

Figure 3.1. Adaptation of the hydrologic cycle by Robert. E Horton, sciencevsaging.org. 2010.

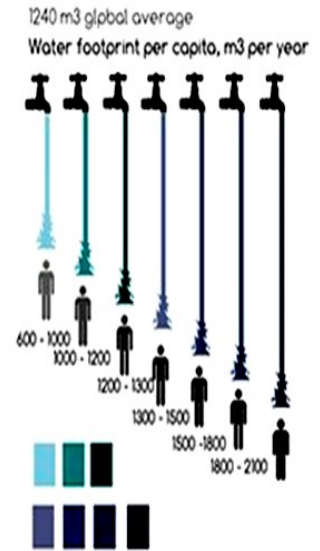
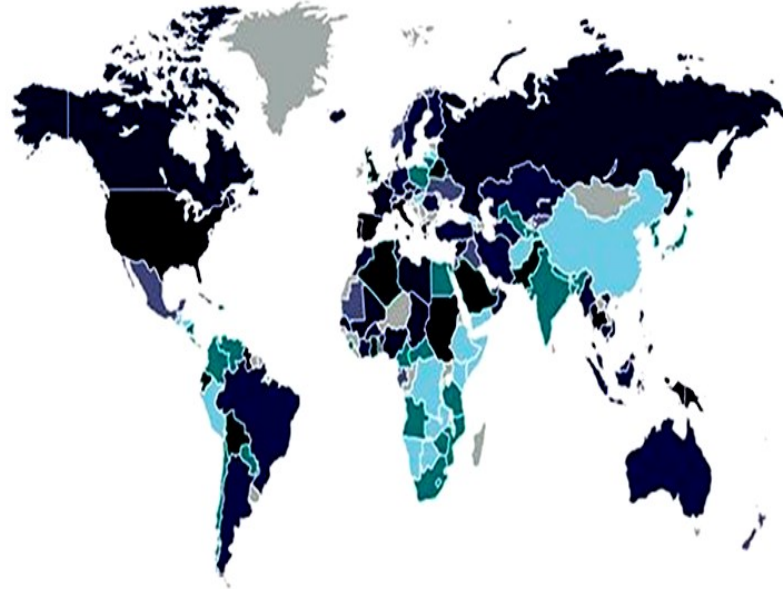
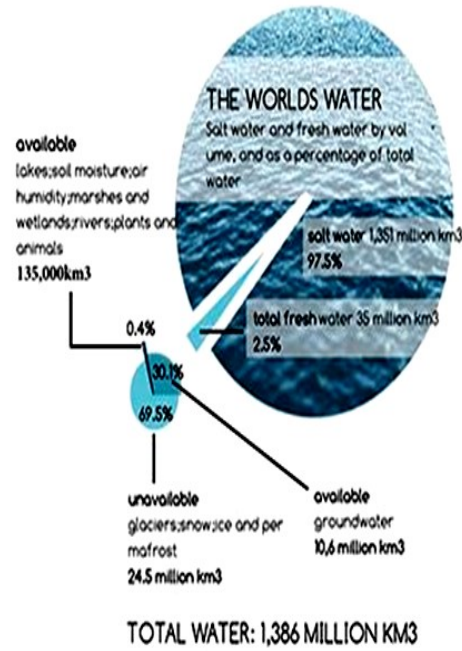


Figure 3.2. Global water footprint. <https://gdblogs.shu.ac.uk/>. WWF. 2013.

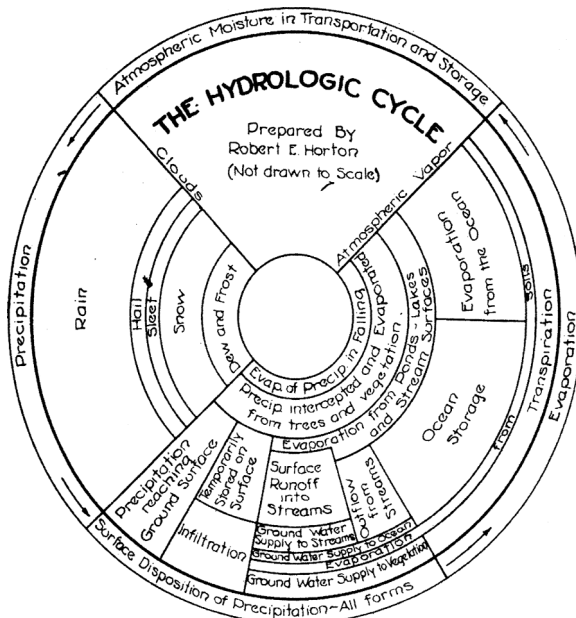


Figure 3.3. The Hydrologic cycle by Robert. E Horton, sciencevsaging.org 2014.

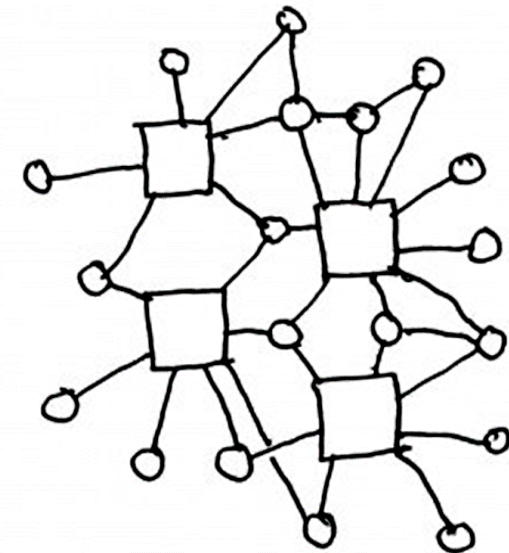
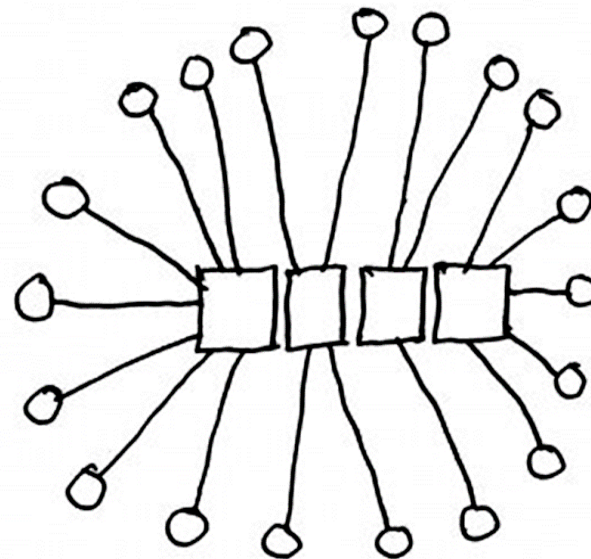


Figure. 3.4. Hierarchical organisation vs. resilient distributed nodal network, theecologist.org. 2013.

3.1 THEORETICAL BASIS

The pursued balance between man-made and natural systems lies in the ‘making of place’ (Mang & Reed, 2012). A regenerative theory that incorporates the hydrological cycle with the local biological and historical narratives supports the combination of natural and man-made systems. The project intends to intertwine hydrological regenerative practice with the identified user needs to create a long-term intervention for the site.

3.1.1 GENERAL ISSUE

The earth’s climatic forces regarding physical air and water systems are directly energised by the sun, as explained by Beran (cited in Oliver & Oliver, 2013:9). Their circulatory processes and physical properties are distressed by pollution, as is well known, (Oliver & Oliver, 2013: 10). With the accelerated production and use of fossil fuels, the hydrological cycle has been altered on a global scale. Water demand is problematic on a local scale and, consequentially, on a global scale (see Figure 3.2) because of contaminated river systems and the effect such pollution has on the hydrological cycle (see Figure 3.3) (Oliver & Oliver, 2013:11).

3.1.2 URBAN ISSUE

Urban areas commonly rely on centralised water distribution networks as diagrammatically. Such networks should organise

a diverse strategy with regard to their supply sources, for example, river systems, groundwater, reservoir storage, and direct rainfall collection, as diagrammatically shown in Figure 3.4. A dynamic water distribution network requires integrative redundancy, with a recursive water fractal network, as explained by Rodríguez-Iturbe and Rinaldo (2001:252). Water distribution should include diverse systems at various scales, as well as the use of various storage units and an integration of a selection of different re-use systems.

3.1.3 ARCHITECTURAL ISSUE

Riparian ecologies specific to urban river margins are lost when natural waterways are altered as stated by Speed et al. (2016: 154). Such changes may affect floodplain and groundwater exchanges (Speed et al, (2016: 70). The hydrotherapy centre’s relationship relative to the river and the surrounds of the site becomes an important aspect to consider. In addition, natural systems should be considered in a recursive manner (Mang & Reed, 2012). In order for human systems to acquire a regenerative basis, they are required to mimic nature or to become ontologically integrated with natural systems that support the earth (Mang & Reed, 2012). Thus as a potential method for a theoretical approach, the architecture should integrate with the site’s hydrological cycle.

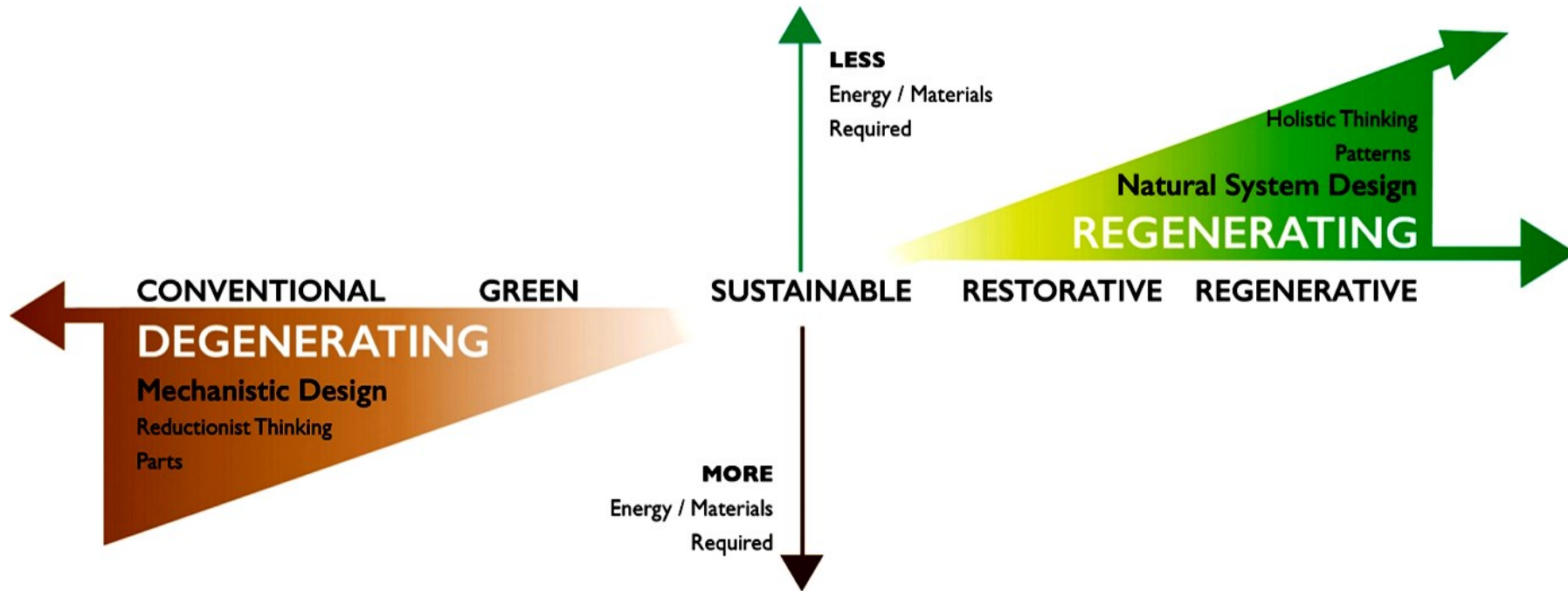


Figure 3.5. Regenerative thinking for a regenerative society. <http://www.kosmosjournal.org/>. 2014.

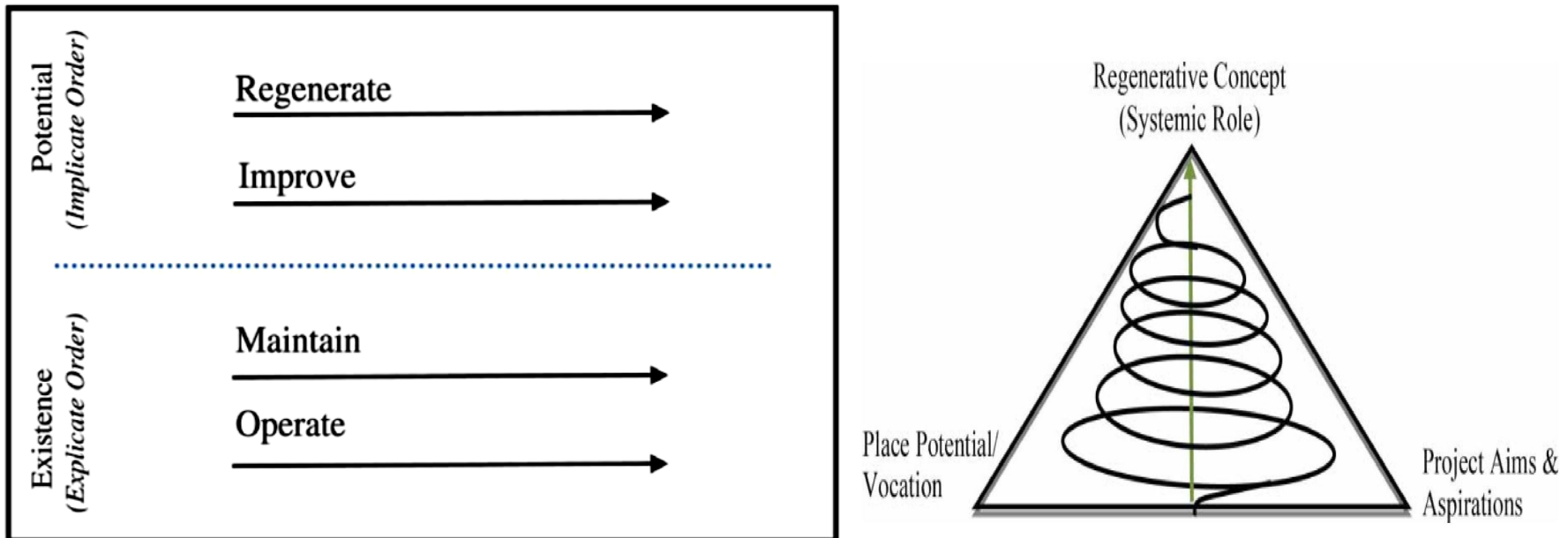


Figure 3.6. Understanding regeneration as a level of work. *Building Research & Information Journal*. (40)1, p.27 and p.34. Mang, P., Reed, B. 2011.

3.2 PRECEDENT THEORIES

3.2.1 REGENERATIVE DESIGN THEORY

The evolutionary role of humankind requires its system to align and to form part of nature, as argued by Mang and Reed (2012:26). A designer's mind-set (Mang and Reed, 2012:33) should evolve to interpret a site as interconnected systemic energy reservoirs that undergo continual restructuring processes.

Regenerative developmental processes improve a system's holistic values (see Figure 3.5) and expand the system's higher aims (Mang and Reed, 2012:27). Regeneration requires four work levels (see Figure 3.6), namely operation, maintenance, improvement, and regeneration to become an integrated whole and to work in harmony in order to improve existing living systems, as described by Mang and Reed (2012:27).

Regenerative design applies an eco-literate strategy and various processes to technologies that can generate new and healthier patterns in a specified place (Mang and Reed, 2012:28). The regenerative paradigm continues and exposes the inherent characteristics of place that can integrate with the design development process (Mang and Reed, 2012: 25). A living place and the design in such a place need to connect to each other and to the overall eco-system.

3.2.2 LIVING SYSTEMS POTENTIAL

A regenerative process develops relationship patterns between an entity and the larger system in which the entity exists by catalysing capacity development through scalar systems (Mang and Reed, 2012:28). The shift to an eco-systemic worldview thus requires an alternative way of seeing how patterns, structures, and systems interact.

(Mang and Reed, 2012:28) proposes a living systems thinking approach to enable designers to think of organisations as living systems. This approach is defined by the following questions:

- What organises living systems?
- How are living systems structured?
- How do living systems evolve?

This arranged discourse rehearses a well-informed view of place and advances design outcomes towards a higher level (Krone, 2015). From this operational process, a greater potential for both the eco-systemic maintenance and operation of a place emerges (Mang & Reed, 2012:34), involving the following:

- the core factors which energise the design process and an on-going resiliency of place, and
- the site being seen as a living system in which to build place, and is not to be understood as a scientific formula.

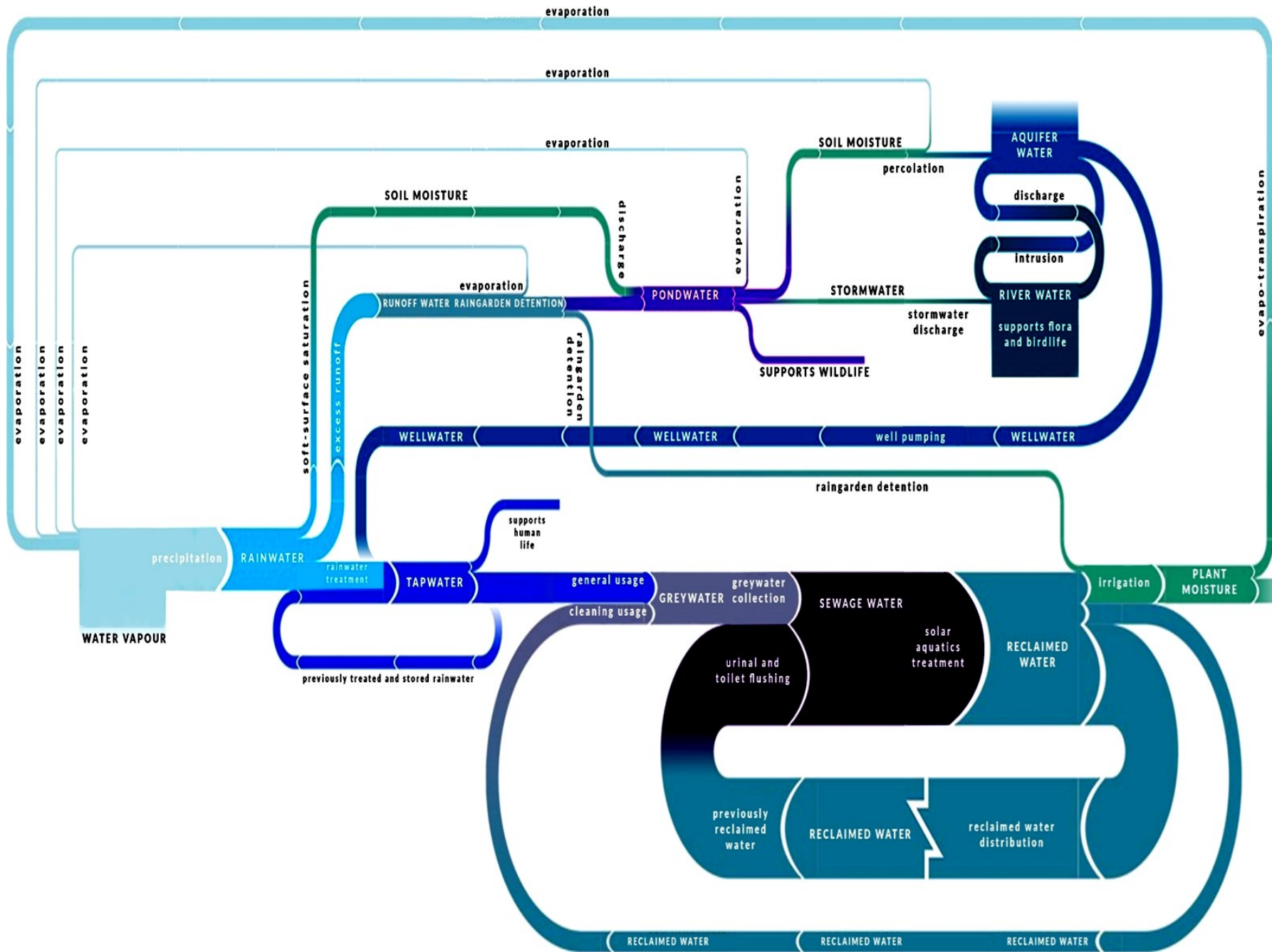


Figure 3.7. Regenerative water cycle. www.estebanmatheus.com. 2011.

3.3 THEORETICAL APPROACH

3.3.1 REGENERATIVE WATER CYCLE

Regenerative design methodologies propose lateral and vertically expansive thinking regarding technical and operational protocols that extend past current building practice (Mang & Reed, 2012:27). Regenerative theory accentuates a symbiotic (Mang & Reed, 2012: 36), mutually responsive correlation between humans and nature by adopting a living systems approach. This approach places priority on connecting the expansive divide between the physical, functional, emotional, and spiritual characteristics of humanity and nature.

The Apies River urban river channel and its adjacent river space provides an opportunity to make this connection, as it seen as a ubiquitous construct that visibly shows society's placement of itself above the natural world. It is a good example that highlights our disintegrated relationship with the environment.

Research conducted by Matheus, (2011) demonstrates regenerative hydrological principles (see Figure 3.7) and indicates how the use of an existing site context can be used to catalyse a regenerative water cycle for a site condition. The approach amalgamates human and natural water systems to bring about symbiotic advantage Matheus, (2011).

“A regenerative water cycle that is embedded in the eco-systemic patterns of place offers a reconciliatory solution that combines the quantitative role of data and metrics involved in rationally thinking about a site with the caring connection of a fluid, yet dynamic and complex world” as stated by Matheus (2011). In order for a natural system to survive, it needs to maintain its robustness and its capacity to continue its eco-systemic importance in time (Mang & Reed, 2012:27).

A building is granted its own water independence, while its water management affects the regeneration of many localised ecosystems Matheus, (2011). If a project uses this approach, it will go beyond meeting a net zero energy output (Matheus, 2011) of the proposed insertion of a building into its context and beyond standard scientifically supported metrics regarding efficiency. In essence, the theoretical outcome is to promote a symbiotic urban ecology (Matheus, 2011).

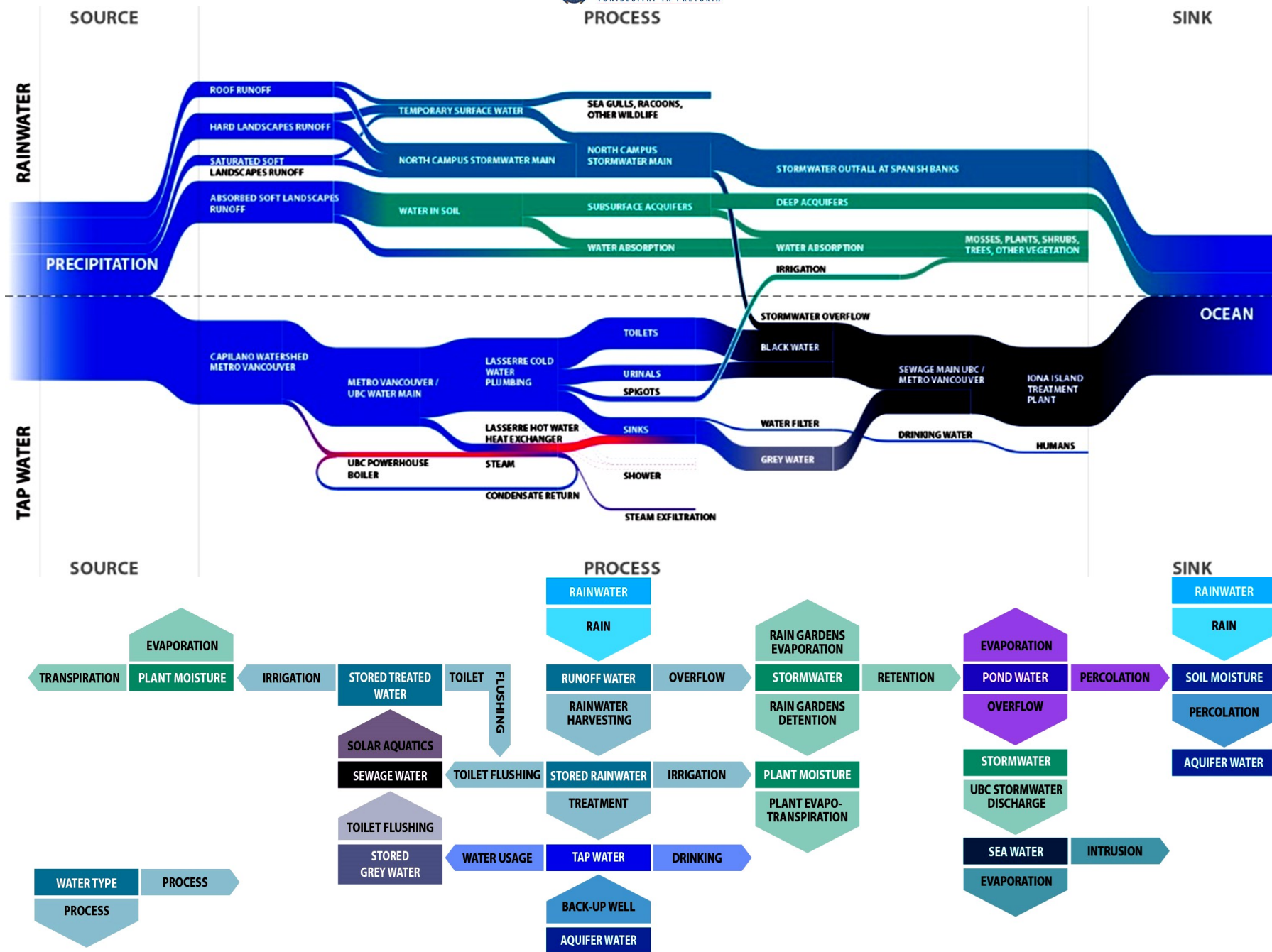


Figure 3.8. Mapping existing unidirectional water flow. www.estebanmatheus.com. Matheus, E. 2011.

3.4 CONCLUSION

3.4.1 REGENERATIVE WATER ARCHITECTURE

Regenerative design applies a system of technologies and strategies based on an understanding of the inner working of living systems and develops into processes that can generate healthier patterns on a particular site (see Figure 3.8).

Landscape elements may extend this fundamental principle to create an approach that includes structural and design attributes of an intervention and how the effects of its spatial insertion will alter its adjacent thresholds (Matheus, 2011).

Realistically, a closed loop hydrological cycle, such as the hydrological cycle present in nature, cannot be fully replicated by architectural or conventional design solutions (Matheus, 2011). Technologies require adaptation to achieve a system or a solution that produces minimal waste output (Matheus, 2011).

An increase in the level of integration of human systems and natural systems mutually benefits both systems and supports co-evolution (Mang & Reed, 2012:27) as concluded below:

- Regeneration is a process not an event.
- Co-evolution of systems is measured by the development of a new mind-set or consciousness and an ontologically novel way of being or existing.
- Harmony is not a steady state.

A synthesised method (see Figure 3.9) may integrate regenerative activities, technologies, and living systems to create a system that is regenerative and naturally self-sufficient. “People become active participants as part of the continuing sustainability of their local communities as well as their local natural resources” as explained by Mang & Reed, (2012:36), they become active agents.

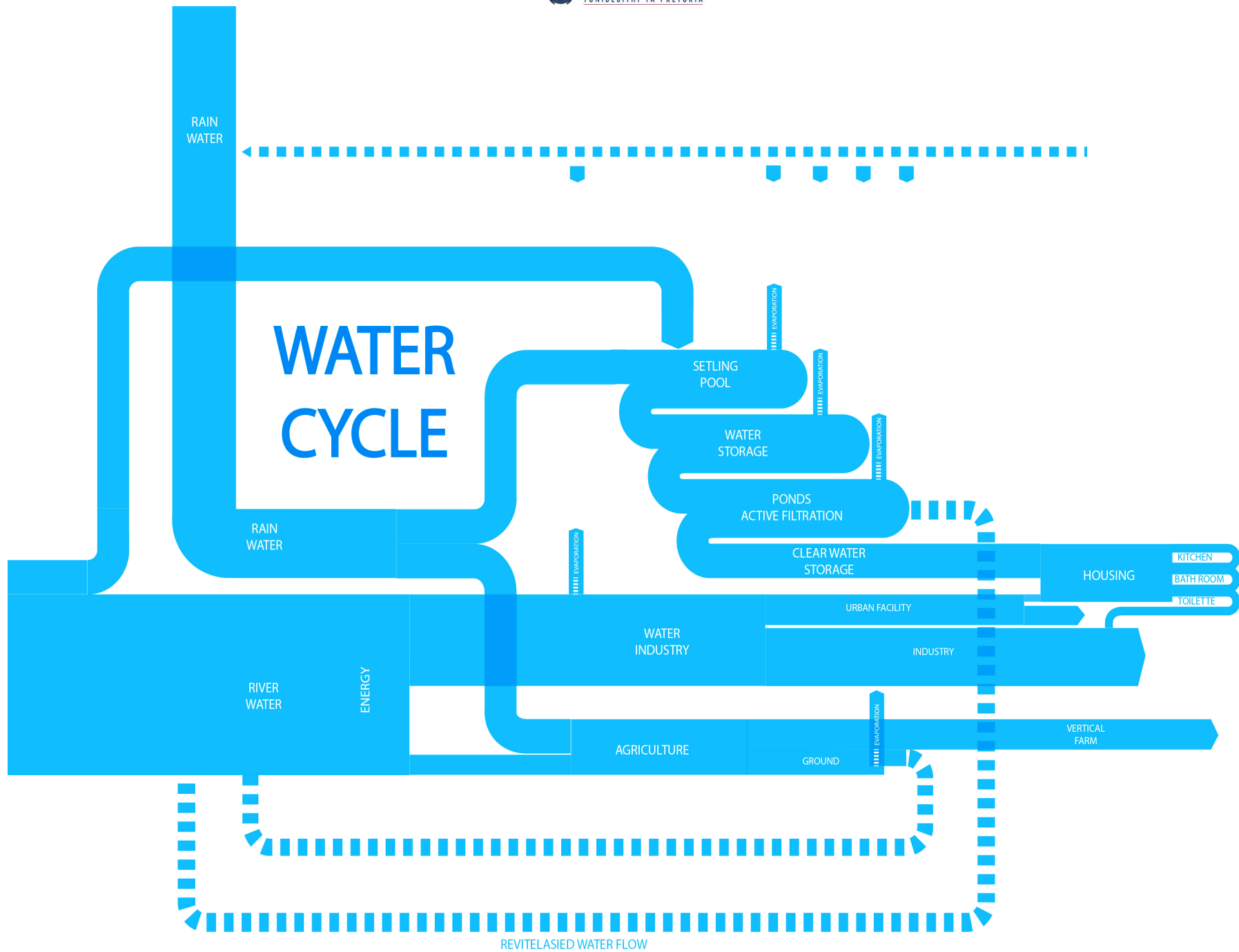


Figure 3.9. Water cycle integration diagram: TowerDelta, design.epfl.ch. 2013.

3.4 CONCLUSION

3.4.2 REGENERATIVE HEALING

Moore and Keim, (2004 :30) state that the positive relationship between water, landscape, human beings, and nature is consistently understood as the essence to water-functional spaces that originate from ancient times. Pristine and pure water is prized for its rejuvenating, transparent, and meditative qualities and is interpreted as part of a refreshing therapeutic experience Moore and Keim, (2004 :30).

Ancient civilisations firmly believed that certain waters contained healing properties, and made frequent holy excursions to these sacred water spaces and natural therapeutic pools Moore and Keim, (2004 :30). Historically, water has predominantly been considered as an aesthetic and a passive therapeutic aspect in Western architecture, as explained by Moore and Keim, (2004 :32).

3.4.3 WATER, THERAPY AND ARCHITECTURE

The built environment often displays hard surfaces and spatially lacks humane responses (Noor, 2015:82). By controlling design elements, such as light, sound, colour, texture, and temperature, an interior space can potentially harmonise a person's physical and mental state. According to

Day and Venolia (cited in Noor, 2015:82), architectural environments exhibit the potential to enhance and possess healing effects. This contributing factor should be passively exposed in the design concept.

3.4.4 WAY FORWARD

This regenerative water approach offers a basis regarding how water can be regenerated and used as a regenerative resource. This method acts as a regenerative catalyst that can attempt to convert the site's existing layers towards delivering a net positive impact by:

- synthesising natural systems with human systems,
- the making of 'therapeutic water space',
- the continuation of the eco-systemic narrative in regenerating a part of the Prinshof Medical District.

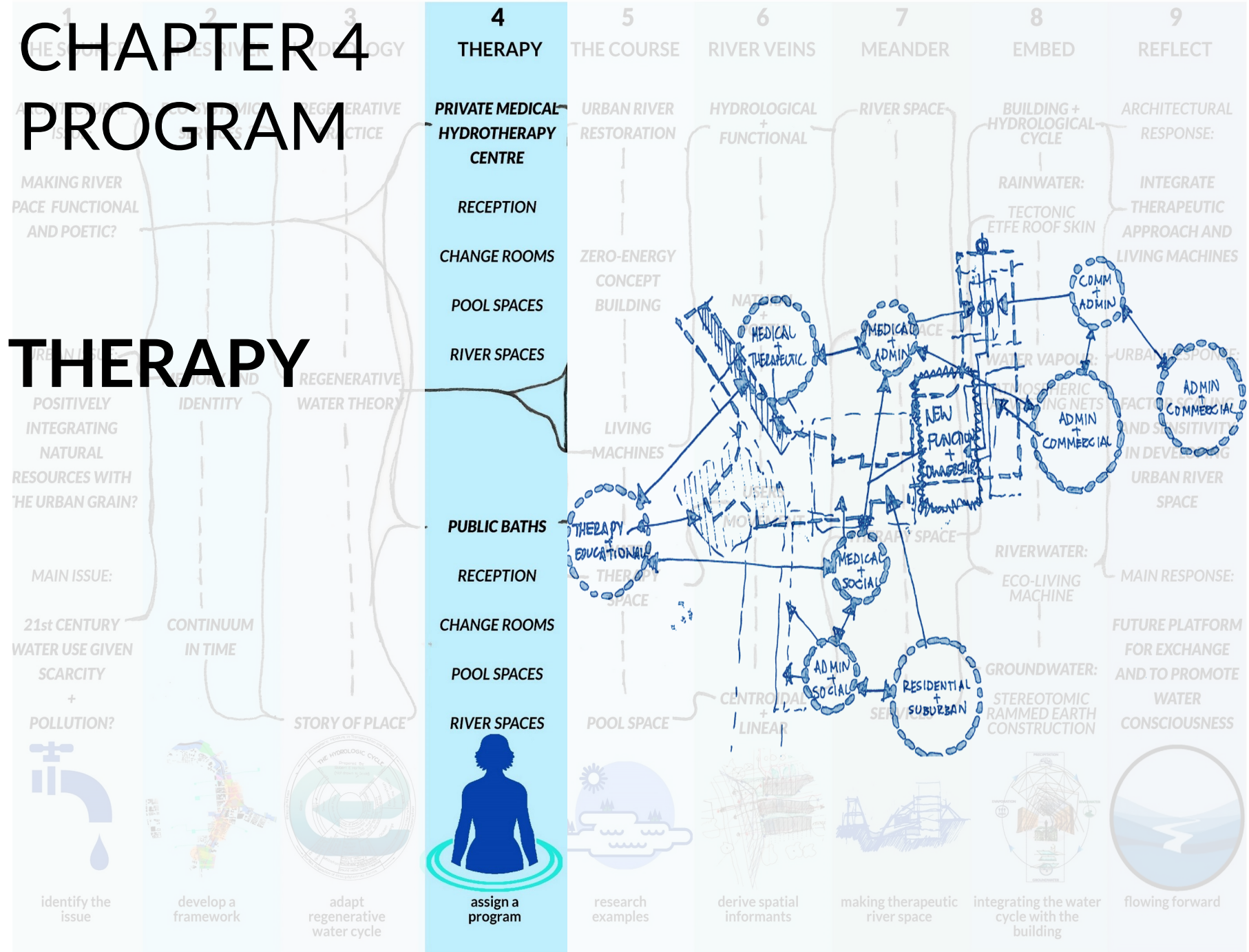


Figure 4.1. Site and program feedback sketch. Author, 2016.



Figure 4.2. Diagram identifying formal and adjacent programs in surrounding context. Author, 2016.

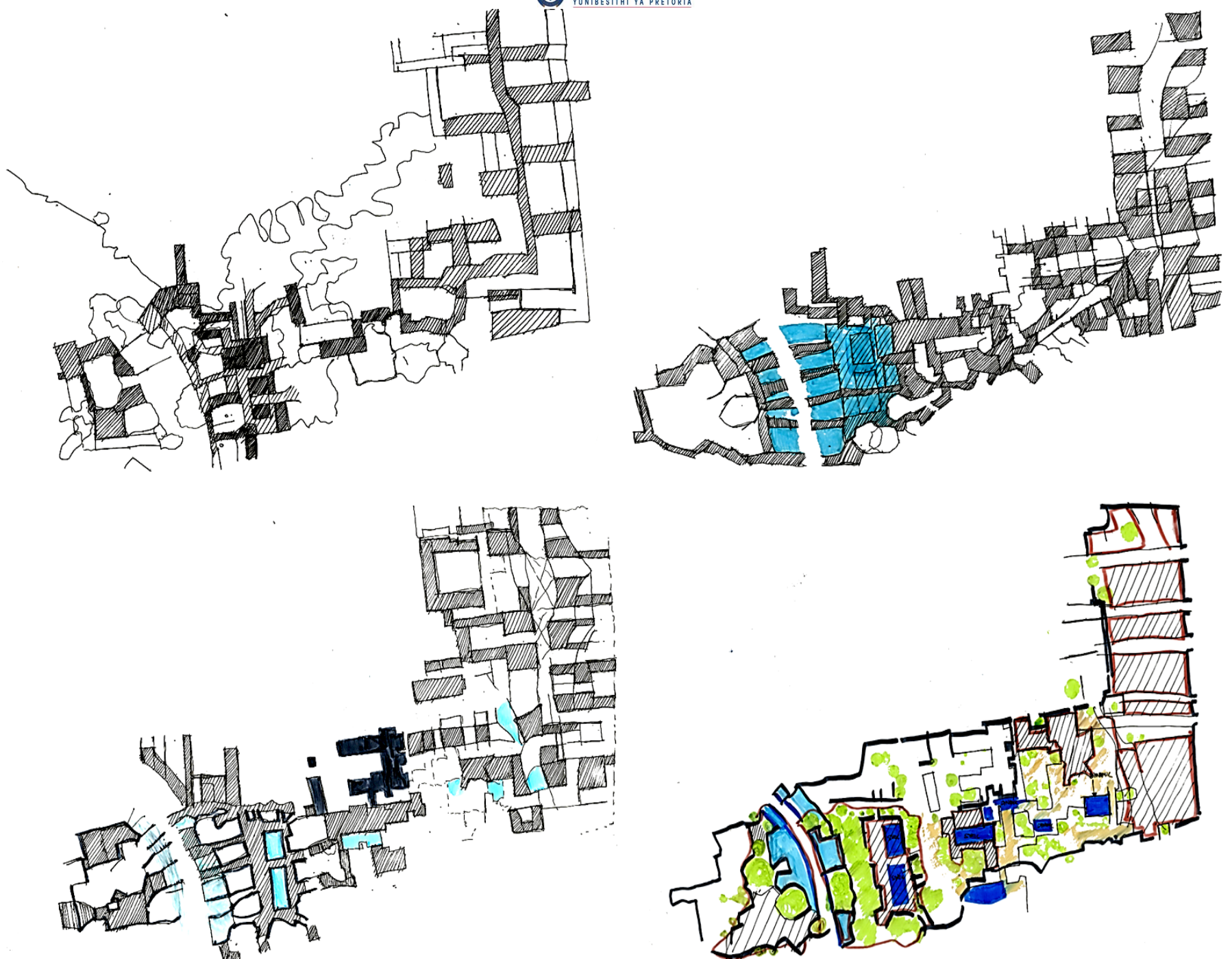


Figure 4.3. Diagrams showing process of potential spatial responses as part of the urban and natural ecologies in the surrounding site. Author, 2016.

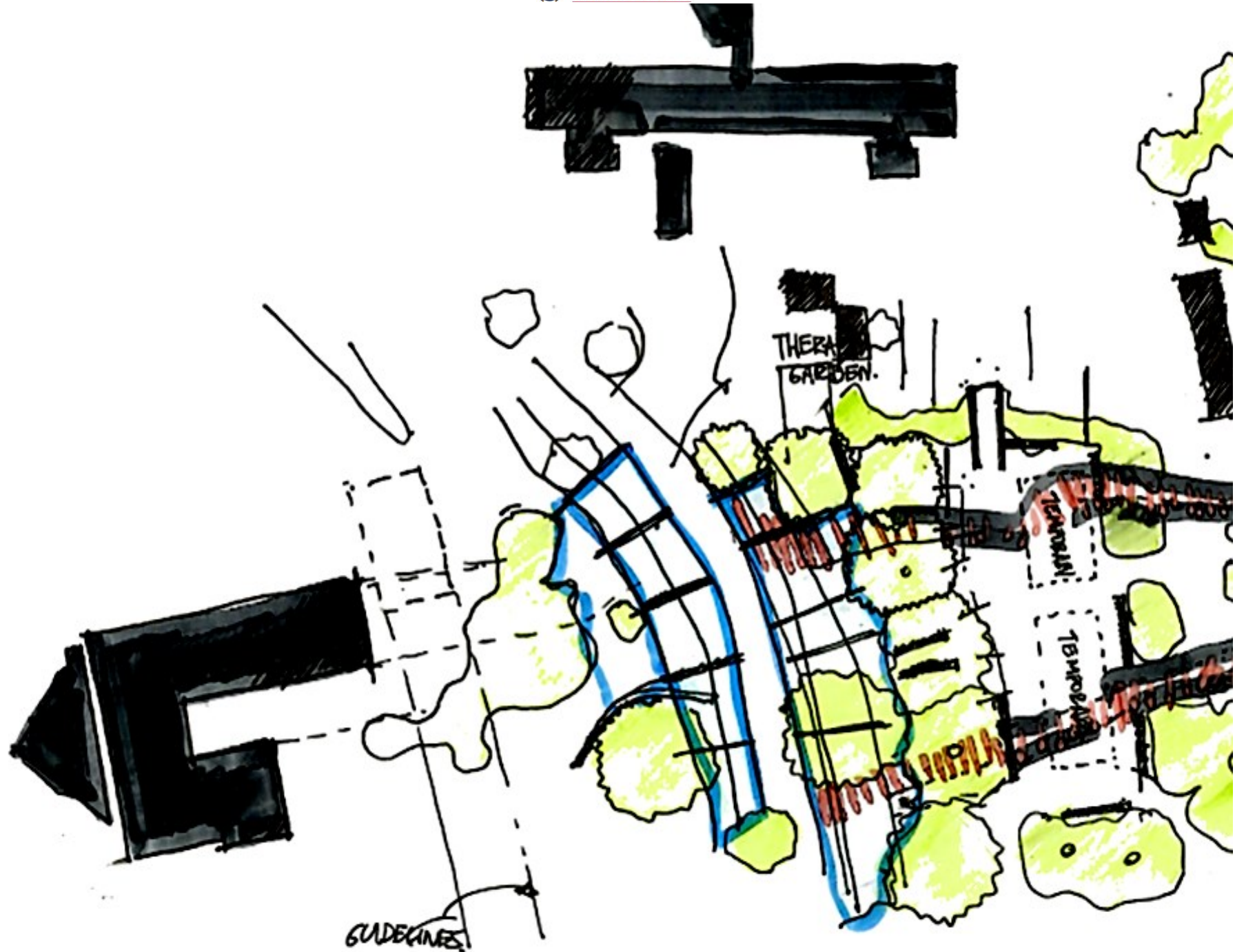


Figure 4.4. Diagram showing potential organic response as part of the urban and natural ecologies in the surrounding site. Author, 2016.

4.1 SITE REQUIREMENTS

4.1.1 URBAN CONDITION

The intervention proposes to respond to the naturally found features, the users' needs, and the movement patterns locally identified on the site (see Figure 4.2). The spatial response is seen to work with the natural and urban patterns beyond the site extents (see Figure 4.3). Due to the permanent presence of medical and educational institutions in the area, a micro response closest to each of the surrounding building functions (SG Lourens Nursing College, Netcare Femina Hospital, Occupational Therapy Centre, Prinshof Cerebral Palsea School is explored as a symbiotic urban ecology (see Figure 4.4).

4.1.2 FLOOD ZONE

In the context of the specified site and according to the framework discussed in Chapter 2 (also see Figure 2.31), flood zones (see Figure 4.5) can be potentially incorporated into the scheme, alongside the Apies River. Proposed river spaces can integrate with a water purification system (Margolis & Chaouni, 2014:177) which can be used to purify a percentage of the water for building or landscape use. The flood zones can be naturally graded or considered as part of a series of river flood tanks to allow for summer rainwater flooding periods.

4.1.3 WATER PURIFICATION

Polluted river water consists of inorganic and organic compounds of biological origin, floating matter and soluble substances, according to the *Glossary of Useful Water Research Terms* (District of Columbia Water Resources Research Center, 1983). Organic compounds contain chemicals ranging from hydrocarbons, bacteria, viruses, and fertilisers (Speed et al., 2016: 28). Water contaminants are required to be removed from polluted water by completing sequential purifying processes (Speed et al., 2016: 169). As previously discussed, proposed flood zones (see Figure 4.5) may integrate with living filters, as described by Margolis and Chaouni (2014:177). Such filters can remediate the effects of water pollutants (see Figure 4.6) in the surrounding environment (Speed et al., 2016: 169).

4.1.4 GROUNDWATER COLLECTION

The site displays high groundwater levels, which can be strategically integrated as a water resource for use in a hydrotherapy centre. The aim is to harvest water to replenish the baths and cisterns, and to use it for drinking purposes. Methods regarding sustainable water extraction (see Figure 4.7) water storage and reticulation need to be accommodated, as explained by Adar (cited in Margolis & Chaouni, 2014:102).

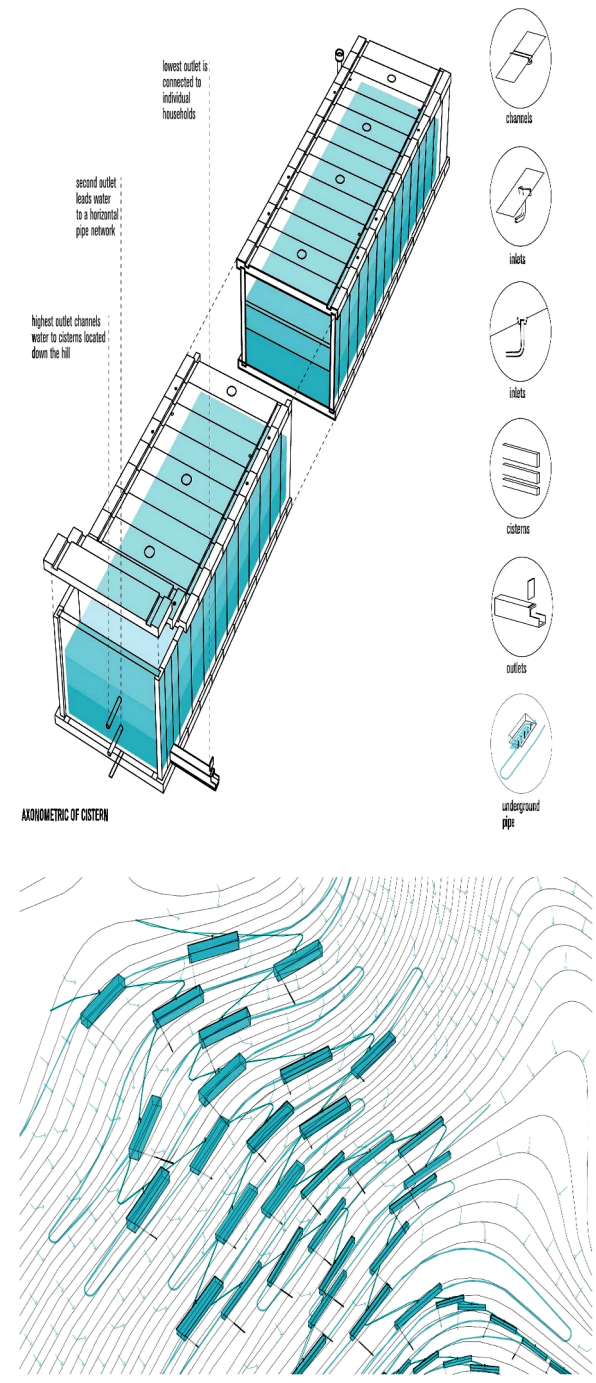
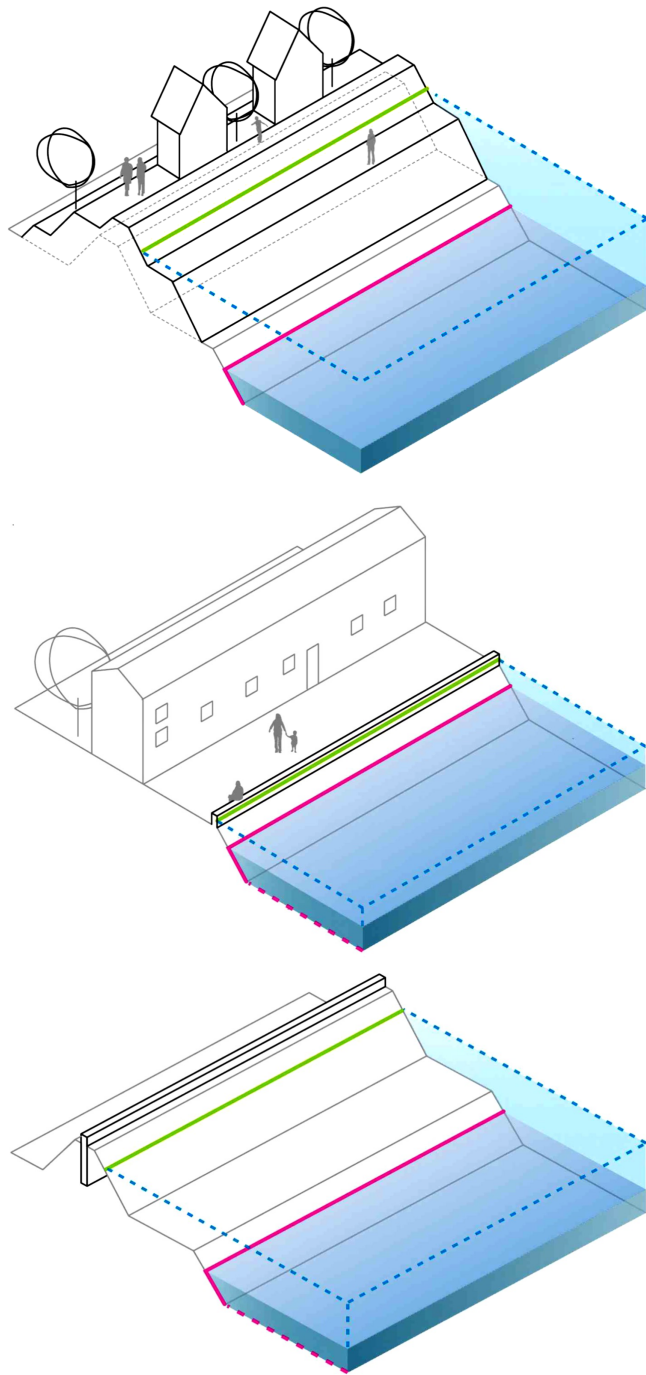


Fig. 4.5. Spatial strategies, p.76, p.78, p.81, Prominski et. al, 2012. Fig. 4.6. Eco-Living Machine, toddecollogical.com. 2016. Fig. 4.7. Groundwater strategy, p.88 Margolis and Chaouni, 2014. 90

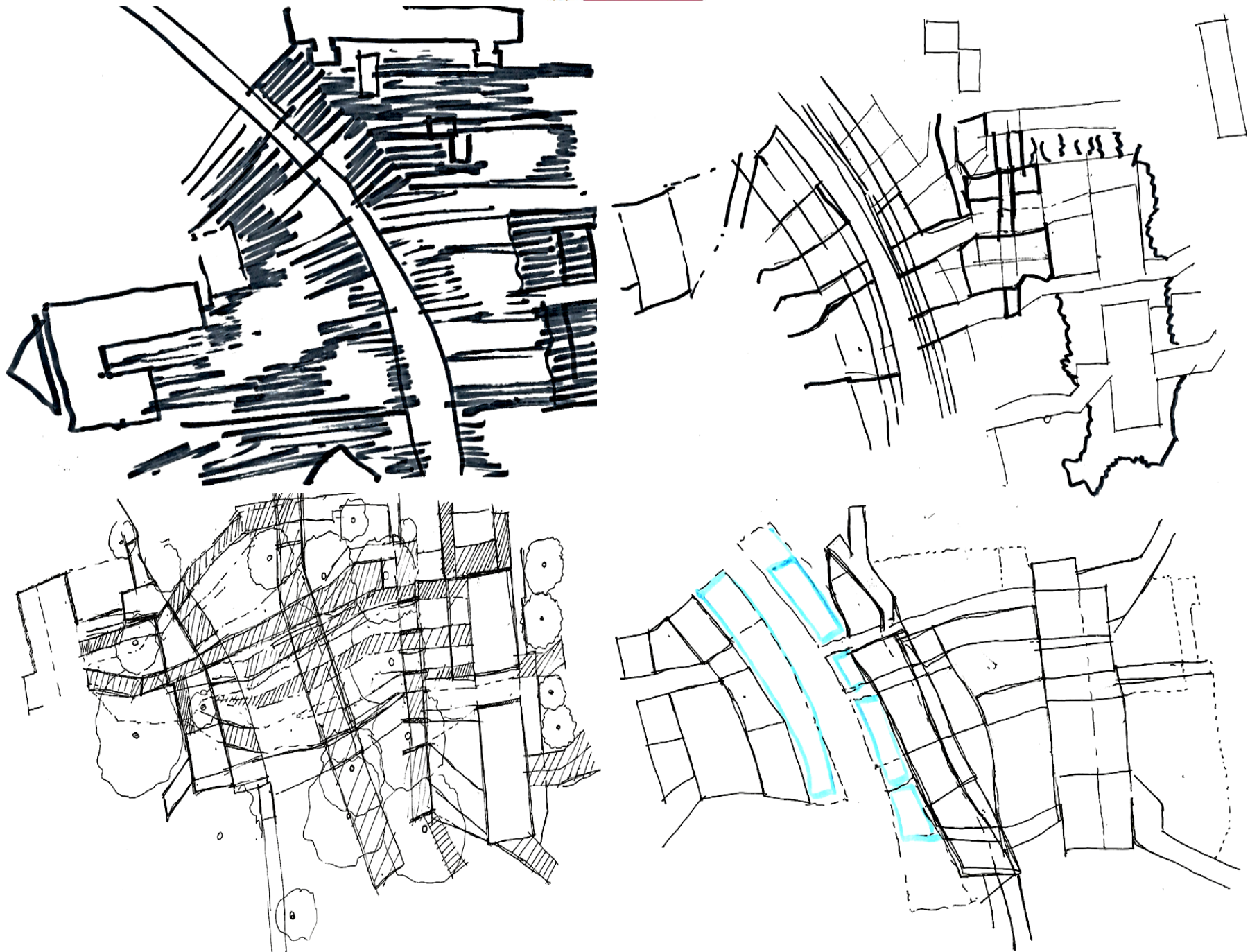


Figure 4.8. Diagrams showing process of potential spatial relationships between the site and the Apies River. Author, 2016.

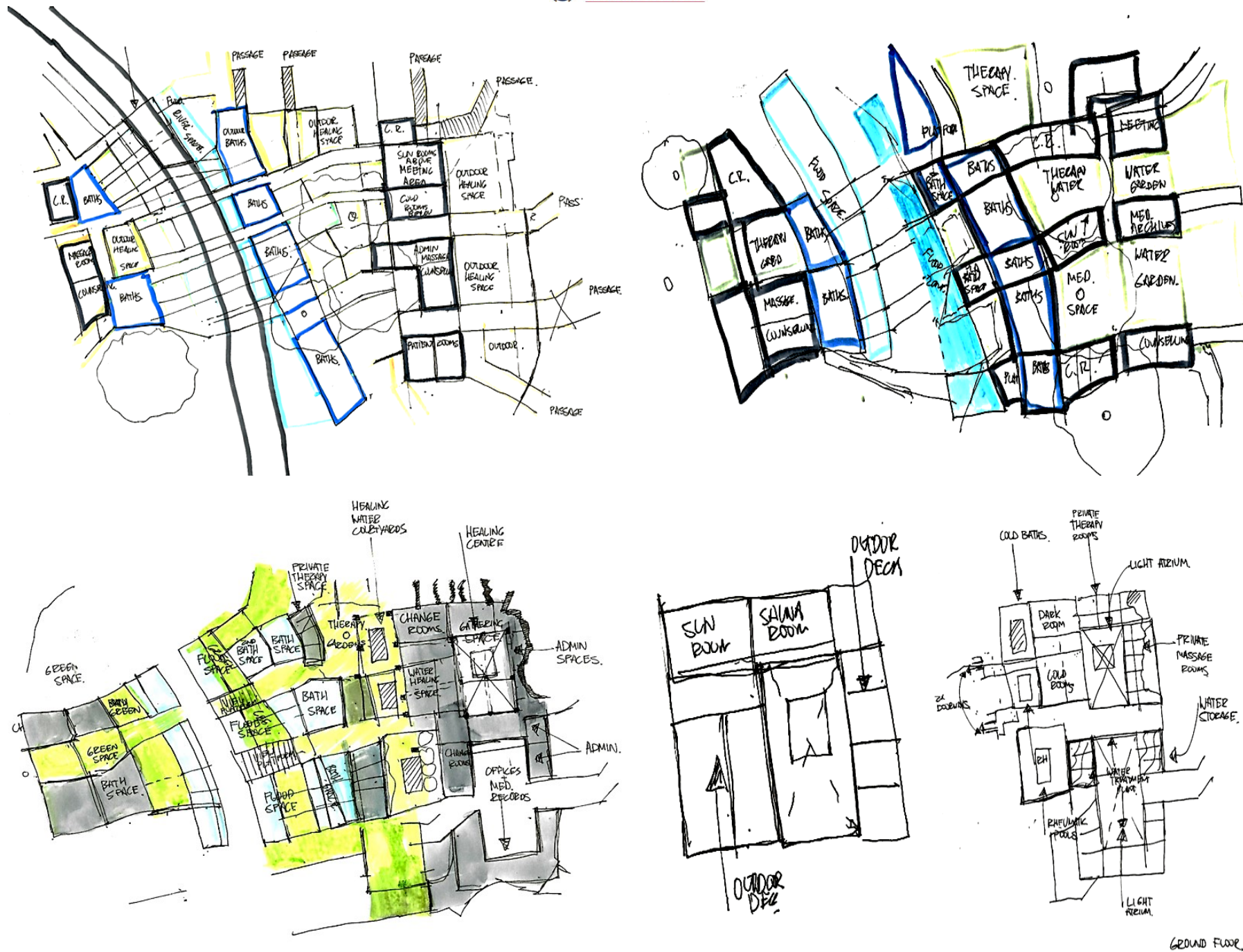


Figure 4.9. Diagrams showing process of program relative to spatial development. Author, 2016.

4.2 PROGRAM REQUIREMENTS

4.2.1 USERS

The programme will cater to the needs of patients (private or medical) and the general public. Building use duration by the public may range from three to six hours a day for interior or exterior therapy sessions. A hydrotherapy centre with water therapy spaces for indoor and outdoor therapeutic sessions is proposed for the site (see Figure 4.9). It would respond to the local urban users and medical patients from the surrounding Prinshof Medical District.

4.2.2 CLIENT

The proposed hydrotherapy building would be accessible to the general public in terms of its public spaces. Its facilities would also be made available to patients and children affected by disabilities, and medical practitioners and staff who work in the area. Potential interest in the hydrotherapy centre would appeal to the adjacent Prinshof Cerebral Palsy School, the Medical Research Council (MRC), the SG Lourens Nursing College (see Figure 4.10), as well as representatives from external institutions (such as the Water Institute of the University of Pretoria (see Figure 4.11), the Water Institute of Southern Africa (see Figure 4.12), and the City of Tshwane Municipality (see Figure 4.13).

4.2.3 CRITERIA

The programme is determined to respond to the following institutions, which are located within a one kilometre radius of the site: the Cerebral Palsy School, the SG Lourens Nursing College, the Netcare Femina Hospital, and the Pretoria Academic Hospital Rehabilitation Centre. There is no interaction in terms of shared resource use or extra-curricular staff/patient interaction involving the site. Mrs Thabethe (2016), the site supervisor of Netcare Femina Hospital, confirmed the lack of interaction between the abovementioned institutions and the site. The site represents a unique and centrally located opportunity that would decrease the level of isolation of the surrounding facilities. The site also presents a central location to create a connection to the urban grain. The guiding principles can be summarised as follows:

- to integrate river spaces with the adjacent open spaces,
- to purify the river to an extent where a part of the total building water used can be derived from river water,
- to consider the flood lines relative to the allocation of dedicated flood zones, and
- to construct a bridge over the Apies River to respond specifically to the Prinshof Cerebral Palsy School.



Figure 4.10. SG Lourens Nurse Training College. www.able.wiki.up.ac.za. 2011.



Figure 4.11. University of Pretoria Water Institute. www.up.ac.za. 2015.



Figure 4.12. Water Institute of Southern Africa. www.wisa.org.za. 2013



Figure 4.13. City of Tshwane. www.tshwane.gov.za. 2015

4.3 INTERIOR SCHEDULE

4.3.1 SALT POOL

Saltwater pools provide healing therapeutic properties, especially with regard to the skin and muscles (Dunn, 2012:7). Saltwater pools should preferably be covered and are usually small and concentrated in size in order to maximise the salinity maintenance (Dunn, 2012:7). They are best located next to therapy gardens or other warm pool spaces (see Figure 4.14 and Figure 4.15). To create heightened sensory experiences, they can be used on levels below ground (Dunn, 2012:7).

4.3.2 STEAM POOL

Steam baths focus on water as an ambient steam (Dunn, 2012:7). These amenities provide both therapeutic and recreational value to their users. Heated, aerated water is considered part of therapeutic treatment for patients who suffer from asthma and chronic sinusitis (Dunn, 2012:7). In addition, recreational value can be found in the sensory experience of feeling hot steam on the skin.

4.3.3 DARK THERAPY ROOM

Dark rooms provide spaces for sensory deprivation from a world of light and noise (Dunn, 2012:6). They are essential in aiding internal therapy, and they assist in the process of mind and body meditation (Dunn, 2012:6).

4.3.4 WARM POOLS

Warm pools are large bodies of water with temperatures that are regulated in three categories, namely 28°C, 32°C, and 33°C (Rust, 2011:42). The temperatures can be passively regulated by exposure to outdoor temperatures, or they can be maintained through the use of a heating system. These areas are considered public and should be larger in size than other pools in order to accommodate a large numbers of people (Rust, 2011:42).

Program Diagram:

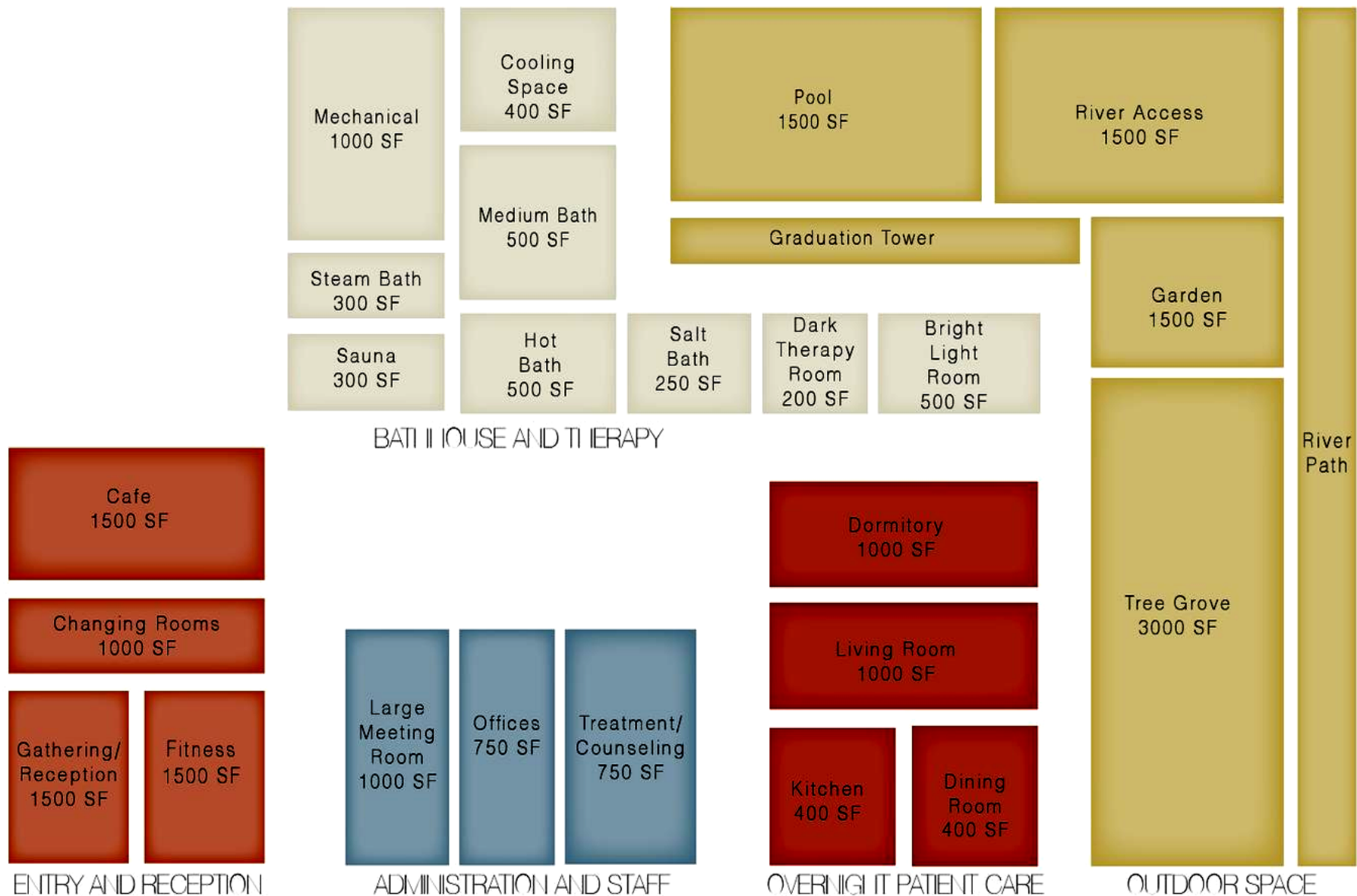


Figure 4.14. Hydrotherapy programme precedent. p.10, Dunn, 2012.

4.3 INTERIOR SCHEDULE

4.3.5 RHEUMATIC POOL

Rheumatic pools are often smaller size than other pools and are allocated for semi-public use due to the requirement of maintaining a consistent heat of 42°C (Rust, 2011:42). Water which is heated to this temperature provides significant healing properties similar to hot baths, but is specifically recommended for patients suffering from osteoporosis and arthritis. Maximum permitted use due to health and safety concerns is limited to a single ten-minute session per hour (Rust, 2011:42).

4.3.6 COLD ROOM

Cold rooms are completely concealed rooms that are well ventilated. They are typically located below ground to retain coolness and humidity (Dunn, 2012:7). They provide the same therapeutic effect as a dark rooms, but are regulated to maintain an air temperature of 12°C (Dunn, 2012:7). Sessions are mostly limited to 20 minutes (Dunn, 2012:7).

4.3.7 MASSAGE ROOM

Massage rooms are small semi-private spaces that are typically associated with hydrotherapy centres (Rust, 2011:42). Appointments are usually arranged via the reception between the patient/user and a medically trained massage therapist or physiotherapist. The massage rooms are best located on ground level to ensure universal access.

4.3.8 COLD POOL

Cold baths are regulated at a water temperature of 14°C and typically offer recreational value to bathers (Rust, 2011:42). They are used after sessions in a hot bath or rheumatic pool and are best placed nearby these spaces (Rust, 2011:42). Cold baths are a major part of public bathing areas but can be incorporated into private bathing rooms for disabled people (Rust, 2011:42).

INTERIOR SPACE														
SPACE	SIZE - m ²	ROOM DIVISION	USERS	LEVEL	M-FUNCT	ADJACENCIES	ADJACENCIES	ADJACENCIES	SPATIAL EXPERIENCE	FUNCTION	THERAPY	OCCUPANCY	EQUIPMENT	SENSES
HYDROTHERAPY														
SALT POOL	32	2 ROOMS x 16m ²	PUBLIC	G					preparation, solitary relaxation	Used to treat manic and bipolar conditions. May be connected to Dark Room. Salt makes water buoyant	sensory deprivation, hydrotherapy	4	cleaning, filtration	minimal eyes, nose
STEAM BATH	32	2 ROOMS x 16m ²	PUBLIC	-1					preparation, solitary relaxation	Heated air - used in conjunction with baths	hydrotherapy, recreational	8	waterproof benches	skin, muscle, skeleton
DARK ROOM	32	1 ROOM	SEMI-PUBLIC	-1					stimulation, preparation, rejuvenation	Used to treat manic and bipolar conditions. May be connected to Salt Pool.	manic therapy, sensory deprivation	4	benches, ventilation devices	minimal eyes, nose
SHADOW ROOM	20	1 ROOM	SEMI-PRIVATE	-1					stimulation	Preparational transition zone between sun and dark room	calming effect, recreational	4	benches, ventilation devices	minimal eyes, nose
SUN ROOM	40	2 ROOMS x 20m ²	PUBLIC	1	*				preparation, solitary relaxation	Heated air	ilotherapy	8	sunbeds	skin, muscle, skeleton
SAUNA	32	2 ROOMS x 16m ²	PUBLIC	1	*				preparation, solitary relaxation	Heated air - used in conjunction with baths	atmotherapy	10	benches, heat element	skin, muscle, skeleton
WARM POOLS - 28°C	150	6 ROOMS x 25m ²	PUBLIC	G					preparation, relaxation, stimulation	Transition between cold and hot pools	sleep phase advance therapy, aerobics, chronotherapy, recreational	20	cleaning, filtration	skin, muscle, skeleton
HOT BATH - 33°C	40	2 ROOMS x 20m ²	PUBLIC	G					preparation, relaxation, stimulation	Induces calming and body healing effects	hydrotherapy, recreational	8	cleaning, filtration	skin, muscle, skeleton
RHEUMATIC POOL - 42°C	40	2 ROOMS x 20m ²	PUBLIC	G					preparation, solitary relaxation	Induces calming and body healing effects	hydrotherapy, rheumatic treatment	8	cleaning, filtration	skin, muscle, skeleton
COLD ROOMS	40	2 ROOMS x 20m ²	PUBLIC	-1	*				preparation, stimulation, relaxation	Relax after hot bath	calming effect, recreational	10	waterproof lounge	minimal eyes, nose
MASSAGE ROOMS	100	10 ROOMS x 10m ²	PRIVATE	-1					preparation, massage, relaxation	sports, general and long-term injuries	physical therapy for joint, bone and tissue pain	10	sports injury beds, storage,	skin, muscle, skeleton
COLD BATH - 14°C	40	2 ROOMS x 20m ²	PUBLIC	-1	*				preparation, stimulation, relaxation	Relax after hot bath	calming effect, recreational	10	cleaning, filtration	skin, muscle, skeleton
ENTRY AND RECEPTION														
CHANGING ROOMS	100	4 ROOMS x 25m ²	SEMI-PRIVATE	G	*				preparation, major, threshold, solitary	Preparing for baths	-	men/women/location dependent 16	towels, hygiene	skin, muscle, skeleton
GATHERING AND RECEPTION	140	1 ROOM	PUBLIC	G	*				guidance, preparation	workshop, class, facilities meeting	-	20	table, chairs, lounge, furniture	eyes, ears
KIOSK, CAFÉ, VENDOR SPACE	140	1 ROOM	PUBLIC	G	*				stimulation, comfort, recreation	users to obtain food and drink before and after public baths	recreational	20	chairs, table, counter, kitchen equipment	tongue, nose, ears, eyes
FITNESS PLATFORMS	140	7 ROOMS x 20m ²	PUBLIC	G	*				guidance, preparation, stimulation	working out, body movement	sleep phase advance therapy, aerobics, chronotherapy, recreational	20	weights, pads, balls	eyes, ears, muscle, skeleton, skin
PASSAGES	-	-	PUBLIC	G					stimulation, threshold	circulation	-	all access	-	-

Figure 4.15. First iteration – accommodation schedule. Author, 2016.

4.3 INTERIOR SCHEDULE

4.3.9 CHANGE ROOMS

It is possible to include a configuration of smaller changing rooms or even a centralised changing room in the proposed hydrotherapy centre. These spaces mediate space between the 'bath' areas and 'dry' areas (Rust, 2011:43). Changing rooms may be coupled with bathrooms or other ablution facilities.

4.3.10 RECEPTION

The reception is intended as a central public gathering point. It is from this space that guests can be directed to various parts of the centre. The reception can be considered to be a space of welcoming (Dunn, 2012:6).

4.3.11 KIOSK AND CAFÉ

A café or kiosk will offer refreshments to guests (Dunn, 2012:6). These spaces are generally set apart from the bath spaces to avoid littering.

4.3.12 OFFICES

Personnel and staff spaces should be allocated for medical practitioners and hydrotherapy staff members. These spaces should contain standard office equipment to meet typical administrative and storage requirements (Rust, 2011:43).

4.3.13 TREATMENT ROOMS

These rooms are typically small and semi-private. They are best located near changing rooms, or reception space. Individual sessions can be arranged between medical practitioners and patients in these rooms (Rust, 2011:43). The treatment rooms can be seen as an opportunity to allow junior nurses in training from the SG Nursing College to facilitate treatment for both private clinical patients and the general public.

4.3.14 MEDICAL RECORDS

Medical records from patient/practitioner sessions should be kept and stored away for future use and review (Rust, 2011:43). A medium-sized, private space should be allocated for the purpose of storing such documents. The medical records room is best located near the administrative or office rooms of the building.

ADMIN AND STAFF														
LARGE MEETING ROOM	90	2 ROOMS x 45m ²	SEMI-PRIVATE	G	*				guidance, preparation	worskop, class, facilities meeting	-	16	conference table, chairs, furniture	eyes, ears
OFFICES	64	4 ROOMS x 16m ²	PRIVATE	G	*				personal ownership, guidance, preparation	analysis, staff, personal space to keep files and equipment	-	8	computer, desk, chair, storage cabinet	eyes, ears
TREATMENT AND COUNSELLING	64	4 ROOMS x 16m ²	SEMI-PRIVATE	-1	*				guidance, preparation	diagonosis - questioning - counselling	-	8	coffee table, chairs	eyes, ears
MEDICAL RECORDS	40	1 ROOM	PRIVATE	-1					-	storage located in private and semi-private locations	-	2	storage cabinets, shelving	eyes, ears
MECHANICAL ROOM														
WATER HEATING ROOMS	144	MULTIPLE ROOMS	SEMI-PRIVATE	-1					-	-	-	-	-	-
EXTERIOR SPACE														
OUTDOOR SPACE	SIZE - m ²	ROOM DIVISION	USERS		M-FUNCT	ADJACENCIES			EXPERIENTIAL GOALS	FUNCTION	THERAPY	OCCUPANCY	EQUIPMENT	SENSES
WATER COURTYARD	140	-	PUBLIC	G	*				threshold, outdoor, lightness, freshness	transition between urban city and sanctuary, secluded urban living room	-	all access/20 people	waterproof benches, outdoor furniture	body, eyes, ears
RIVER ACCESS	280	-	PUBLIC	G	*				threshold, outdoor, lightness, freshness	workout space, public access, recreational use	-	all access	waterproof benches, outdoor furniture	body, eyes, ears
THERAPEUTIC GARDEN	140	-	PUBLIC	G	*				threshold, outdoor, lightness, freshness	activity for concentration.	-	all access/20 people	vegetables, soil, gardening tools	body, eyes, ears
RIVER WALKWAYS	-	-	PUBLIC	G	*				threshold, outdoor, lightness, freshness	workout space, public access, recreational use	-	all access	waterproof furniture	body, eyes, ears
CHILDREN'S SPLASH GARDEN	313	-	SEMI-PUBLIC	G	*				threshold, outdoor, lightness, freshness	recreational and educational	-	30	waterproof surfaces and play objects	body, eyes, ears
MEDICINAL GARDEN	314	-	MA	G	*				threshold, outdoor, lightness, freshness	activity for concentration, possible food source	-	all access/20 people	vegetables, soil, gardening tools	body, eyes, ears
PURIFICATION + MISC.														
REED BEDS	825	VARIOUS	PUBLIC	G					connection to natural rhythms educational	purification	-	all access	vegetables, soil, water, and gardening tools.	body, eyes, ears
AIR WELLS	80	6 ROOMS x 12.5m ²	PUBLIC	1					connection to natural rhythms, educational	collection	-	all access	collection coils and tanks	body, ears, eyes
GROUND WELLS	80	6 ROOMS x 12.5m ²	PUBLIC	-1					connection to natural rythms educational	extraction	-	all access	pumps, collection troughs, pipework	body, ears, eyes
TOTAL AREAS	SIZE - m ²													
TOTAL EXTERIOR	1331													
TOTAL -1	348													
TOTAL GROUND	936													
TOTAL 1ST	152													
TOTAL INTERIOR	1436													

Figure 4.16. First iteration - accommodation schedule II. Author, 2016.

4.4 EXTERIOR SCHEDULE

4.4.1 WATER THERAPY SPACES

These spaces may integrate indigenous plant beds with water features and may enhance therapy activities (see Figure 4.16). Therapeutic effects of water in the landscape may be explored in a passive manner.

4.4.2 RIVER SPACES

Riparian zones are considered a part of the fifteen main terrestrial biomes (Mathur and Da Cunha, (2014:9). Riparian zones or riparian areas act as an interface between a river or stream and the ground terrain/land, as defined by Mathur and Da Cunha (2014:9). These areas include the communities of flora and fauna which exist along the margins and banks of rivers.

4.4.3 RAINWATER GARDEN

The main objective of rainwater garden layouts requires the provision for the categories of various pollutants and their tolerable levels for the duration of attenuation in a rain garden's filtration system as explained by Nigel Dunnett and Andy Clayden, (2007: 25). It is required to manage large

catchments of rainwater in the event of seasonal storms. This aspect is significant when a period of seasonal rain occurs briefly after a long dry season. The release of accumulated pollutants from the dry season need to be factored into the function and design of a rainwater garden (Dunnett and Clayden, 2007: 25). A rainwater garden is able to respond to a range of light, medium, and heavy climatic rainwater conditions, thus reducing the need for irrigation. Rain gardens are considered an integral part of a rainwater design strategy that is capable of accommodating surplus surface water runoff without overwhelming the public storm water system (Dunnett and Clayden, 2007: 25).

4.4.4 SERVICE ROOM

There should be sufficient space allocated to the maintenance of systematic water technologies. Spaces need to be allocated for heating rooms and the servicing of the pool pump equipment. Maintenance and service rooms are required for personnel to access maintenance operations and for the storage of the equipment required for these operations (Dunn, 2012:7).

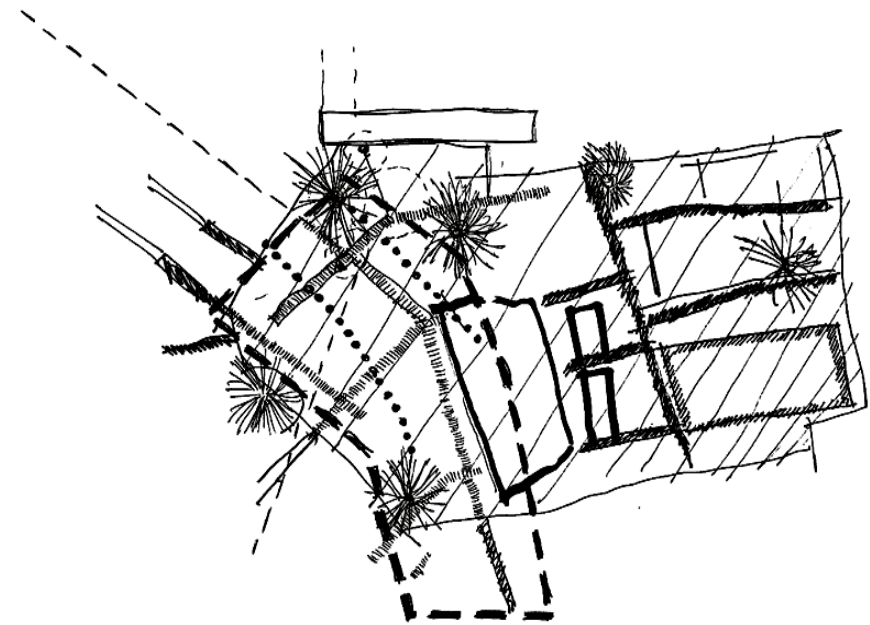
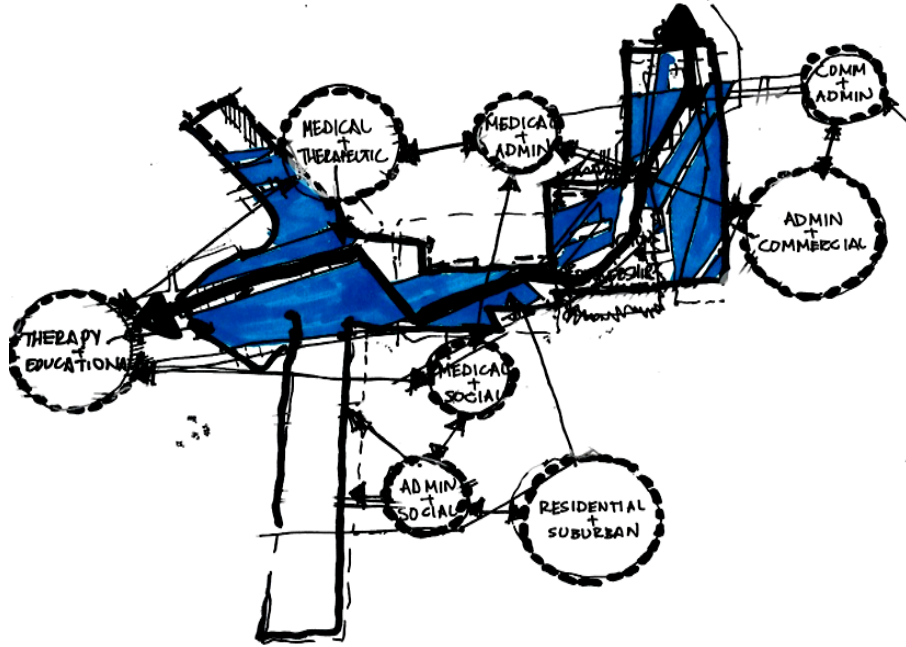


Figure 4.17. Diagram of feedback response coupled with hydrological qualities. Author, 2016.

Figure 4.18. Parti Diagram synthesising program spaces with site features. Author, 2016.

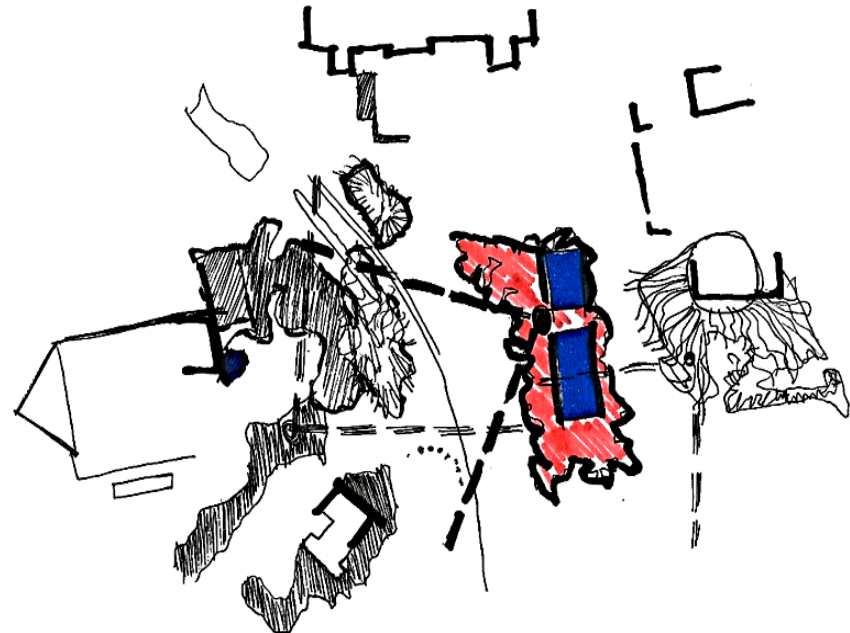
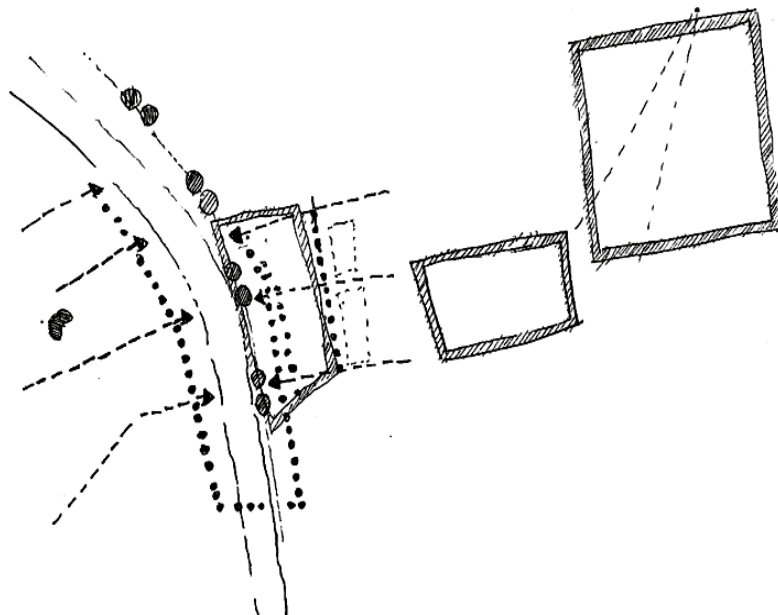


Figure 4.19. Parti Diagram synthesising river space with surrounding site. Author, 2016.

Figure 4.20. Parti Diagram of site vistas and experiences of natural site features. Author, 2016.

4.5 PROGRAM CONCLUSION

4.5.1 ARCHITECTURAL RESPONSE

A hydrotherapy orientated programme is proposed as a response to the disconnectedness and isolation of the institutions surrounding the site (see Figure 4.15). This approach makes a programmatic response possible that is able to interpret water in a spatial framework, as demonstrated by Dunn (2012:2). The building will serve as an urban retreat and connection point to help patients and staff during times of need. It is intended for general public use, making it accessible to all. These aims can be systematically incorporated into the proposed redevelopment of the area surrounding the Apies River (see Figures 4.17 and 4.18).

4.5.2 INTERIOR VS. EXTERIOR

The programme's main benefit is the synthesis created between water space, river space and outdoor therapy space Dunn (2012:2). The design incorporates a living water element to create a functional water therapy space. The exterior architecture will introduce the facility and its functions to patients and the general public as they approach the building. The design of the exterior will help to create (positive) initial expectations with regard to the facility. The scale of the

intervention should be considered, as well as how smaller private outdoor spaces relate to the overall intervention (see Figure 4.19).

4.5.3 URBAN REGENERATIVE RESPONSE

At present, Pretoria's inner-city vacuum, the Apies River's isolation from the urban condition, and the isolation of the medical district can all be considered to be negative conditions. However, these conditions provide the opportunity for the city to regenerate itself through the medium of water. The manipulation of natural geometries and features found on site and the experiential approach of the Apies River will enhance the user experience of the hydrotherapy centre that can potentially rejuvenate the city (see Figure 4.20).

The proposed hydrotherapy centre is seen as a place of exchange where interactions between natural and human systems can take place. The centre will become a positive response to the negative conditions mentioned above and will connect the currently disconnected systems (see Figure 4.21). The proposed intervention will synthesise the potential of the area and the opportunity to create a regenerative design response, thus rejuvenating the city.

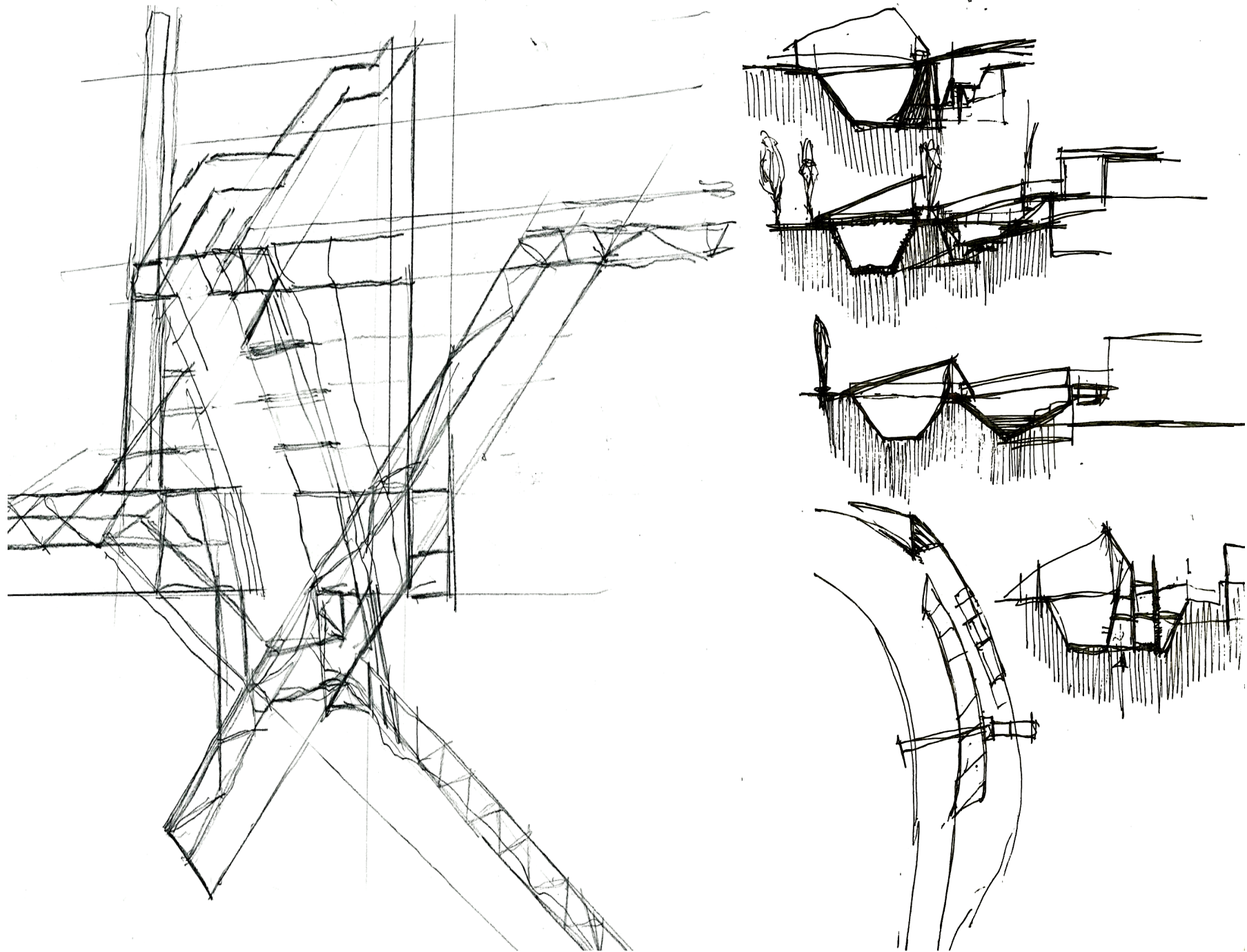


Figure 4.21. Draft Program Sketches and architectural translation, Author, 2016.