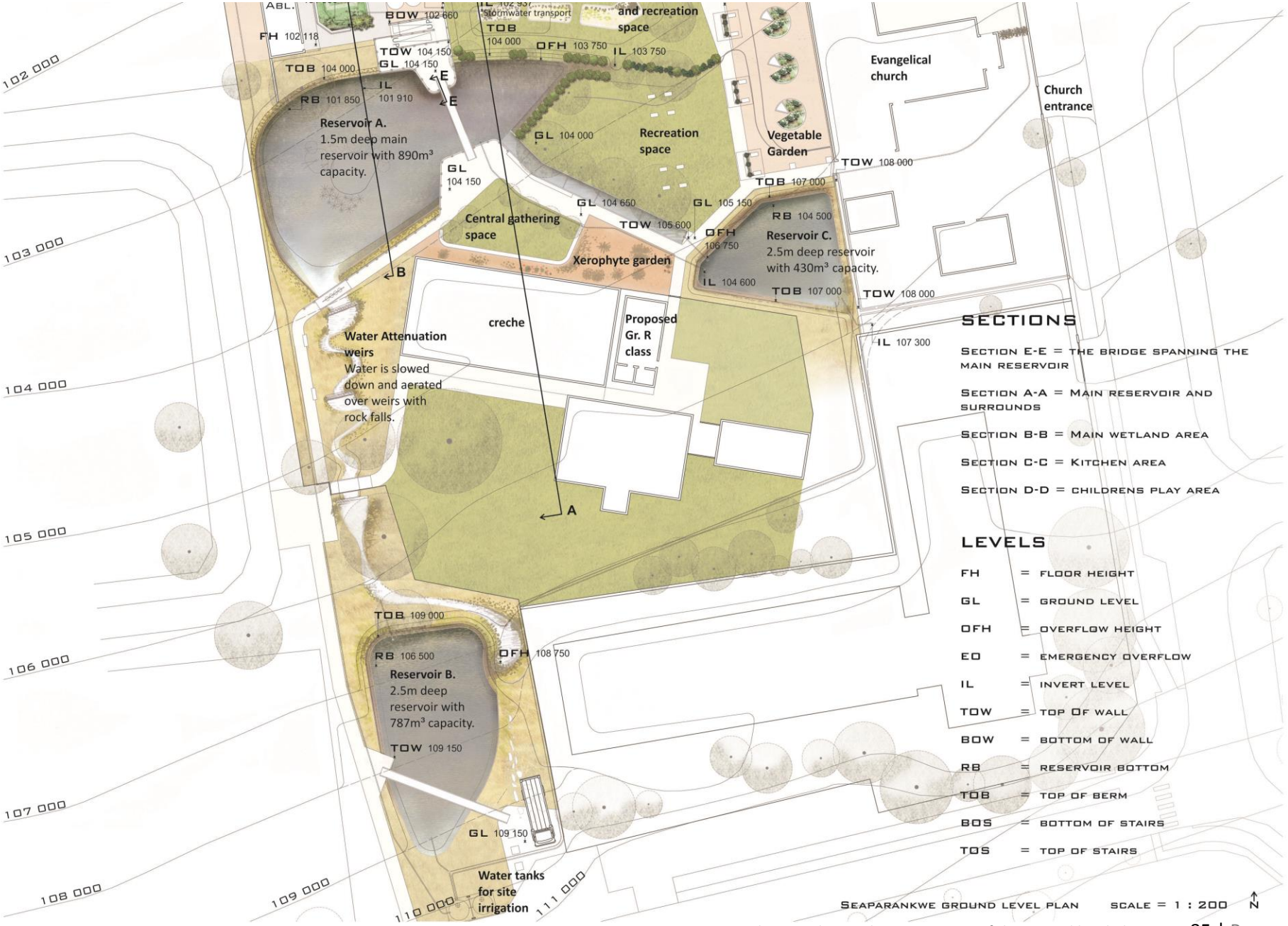

Fig. 86 showing the southern-most part of the ground level plan

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8.2.7 Section A-A

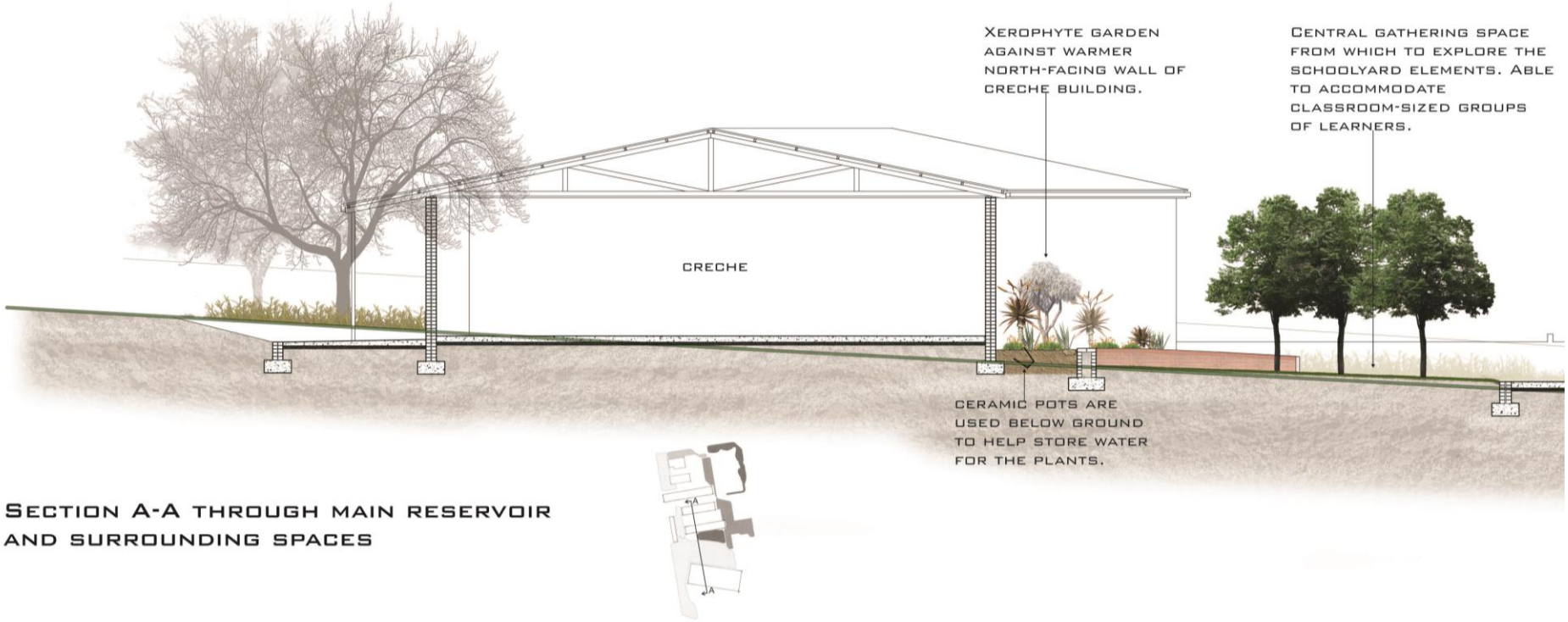

 Fig. 87 showing the southern-most part of section A-A

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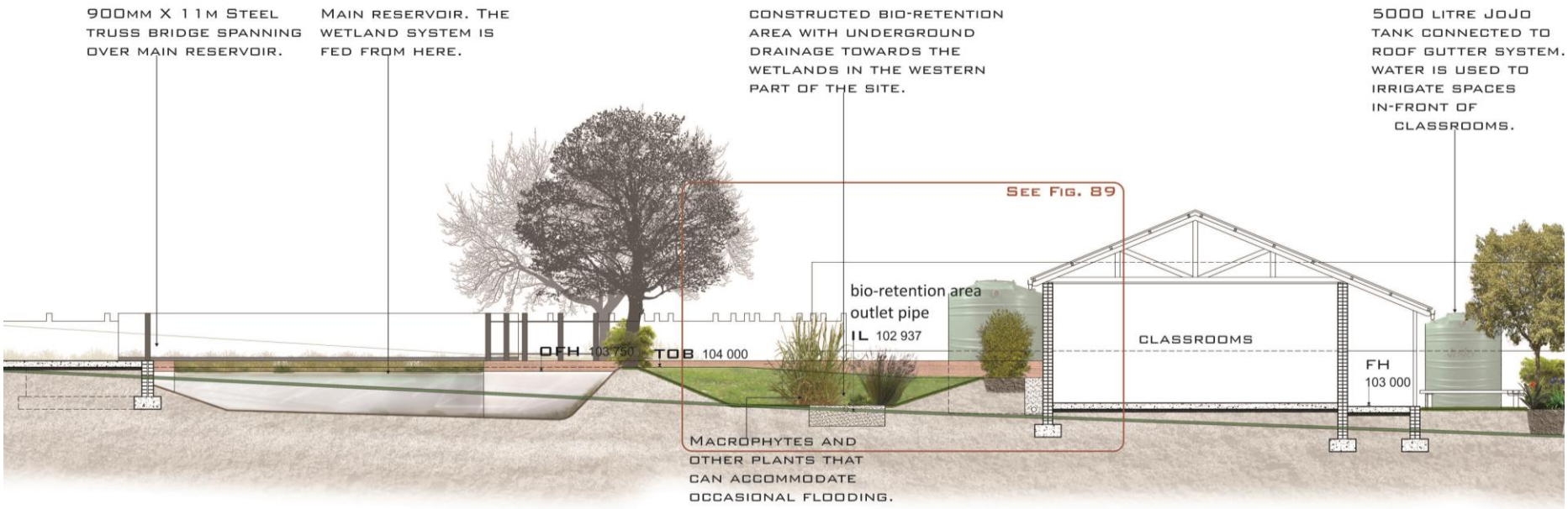

Fig. 87 showing part of section A-A

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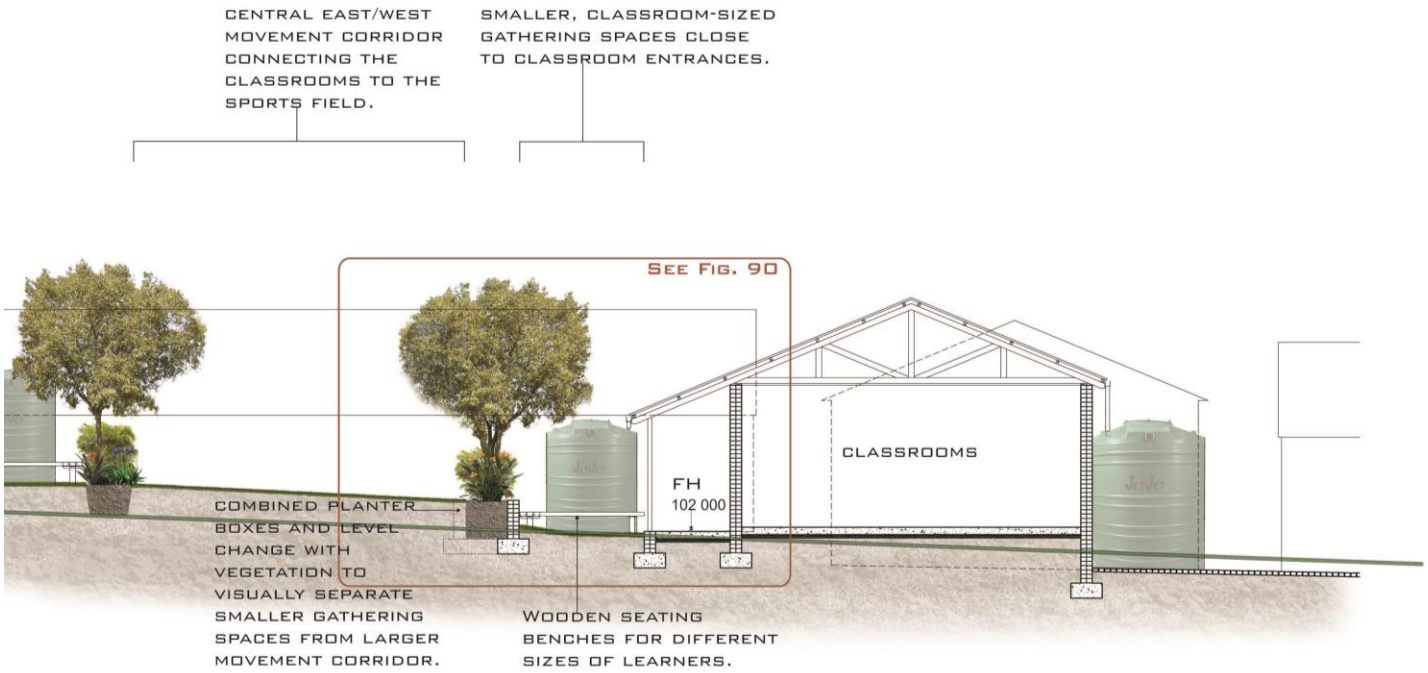

 Fig. 87 showing the northern-most part of section A-A

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8.2.8 Section B-B

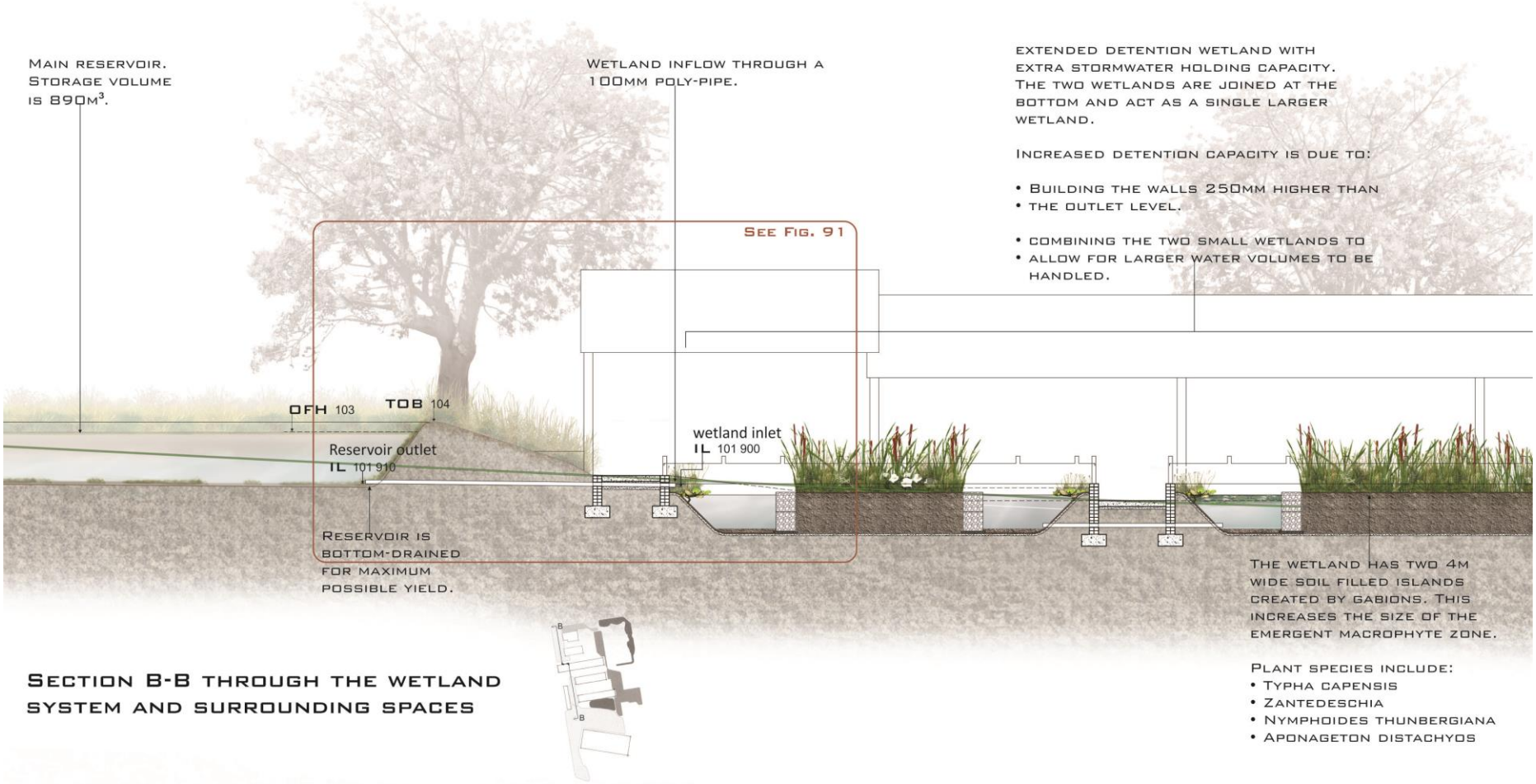

Fig. 88 showing the southern-most part of section B-B

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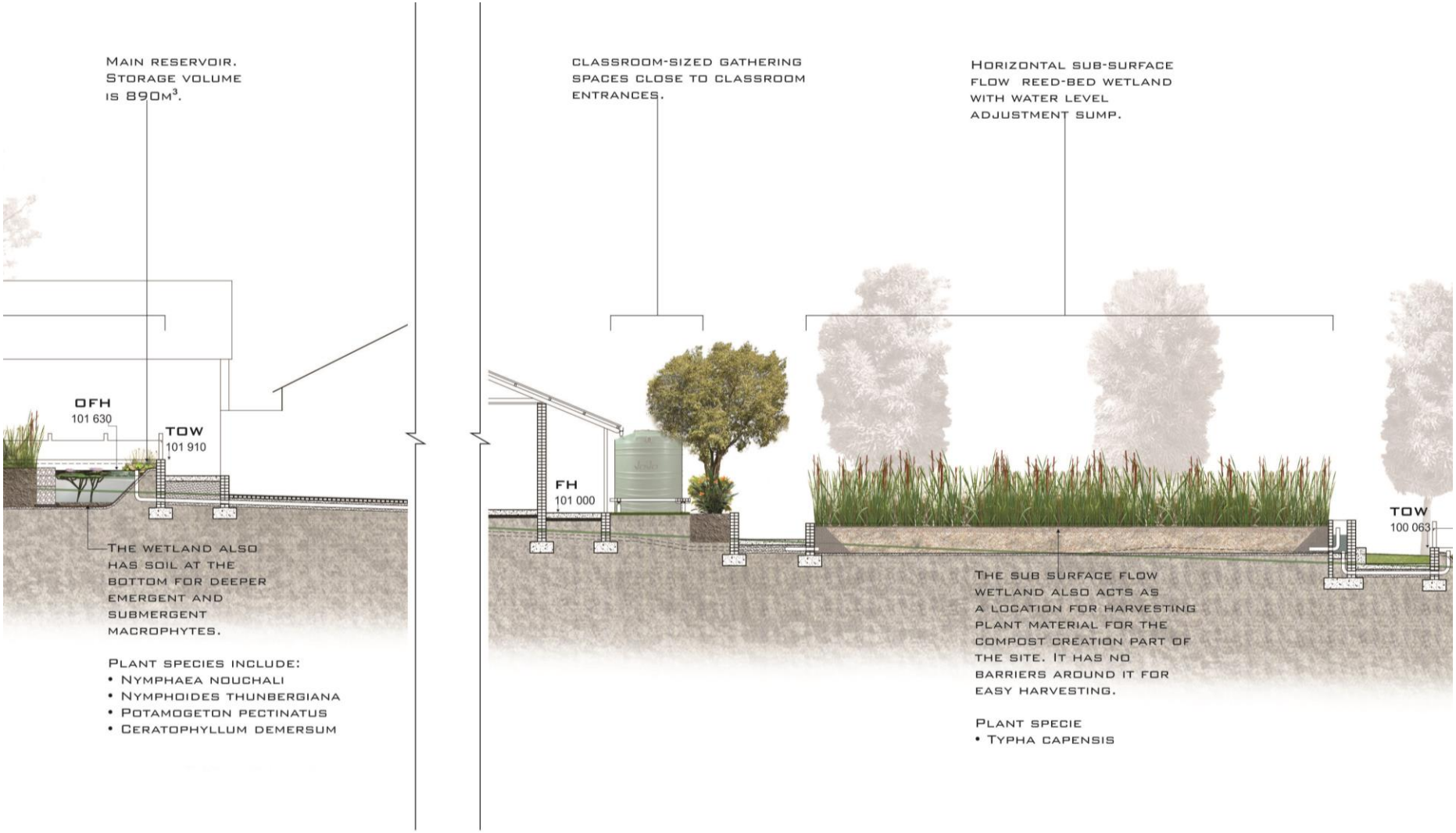

 Fig. 88 showing part of section B-B

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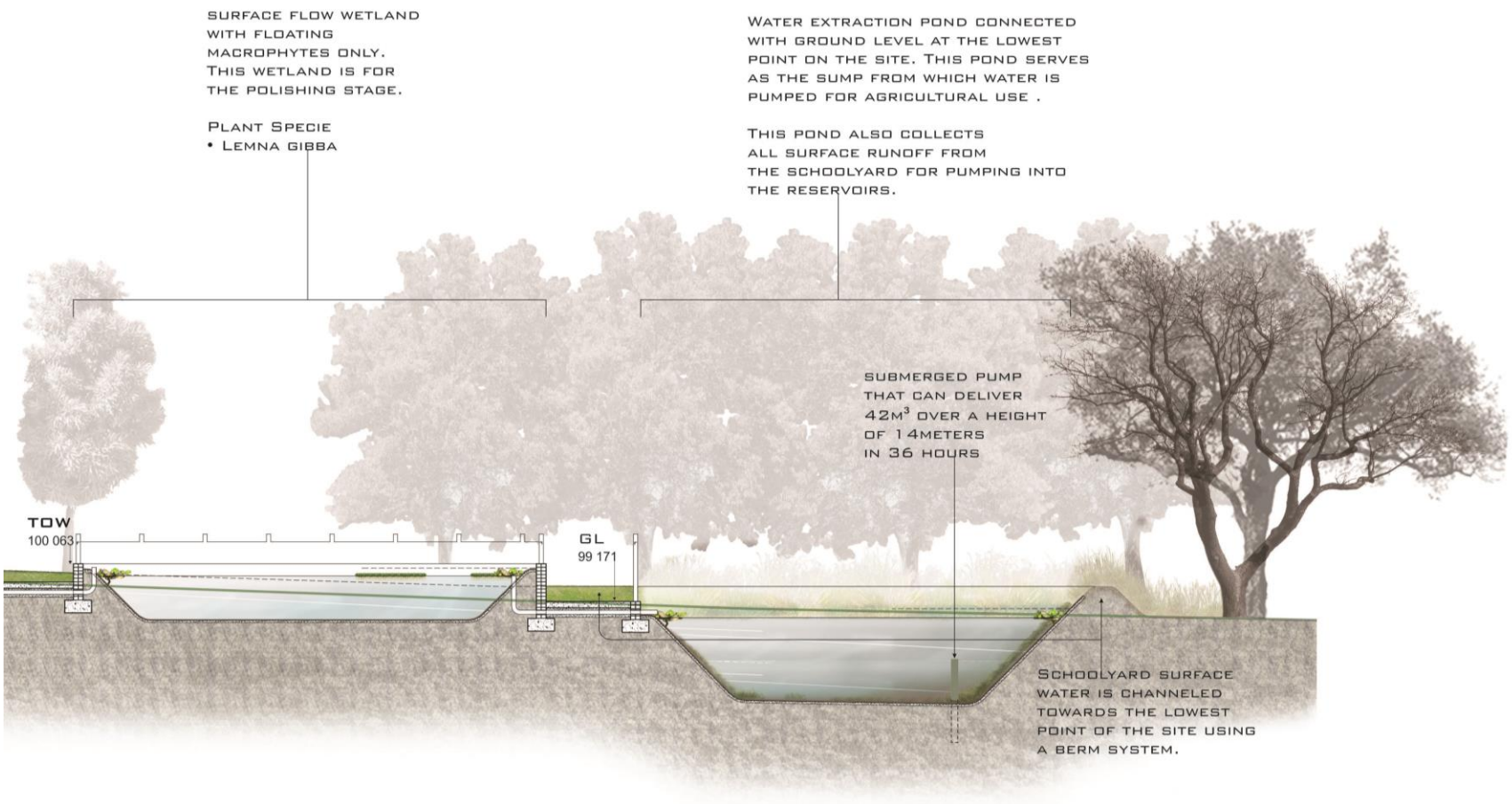

Fig. 88 showing the northern-most part of section B-B

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8.2.9 Detail Design

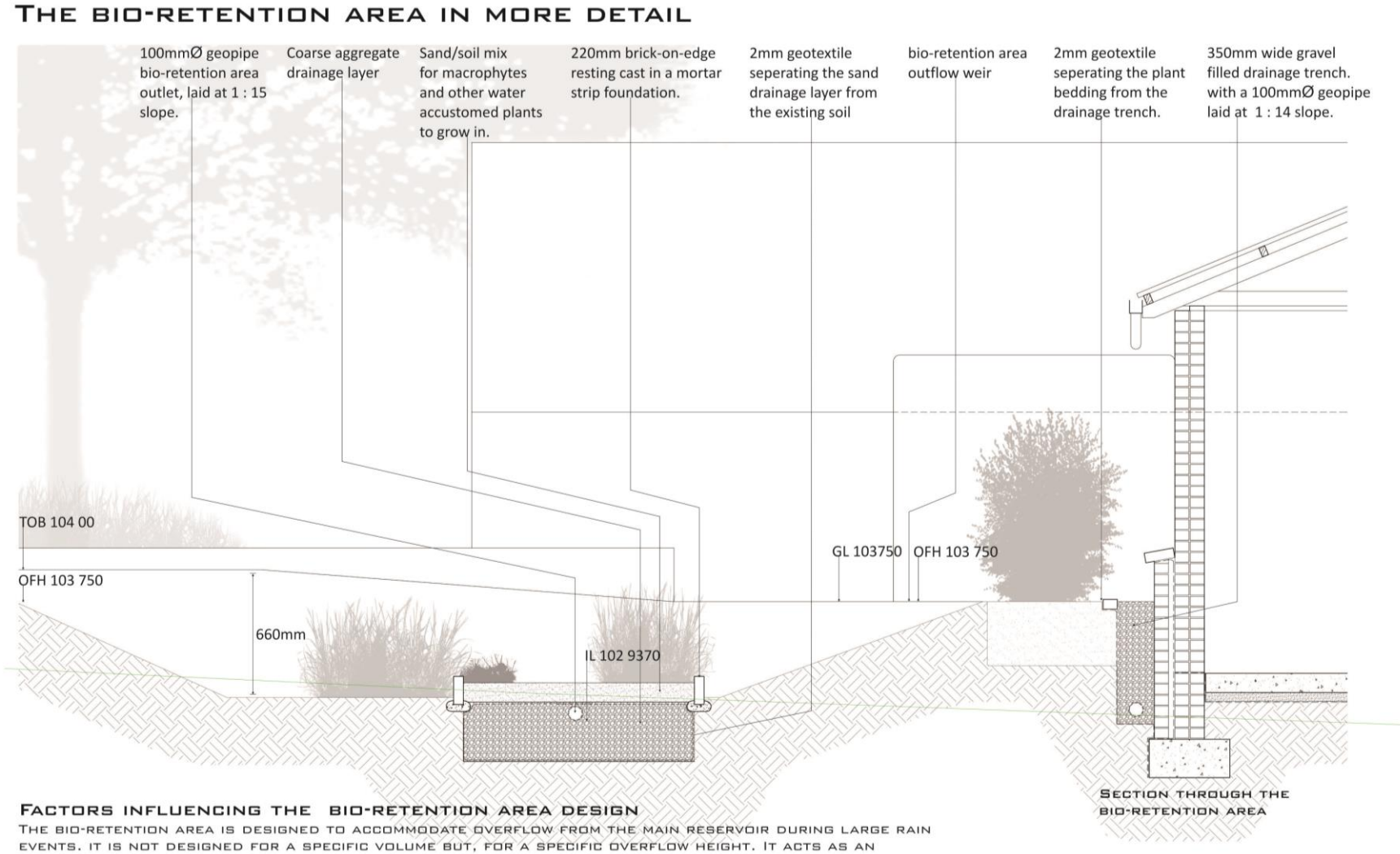

 Fig. 89 showing the bio-retention area in more detail

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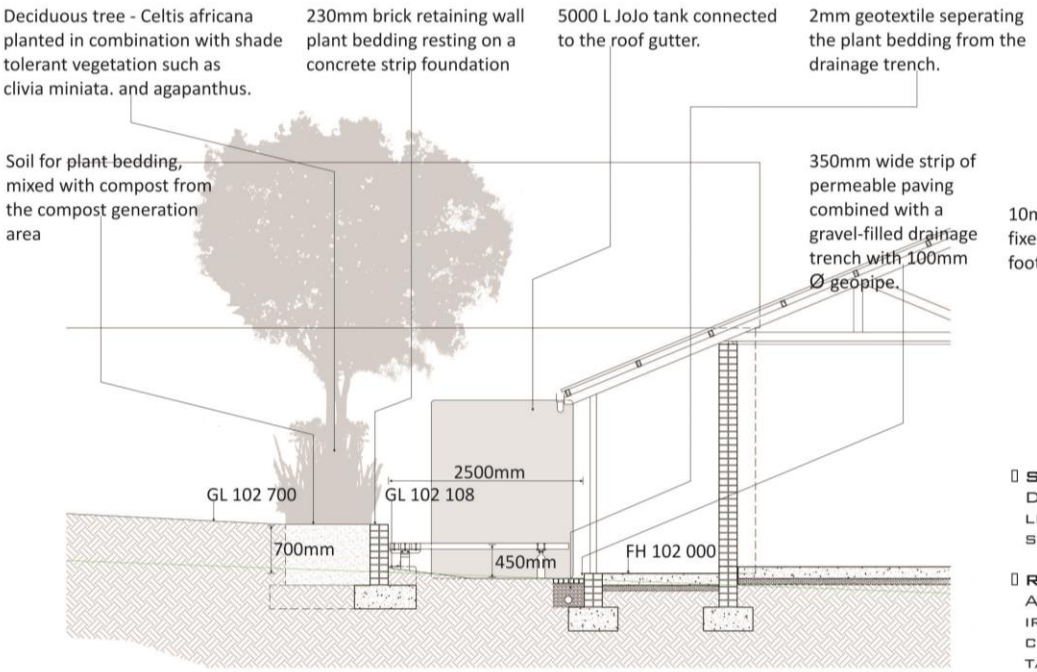
GATHERING SPACES IN FRONT OF CLASSROOMS

FACTORS INFLUENCING THE CLASSROOM GATHERING AREA DESIGN

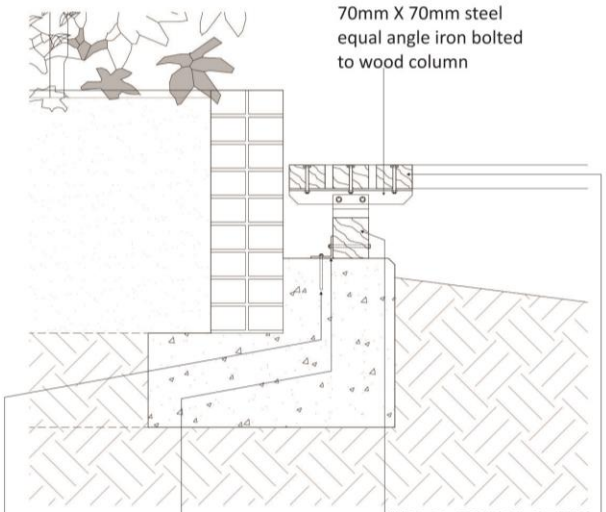
THE GATHERING SPACES IN FRONT OF THE CLASSROOM ARE DESIGNED WITH SPACE DEFINITION IN MIND.

- **PUBLIC TO PRIVATE TRANSITION**
  THE SPACES ARE SCREENED FROM THE REST OF THE SITE BY PLANTS. A VISUAL OPENING IS CREATED IN THE VEGETATION TO ALLOW FOR VIEWS FROM THE SMALLER SPACE CLOSE TO THE CLASSROOM TO THE LARGER SPACE FURTHER AWAY.

- **COMFORTABLE SEATING**
  THE GROUND LEVEL AROUND THE WOODEN BENCH CHANGES TO ACCOMMODATE LEARNERS OF DIFFERENT AGES AND SIZES.



SECTION THROUGH A GATHERING SPACE IN-FRONT OF A CLASSROOM



WOOD BENCH DETAIL

- **SHADING**
  DECIDUOUS TREES PROVIDE SHADING DURING SUMMER. LIGHT SHINES THROUGH IN WINTER, ALLOWING THE SPACE TO STILL REMAIN COMFORTABLE.

- **RAINWATER IRRIGATION**
  ALL AREAS IN-FRONT OF THE CLASSROOM ARE IRRIGATED WITH RAINWATER COLLECTED FROM THE CLASSROOM ROOFS. WATER IS STORED IN JOJO TANKS CONNECTED TO THE BUILDING GUTTER.

Fig. 90 showing the gathering spaces in front of the classrooms in more detail

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WETLAND AREA IN MORE DETAIL

Factors influencing the wetland area design

The wetland system is designed to purify the water in the reservoirs. The wetlands also transport the reservoir water to the lowest pont on the site from which it is distributed for agricultural and normal irrigation purposes. the reservoirs are bottom-drained so all the water can be used for irrigation. All the surface runoff from the site ends up at the lowest point from where it is pumped uphill and is stored in the reservoirs so reservoirs. the wetland system purifies the reservoir water.

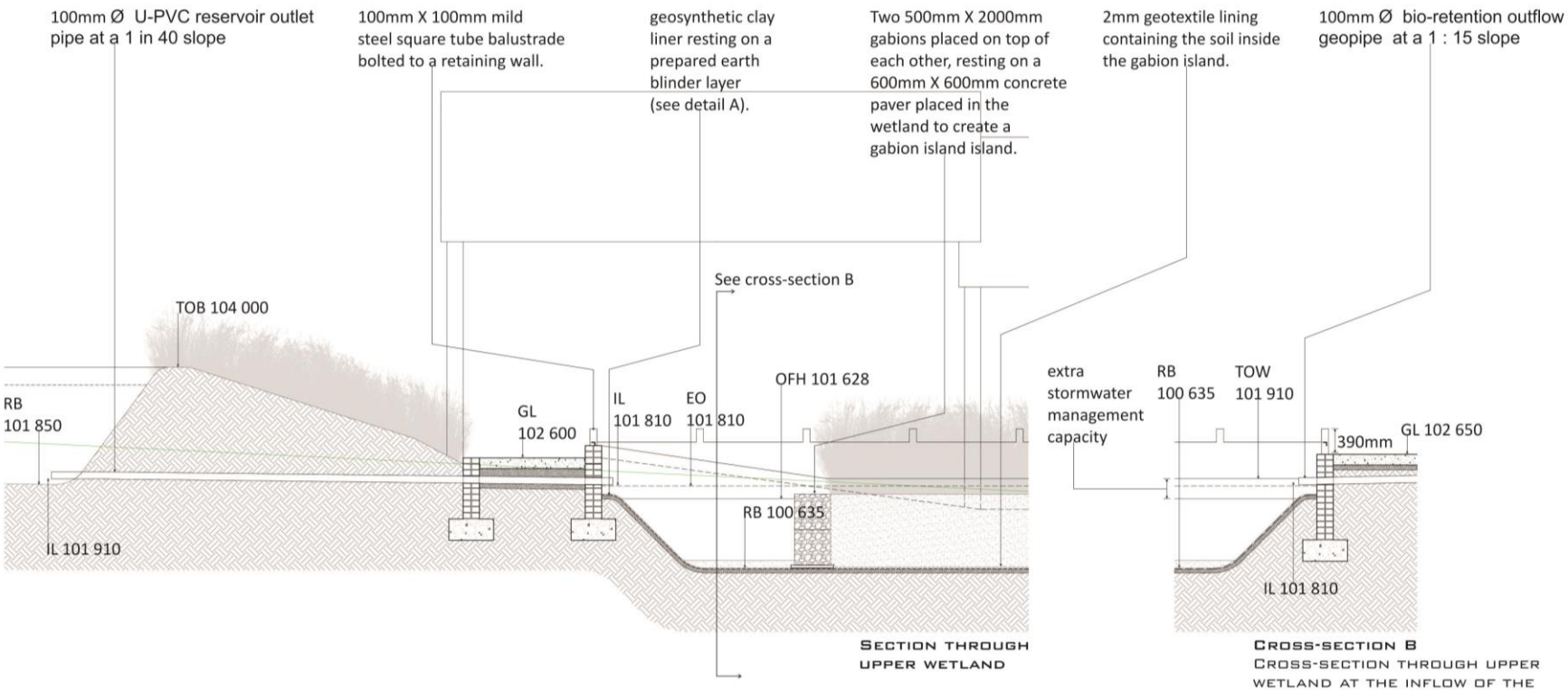
The upper wetland

The upper wetland is designed to be as low as practically possible so that the main reservoir situated above it can be as deep as possible because the main reservoir height is restricted to the 104 000 contour line. This wetland also takes the flow from the bio-retention area in large rain events. It has added stormwater management capacity and an emergency overflow drain which transports excess water offsite.

The lower wetlands

The upper wetlands are a reed-bed sub-surface flow wetland and a finishing phase surface flow wetland. The reed-bed sub-surface flow wetland cleans water more efficiently and can also be used as a treatment wetland for grey-water used in the school washbasins.

The finishing phase surface flow wetland overflows into the lowest point on the site from where the water is pumped.



Section through upper wetland

Cross-section B
Cross-section through upper wetland at the inflow of the bio-retention area outlet pipe.

 Fig. 91 showing the wetland area in more detail

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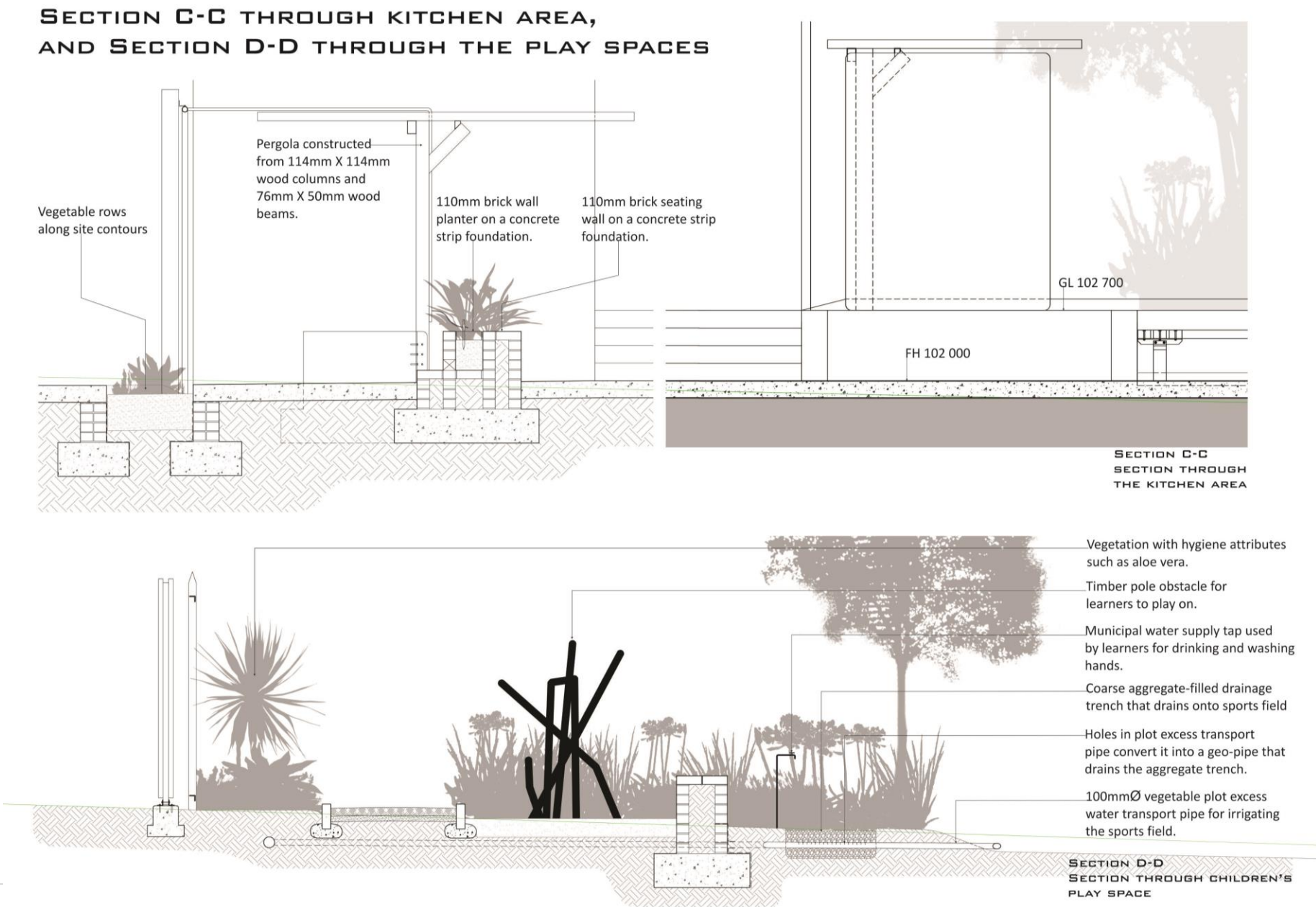

Fig. 92 showing the kitchen area and the children's play area in more detail

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8.3 Conclusion: Improved learner performance

This landscape intervention balanced a variety of possible solutions to tackle the problem of low learner performance in Atteridgeville. To summarise:

Theoretical approach

The landscape intervention made use of thoroughly researched theoretical strategies for improving learner performance. From the fields of urban design, environmental psychology, experiential learning, service design, outdoor learning and environmental education strategies were drawn that made it possible to turn outdoor spaces into educational spaces.

Community Approach

Building on the example of the nearby Banareng Primary School, a joint school/community project in the form of a vegetable garden was proposed that would help learners to learn skills from community members.

Site solutions approach

In responding to site aspects such as the site slope, vegetation, existing elements and access, the landscape intervention manages to convert the schoolyard into a place in which the combinations of experiences are limitless. Water storage reservoirs, streams, wetlands, vegetable gardens, compost heaps, agricultural tunnels, a sales area, numerous new planted areas with different irrigation options and generally more open green space all make this schoolyard a place that learners can experience with all the senses.

The combination of these three approaches to improving learner performance should be successful. They give a good account of what is possible, necessary and appropriate in the discipline of landscape architecture with regards to improving learner performance.

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