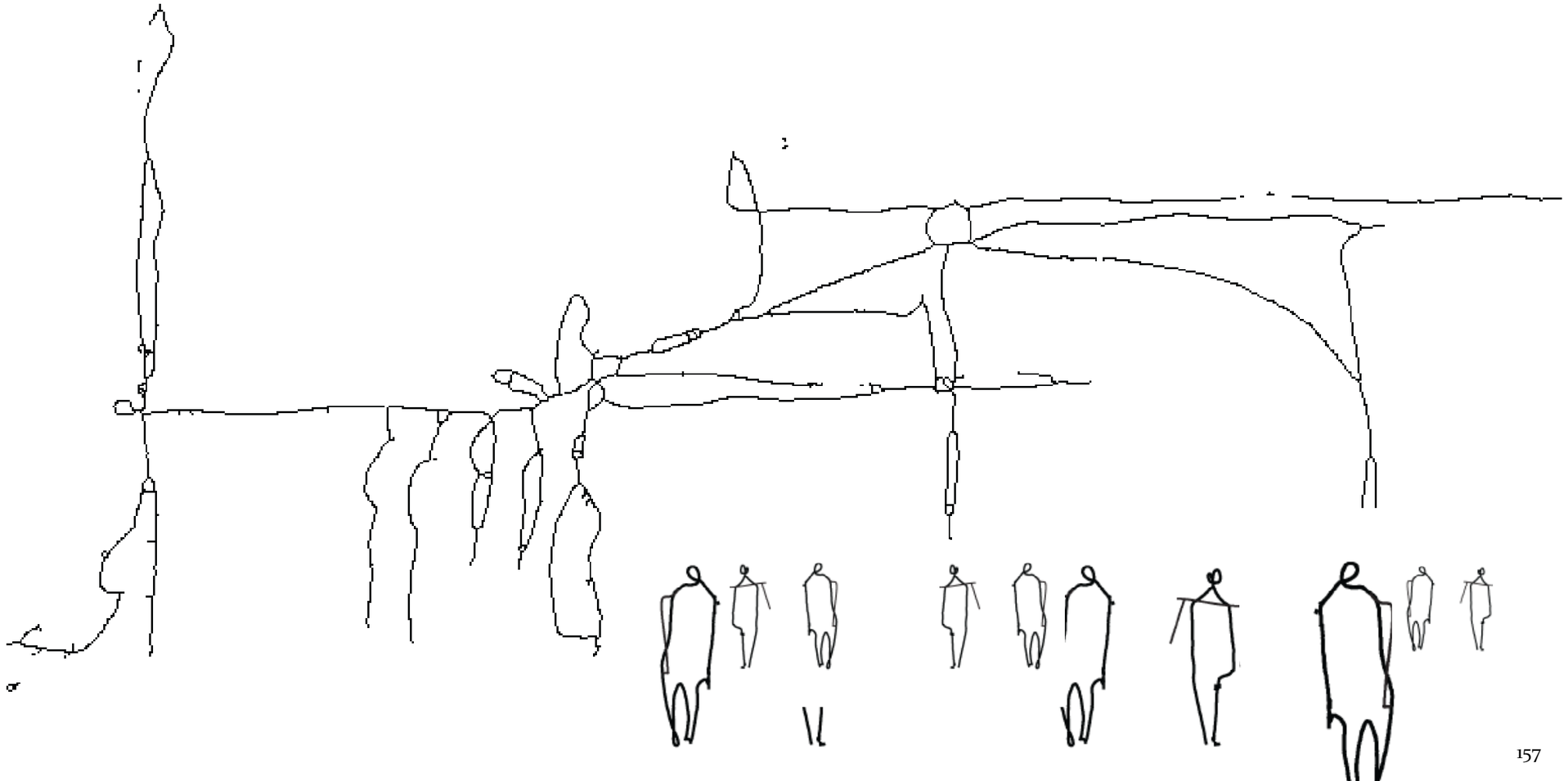
5 Design development



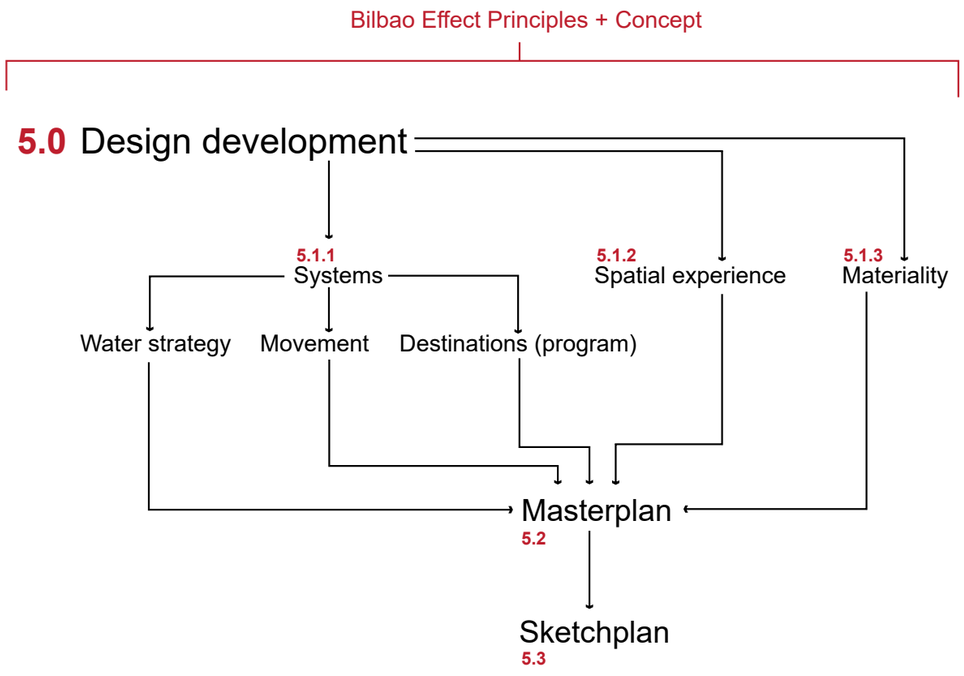


Figure 5.1: Flow diagram showing the chapter outline

The following chapter will take the reader through the design process. In the previous chapter, the concept has been refined. Now, the concept is linked to the site to create tangible spaces emulating the theory of the Bilbao Effect. This chapter looks at systems identified and improved (water strategy, different exterior spaces, movement and new zonings) to resolve the functional issues on site as well as the theoretical issues (replicating the Bilbao Effect). Figure 5.1 highlights the intentions of this chapter, marrying the idea of abstracting Pretoria West (the design language) with the functional issues on site to conclude in a cohesive masterplan.

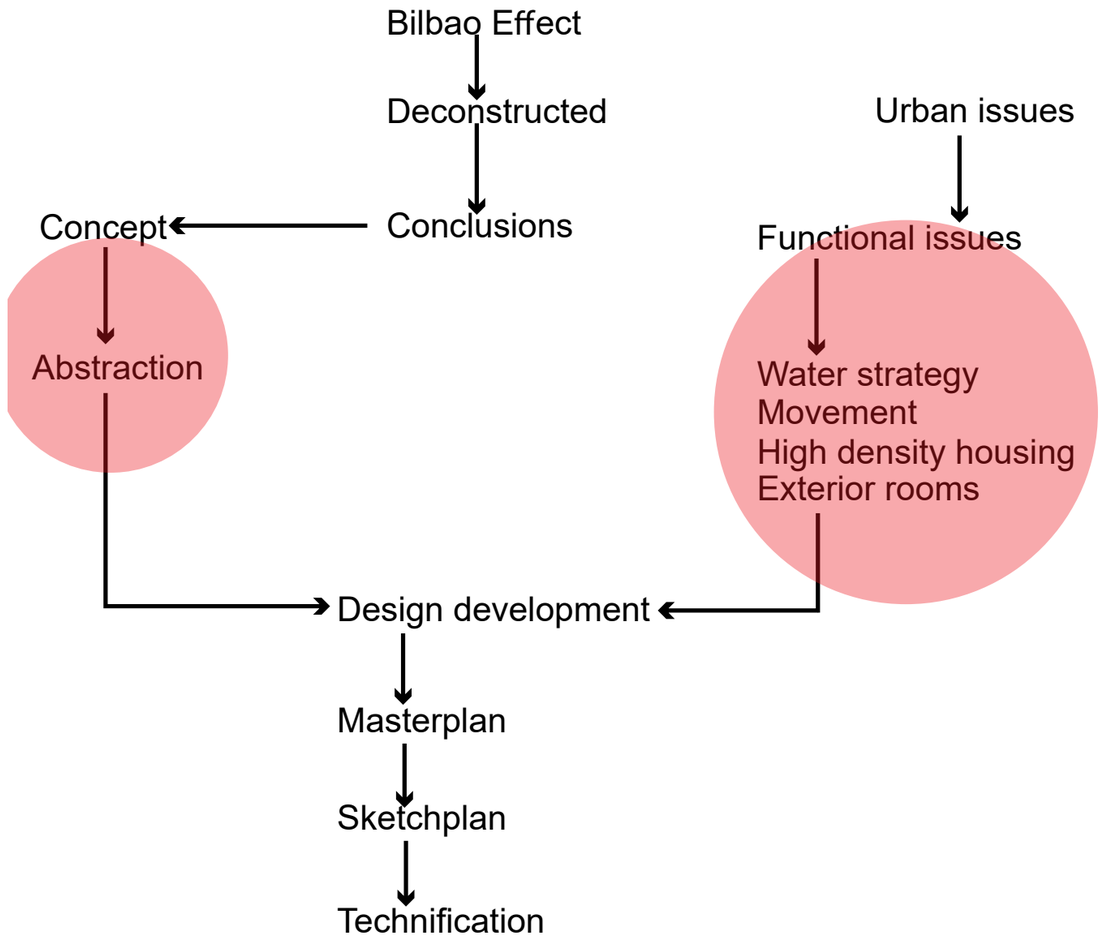


Figure 5.2: Flow diagram showing where this chapter fits in

In order to improve the current systems an analysis is conducted, focusing on the status quo of the systems such as boundary edges, temporality (movement), vegetation and any other stakeholder that might influence the current systems. Figures 5.3 - 5.11 displays the analytical mapping of the showgrounds.

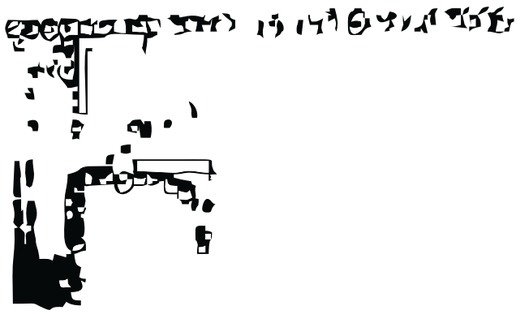


Figure 5.3: Sketch of existing, noteworthy vegetation (excluding veldgrasses)

Figure 5.4: Sketch exploring boundaries in and around the showgrounds

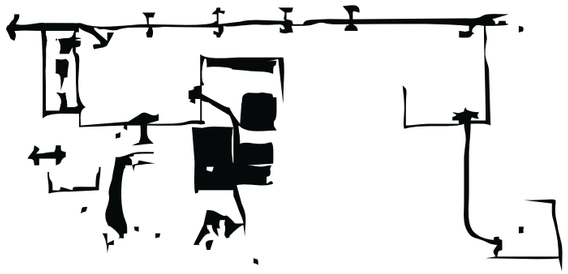


Figure 5.5: Sketch exploring boundaries in and around the showgrounds

Figure 5.6: Sketch exploring movement patterns in and around the showgrounds

Figure 5.7: Sketch exploring movement patterns during events

Figure 5.8: Sketch exploring movement patterns during events

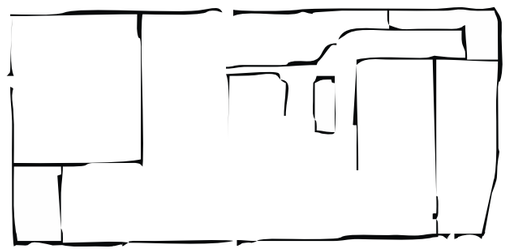


Figure 5.9: Sketch illustrating the current boundaries

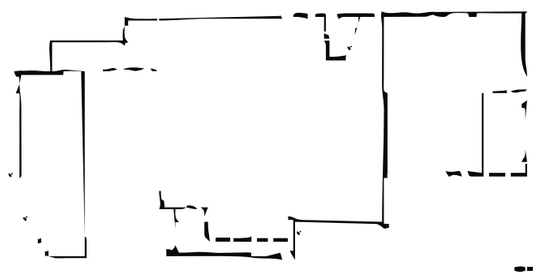


Figure 5.10: Sketch exploring possible boundaries

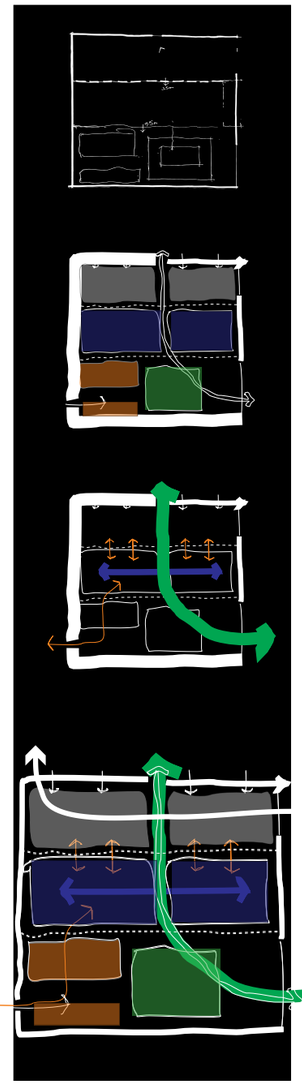


Figure 5.11: A series of sketches exploring how various programmes can be connected to the site

5.1.1 Water strategy

In order for the design to manifest, a water strategy needs to be in place as water will play an important role recreating and deconstructing farm and industrial elements (linking it to the concept of the overall design). There are no contamination or other issues on site that needs to be resolved through the water strategy. The proposal includes large spaces of manicured landscapes, meaning water will be collected, filtered, and used for irrigation purposes (Figure 5.1). Within the stance of the project, water will play a vital role (as it does in agricultural systems) to act as an aesthetic, functioning feature, within the landscape. An example is the abstraction of a typical concrete farm reservoir offering opportunities for the user to interact with (Figure 5.1).

The following page indicates the water calculations. The calculations indicate how much water can be collected and how much water is needed (the yield, Figure 5.2 and demand, Figure 5.3). The total annual water yield for the entire showgrounds is 61 342sqm (Figure 5.2). The total annual demand for the entire show-grounds is 37 626sqm (figure 5.3). The water strategy is translated into quantifiable calculations (Figures 5.2-5.4). The calculations reflect that the water strategy will be feasible.

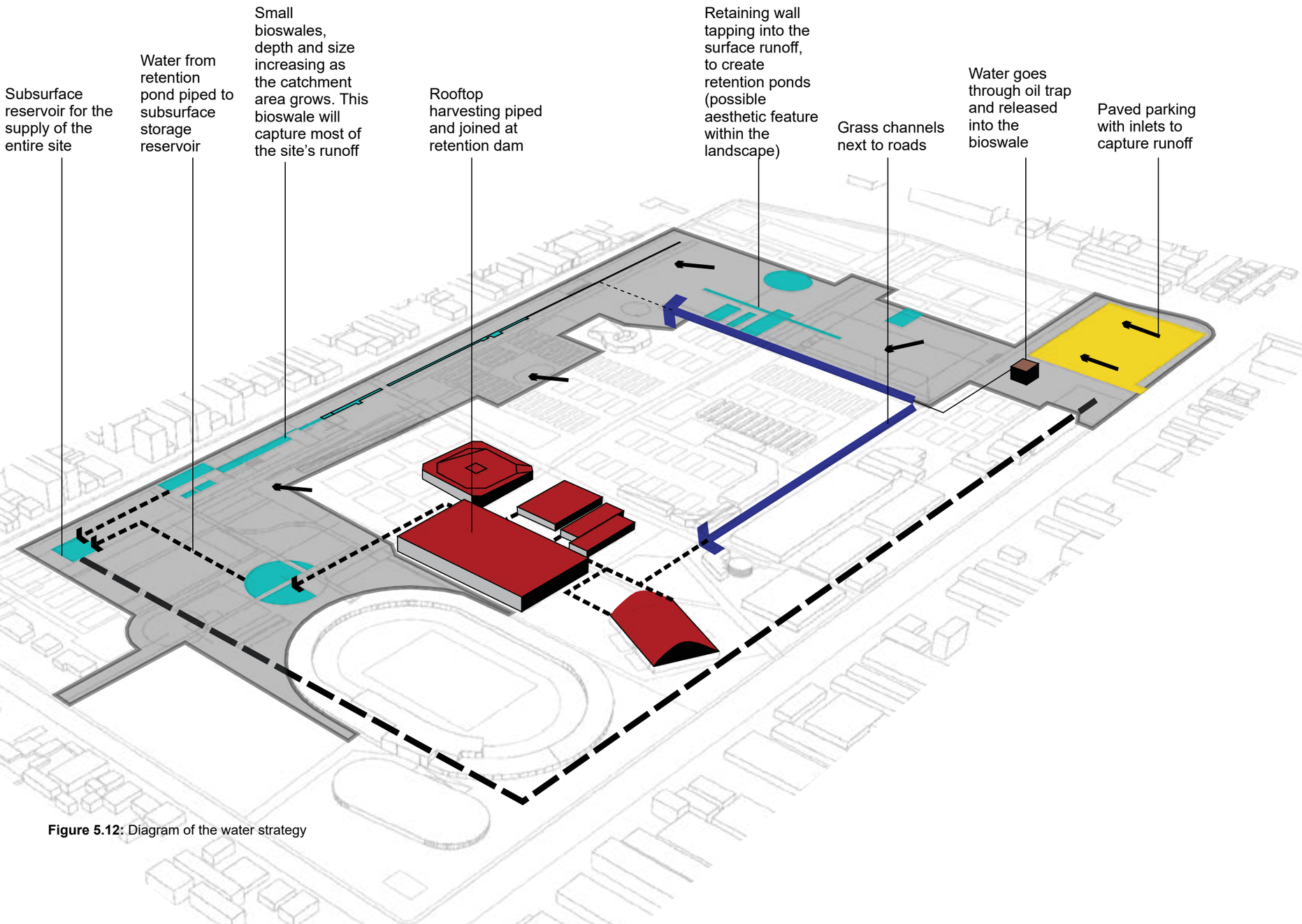


Figure 5.12: Diagram of the water strategy

WATER MANAGEMENT MODEL

By Fourie Pieterse (October 2014)

A WATER RESOURCE INFORMATION (YIELD, m³)

A1 RAIN WATER HARVESTING DATA

DESCRIPTION	AREA (m²)	RUNOFF COEFF. (C)
Roof structures	70000	0.9
Paving A	17762	0.8
Detention	11773	0.5
Lawn	25864	0.1
Other	41551	0.05
TOTAL AREA (A)	166950.00	
WEIGHTED C		0.53

A2 RECYCLED / ALTERNATIVE WATER SOURCE

MONTH	SOURCE 1		SOURCE 2		TOTAL / MONTH (m³)
	WEEKLY YIELD (m³)	MONTHLY YIELD (m³)	WEEKLY YIELD (m³)	MONTHLY YIELD (m³)	
January	2	8.00	0.2	0.80	8.80
February	2	8.00	0.2	0.80	8.80
March	2	8.00	0.2	0.80	8.80
April	2	8.00	0.2	0.80	8.80
May	1	4.00	0.2	0.80	4.80
June	1	4.00	0.2	0.80	4.80
July	1	4.00	0.2	0.80	4.80
August	1	4.00	0.2	0.80	4.80
September	1	4.00	0.2	0.80	4.80
October	2	8.00	0.2	0.80	8.80
November	2	8.00	0.2	0.80	8.80
December	2	8.00	0.2	0.80	8.80
ANNUAL AVE.		76.00		9.60	85.60

A3 TOTAL WATER YIELD

MONTH	AVE RAINFALL , P (m)	CATCHMENT YIELD (m³) (Yield = PxAxC)	ALTERNATIVE WATER SOURCE (m³)	TOTAL WATER YIELD (m³)
January	0.13	11672.09	8.80	11680.89
February	0.09	7459.60	8.80	7468.40
March	0.09	7722.88	8.80	7731.68
April	0.05	4563.52	8.80	4572.32
May	0.01	1053.12	4.80	1057.92
June	0.01	702.08	4.80	706.88
July	0.00	351.04	4.80	355.84
August	0.01	526.56	4.80	531.36
September	0.03	2194.00	4.80	2198.80
October	0.07	6406.48	8.80	6415.28
November	0.10	9127.05	8.80	9135.85
December	0.11	9478.09	8.80	9486.89
ANNUAL AVE.	0.70	61256.51	85.60	61342.11

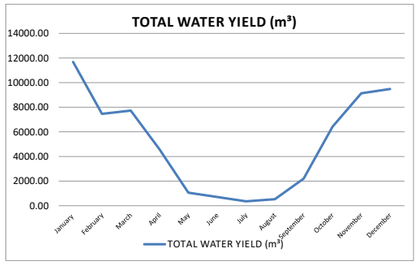


Figure 5.13: Water calculations of the yield

B WATER DEMAND

B1 LANDSCAPE IRRIGATION DEMAND (m³)

DESCRIPTION:	LAWN (m²):	25864	AGRI (m²):	0	PLANTING (m²):	61551	
MONTH	WEEKLY IRR. (m)	MONTHLY DEMAND (m³)	WEEKLY IRR. (m)	MONTHLY DEMAND (m³)	WEEKLY IRR. (m	MONTHLY DEMAND (m³)	TOTAL MONTHLY IRR. DEMAND (m³)
January	0.02	2069.12	0.025	0	0.005	1231.02	3300.14
February	0.02	2069.12	0.025	0	0.005	1231.02	3300.14
March	0.02	2069.12	0.025	0	0.002	492.408	2561.528
April	0.02	2069.12	0.025	0	0.002	492.408	2561.528
May	0.01	1034.56	0.025	0	0.002	492.408	1526.968
June	0.01	1034.56	0.025	0	0	0	1034.56
July	0.01	1034.56	0.025	0	0	0	1034.56
August	0.02	2069.12	0.025	0	0	0	2069.12
September	0.02	2069.12	0.025	0	0.005	1231.02	3300.14
October	0.02	2069.12	0.025	0	0.005	1231.02	3300.14
November	0.02	2069.12	0.025	0	0.005	1231.02	3300.14
December	0.02	2069.12	0.025	0	0.005	1231.02	3300.14
ANNUAL TOTAL		21725.76		0		8863.344	30589.104

B2 DOMESTIC / ALT DEMAND

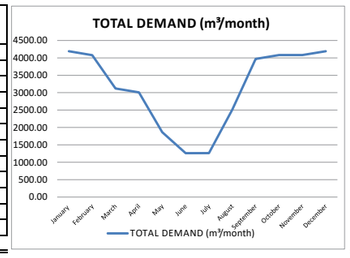
MONTH	PERSONS	WATER/ CAPITA/ DAY (l)	DOMESTIC DEMAND (m³/month)
January	50	4	6.2
February	50	4	5.6
March	50	4	6.2
April	50	4	6
May	50	4	6.2
June	50	4	6
July	50	4	6.2
August	50	4	6.2
September	50	4	6
October	50	4	6.2
November	50	4	6
December	50	4	6.2
ANNUAL TOTAL			73

B3 EVAPORATION LOSS (For 'open' reservoirs)

35mm - 45mm/week in summer

AREA OF RESERVOIR (m²): 5527

MONTH	EVAPORATION RATE (m/week)	EVAPORATION RATE (m/month)	TOTAL LOSS (m³/month)
January	0.04	0.16	884.32
February	0.035	0.14	773.78
March	0.025	0.1	552.7
April	0.02	0.08	442.16
May	0.015	0.06	331.62
June	0.01	0.04	221.08
July	0.01	0.04	221.08
August	0.02	0.08	442.16
September	0.03	0.12	663.24
October	0.035	0.14	773.78
November	0.035	0.14	773.78
December	0.04	0.16	884.32
ANNUAL TOTAL	0.32	1.26	6964.02



B4 TOTAL WATER LOSS & DEMAND

MONTH	TOTAL DEMAND (m³/month)
January	4190.66
February	4079.52
March	3120.43
April	3009.69
May	1864.79
June	1261.64
July	1261.84
August	2517.48
September	3969.38
October	4080.12
November	4079.92
December	4190.66
ANNUAL TOTAL	37626.124

Figure 5.14: Water calculations of the demand

C WATER BUDGET

TANK CAPACITY (m³): 7000
MIN VOLUME (m³): 0

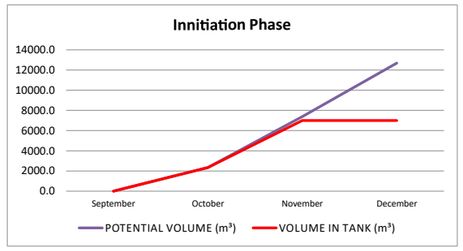
C1 WATER BUDGET — INNITIATION PHASE

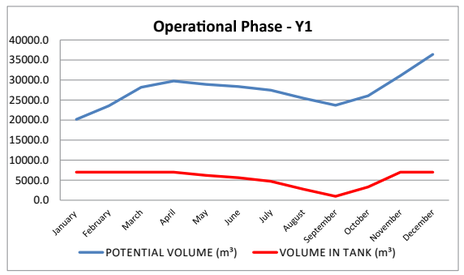
MONTH	YIELD (m³/month)	DEMAND (m³/month)	MONTHLY BALANCE	POTENTIAL VOLUME (m³)	VOLUME IN TANK (m³)
September	2198.8	3969.4	-1770.6	0.0	0.0
October	6415.3	4080.1	2335.2	2335.2	2335.2
November	9135.8	4079.9	5055.9	7391.1	7000.0
December	9486.9	4190.7	5296.2	12687.3	7000.0
	27236.8	16320.1	10916.7		

C2 WATER BUDGET — YEAR 1

MONTH	YIELD (m³/month)	DEMAND (m³/month)	MONTHLY BALANCE	POTENTIAL VOLUME (m³)	VOLUME IN TANK (m³)
January	11680.9	4190.7	7490.2	20177.5	7000.0
February	7468.4	4079.5	3388.9	23566.4	7000.0
March	7731.7	3120.4	4611.3	28177.7	7000.0
April	4572.3	3009.7	1562.6	29740.3	7000.0
May	1057.9	1864.8	-806.9	28933.4	6193.1
June	706.9	1261.6	-554.8	28378.7	5638.4
July	355.8	1261.8	-906.0	27472.7	4732.4
August	531.4	2517.5	-1986.1	25486.6	2746.3
September	2198.8	3969.4	-1770.6	23716.0	975.7
October	6415.3	4080.1	2335.2	26051.2	3310.8
November	9135.8	4079.9	5055.9	31107.1	7000.0
December	9486.9	4190.7	5296.2	36403.3	7000.0
ANNUAL AVE.	61342.1	37626.1	23716.0		

Figure 5.15: Water calculations of the budget





The water strategy is translated into quantifiable calculations (Figures 5.13-5.15). The calculations reflect the implementation to be feasible.

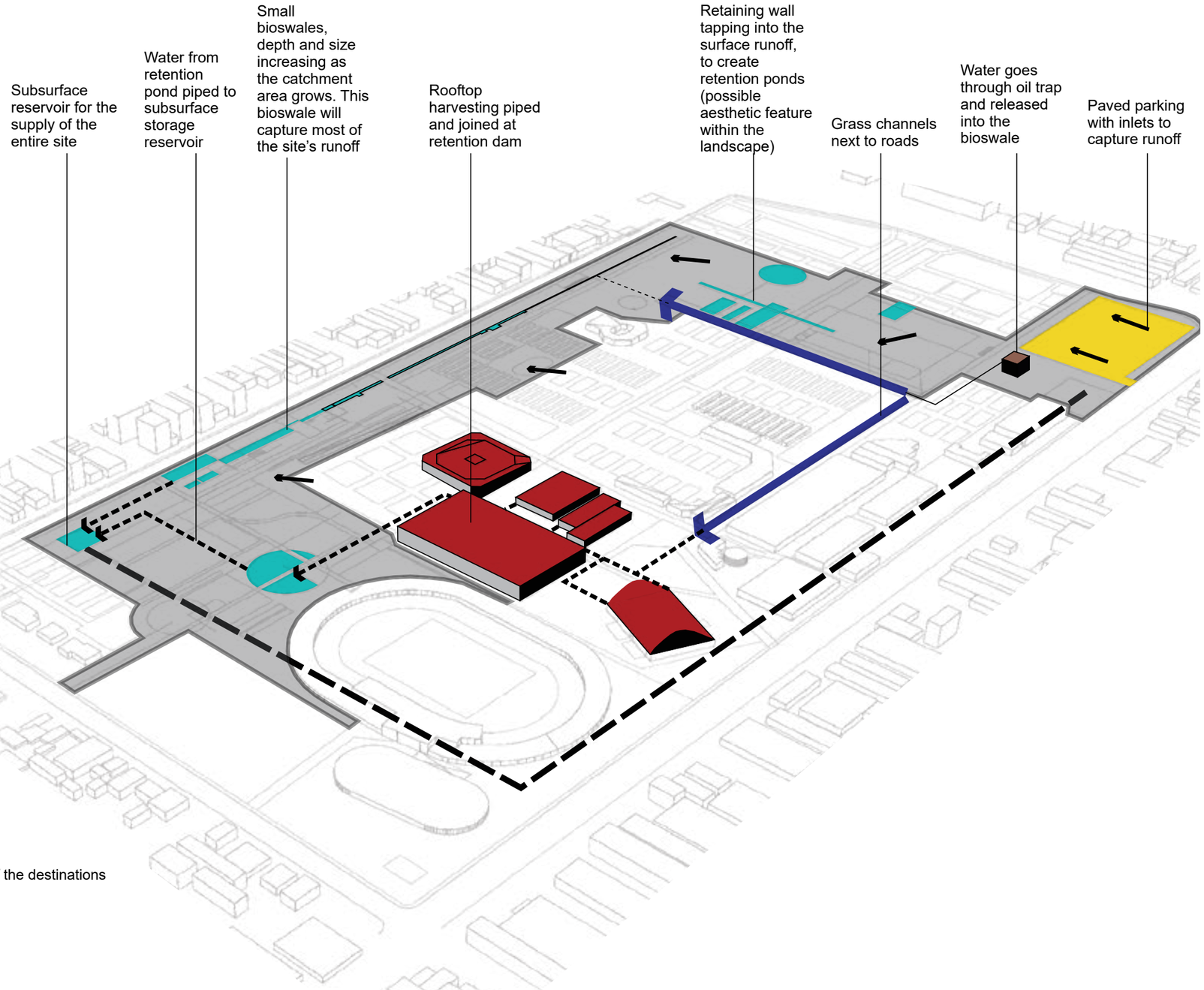


Figure 5.16: Diagram of the destinations

5.1.2 Destinations

According to the analysis of movement and cultural significance (figure 4.33), different activities were assigned to different zones. The programme of the site is balanced between programmed and unprogrammed space. An example of a programmed space is a restaurant, where the building will allow for the related activities to take place.

An example of an unprogrammed space is an open urban space, where no specific activity is linked with it, but does allow for a variety of activities to take place. The balance of these two spaces will solve the issue of the showgrounds being dormant most of the year, and will attract people to the site. The idea is to make a positive impression on the user, in order for him/her to return.

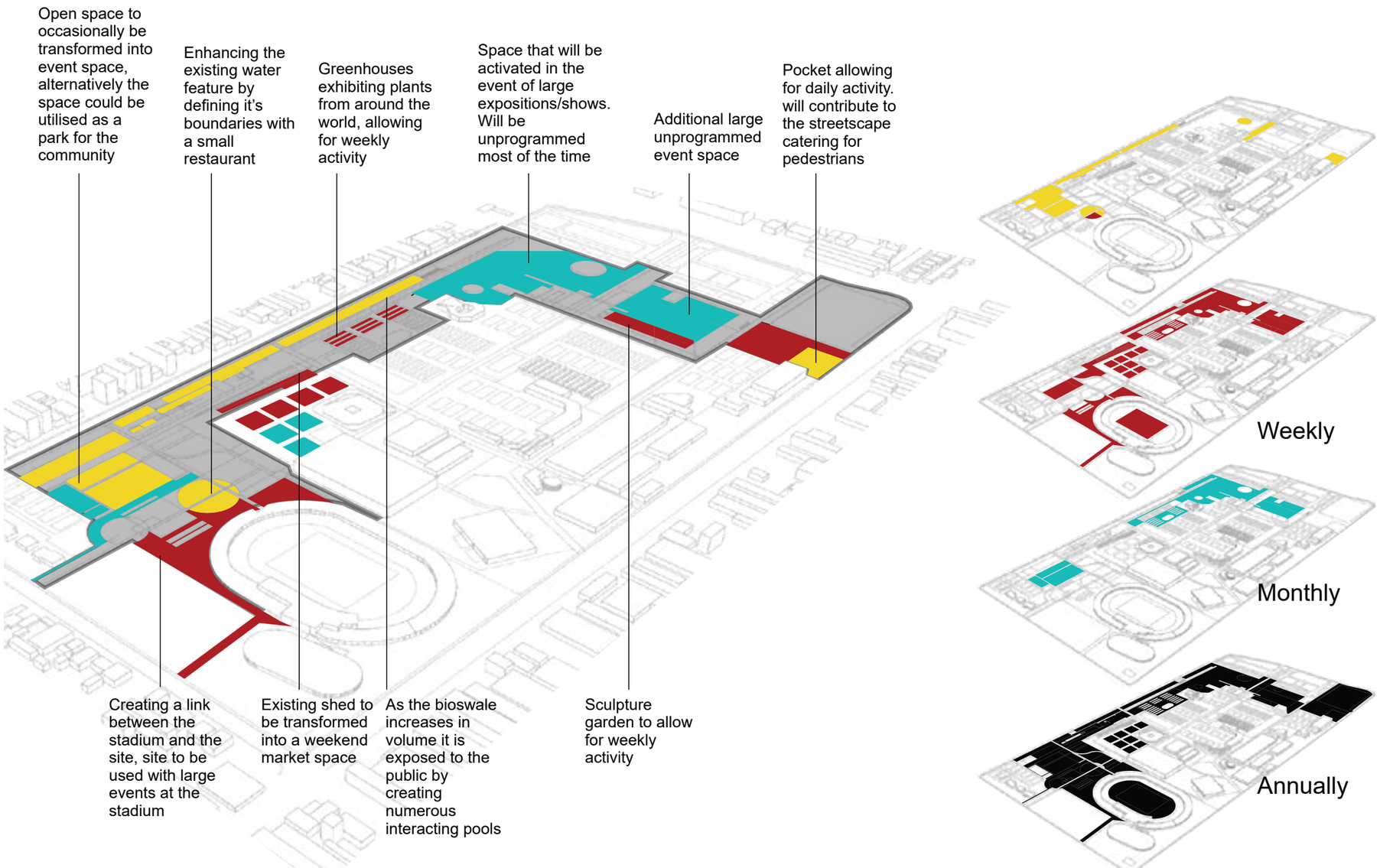


Figure 5.17: Diagram of the movement

5.1.2 Movement

According to the quantitative mapping of the site (Figures 3.3-3.10), it is illustrated that the movement on, through, and around the site, does not allow for a pedestrianised streetscape. The showgrounds sit as an impermeable barrier within Pretoria West. Figure 5.6 highlights the intentions of breaking down the impermeable barriers. This design decision will create an inviting precinct that will support the mixed use streetscape.

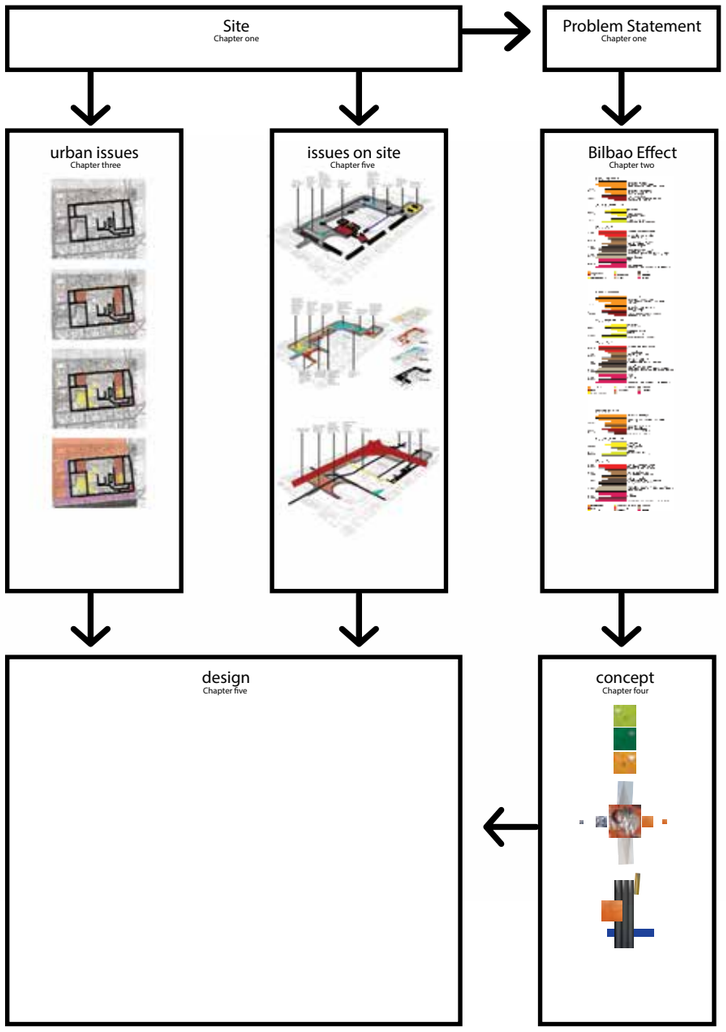


Figure 5.18: Diagram of the various spheres of the design process coming together

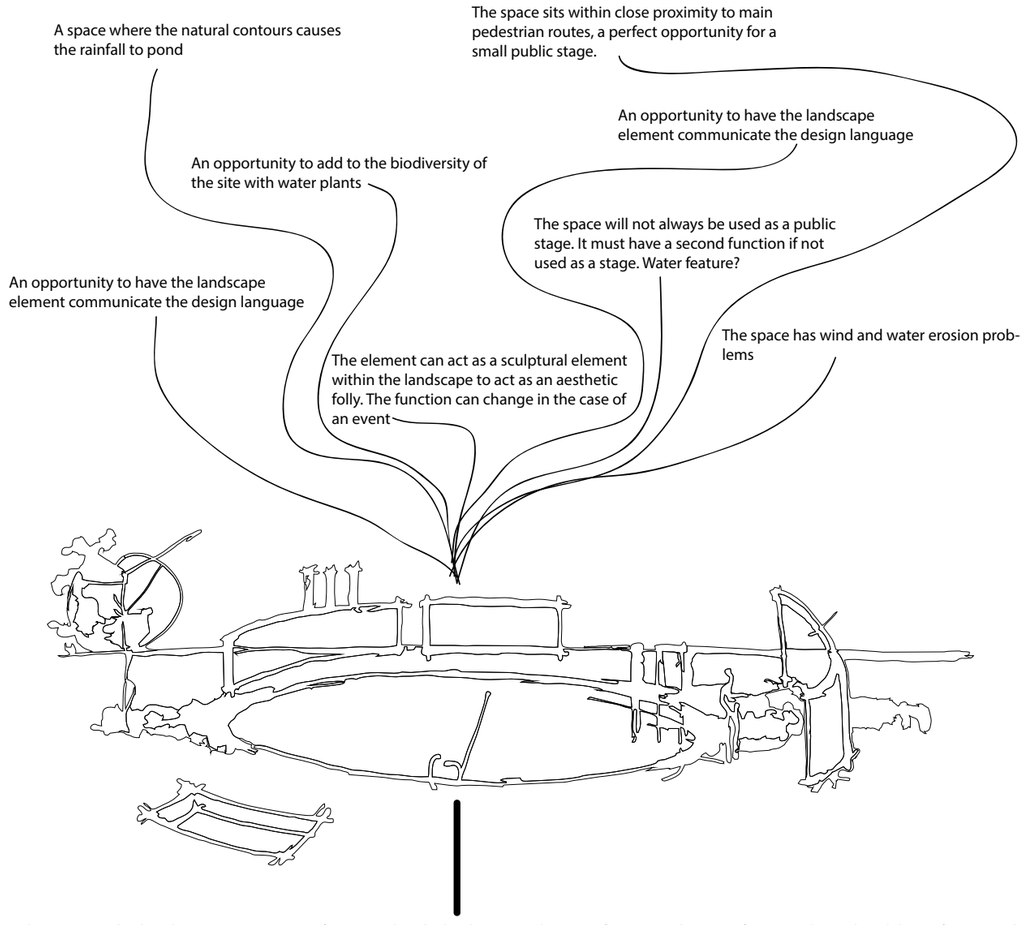
Figure 5.18 is a diagram of the design process up to this stage. Figure 5.18 illustrates the process in a simplified manner. Following the selection of the site (precinct), the problem statement and brief for the project was refined. The problem statement introduced the researcher to the Bilbao Effect which led to the refinement of the concept through various investigations. The identification and analysis of the site within the precinct led the researcher to the identification of systems (Figures 5.12 - 5.17) to be improved in order to improve conditions on the site.

The dissertation is now at a stage where the concept is applied to the site. For the first time spaces are created. These are spaces that resolve issues on functional, social, ecological, and economical levels. The combining factor being the concept defined at the end of chapter four (page 150). All information, research, and sketches completed up to this stage are now combined to create an inclusive design that will recreate the Bilbao Effect.

5.2 Spatial development

Figure 5.19 aims to explain the thought process behind the design of spaces. In the instance of Figure 5.19, a water feature is designed to solve numerous issues on site.

Figure 5.19 is a specific space designed, but it aims to convey the author's approach and outcome to the creation and reaction to any space on the site.



A deconstructed "plaasdam" to create a water feature within the landscape. In the case of an event, the water feature is drained, and the surface is used as a small stage with allocated seating spaces. The shape of a traditional round plaasdam is altered to fit in with the design language. The water feature is filled with rainfall runoff, and when drained the water is directed to the bioswale leading to the subsurface water storage. The water feature can be filled through the storage tank after an event. Concrete planters will host water plants, even when the water feature is drained the planters will remain wet. Trees are planted at the western edge shelter the space from the wind, but still allowing users to view the main folly from within the space. The water feature is surrounded with shrubs and veldgrass. The veldgrass contributes to the farm atmosphere the water feature attempts to create. Steel structures are created to use as exhibition space during an event and to act as a sculptural feature to help define the space. A part of the water feature is designed to act as a zero-depth pool. The reasoning for that is to create a play space for children, adding more program to the space. Additional seating will be installed for the parents to have clear views on their children playing. A pump room is needed to filter the water and remove all pathogens as children will be interacting with the water. The pump room is an opportunity to be designed in such a manner for it to contribute to the composition this sculptural water feature attempts to create. The trees planted at the western edge needs to cast shadows to the seating area, but should not be a problem when the water feature is filled with water. The selection of trees is crucial in this instance. It needs to be deciduous to allow for sunlight to pass through the branches during the winter to heat up the zero-depth pool, and needs to cast shadows during the summer. As the water feature is also used as a stage, it needs to be illuminated. LED lights are set up on poles. Lights need to be solar powered. The small solar pad and poles for the lights are incorporated into the exhibition structures, again, contributing to the sculptural value of the space. The shrubs or veldgrass selected needs to create a simple platform to emphasize the main folly. If veldgrass is planted, it needs to be cut back once a year. Service vehicles will need access to the space, the placement of bollards will keep that in mind. Waterproofing finishes on the surface needs accommodate both functions (water feature and stage).

--

Figure 5.19: Diagram explaining the design process of a typical space within the landscape

With the author setting out strategies for the various systems to take place (Figures 5.12 - 5.17) they now come together to create one, inclusive design.

Figures 5.12 - 5.17 consist of investiagtive sketches and model explorations, focusing on the design language as a tool to resolve functional issues.

Figure 5.20 starts to refine the spaces within the showgrounds on a large scale. This investigative sketch will lead to the masterplan and thereafter the sketchplan area is refined on a technical level (chapter 6).

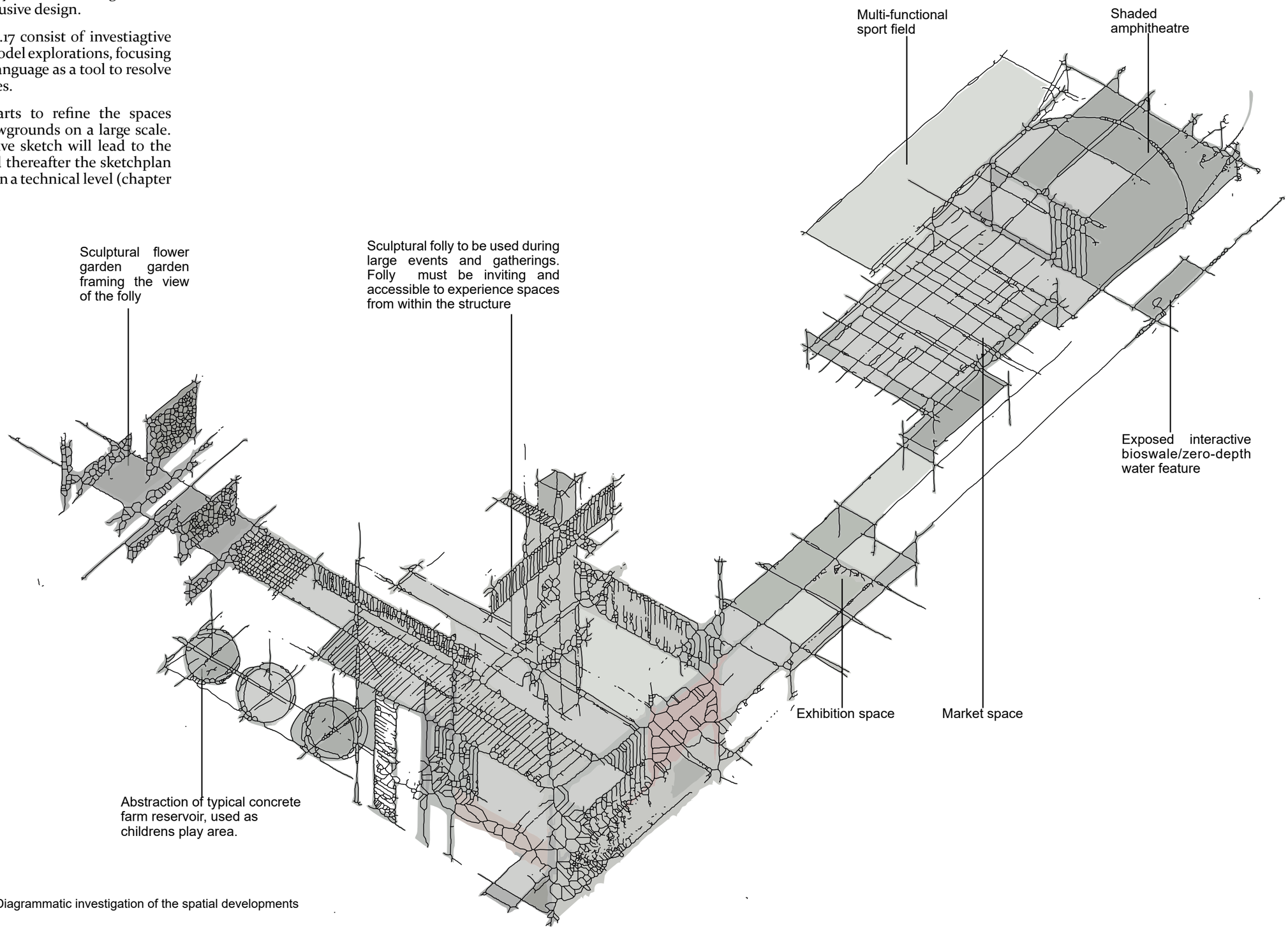


Figure 5.20: Diagrammatic investigation of the spatial developments

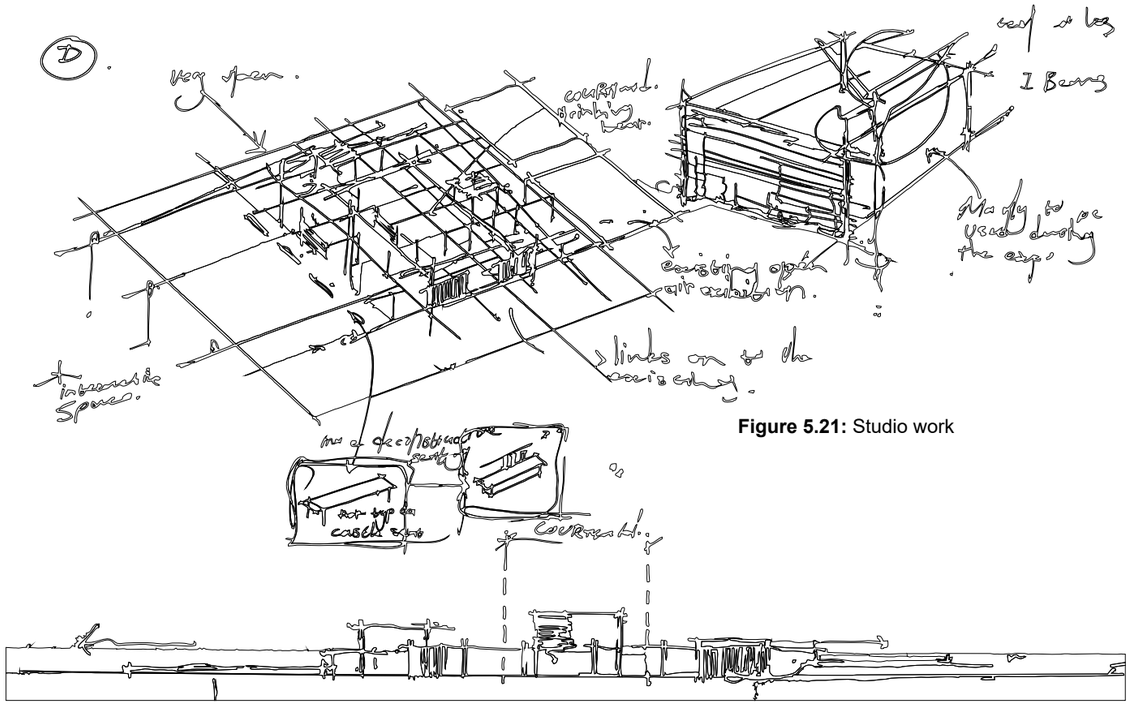


Figure 5.21: Studio work

Figure 5.22: Studio work

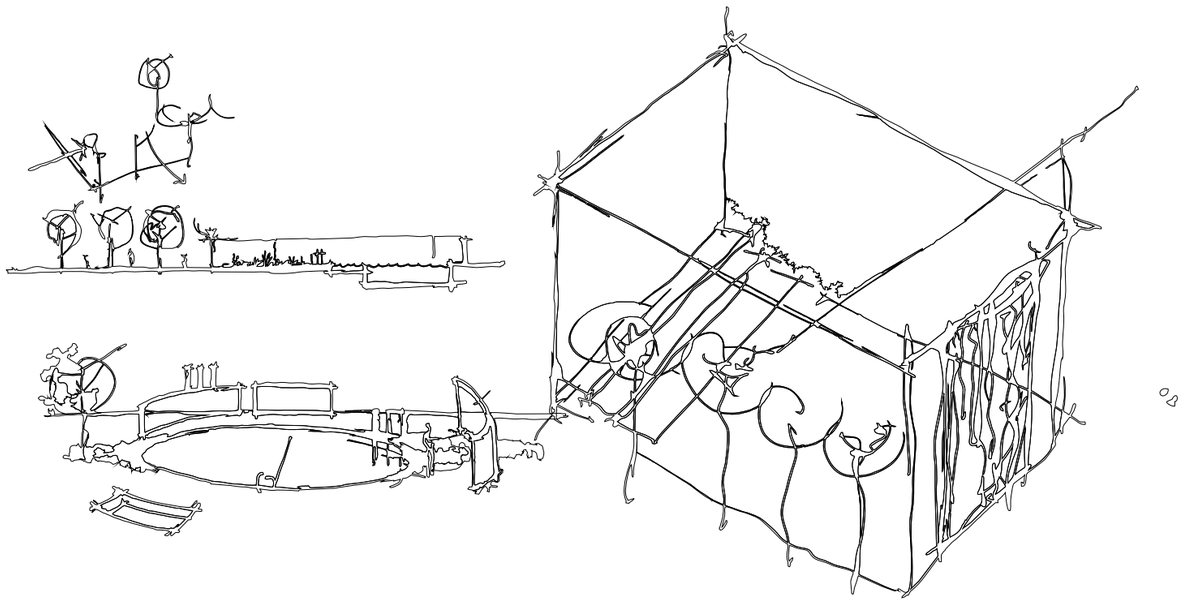


Figure 5.23: Studio work

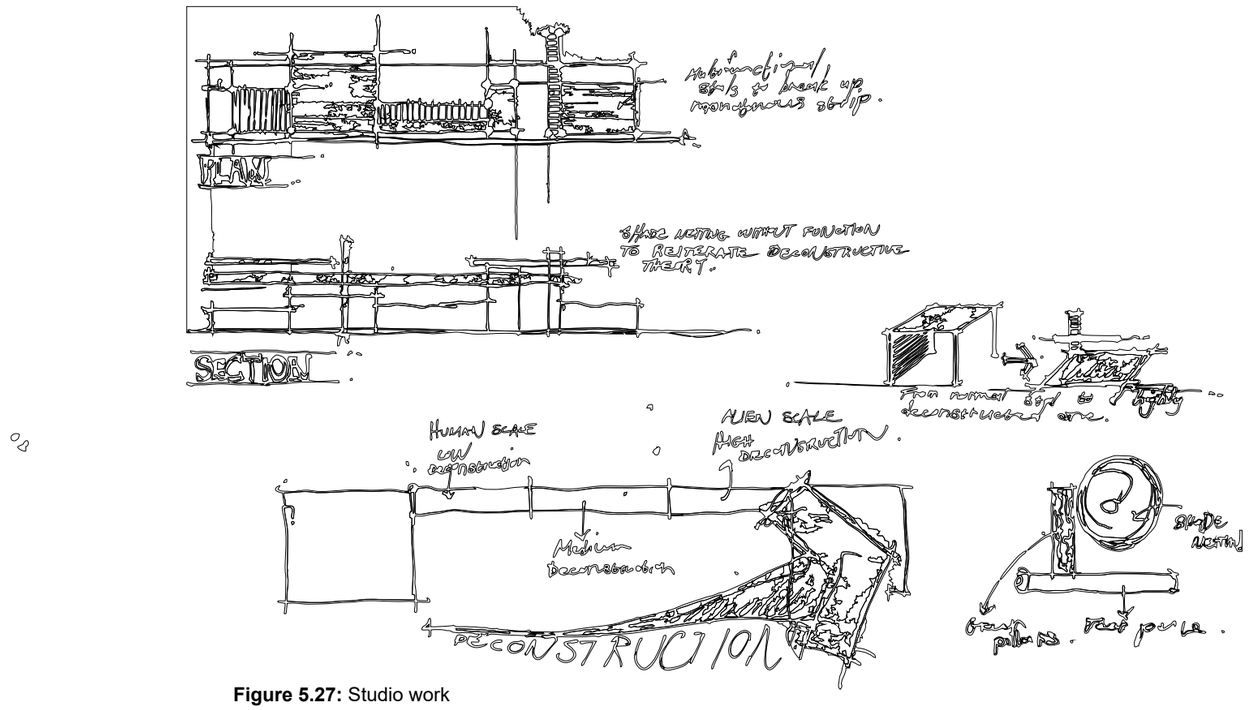


Figure 5.24: Studio work

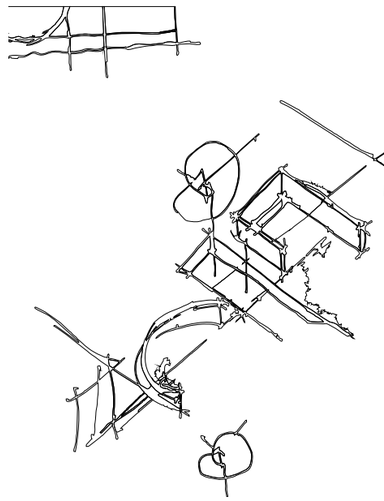


Figure 5.25: Studio work

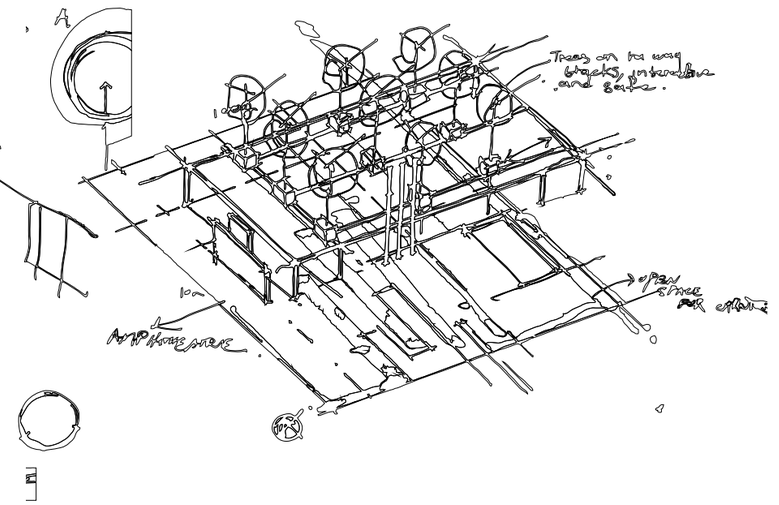


Figure 5.26: Studio work

Figure 5.27: Studio work

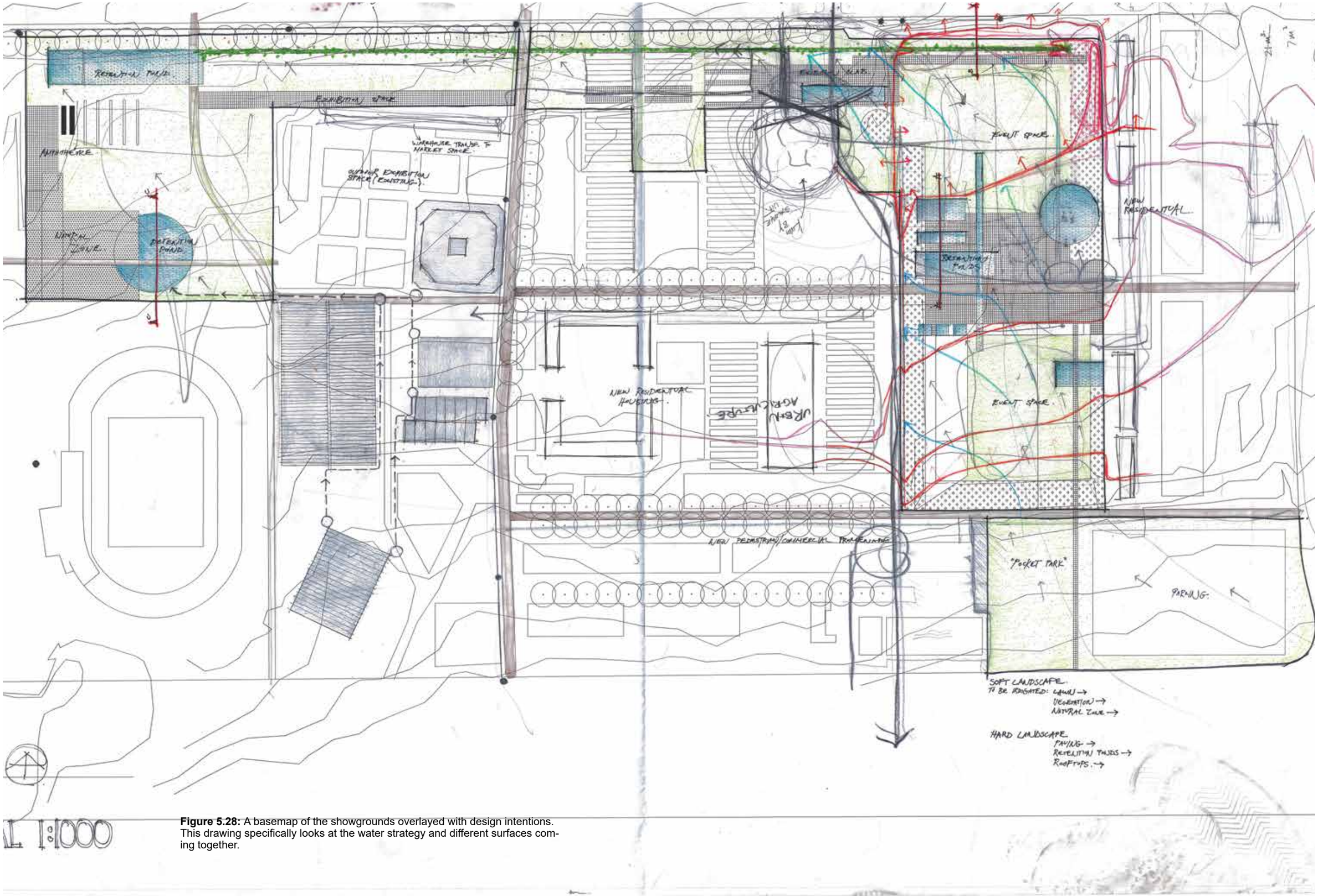


Figure 5.28: A basemap of the showgrounds overlayed with design intentions. This drawing specifically looks at the water strategy and different surfaces coming together.

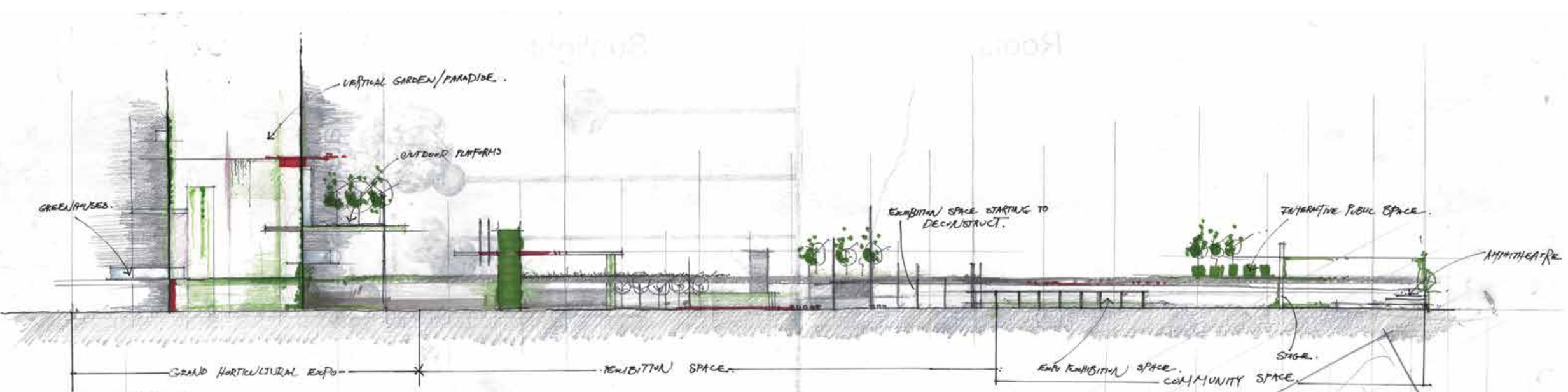


Figure 5.29: Sketch of the spatial developments

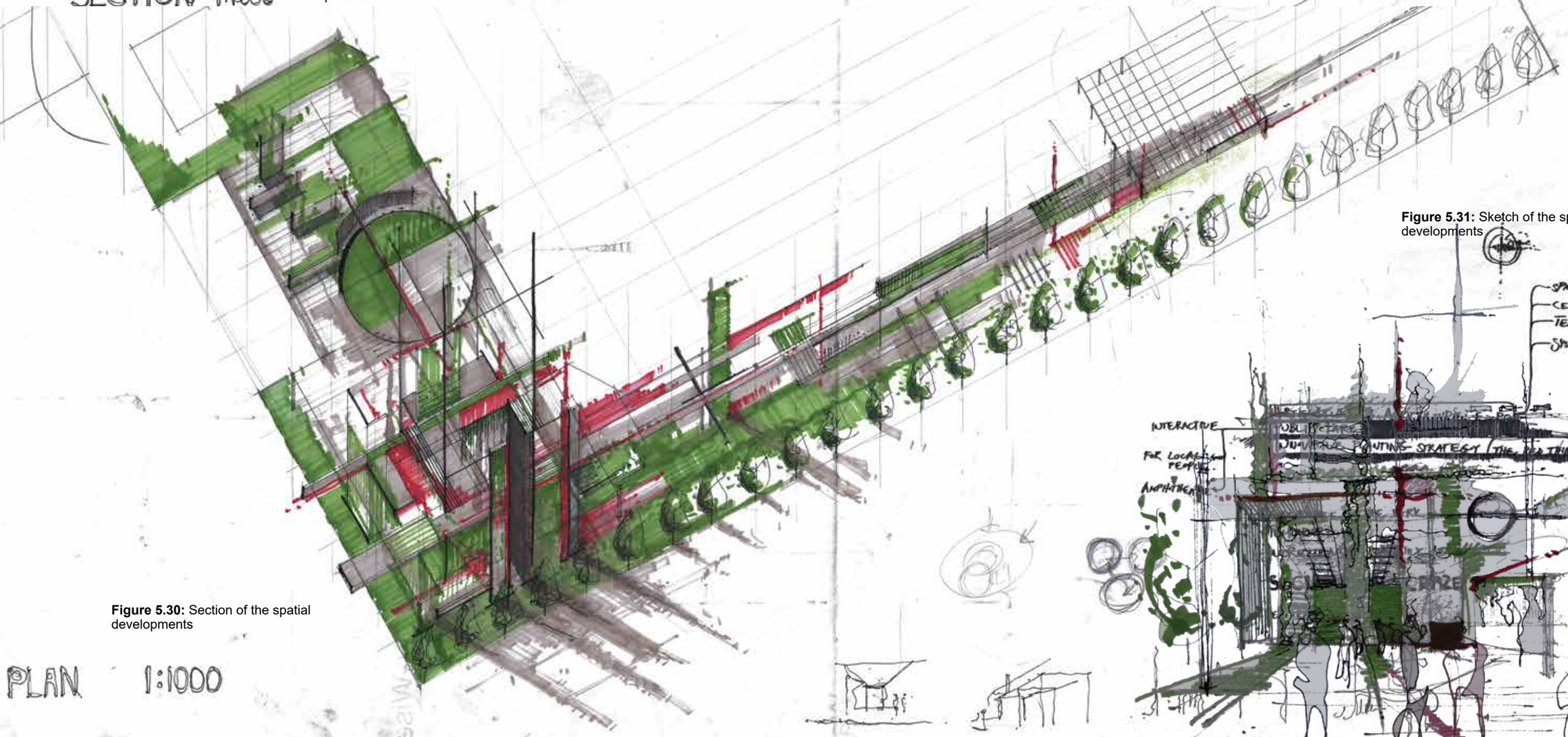


Figure 5.30: Section of the spatial developments

Figure 5.31: Sketch of the spatial developments

Large open space filled with wild flowers typically found in the Pretoria West area. Flowers are sculpted to create an abstract composition on a large scale to attract people. Flowers would not break up the vastness of the open space, but it would solve the issue of wind and water erosion of the soil.

This open space is a great opportunity to create an exhibition (something to attract the user to the site). Through sketches in Figures 5.20 - 5.23 this space organically developed into a large structure or sculpture. A structure with the purpose to allow users to interact with. The structure is a culmination of the abstract design language. The structure needs to not only allow the user to interact with it, but it needs to act as a visual play area for the user. Something to be viewed and used from a distance. This structure is defined and referred to as a folly. This space responds to the cultural significance map (Figure 4.66, page 148) by allowing for the author to create an exhibition as the space does not score high on cultural significance.

This space developed in a transition space between the two large open spaces in the showgrounds. The space to the east (where the folly develops) and the large open space to the west are linked through this transitional space. It serves as a exhibition space to allow people to move in and around the space.

Figure 4.67 on page 149 highlighted the two main zonings on site. This western quadrant was zoned to act as a community park (as it sits within close proximity to the residential area of Pretoria West). This space seeks to link the park to the existing and succesful Pilditch stadium. There are existing ecological biodiverse spaces (Figure 4.56, page 143). These spaces are amplified to create spaces for the community to experience natural spaces in innovative manners. This part of the site will have a public stage for users to interact with. It will also have elements for the community to interact with on a daily basis. Elements such as small sport fields, vendors and outdoor gyms.

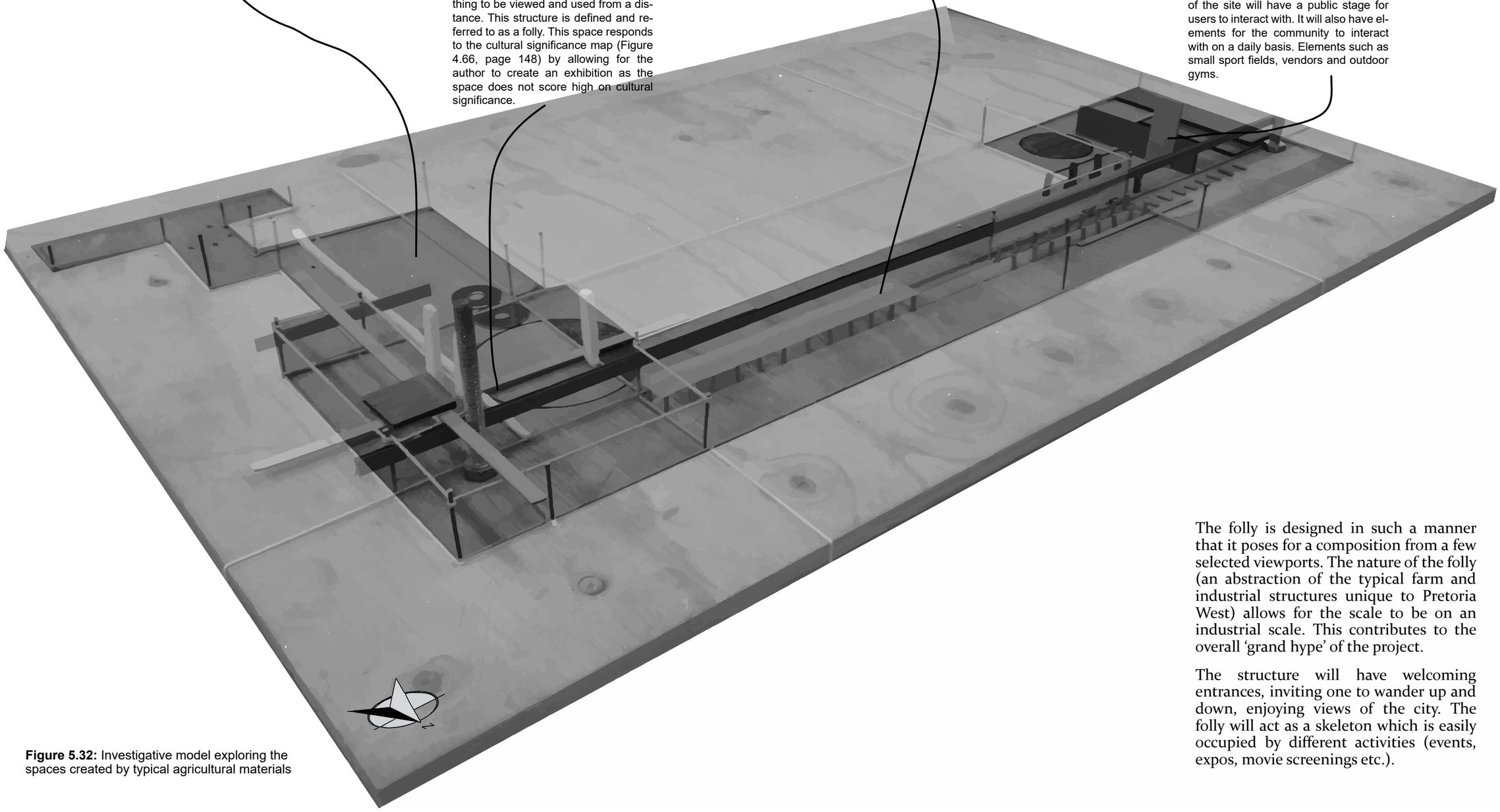


Figure 5.32: Investigative model exploring the spaces created by typical agricultural materials

The folly is designed in such a manner that it poses for a composition from a few selected viewports. The nature of the folly (an abstraction of the typical farm and industrial structures unique to Pretoria West) allows for the scale to be on an industrial scale. This contributes to the overall 'grand hype' of the project.

The structure will have welcoming entrances, inviting one to wander up and down, enjoying views of the city. The folly will act as a skeleton which is easily occupied by different activities (events, expos, movie screenings etc.).

5.3 Masterplan

A hand drawn preliminary master plan (figure 5.32) highlights the sketch plan zone to be developed in the next chapter. The drawing shows how the sketch plan fits in with the larger precinct.

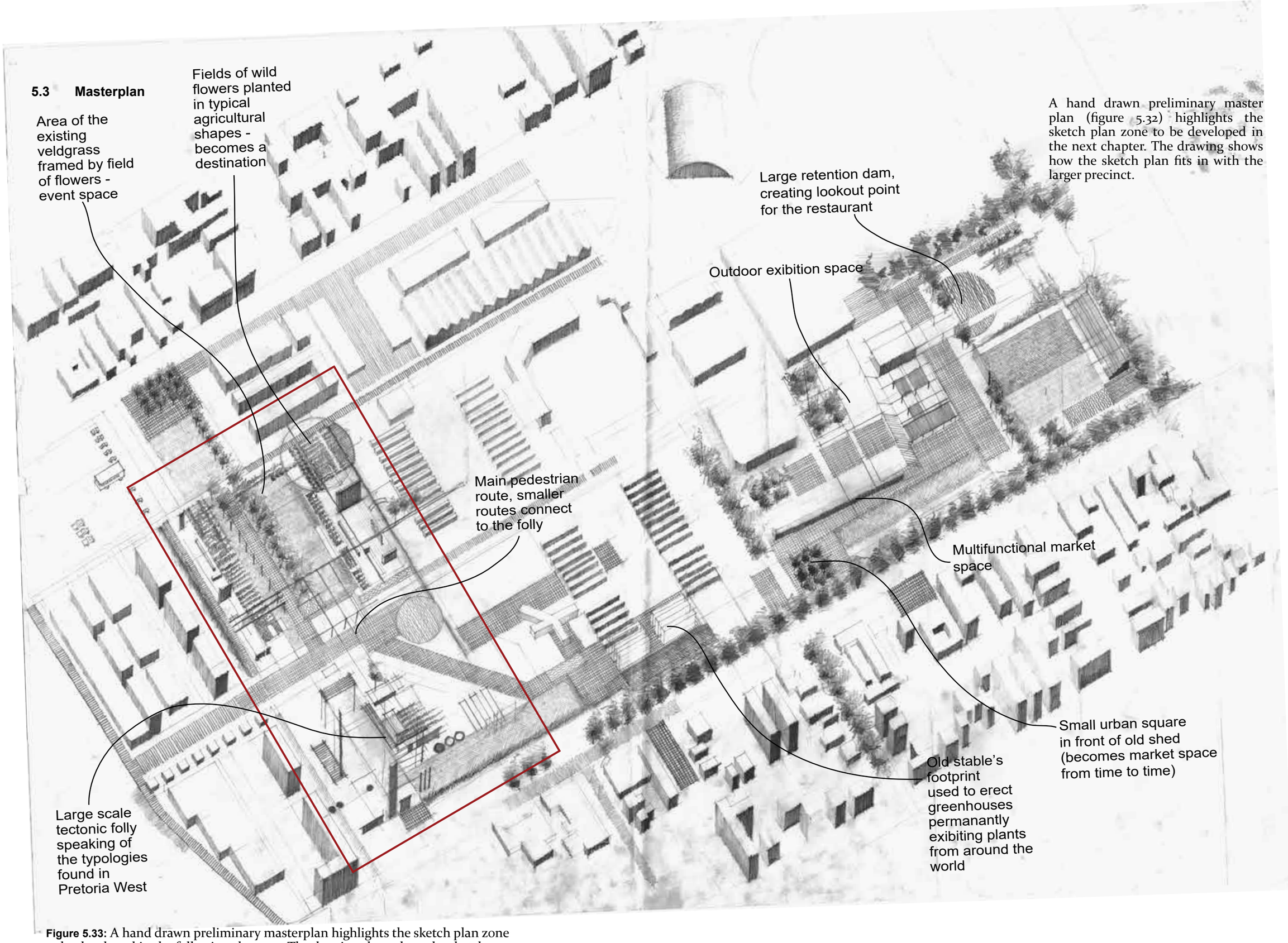


Figure 5.33: A hand drawn preliminary masterplan highlights the sketch plan zone to be developed in the following chapters. The drawing shows how the sketch plan fits in with the larger precinct.

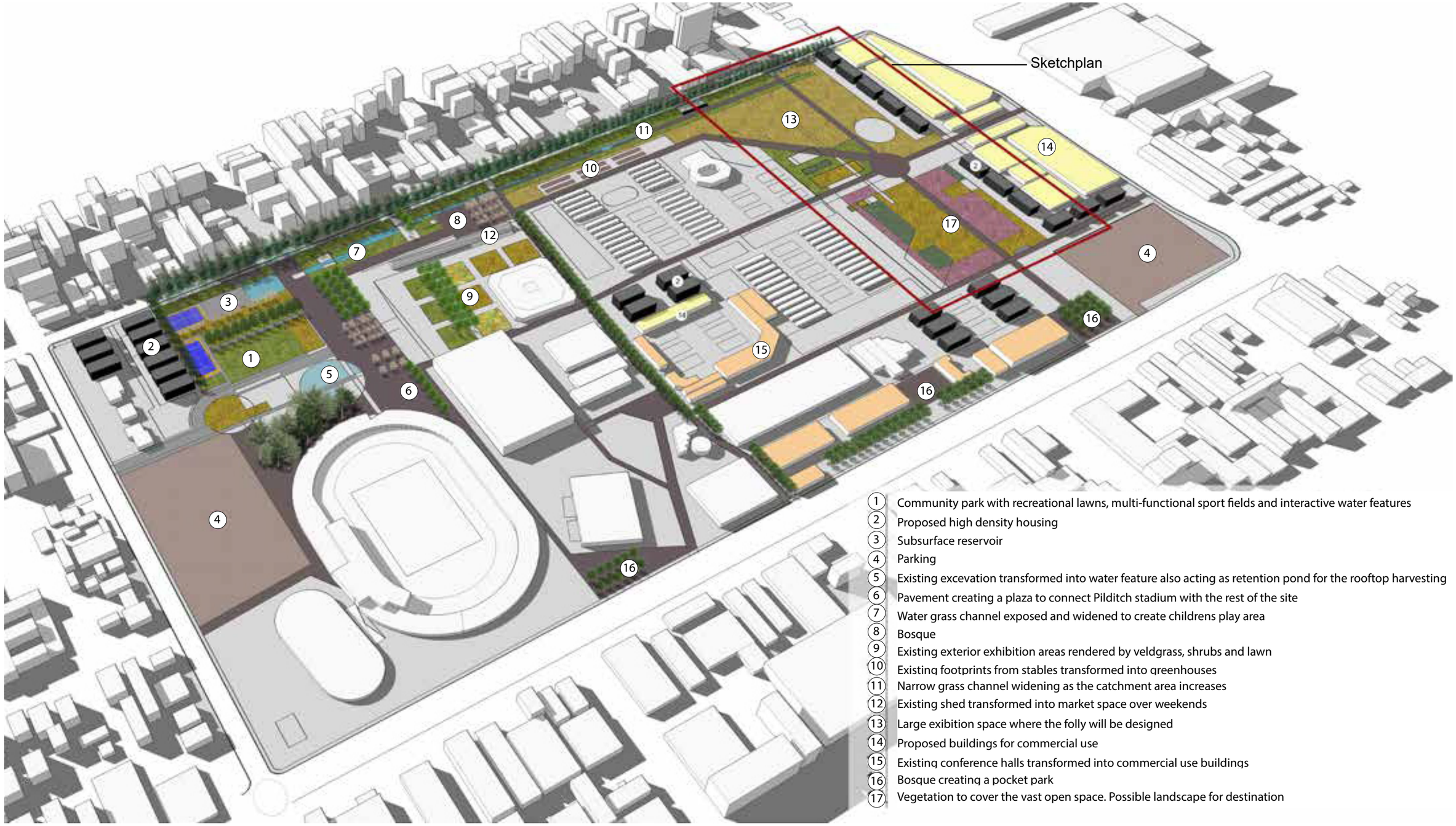


Figure 5.34: The masterplan outlining the sketchplan area

5.4 Sketchplan

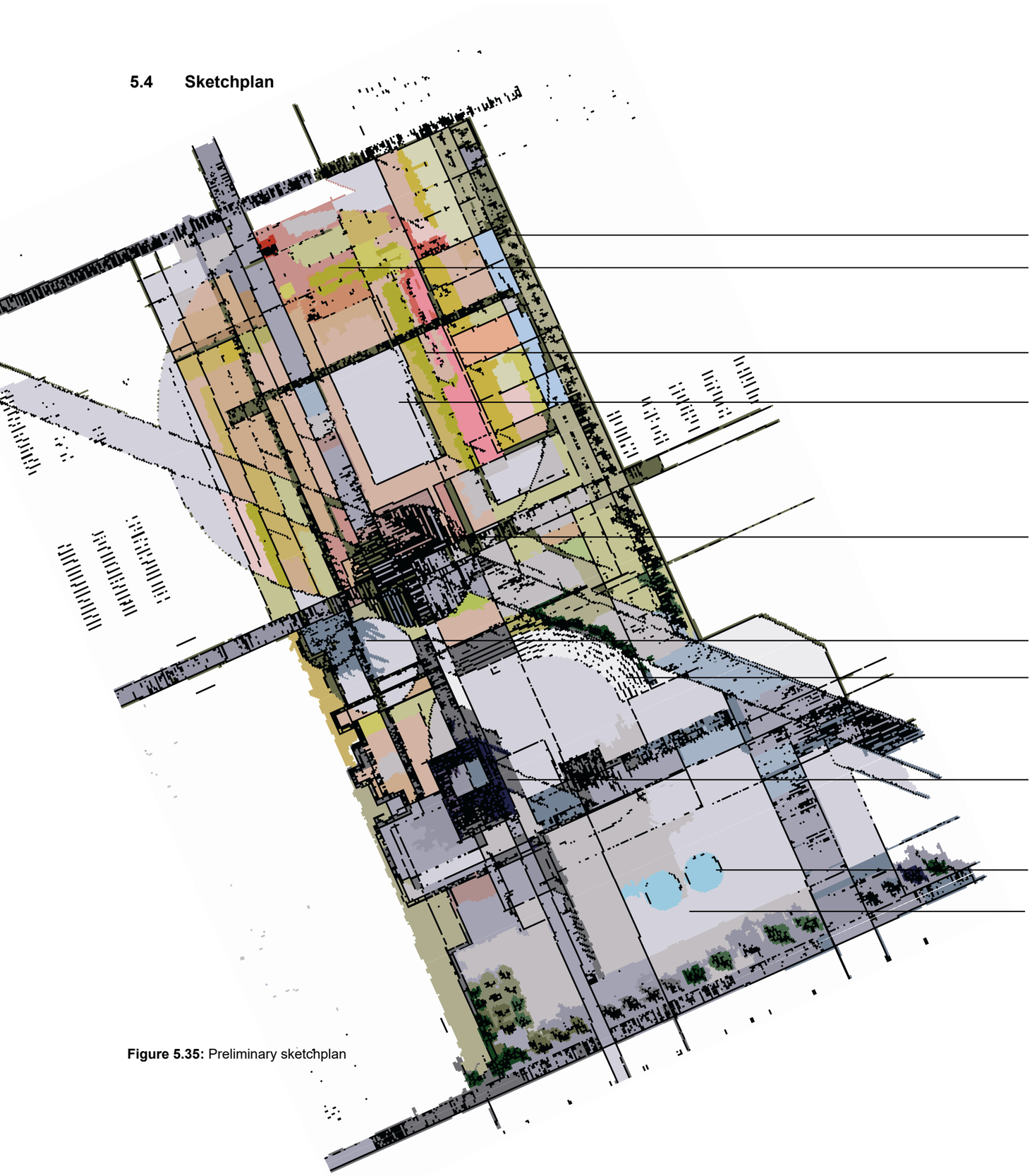


Figure 5.35: Preliminary sketchplan

Figure 5.34 shows the preliminary sketch plan and communicates the main objectives of this space. The eastern part of the showgrounds is shown in the sketch plan (Figure 5.34). As shown in the masterplan (Figure 5.33), this part of the site consists of two large open spaces. The southern open space is rezoned and filled with fields of wild flowers and veld-grass. This resolves the issue of erosion and embraces the vastness of the open space. It will also act as an aesthetic destination for the user. The northern open space is rezoned for event space. The event space will mainly consist of a large sculptural folly (Figure 5.31) creating the platform for numerous activities to take place. The fields of colourful flowers are met by a hard, stark folly, within the landscape. This folly binds in with the Bilbao Effect's principles as it is a manifestation (de-constructed abstraction) of Pretoria West. It also features as functional outdoor space.

The following chapter will discuss the refinement of the project. The technicalities will translate the concept into practical implementations.

Figure 5.36: A perspective of the folly as one approaches it from the fields of wild flowers.

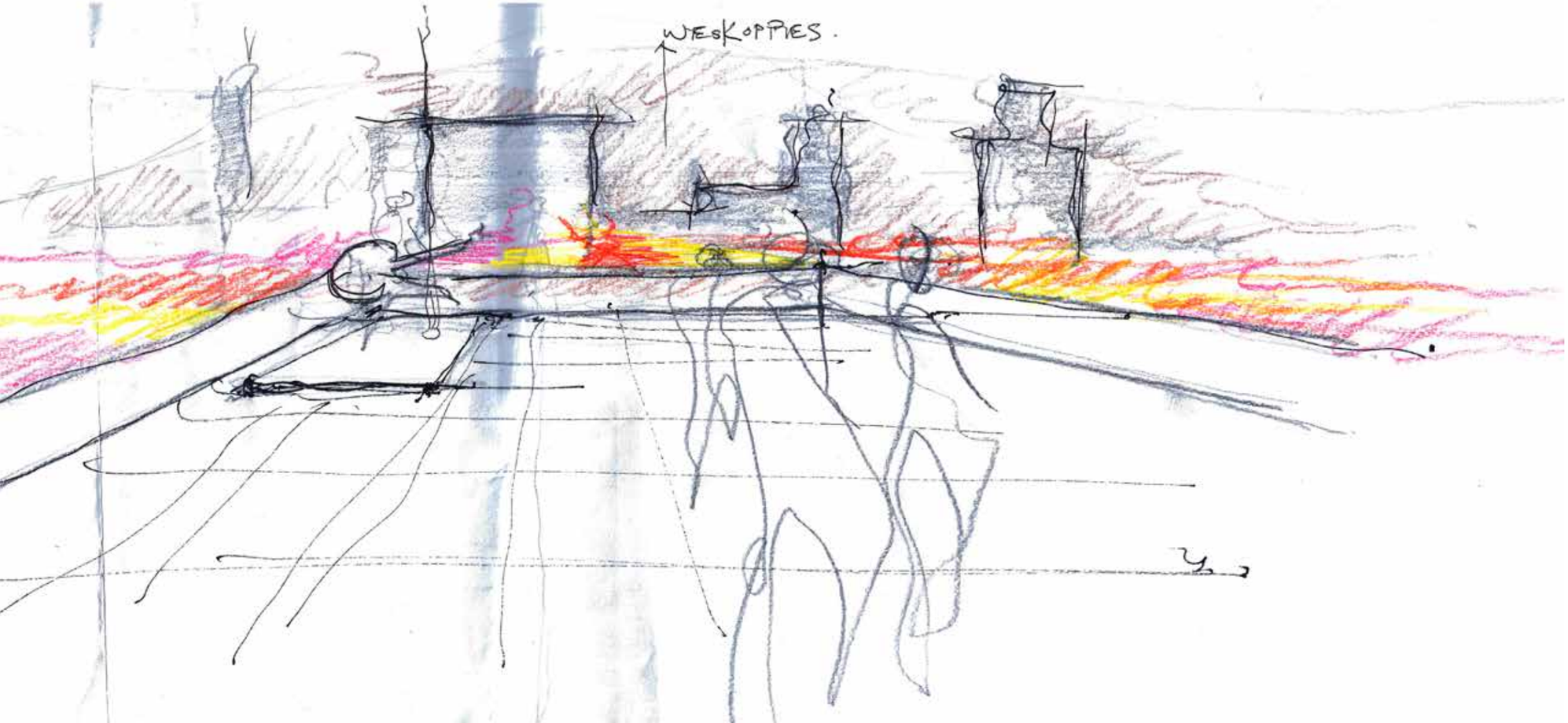


Figure 5.37: A perspective from the folly as one looks over the fields of wild flowers.

Figure 5.38: Elevation of the folly communicating the spacemaking capabilities of the structure

Figure 5.39: Elevation of the folly communicating the spacemaking capabilities of the structure