Chapter 5

Programme

5.1 Identifying the appropriate programme

5.1.1 Heritage and Legacy

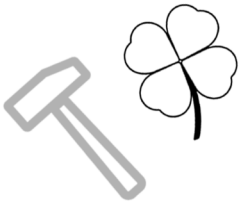
As a means to commemorate the heritage of the Gasworks and its identity as a pioneer in industry, it is fitting to propose an industry that seeks to continue and strengthen the genius loci of the site - albeit in a more ecologically sensitive direction. By proposing an ecologically sensitive industry, the site could become a place of learning, where comparisons can be drawn between old methods and new and lessons learned through that comparison.

As part of an urban vision containing four proposals, the commonality between schemes was determined to be that of production. The production of sustainable goods and foods in such a way that the heritage of the site is strengthened.

5.1.2 Restituting industry with ecology on the Gas Works site

It is imperative that the programme of the proposal assists in the remediation of the site itself. A means through which industry can be restituted with ecology is that industry itself becomes the restorer of its own damaging history. The Gas Works site bears testimony to damage brought about by industry, thus in the pursuit of identifying an adequate industry, the remediation of tar polluted soil had to be a consequence of the new industrial activity.

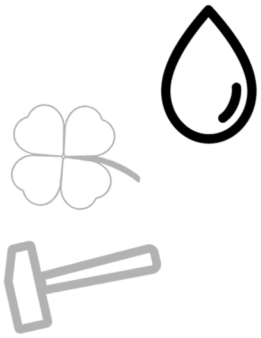
One of the means of this remedial action is the continuous introduction of compost and mineral rich soils into the site and therefore industries were considered which could have compost as an output of its processes.



5.1.3 The presence of water

When one understands the morphology of the site before and after the introduction of industry (see Figure 2 on page 11), it is apparent that the surface water, more specifically the tributary to the Braamfontein Spruit, is one the many ways in which the site was stripped of its ecological richness and potential by underground channelling. Since the re-introduction of water in the form of an exposed waterway is undertaken by a landscape architectural proposal for the same site dealing with purification methods and water circulation beyond the scope of this particular scheme, this project focuses on the potential of water for its meaning and practical implementation.

The associations made with water such as life, purity and ecological richness offer a powerful statement of purification in a scheme that seeks to remediate the legacy of polluting substances such as gas and tar. Since the particular intervention area served as the storage and purification of gas, it is appropriate that the proposal offers similar functions (purification and storage) of this life giving substance. After the importance of the presence of water within the scheme was established, the pursuit for an appropriate programme was focused on industries that were water dependant. In so doing, a meaningful connection between the landscape and the industry could be established in that both were dependant upon the same substance.

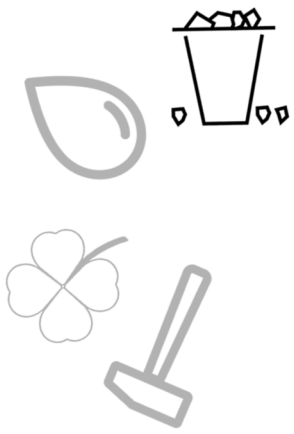


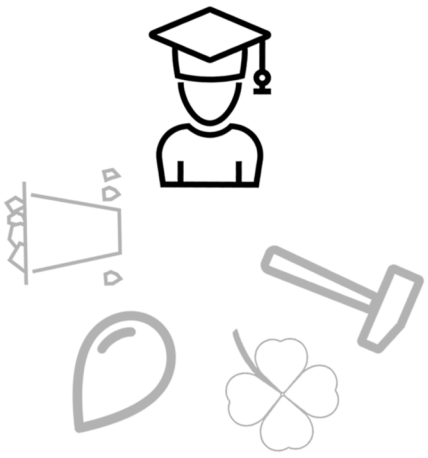
5.1.4 Promoting sustainable urbanism

In Lehman's book on sustainable urbanism, four of the fifteen principles were informative with regard to formulating the program of the scheme. Promoting these principles would also align the scheme with the vision proposed in the Johannesburg SDF for a sustainable future city. These four principles are local food and short supply chains; sustainable transport; landscape, gardens and urban biodiversity and lastly a zero-waste city (Lehmann 2012: 169). Therefore, the programme was expected to gather a waste material from a close proximity to the site and produce a product that would otherwise have been transported from a far location. The waste material identified was organic waste from the collection of restaurants and institutions in close proximity to the site. Campus restaurants of Wits University as well as the University of Johannesburg's catering school opposite the Gas Works site offered great potential for waste collection.

5.1.5 Connection with established networks

As part of the urban vision for the Gas Works site, the isolation of the site from its surrounding urban context had to be addressed by linking programs on the site with established networks in the city. With university and secondary school students being the largest demographic of the immediate surrounding area, it was established that the program required a public component such as a restaurant and recreational area that would assist in drawing students to the site. This restaurant would have to fill a gap within the network of campus restaurants in terms of their dietary provision and this gap was found to be a fresh, affordable source of protein.





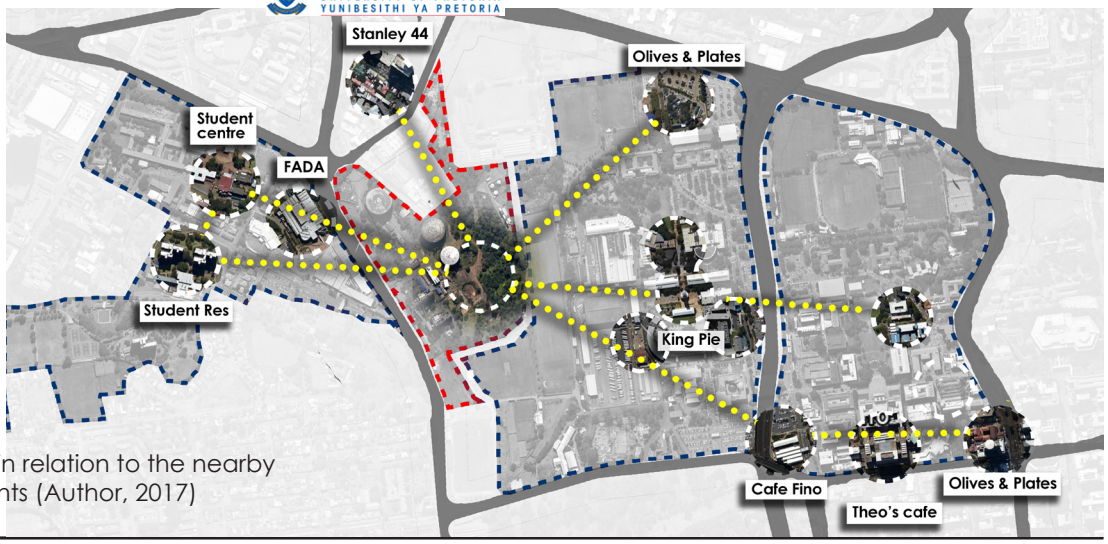
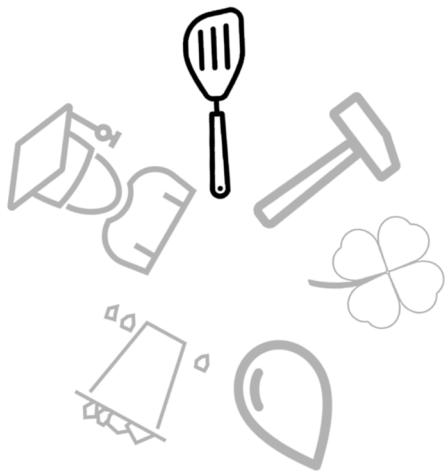


Figure 52 The Gas Works site in relation to the nearby campus and public restaurants (Author, 2017)

5.1.6 The Gas Works and cooking

As mentioned on page 17, a little known aspect of the Johannesburg Gasworks site is its connection with cooking. The Gasworks sought to promote the use of gas for cooking by offering cooking demonstrations on a collection of gas stoves in their showroom. This unique connection to the public collapsed when the Gasworks was decommissioned and is therefore one of the few intangible (unbuilt) aspects of the Gasworks heritage under threat. In the pursuit of a commemoration strategy that captures more than merely the built legacy of the Gasworks, it was decided that the connection with the restaurant network (see Figure 52) can be extended to include the actual processing of the raw product into the edible dish. Therefore, cooking and food preparation was found to be a credible means by which to draw the public and revive a dormant facet of the Gasworks identity.



5.1.7 Conclusion

In summary, the industry proposed for the intervention had to be a productive industry that produces compost, makes much of water, transforms waste, connects with the established network of campus restaurants and offers a product that enables cooking opportunities. Aquaculture satisfies part of these requirements if incorporated into other sub-systems. The incorporation of aquaculture also grapples with the global ecological issue of oceanic fish stocks and the local issue of sustainable food security.

One of the largest ecological issues today is the sustainable harvesting of oceanic fish stocks. Of the oceanic fish stocks surrounding Africa, 80-95% are exploited at or beyond their maximum sustainable yield. In 2015, of the 148 million tonnes of fish captured from the ocean and aquaculture facilities,15 million tonnes were processed as fish feed and fish oil. (WWF South Africa 2014)

Increased restrictions from environmental pressure groups, have given traditional fisheries very few ways to increase their supply and therefore, intensive aquaculture facilities must meet the growing demand that oceanic fish stocks can no longer sustainably provide. In addition to this, aquaculture facilities should be exploring alternatives to using oceanic fish for fish-feed. Inland aquaculture farming can reduce the carbon footprint involved in transporting fish products to users.

As mentioned in the Johannesburg SDF, water scarcity is a problem all urban centres in Africa have to solve. The recent drought in South Africa has emphasized how food security in this country is contingent on fresh water sources. Bovine farming requires up to 15000 litres of water per kilogram beef supplied (Water Footprint Network, 2017)

As freshwater is being depleted, the need for a sustainable agricultural industry to assist and perhaps incrementally replace the bovine industry is evident. Food security in urban sectors should be addressed by having local food providers in close proximity to urban centres since large supply chains from farm to plate also contribute to carbon emissions from transport vehicles as well as energy usage in maintaining a cold chain in the transport of meat.

Local intensive food suppliers should not have their provision contingent upon water resources. Aquaculture proves very water efficient since breeding tanks can circulate the same water body and only needs additional water to recompense evaporation losses

Site-specific restitution

The site's location offers tremendous educational possibilities for the surrounding school and universities. Showcasing an ecologically sensitive industry was prioritized.

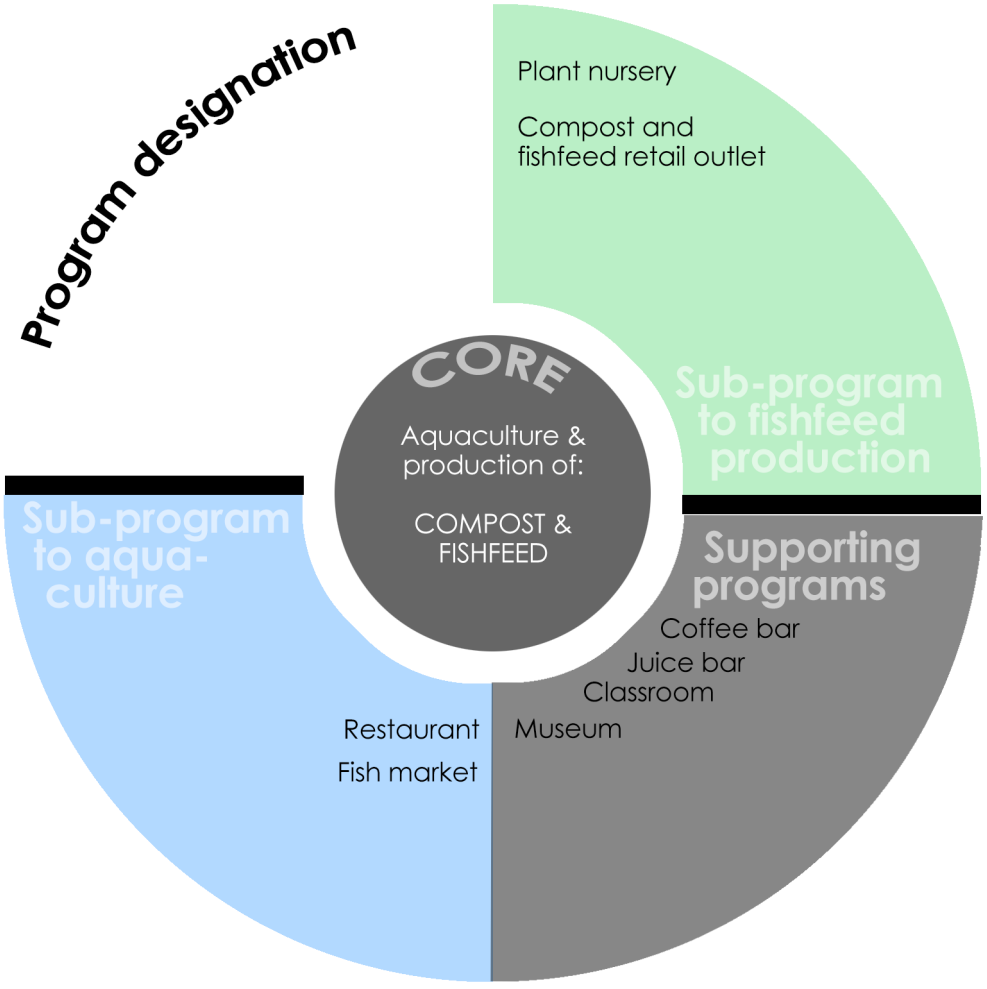
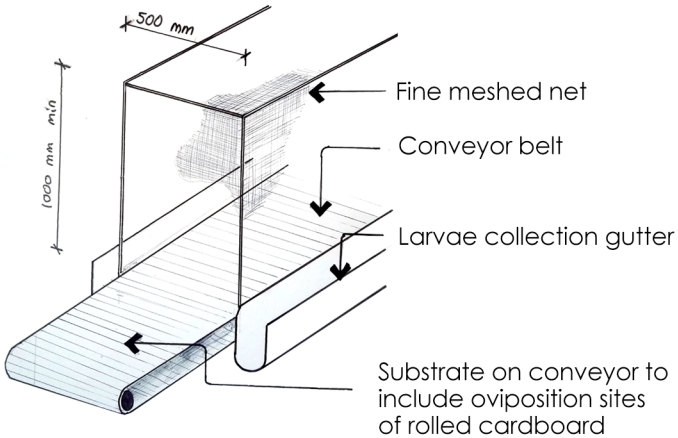


Figure 53 Program designation showing core, sub- and supporting functions (Author, 2017)

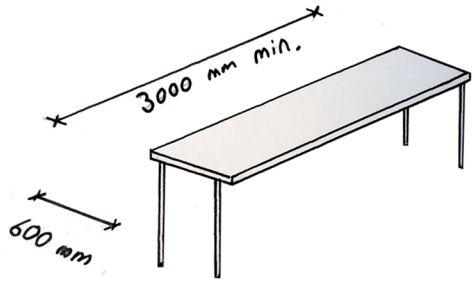
5.2 Magmeal - an innovative solution as precedent.

In light of the global and local issue pertaining to food security and fish feed mentioned above, a South African company, AgriProtein has launched a product called Magmeal which produces fish feed from maggots bred from black soldier fly eggs. Although finer details of the exact process is understandably confidential, the principles and their implementation in the intervention area was explored to discover to what extent this core industry could relate to and activate other functions.

Black soldier fly breeding



Egg harvest

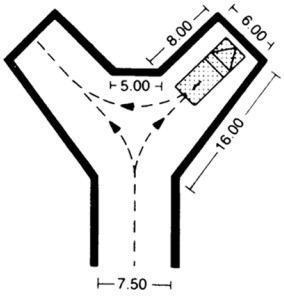


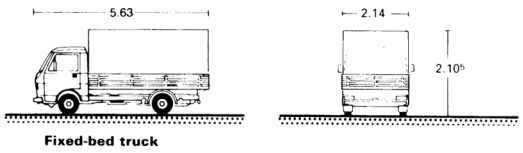
Sorted and carried by crate to compost production floor

The process starts with the intensive breeding of black soldier flies. After breeding in tall breeding cages, eggs are laid on rough surfaces (usually corrugated cardboard rolls can be used) and collected. In the proposal sketched above, newly hatched maggots can scurry towards the gutter on either side of the cages for easier collection by labourers. The eggs are then taken in crates towards the feeding troughs.

Waste collection

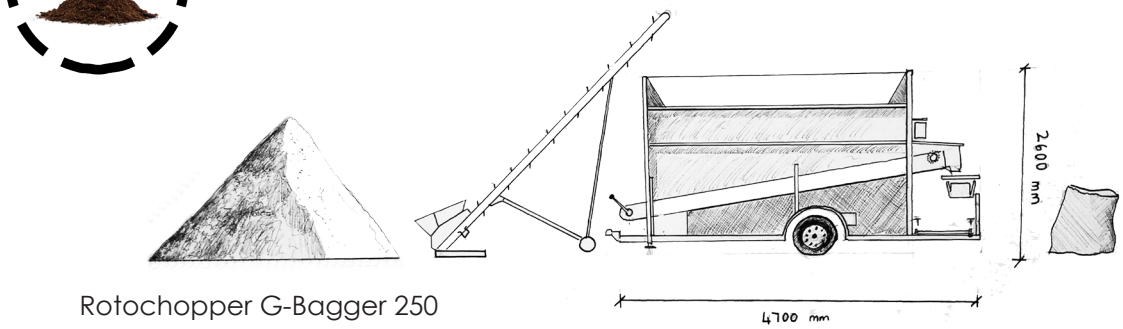
Organic waste, collected from the surrounding restaurants, is delivered via a fixed-bed truck at a waste collection area. This area would have to have sufficient space to facilitate the arrival and departure of the truck. Waste from elsewhere on site such as plant waste from the textile factory and plant based waste from the aromatic plant industry would also supplement the waste collected from elsewhere. A space for sorting the waste and only maintaining consumable waste would be required.





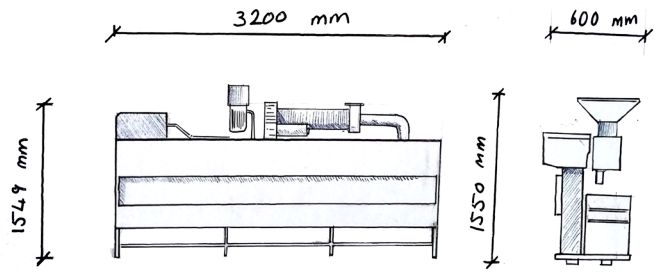
min 30m²

Compost processing



Rotochopper G-Bagger 250

Sorting the compost into bags will enable convenient transport into the park on smaller vehicles and will enable the product to be sold to the public. Similar to cooking, the Gasworks heritage has a unique connection to fertilizer since liquid Ammonia used to be provided freely to any citizen for use in their gardens. The Rotochopper G-bagger 250 was identified as a suitable machine because of its transportability and its relatively small scale.



Davron DTI-464 Tunnel drying oven

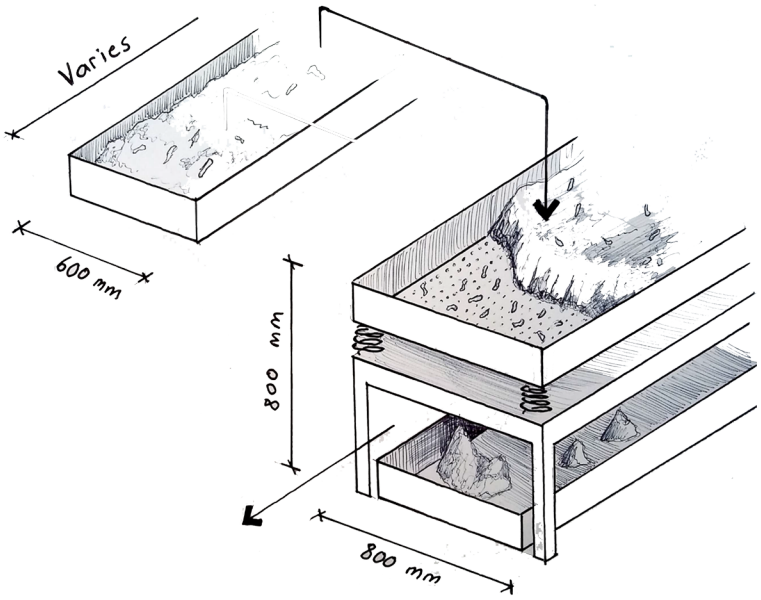
Toper TKS - 36D

Fishfeed production

Processing the live maggots into fish feed required two stages - baking and grinding. After the maggots have been baked until crispy, a grinder similar to a industrial coffee bean grinder is used to grind them into a powder. Grinding and bagging are both done by the same machine. The powder is then packaged and can be sold at a retail outlet or can be used in the aquaculture facility as a fish feed.

Compost production

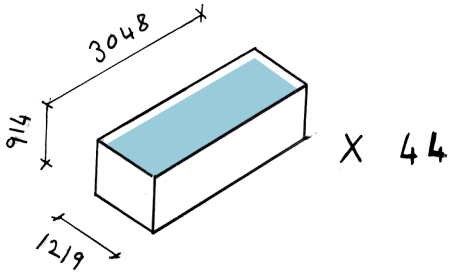
In a feeding trough, newly hatched maggots feed on the heaps of organic waste and over the course of 72 hours grow to their full size. As maggots devour the waste, the waste is broken down into maggot fecal matter and n nutrient rich compost. In this scheme, the separation of maggot and compost is realized by incorporating a vibrating table with a sieve. Compost is collected from below and live, full grown maggots too large to fall through the sieve get moved toward the fish feed production area.



Feed bed + vibrating feed bed

Aquaculture

Tilapia is a warm water fish breed that requires temperatures of between 20 to 21°C for breeding fish and between 18 and 30°C for fingerlings. Before harvesting (for dish preparation) Tilapia would have to be allowed 10-12 months to grow in temperatures of about 28C°. Therefore the calculations for the number of Tilapia tanks required, would have to take into account that there would have to be one year's worth of Tilapia ready for continual harvest.



*If the restaurant can seat 66 people seated daily
= 33 Tilapia prepared per day
= 167 Tilapia per week @ 800g per fish
= 134kg/week
= 6724 Tons/year

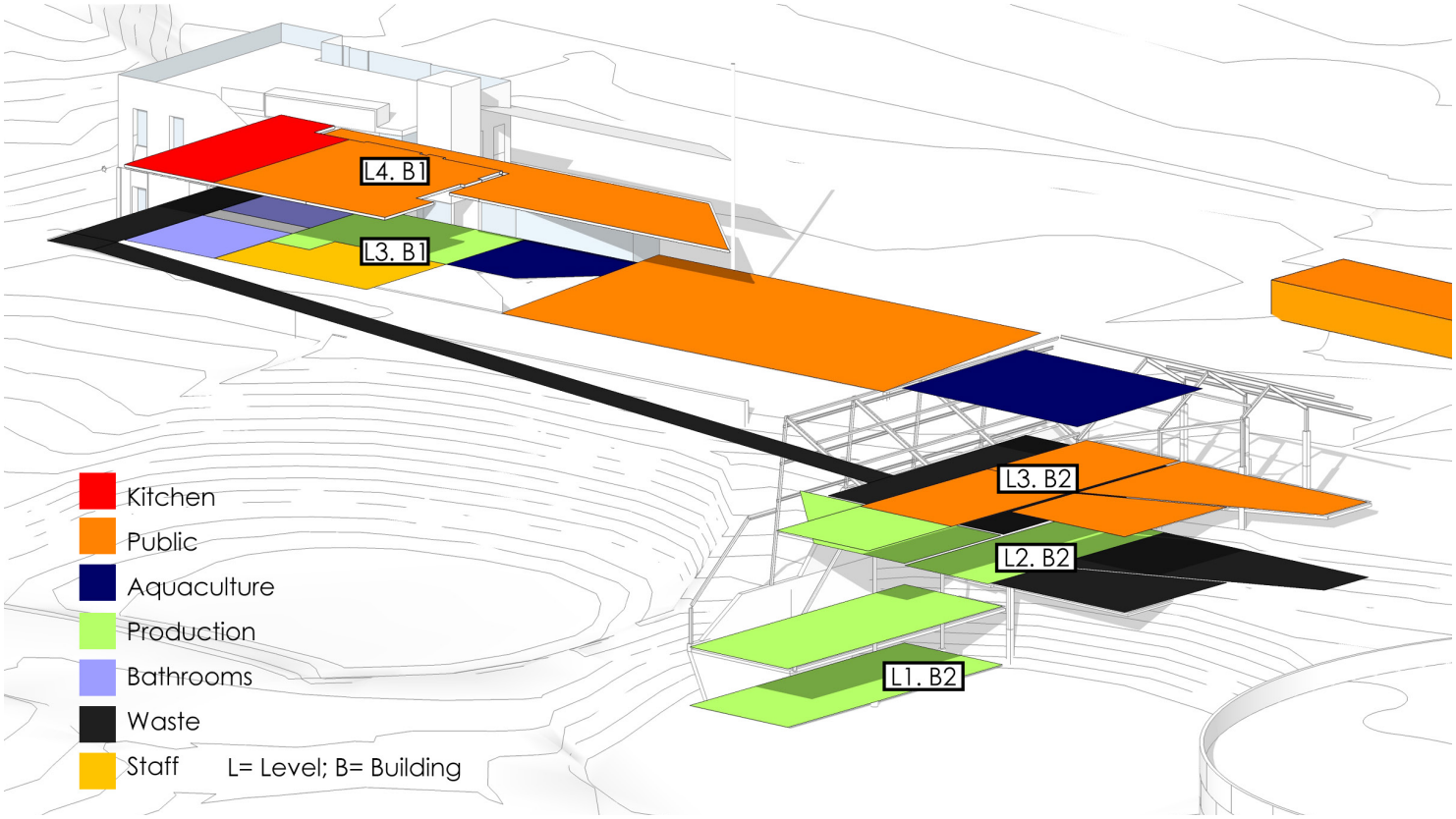
Full grown Tilapia have a yield of 45kg/m³ therefore
6724 Tons @ 45kg/m³
=149m³ of Tilapia filled water excluding fingerling tanks.

For space efficiency, the FBT rectangular tank by Hydro Composites or similar is considered. Dimensions are 3048x914x1219mm. Therefore,
if one tank has a volume of 3.4 m³, 44 tanks measuring 1,2x3m in plan would be required. Tanks need not be separated and larger built tanks of the same volume can also be used.

5.3 Programme areas schedule

Left: **Figure 54** Areas schedule (Author, 2017)

Right: **Figure 55** Area function allocation (Author, 2017)



In order to effectively activate the public space between the three buildings involved in the intervention, it was decided that each building should contribute to the public realm on it's square level. Therefore, after each required space was analyzed in terms of it's size, it's placement was determined by the contribution it could make to the public realm. Since waste sorting and maggot breeding give off offensive odours, it was clear that these spaces would have to be separated from the public realm by possibly being partially submerged.

Below: **Figure 56** Layout of programme on intervention area (Author, 2017)

5.4 Programme allocation