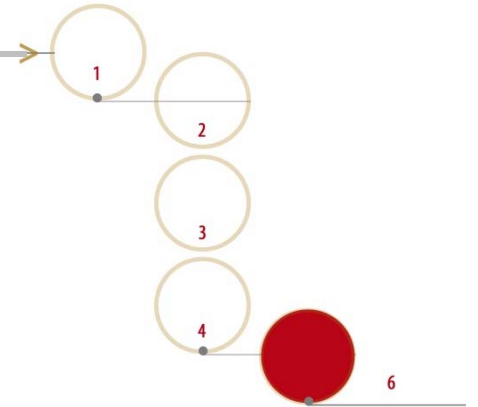


## CHAPTER 5

# TECHNICAL DEVELOPMENT



*“An honest use of materials, never making the material seem as that which it is not, is a good method. Materials must be used optimally, never using one material where another can do the job less expensively, more effectively, or both”*

Victor Papanek, Austrian designer and educator.

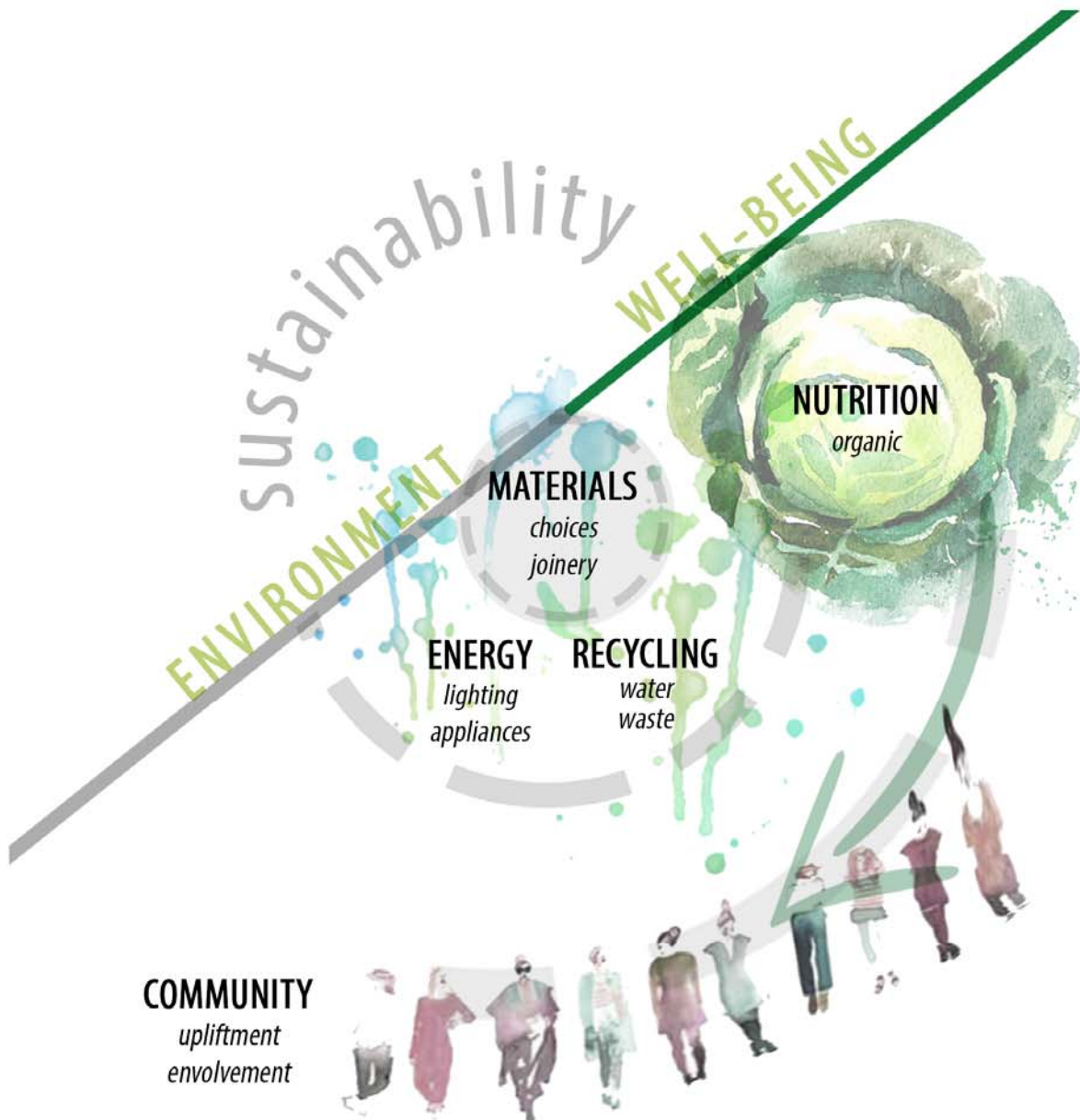
Chapter five develops the various identified design details and layouts for the interior environment of the proposed programme. The elements are detailed in terms of specifications, materiality, joinery and various sustainable considerations. The technical development will be divided into three groups namely: materiality, electric approach and various frameworks. Together with the material group, the focus will be placed on the identified interior areas namely, the seating configurations, the kitchen interface, the interaction platform and the infarm systems. The lighting strategies, calculations, waste operation and the community integration framework are also defined. In this chapter, the South African National Standards are also stipulated as requirements for the interior interventions and details adhere to. Technicalities are expressed with plan layout drawings, sections, details, diagrams and photographs of prototypes.

## 5.1

### TECHNICAL APPROACH

Three aspects for technical development are identified within the categories of the design details (*diagram 4.7*). All of these design interventions will be based on principles of sustainability.

An illustration summarizes the interior interventions' approach to sustainability (*diagram 5.1.1*). It has become evident that the materiality of the interior plays an important role within the technical focus of the programme. Systems of energy consumption and recycling are also recognised.



*Diagram 5.1.1: Aspects of sustainability for the proposed programme*

The technical focus is primarily placed on the material choices and joinery (*as referred to in 4.6*). Further technical development is placed on the electric approach and individual frameworks. An outline of the technical development is compiled (*diagram 5.1.3*).

The specifications of the materials and the electric approach are defined with icons (*diagram 5.1.2*), representing the assessment, considerations and principles of sustainability.

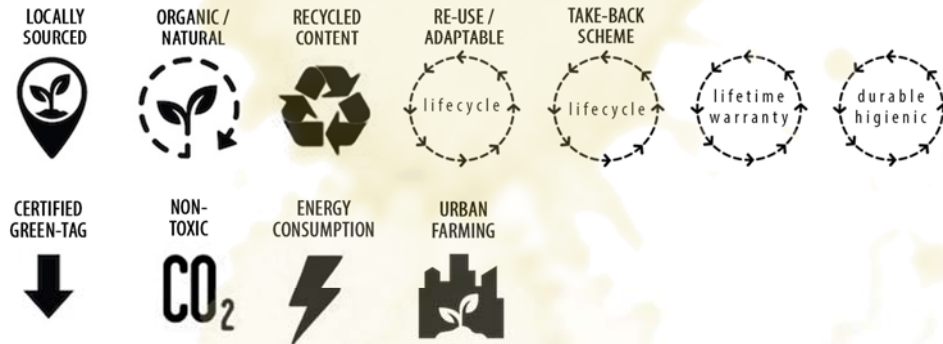


Diagram 5.1.2: Icons for material and electric specifications

## TECHNICAL FOCUS

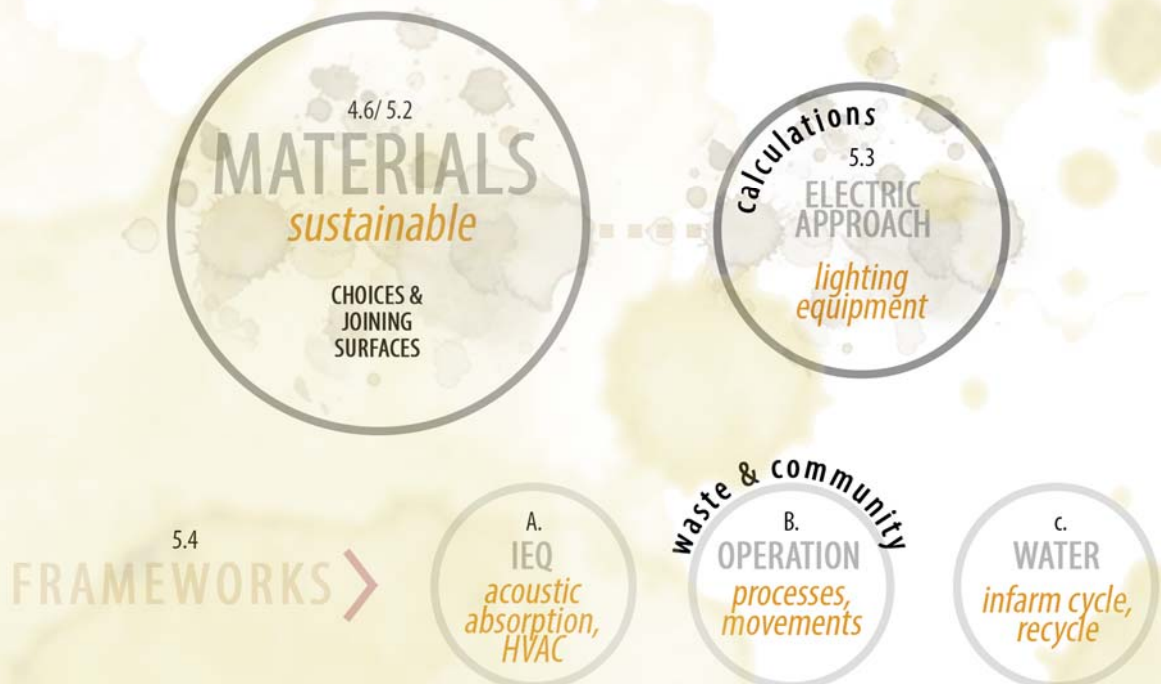


Diagram 5.1.3: Outline of the technical focus

## 5.2

### MATERIALS

---

Sustainable materials choices and surfaces are defined within the general layout plan (*figure 5.2.1 with reference to table 5.2.1*). The materials selection proposes both solid and transparent materials, in order to reveal the processes of the various elements and interfaces. A combination of materials is specified such as wood, Xanita x-board and cork in contrast with various steel metal elements. It is also important to consider and portray the lifecycles of the materials by means of its aging and patina. In conclusion, the various textures will contribute towards the sensory exploration of the user interactions.

The experience of the restaurant is expressed with a sequence of views. Within the views, details are identified and developed within the following categories:

- Urban façade (*figure 5.2.2*)
- Kitchen interface (*figures 5.2.3 & 5.2.3.1 & 5.2.3.2*)
- Infarm systems (*figures 5.2.4 & 5.2.4.1*)
- Interaction platform (*figures 5.2.5 & 5.2.5.1*)
- Seating configurations (*figures 5.2.6 & 5.2.6.1 & 5.2.6.2*)

The general layout implemented the following standards:

#### 1. GENERAL REQUIREMENTS

- The electrical works, plumbing and drainage installations require registered workmen.
- The aluminium floor strip details and joinery details require trained artisans.
- Shop drawings must be provided for the various floor and joinery details.

#### 2. CIRCULATION

Accessible doorways and passage requires a clear opening width of 750mm, recommended to be 800mm (SANS Part S, 2011: 11). All the circulation routes, doorways and distances between interior elements will have a minimum width of 900mm. The floor is flush without level differences or obstructions (SANS Part S, 2011: 14-15). It furthermore meets the requirements of inclusivity with unisex ablution facilities including a disabled bathroom. The surface articulations, such as the proposed strip detail (*refer to diagram 5.2.1*) will act as wayfinding devices between the various thresholds. The installation adheres to SANS 10109-2 - *Concrete floors – Part 2: Finishes to concrete floors*.

#### 3. WALLS AND PANELS

The existing shopfront doors will be adapted to sliding doors. A new urban interface with branded and moveable glass panels are proposed to make the intervention apparent for the approaching users. The newly constructed internal walls comply with requirements (SANS Part K, 2011: 21-22 & 46). It adheres to SANS 2001 - *Construction works – Part CM1: Masonry walling*. The following specifications are required for single leaf masonry walls (nominal thickness of 140mm), built from hollow units:

- Freestanding walls: maximum 1.2m height
- Supported on one vertical side: 2.5m length and 4.3m height
- Supported on both sides: 8m length and 4.6m height
- Drywall: nominal thickness of 90mm, 4.5m length and 3.4m height

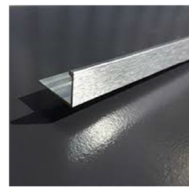
#### 4. FIRE

The existing and new fire installations will be tested and approved by a competent person. A fire protection plan will clearly indicate the escape route, doors and equipment. The programme will make use of the existing fire installations and automatic sprinkler system together with a newly proposed centrally placed fire extinguisher in the kitchen interface.

# MATERIALS



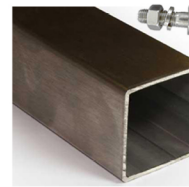
Concrete cement screed, polished finish (spec by: Floorcote)



2500mm x 15mm Aluminium strip, floor finish as wayfinding device, routed into existing concrete screed



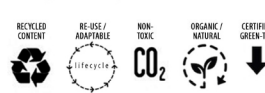
Float / Laminated Safety Glass used at seating as edging (float), infarm hydroponics water tank & kitchen interface screen (laminated)



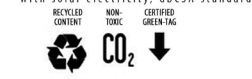
Mild Steel as structural elements (galvanized vs. exposed patina) square tubing & flatbar GMS nuts, bolts, washers (joining)



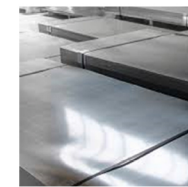
Xanita, x-board as core structure, 1220mm x 2440mm x 16mm (standard size) (spec by distributor: Antalis South Africa)



Wood vinyl boards, 78mm x 1244,6mm x 4mm Range: Arlington, Colour: Sugarberry (spec by: Belgotex Flooring)



Cork wall tiles, 300mm x 300mm x 6mm, strand, varnished (spec by: Corksribas)



Stainless Steel worktop, 1600mm x 600mm x 3mm sheet, polished



Caeserstone quartz worktop, 1600mm x 600mm x 40mm x 20mm, Series: Supernatural Colour: S211 Noble Grey



## FINISHES LEDGEND

1 Aluminium strips floor finish form a pattern for wayfinding (refer to floor finishes detail 1)

2 Dark red painted wall, colour: fire crackler, code: 95R8 07/271 (spec by: Dulux) (refer to section A)

Green painted duct & freestanding concrete column in waste area, colour: INDIAN IVY 3 code: 89Y 38/628 (spec by: Dulux) (refer to ceiling & lighting layout)

NOTE Rest of the wall surfaces: Painted white, matt, low VOC. Brand: Dulux trade ECOSURE (spec by: Dulux)

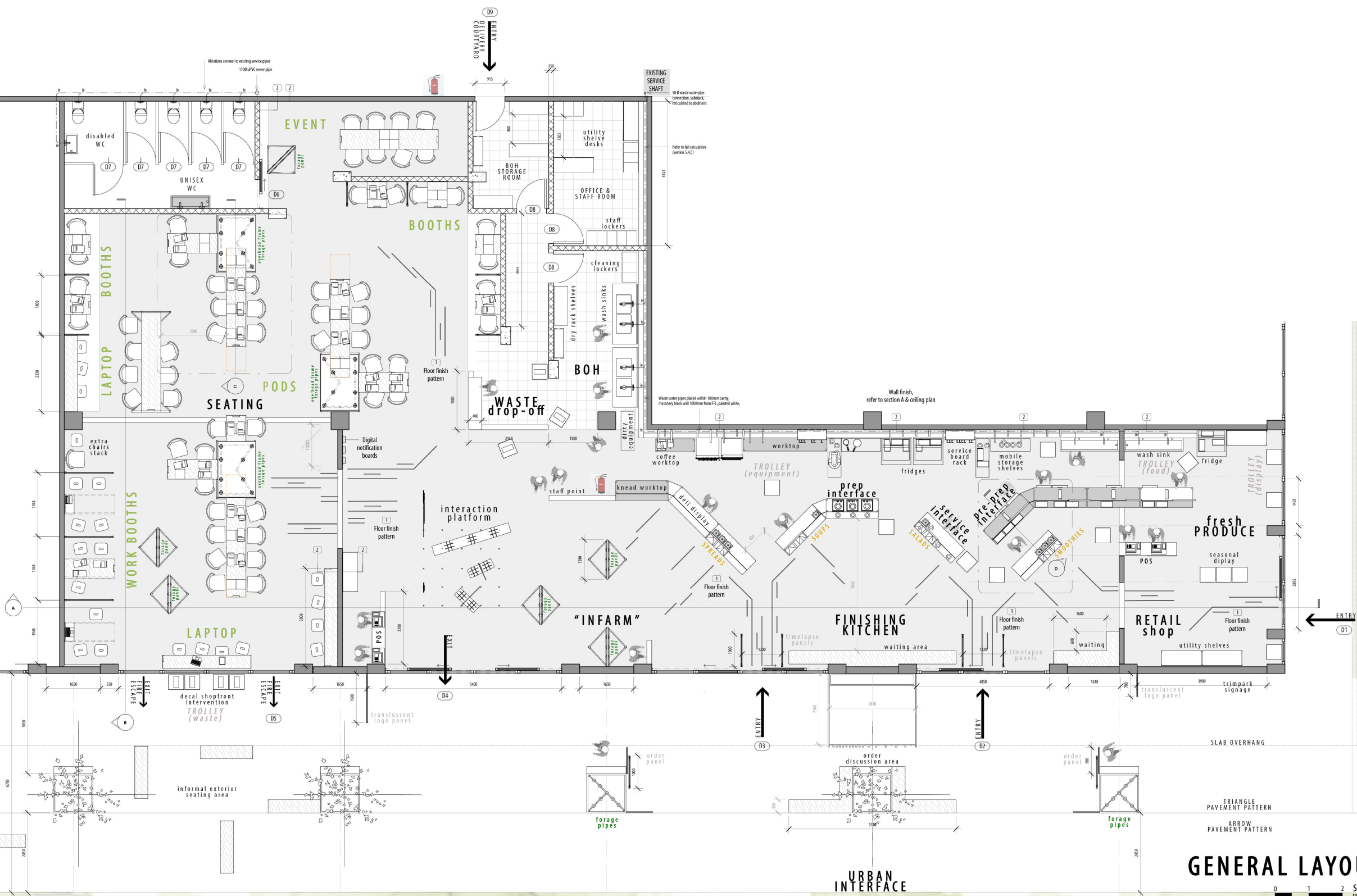
## DOORS & ACCESS

- D1 ACCESS/ENTRY DOORS Sliding steel shopfront doors, manually operated (also fire escape doors)
- D2 EXIT DOORS Sliding steel shopfront doors, mechanical opening system
- D3 FIRE ESCAPE EXIT DOORS used only for exit during fire
- D4 ABLUTIONS Glass sliding door, mechanical opening system
- D5 Standard woodframe doors
- D6 BOH Standard woodframe doors
- D7 ACCESS: DELIVERIES COURTYARD Existing steel frame door

## FIRE

The existing and new fire installations will be tested and approved by a competent person. Fire protection plan: will indicate the escape routes, doors and equipment.

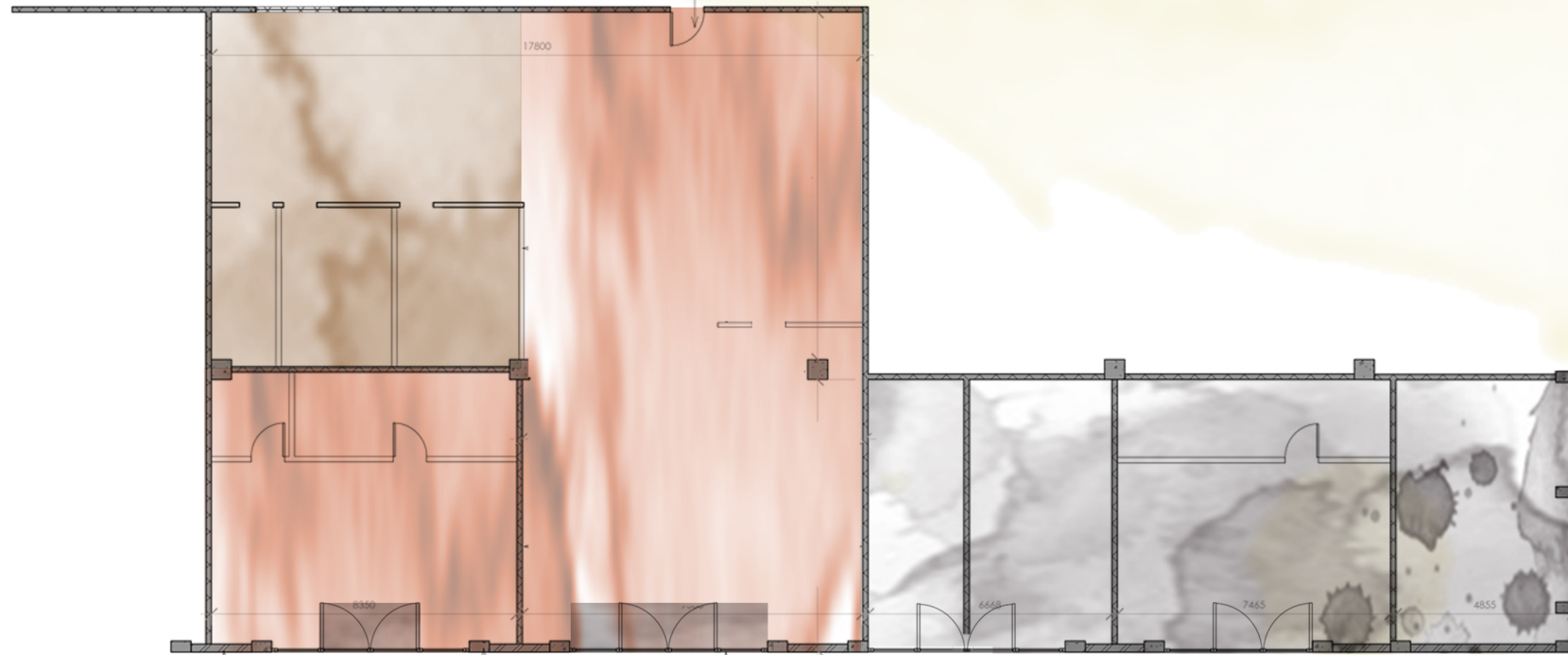
The programme will make use of the existing fire installations and its automatic sprinkler system together with a new proposed centrally placed fire extinguisher in the kitchen interface.



## GENERAL LAYOUT

0 1 2 scale meters

Existing floor finishes will be partially removed and re-used as indicated.



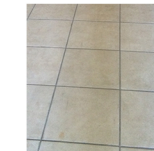
EXISTING FINISHES

FLOOR FINISH LEGEND

image



430mm x 173mm  
Wood-look tile  
(specification unknown)

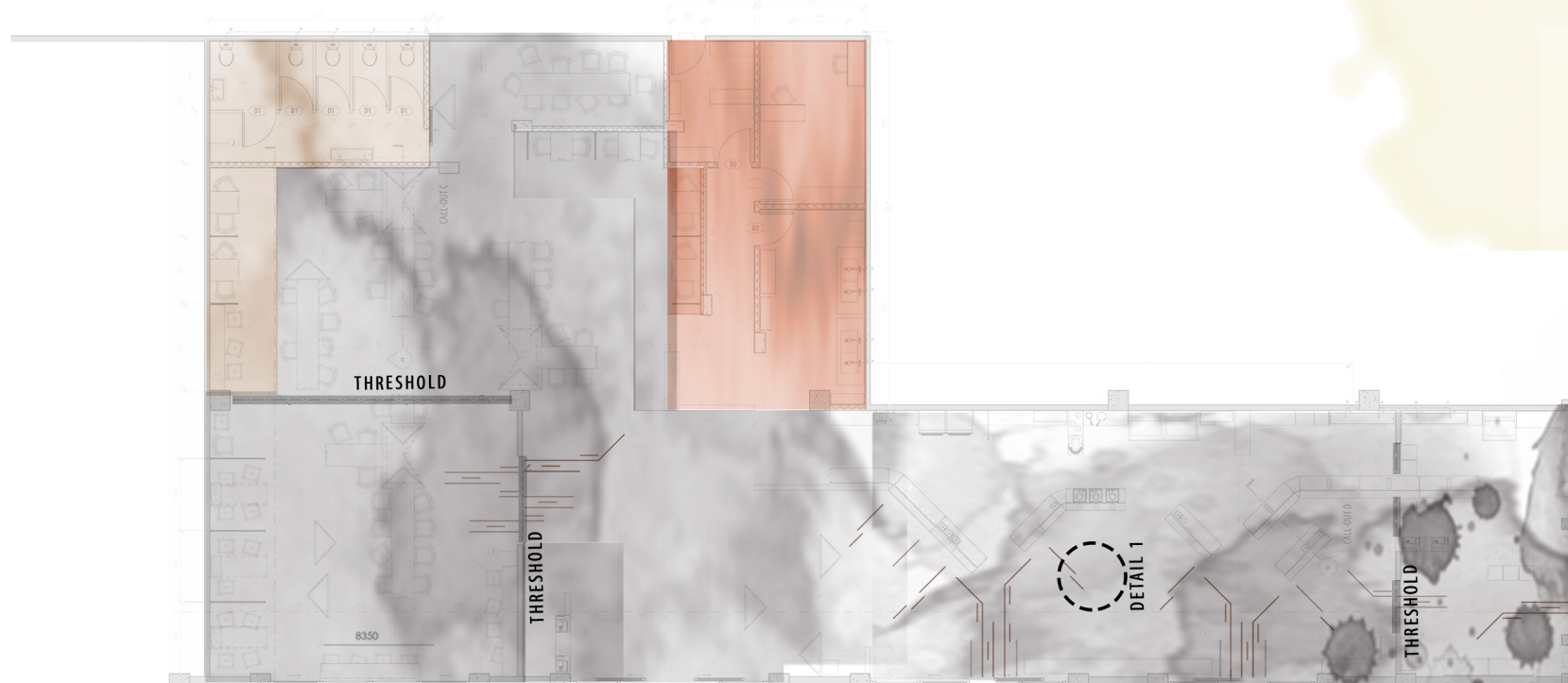


300mm x 300mm  
Floor tile, off white  
(specification unknown)

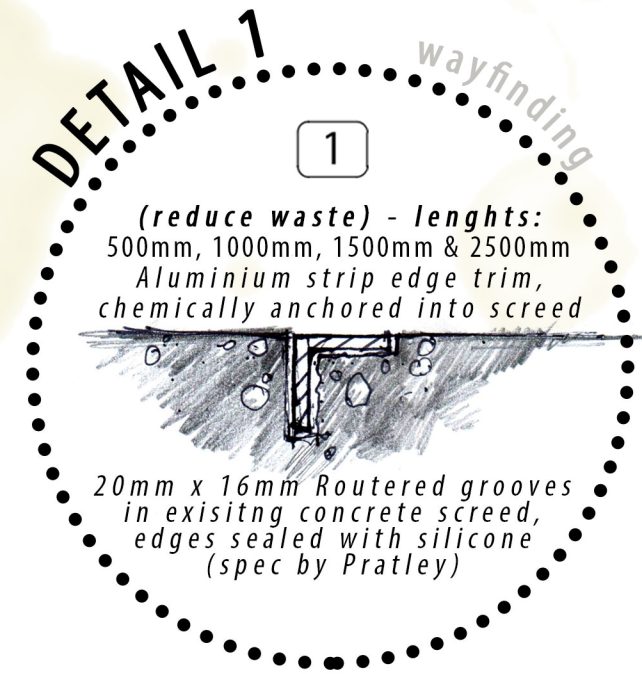


Concrete screed,  
painted/treated in areas

NEW:  
Aluminium strips (*detail 1*).  
Removed interior walls: form thresholds.



NEW LAYOUT



scale  
meters

FURNITURE SCHEDULE

VIEWS		SPECIFICATION	SUSTAINABLE ATTRIBUTE	IMAGE
PLAN	ELEVATION			
		<b>Tolix dining chair</b> 450 x 520 x 500, powdercoated steel, white	TAKE-BACK SCHEME RECYCLED CONTENT	
		<b>Tolix barstool</b> 430 x 430 x 760, powdercoated steel, white	TAKE-BACK SCHEME RECYCLED CONTENT	
		<b>Utility Shelving</b> 1220 x 458 x 2135, powdercoated steel, grey, 3 shelves (870, 1670, 2070 from FFL) Used for the display of dry ingredients or products to purchase. Also used as worktop and shelving within the office.	RECYCLED CONTENT craftmanship	
		<b>Mobile Storage Shelf</b> 1200 x 400 x 1600, Stainless Steel structure with castor wheels, 4 shelves Used for the storage/display of dry ingredients, crockery, equipment and fresh produce bins	RECYCLED CONTENT MULTI-FUNCTIONAL	
		<b>Plate rack display cabinet</b> 915 x 305 x 762, Wallmounted, Galvanized Mild Steel, powdercoated, grey Used for the storage of the service boards	RECYCLED CONTENT	
		<b>Lockers</b> 915 x 455 x 1830, Galvanized Mild Steel, powdercoated, white (locker size: 280 x 455 x 855/1800) Used for the storage of cleaning equipment or valueables of the staff	RECYCLED CONTENT generic	
		<b>Point of Sales system</b> iPad screen system, money till and separate card machine		
		<b>Service board</b> 400 x 200 Plywood bespoke board with demarcating panels and cork surface, staple joints.  <b>Packaging:</b> Menu, Away-bag & Seeds packet Brown paper, sewing thread joints.	LOCALLY SOURCED ORGANIC/NATURAL RECYCLED CONTENT handcrafted community upliftment URBAN FARMING	
		<b>Crockery (spec by: Wonki Ware)</b> <b>WHITE GLAZE:</b> white-beach sand: Organic pudding bowl, 15cm x 6cm Wonki pudding bowl, 18cm x 5cm <b>GREY GLAZE, plain:</b> Organic soup bowl, 17.5cm x 6.5cm Medium salad bowl, 30cm x 6.5cm Small Etosha, 18.5cm x 3.5cm, white - cake lace Salt bowl, dish stone Squat Mug, thin stripe-charcoal	LOCALLY SOURCED ORGANIC/NATURAL RECYCLED CONTENT	
		<b>Casserol</b> 240mm x 120mm, cast iron pot, enamel coating; red (exterior) & cream (interior), domed glass-lid, steel rimmed 4.7 Liters, light weight Code: CICA024 (spec by: Snappy Chef)	RE-USE lifetime warranty	
		<b>Knife set</b> Stainless Steel, magnetic stand, 6 piece. Code: SK5005 (spec by: Snappy Chef)	RE-USE NON-TOXIC lifetime warranty CO <sub>2</sub>	
		<b>Trolley</b> 460 x 460 x 860 generic size: 32 x 32 Galvanized Mild Steel square tubing frame welded onto GMS base plate, on castor wheels 1. DISPLAY: 20mm Ceaserstone worktop 2. STORAGE: Worktop with stainless steel rack and side edge strips for holding bins 3. WASTE: 3 glass sides form a frame with perspex inner bin, cut-out in ceaserstone		
		<b>Bin</b> 360 x 180 x 200 container bin, 3mm Stainless Steel, brushed. One side is a 6mm toughened glass panel, crystal glass silicone joint.	RECYCLED CONTENT	

FITTINGS SCHEDULE

VIEWS		SPECIFICATION	SUSTAINABLE ATTRIBUTE	IMAGE
PLAN	ELEVATION			
		1830 x 762 Commercial clean-up sink, Stainless Steel, 2 bowls (915 from FFL)  Sink mixer tap with pull-out rinsing spray, single-lever, starlight finish. Code: K7_32 950 000 (spec by: Grohe)	adjustable flow rate limiter	
		Sensor pillar tap, surface mounted, chrome finish. Code: EL-JOE (spec by: Cobra South Africa)  600mm/1200mm Washtrough, Stainless Steel, wallmounted 850 from FFL. (spec by: Franke)	Low flow rate: 6 L/min durable hygienic CERTIFIED ISO RECYCLED CONTENT	
		Sensor spout tap, wall mounted 200 from FFL, pre-blended temperature, solenoid valve. Code: EL-3002 (spec by: Cobra South Africa)  1800 x 480 x 170 Washtrough, Miranit (composite granite), wallmounted 850 from FFL, colour: Alpine white. Code: SOLX1800 (spec by: Franke)	Low flow rate: 6 L/min CERTIFIED ISO durable hygienic 80% natural minerals (calcium carbonate & quartz) 20% unsaturated polyester resin	
		360 x 500 x 455 Stainless Steel WC pan, floor standing and wallmounted, satin finish. Concealed dual flushing system with white seat.  Code: CMPX597W (spec by: Franke)	Low flow rate: 4 L/min RECYCLED CONTENT	

EQUIPMENT SCHEDULE

Primarily considered energy consumption:

VIEWS		SPECIFICATION	WATT	SUSTAINABLE ATTRIBUTE	IMAGE
PLAN	ELEVATION				
		<b>Display fridge</b> 524mm x 450mm x 1083mm, 2°C-10°C R134a gas & electric temp control, 120L capacity, 4 adjustable shelves, magnetic seal double glaze windows Code: CDF2000 (spec by: Salvador) (supplier: BBRW catering equipment Jhb)	0.48kW 230V	ENERGY CONSUMPTION GAS	
		<b>Combi Steam Gas Oven</b> 900mm x 770mm x 880mm, 0-280°C, 7 trays (70mm spacing) Code: COP9207 (spec by: Magellano, Piron) (distributor: BCE Johannesburg)	0.8-16.5 V/kW	ENERGY CONSUMPTION GAS	
		<b>High speed blender</b> Capacity: 710ml/532ml, BPA free plastic, Accessible replacement: Extractor Blade/ Milling blade compact & efficient, easy clean (spec by: Nutribullet)	600W	RE-USE/ADAPTABLE NON-TOXIC lifetime warranty CO <sub>2</sub> RECYCLED CONTENT	
		<b>Induction stove</b> 405mm x 340mm x 80mm, tempered black crystal-glass top Code: SCS002 (spec by: Snappy Chef)	0.2-2kW	ENERGY CONSUMPTION instant heat	
		<b>Coffee Machine Bravoril</b> 205mm x 340mm x 430mm, regulating hot plate and 2 glass jugs 1.7L in 5 min Code: CMB0001 (spec by: Nova) (distributor: BCE Johannesburg)	2.1kW	ENERGY CONSUMPTION RECYCLED CONTENT compost used content	

SCHEDULES

Table 5.2.1:



SECTION A  
1:50



SECTION E  
1:50

Figure 5.2.2:

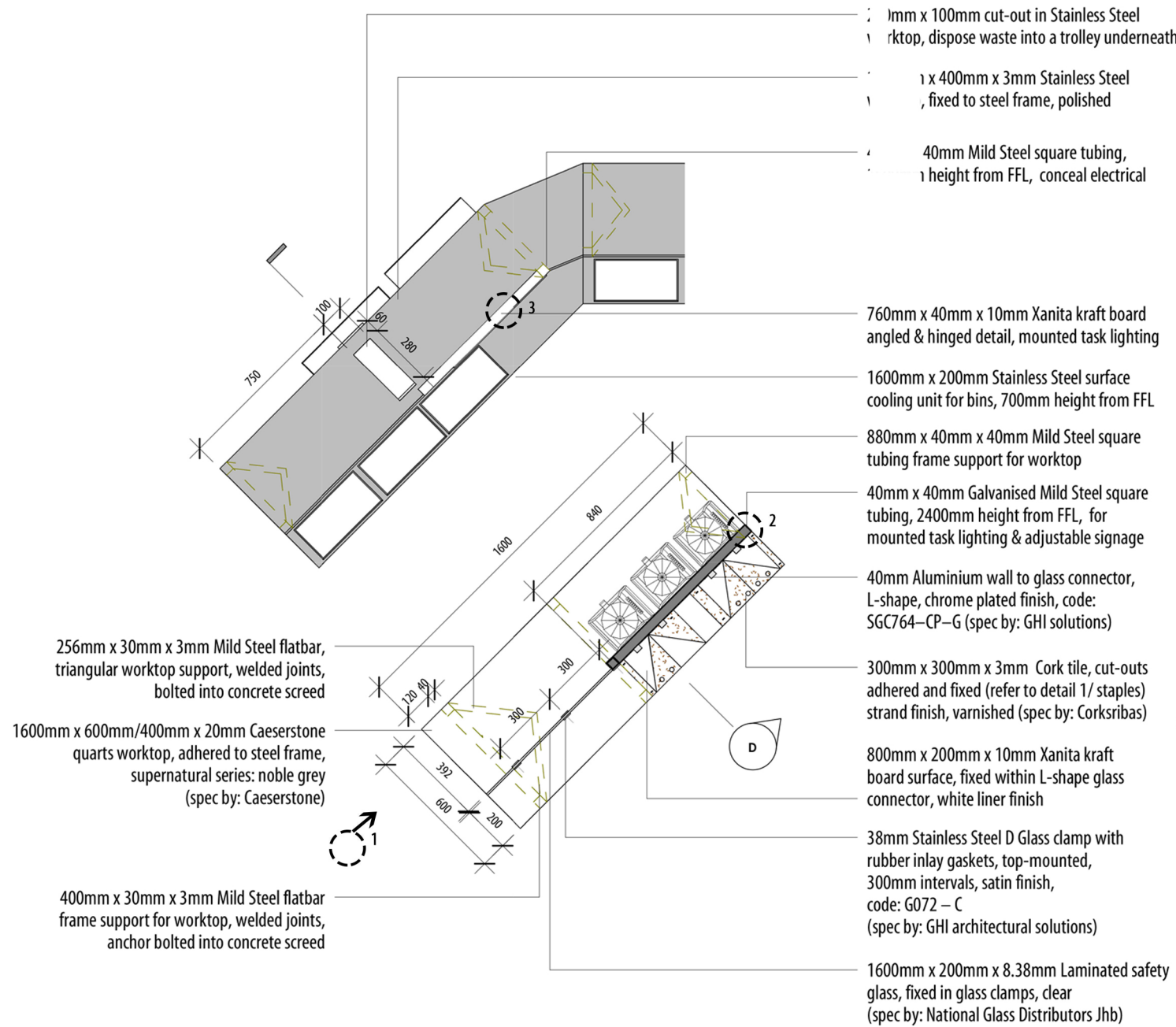
Beacon road



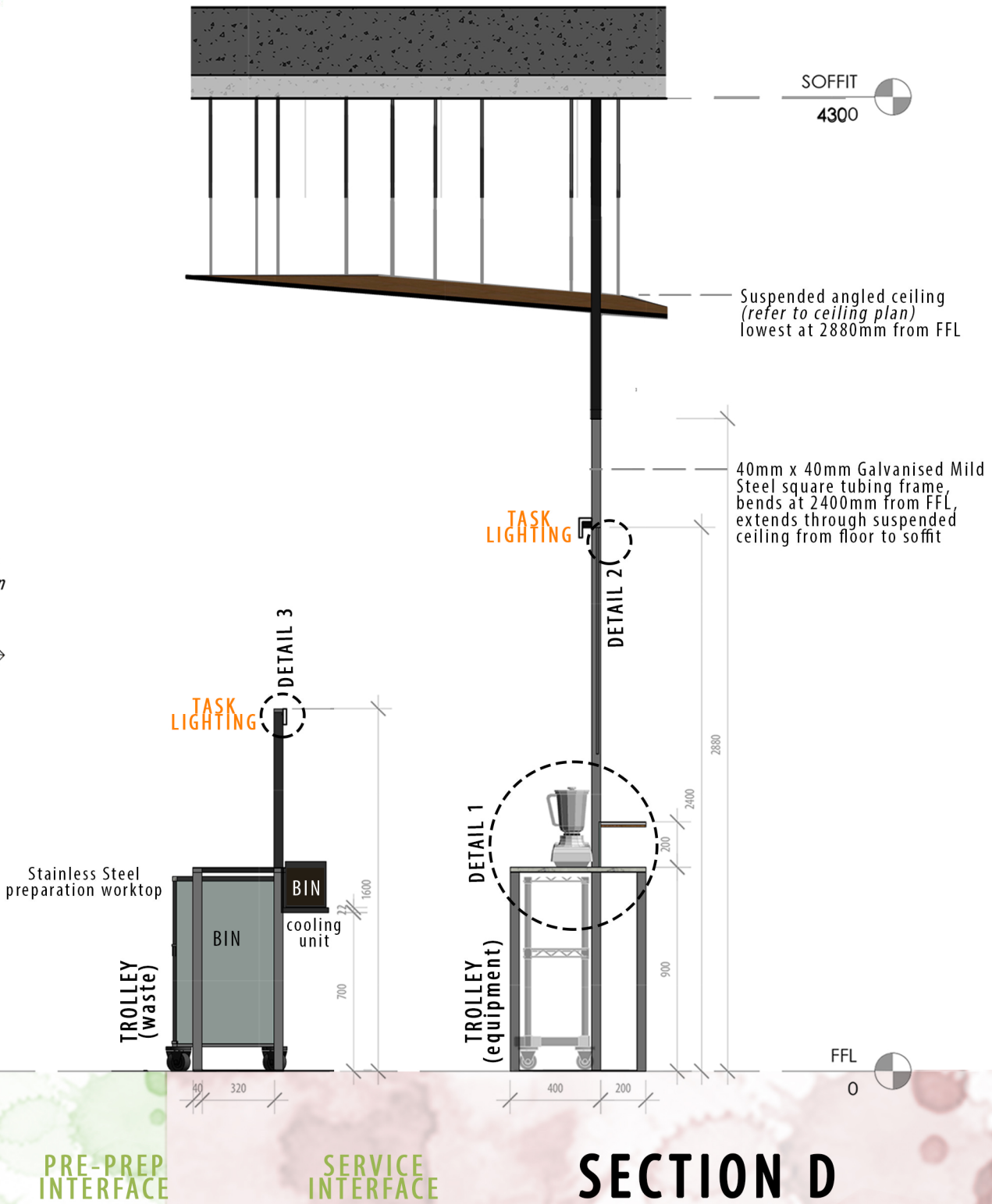


KITCHEN INTERFACE

Figure 5.2.3:



## CALL-OUT D

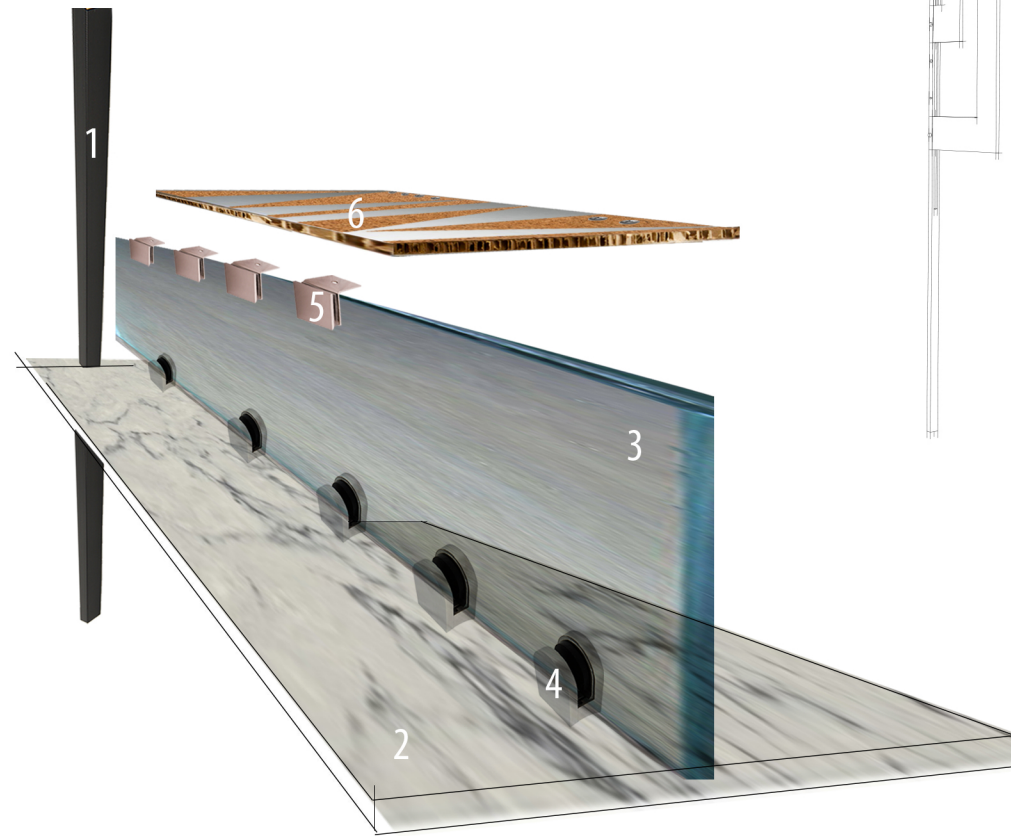


An adaptable and simplistic design is required to extend the function and lifecycle of the kitchen worktop. The interface materiality and joinery articulations (*detail 1*) will demarcate and emphasize the processes of eating, from its preparation and ingredients through to the finishing and waste accumulation.

An adaptable signage panel are proposed to demarcate the various kitchen stations (*detail 2*). The task lighting and its fixing within the preparation interface on a hinging frame will also be explored with a prototype (*detail 3*). The trolley & bin system are moveable elements within the areas of the interface, for the storage of organic produce, cutlery or equipment.

Figure 5.2.3.1:

## DETAIL 1 materials & joinery

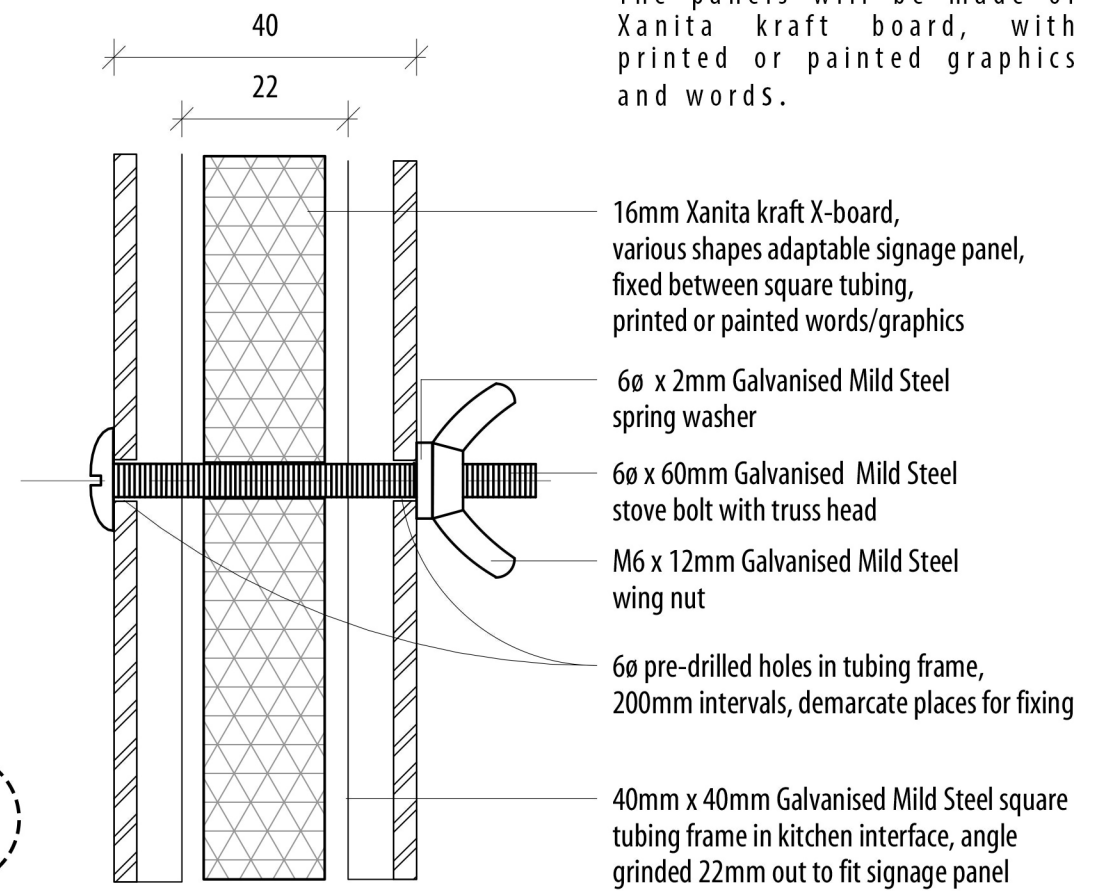


1. Galvanised Mild Steel square tubing frame
2. Caeserstone worktop
3. Laminated glass
4. D-shape glass clamp with rubber inlay gaskets
5. Wall to glass L-shape connector
6. Xanita kraft board surface, with fixed cork tile cut-outs



scale  
1:1

## DETAIL 2



Adaptable signage panels, differentiated in various shapes which will be temporarily fixed within the pre-drilled holes in Galvanised Mild Steel frame structure.

The panels will be made of Xanita kraft board, with printed or painted graphics and words.

16mm Xanita kraft X-board, various shapes adaptable signage panel, fixed between square tubing, printed or painted words/graphics

60 x 2mm Galvanised Mild Steel spring washer

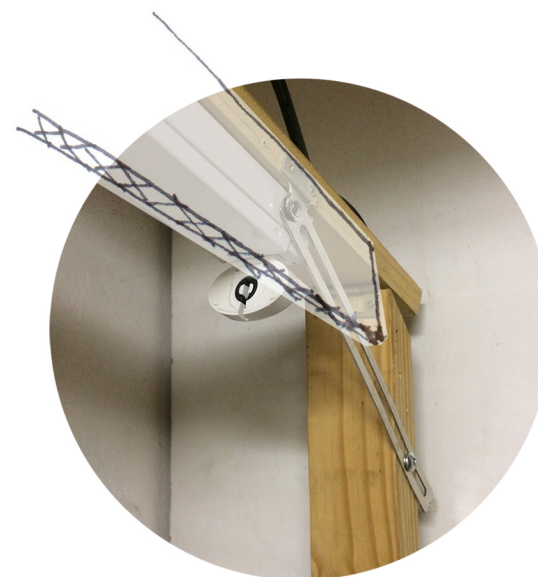
60 x 60mm Galvanised Mild Steel stove bolt with truss head

M6 x 12mm Galvanised Mild Steel wing nut

60 pre-drilled holes in tubing frame, 200mm intervals, demarcate places for fixing

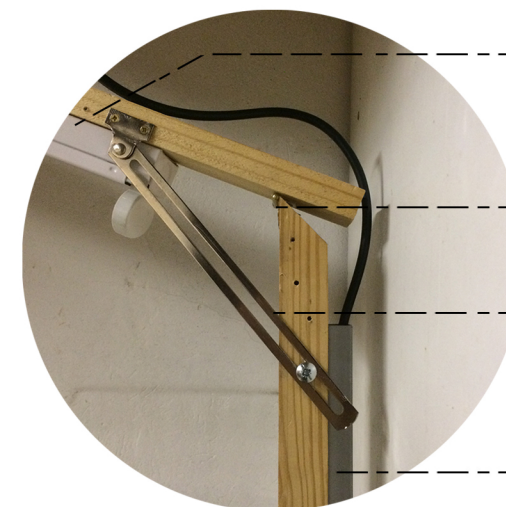
40mm x 40mm Galvanised Mild Steel square tubing frame in kitchen interface, angle grinded 22mm out to fit signage panel

## DETAIL 3



Conceal luminaire, with xani© University of Pretoria

PROTOTYPE



LED tube task lighting, surface mounted G13 to xanita x-board

Flush hinge

Galvanised Mild Steel sliding stay hinge

40mm x 40mm Galvanised Mild Steel square tubing, (representation) electric cable within

Timber represents 16mm Xanita kraft x-board

Task lighting lamp horizontally fixed on the overhead steel frame structure and a hinged detail of the preparation station. This lighting detail will emphasize the intricate preparation processes.



Figure 5.2.4:

# INFARM DETAILS

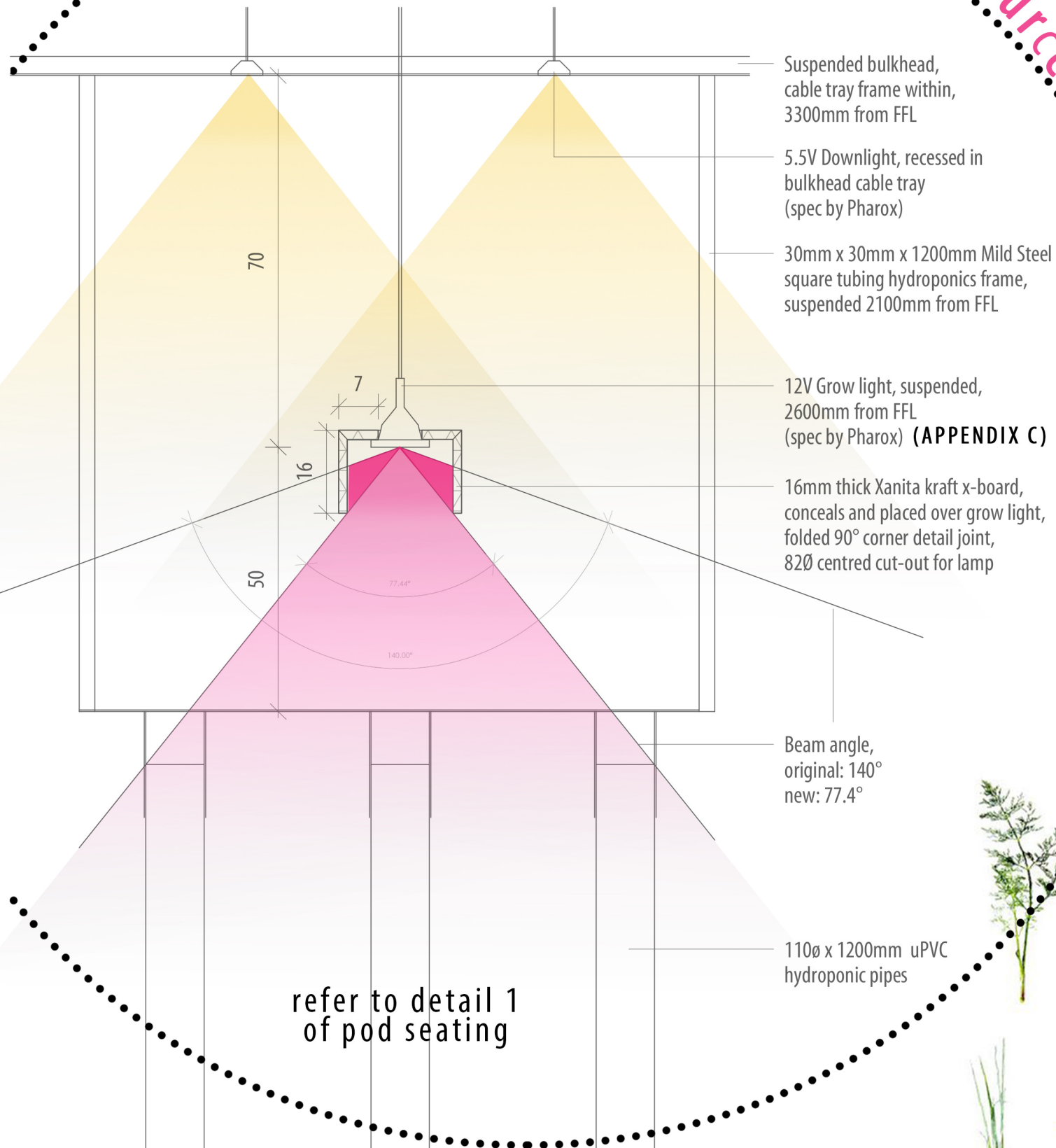
PROTOTYPE  
FORAGE PANEL



# DETAIL 1

grow light:

## conceal source



-  Leca, grow medium, placed within netpots
-  550/750 x 52mm x Netpots, with Neoprene discs or net
-  30-450 Stainless Steel pipe clamp, installed around tubing
-  8mm Thinwall tubing water for reticulation pipes & dripperline, clear, connect to sprinklers
-  Submersible water pump, 1500L / hour, 25 W. Code: F1500, Number: 7040002

The design must reflect the same industrial and aesthetic identity of the proposed programme. The design of the pipe joining within the systems will be adaptable in order to rotate the herbs within the space or outside (*detail 1: seating configuration*). The required water capacity and parts for the systems is specified.

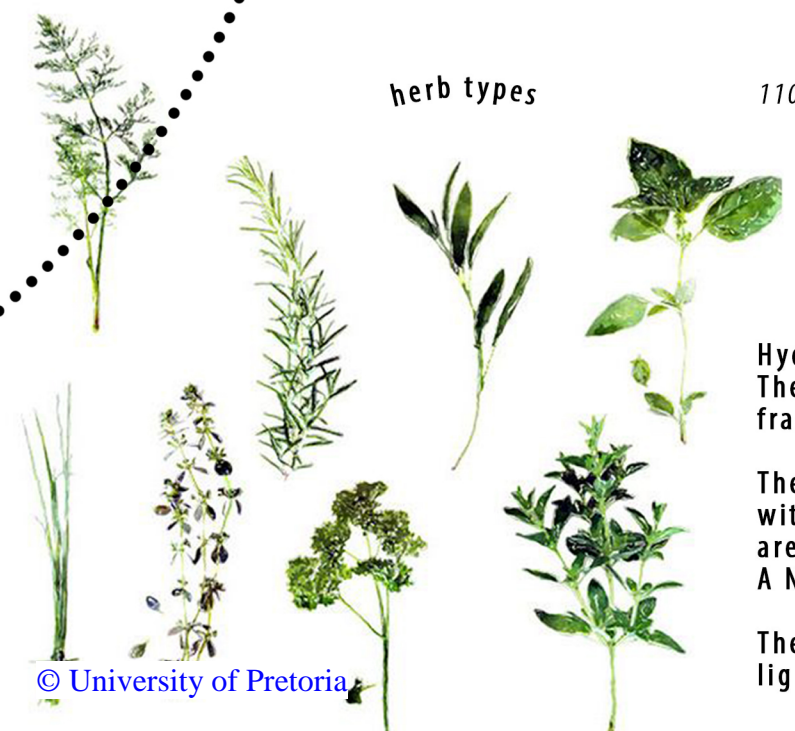
Adapted pump specifications, required volume of water reservoir:  
 - 10L required for 9 plants  
 (10 Watt pump circulates 700L/hour)  
 - 25L required for 27 plants  
 (25 Watt pump circulates 1500L/hour)

**Proposed programme:**  
INFARM FRAME: 3 pipes, 9 plants/pipe  
= require 25L capacity  
 frame inner dimension  
 = 1200-40-40-16 (glass)  
 = 1104 mm  
 25L = 0.025m<sup>3</sup>  
 0.025 = 1.104 x w x h  
 Where w = h  
 0.025 = 1.104 x h x h  
 0.025/1.104 = h<sup>2</sup>  
 √0.023 = √h<sup>2</sup>  
 = 0.155 m  
 1104mm x 155mm x 155mm

Change: 1040mm x 100mm x 210mm

POD: 6 growing pipes, 9 plants/pipe  
= require 50L capacity  
 frame inner dimension  
 = L: 1200-40-40-16 (glass)  
 = W: 1800-40-40-16 (glass)  
 = 1104 mm x 1704  
 With 50L = 0.050m<sup>3</sup>  
 0.050 = 1.104 x 1.704 x h  
 0.050/1.88 = h  
 √0.027 = √h  
 = 0.164m

1104mm x 1704mm x 165mm



refer to detail 1 of pod seating

Hydroponic systems are design for the interior environment. The systems are integrated within the interior as freestanding frames or as part of the pod seating configuration.

The design is based on existing innovations and systems within the field of hydroponics. Parts used within the systems are specified by suppliers (*Greenthumb, 2014*). A Nutrient Film Technique (NFT system) proposed.

The grow lights must be installed in conjunction with other light sources to reduce its intensity on the user eyes.

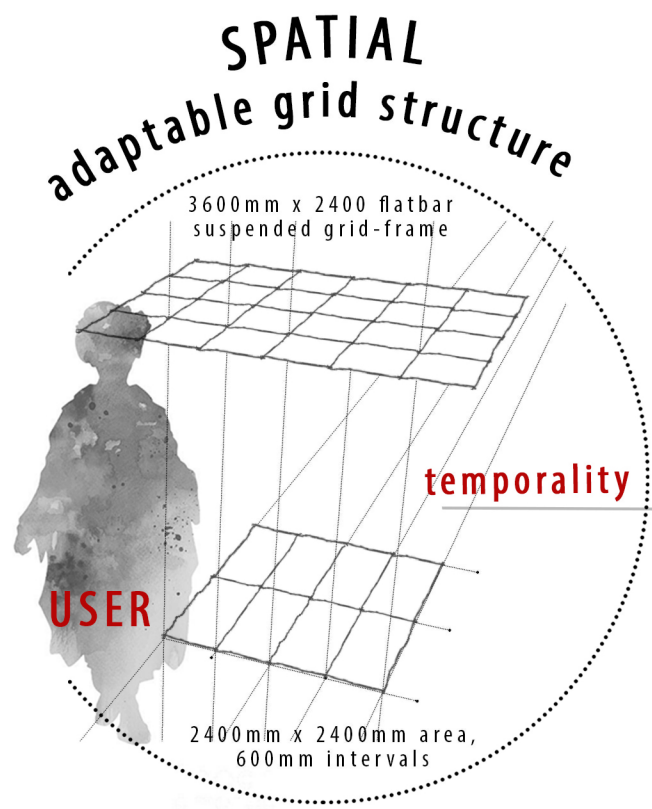
Figure 5.2.4.1:



INTERACTION PLATFORM

Figure 5.2.5:

# CONCEPTS



Routed holes into the existing concrete screed with chemically anchored eyebolts. The eyebolts correlate with the overhead suspended grid-frame.

seasonal

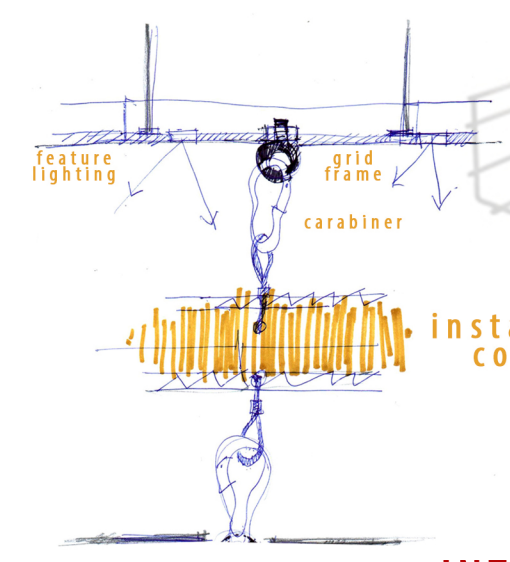
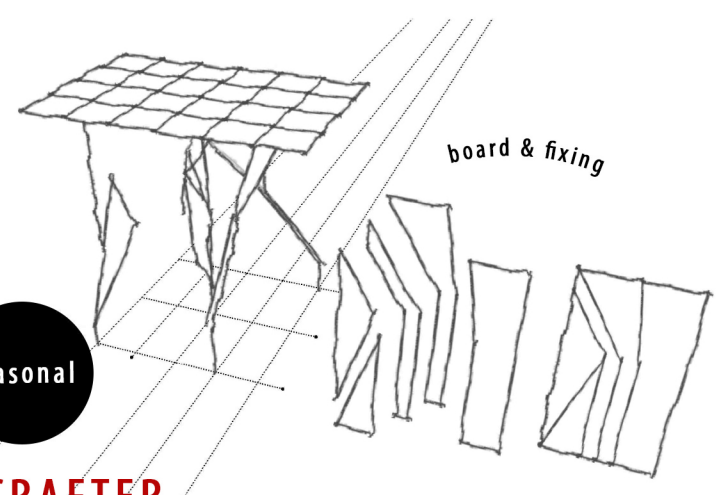
**CRAFTER**

## PROPOSAL

Changes per season with various conceptual installations to be designed by artisans or creatives within the community.

## STRUCTURE

1-2 Xanita kraft x-board per concept with fixing accessories (5mm Stainless Steel cable, nylon rope, wing nuts, bolts and carabiner hooks (appendix A)).



**INTERACT**

EXPLORATION

**MESSAGE**



**RATIONALE**  
Practice sustainable principles by living in simplicity. Encourage a raw food diet, less processing, less stress, more sleep, reduce environmental footprint. Rethink and balance your life. Enjoy life with less.

**INSTALLATION**  
Interact by playing a simplistic game: nots & crosses. Enjoy the small things in life, as they are and for what they are. It furthermore resembles a shared experience (team effort), for another person is needed to play a game.

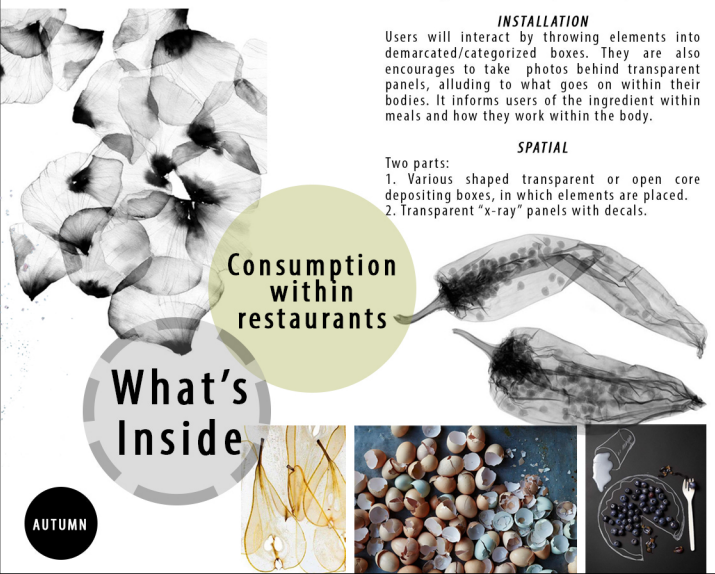
**SPATIAL**  
Long and linear installations with big scale nots & crosses, played with food elements.



**RATIONALE**  
Showcase the accumulating waste of restaurants, indicating what is used in processes/operations.

**INSTALLATION**  
Users will interact by throwing elements into demarcated/categorized boxes. They are also encouraged to take photos behind transparent panels, alluding to what goes on within their bodies. It informs users of the ingredient within meals and how they work within the body.

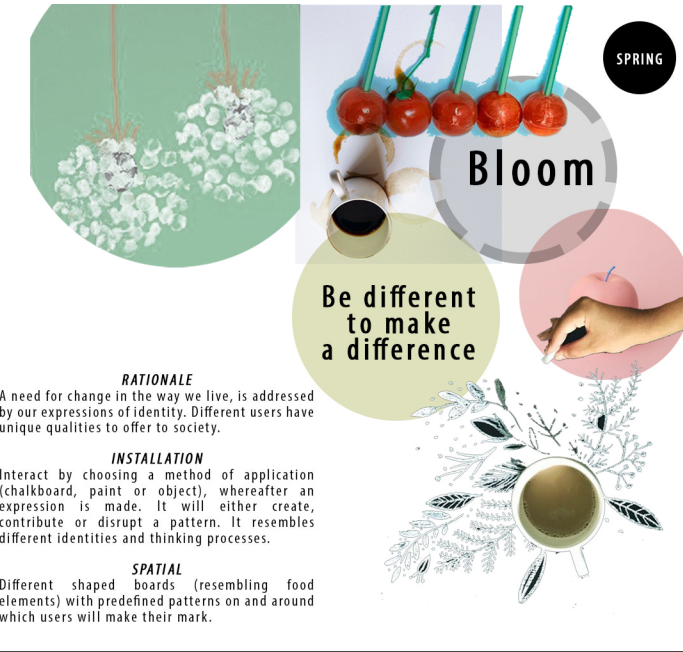
**SPATIAL**  
Two parts:  
1. Various shaped transparent or open core depositing boxes, in which elements are placed.  
2. Transparent "x-ray" panels with decals.



**RATIONALE**  
A need for change in the way we live, is addressed by our expressions of identity. Different users have unique qualities to offer to society.

**INSTALLATION**  
Interact by choosing a method of application (chalkboard, paint or object), whereafter an expression is made. It will either create, contribute or disrupt a pattern. It resembles different identities and thinking processes.

**SPATIAL**  
Different shaped boards (resembling food elements) with predefined patterns on and around which users will make their mark.



**RATIONALE**  
Users usually have a preference of what colour/type of fruit/vegetable they like or not. Various colours indicate the nutritious value we require, although not always practices. The earth provides for our bodies according to season.

**INSTALLATION**  
Paint made from food/spice concentrates are provided. Users will pick a colour and stamp on the installation (this will highlight what others consumers prefer). Furthermore encouraged to capture a photo under the installation.

**SPATIAL**  
Half circle, resembling a rainbow. The user interaction will apply the colours to the rainbow in a natural and expressive way.



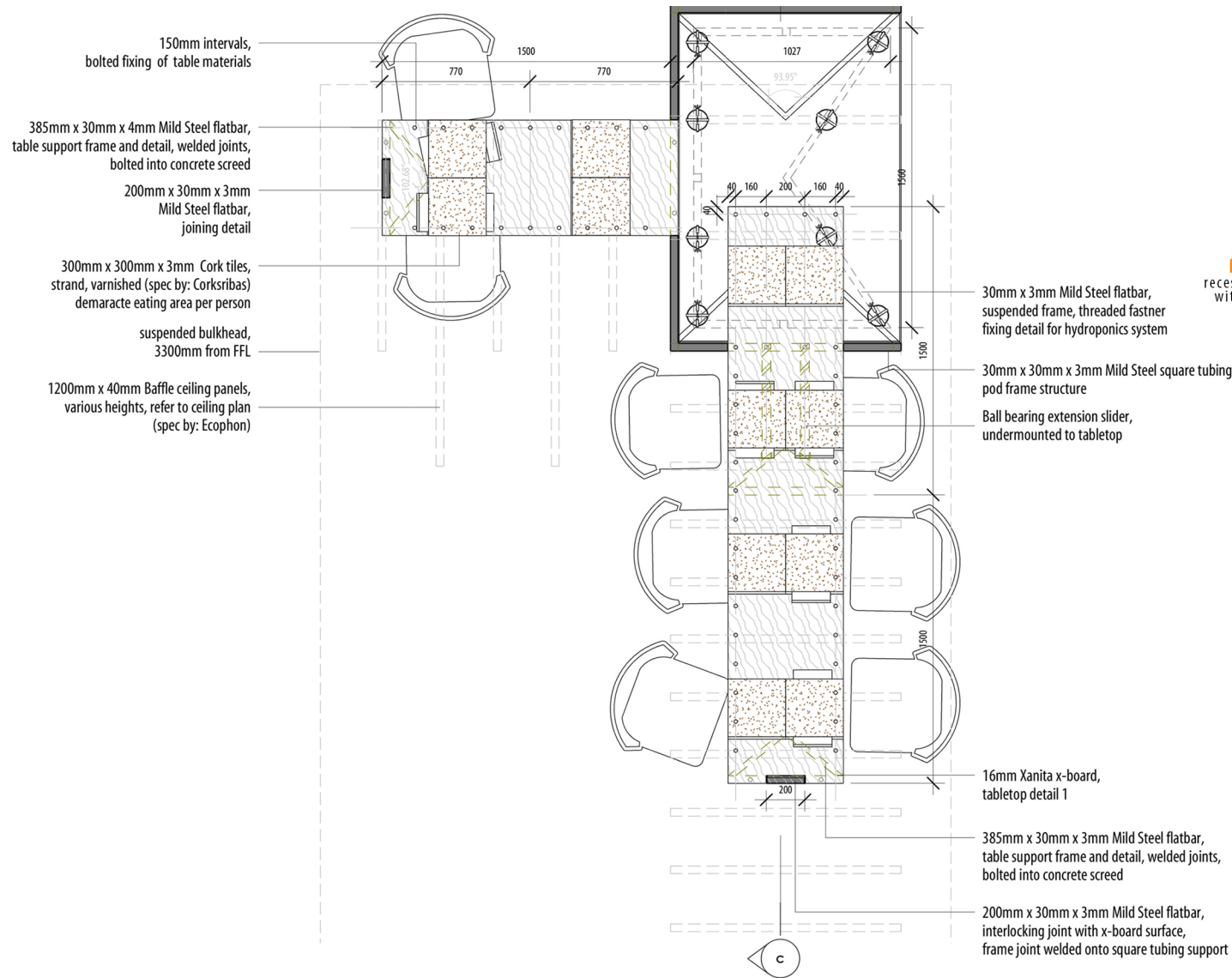
Figure 5.2.5.1:



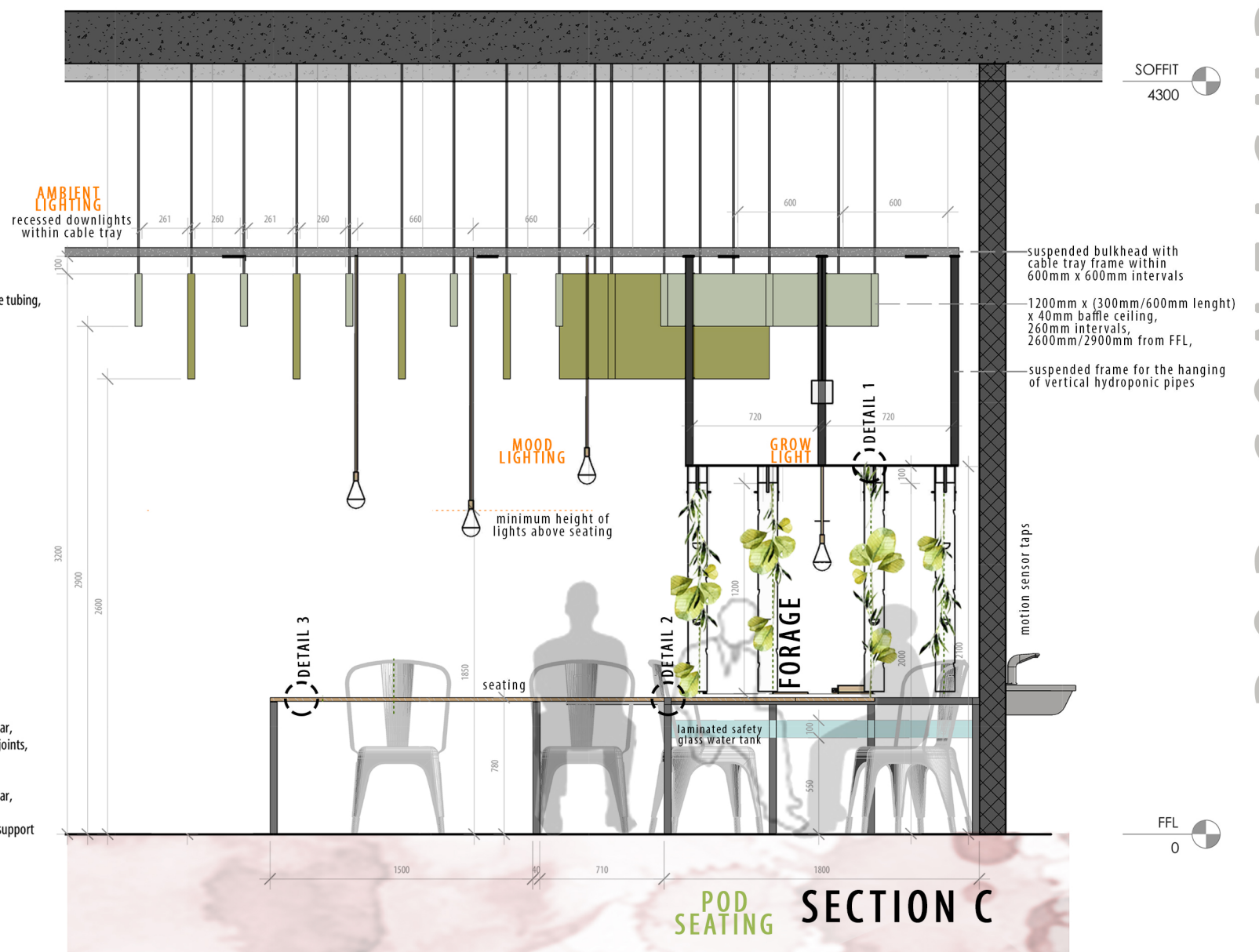


SEATING CONFIGURATION

Figure 5.2.6:



CALL-OUT C



Seating with integrated hanging vertical farming systems, forming the core of the structure. It is accessible, bespoke and adaptable in its fixing method (detail 1).

The interface focus on both adaptability of the table (detail 2) and the joining of the material surface (detail 3).

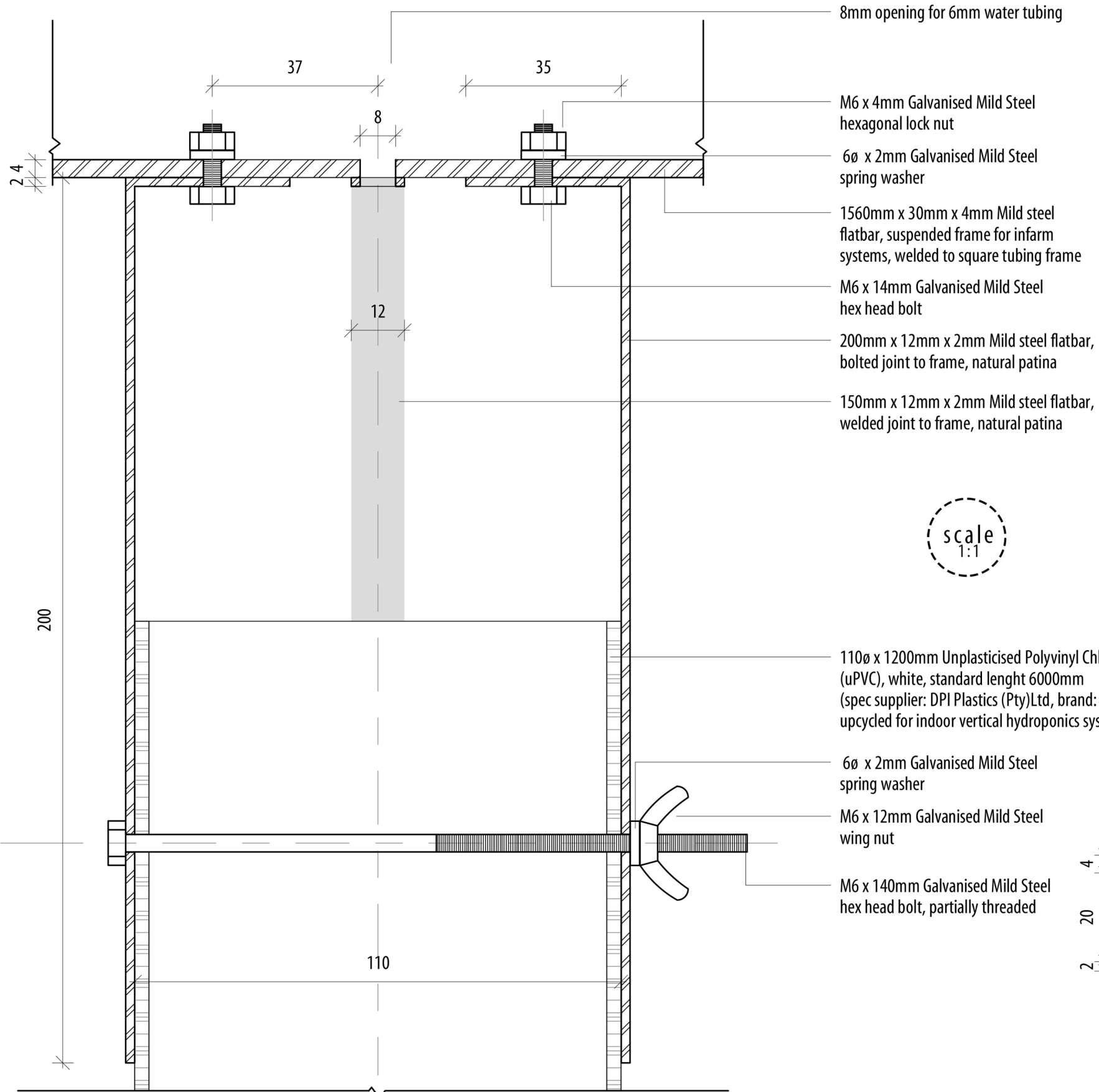
Figure 5.2.6.1:



DETAIL 1

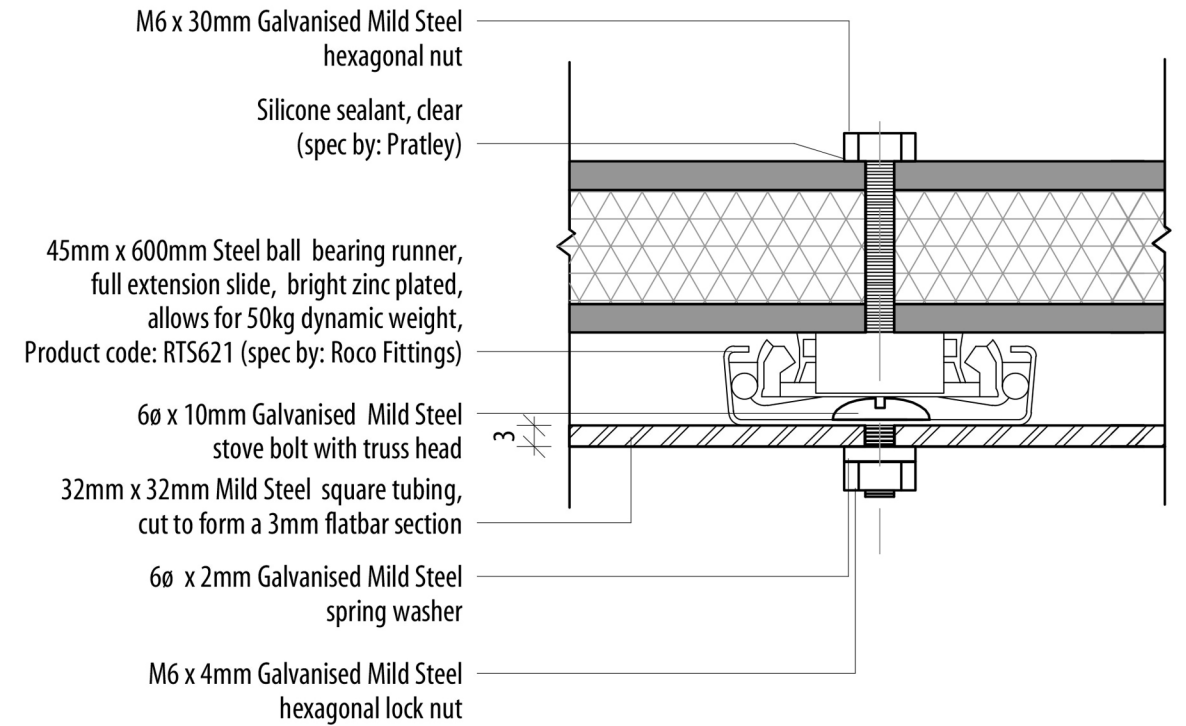


# DETAIL 1



scale  
1:1

# DETAIL 2



# DETAIL 3

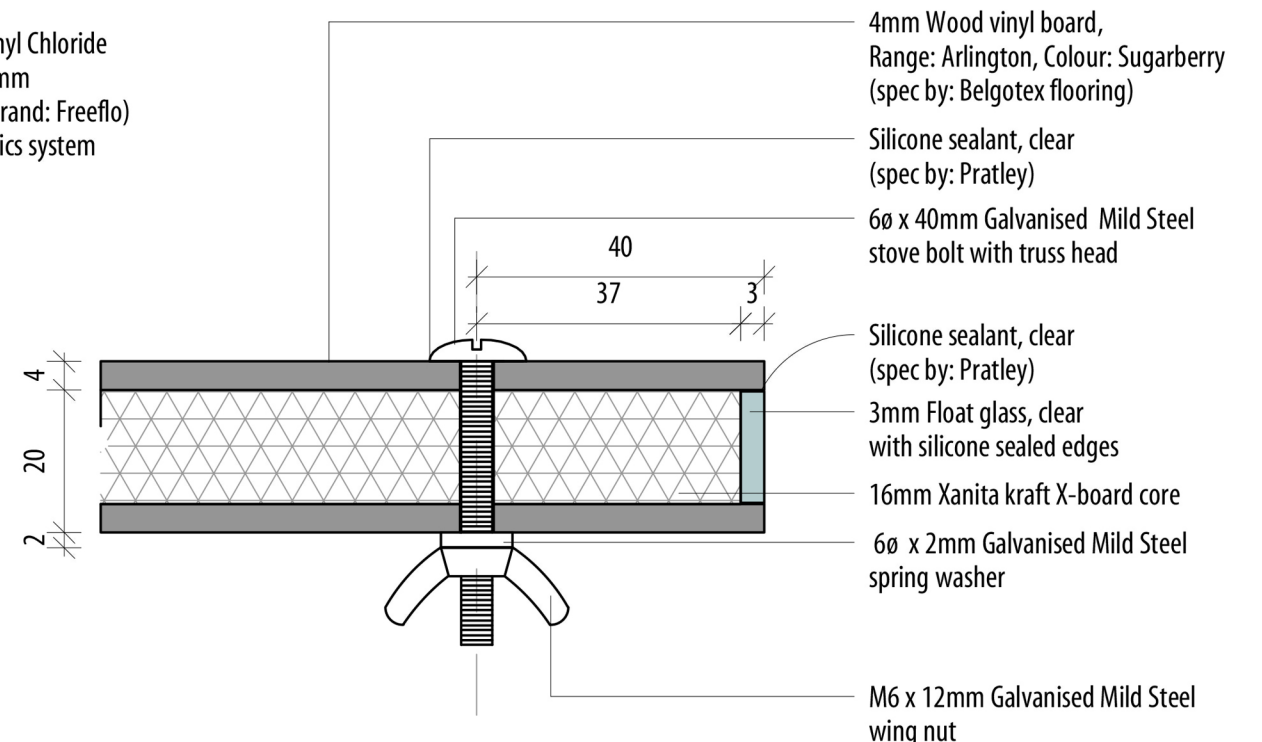


Figure 5.2.6.2:

## 5.3

### ELECTRIC APPROACH

---

The electric approach is defined in the ceiling and lighting plan, communicated together with the different ceiling types (*figure 5.3.1*). The equipment specifications (*referred to in table 5.2.1*) primarily considered energy consumption, whereas the lighting installation will significantly portray the concept of the proposed programme by either exposing or concealing the luminaires.

The electric and lighting installations in compliance to SANS 10142: *the wiring of premise* and SANS 10114: 2005: *the artificial lighting of interiors*, consider the following aspects:

- It is urged that only the areas being used are lit. Parts of the interior will have dimmable installations for energy saving when the natural lighting is sufficient. The dimmable sections will also serve as an indication of the occupancy of the space.
- The grow lights must be installed with other light sources in close proximity. This is to reduce the users' eye sensitivity to the specific colour spectrum of the light. A detail will be designed to further conceal the grow light source.
- Motion sensors are proposed in the ablutions, as its occupation level is low and inconsistent.

Natural lighting and ventilation requires 10% of the total floor area (SANS Part O, 2011):

$$10\% \times 435\text{m}^2 \text{ (total floor area)} = 43.5\text{m}^2$$

*Transparent glazing shopfront doors: 77.5m<sup>2</sup> (adequate)*

*Shopfront door openings: 23.8m<sup>2</sup> + 7.8m<sup>2</sup> = 31.6m<sup>2</sup> (not adequate)*

*(fire escapes closed during normal operation)*

The shopfront doors therefore comply with adequate natural daylight (77.5m<sup>2</sup>), but the openings on the external façade wall (31.6m<sup>2</sup>) do not meet the requirements. A new mechanical ventilation system will be proposed (*refer to figure 5.3.1*). This system will supply the seating and back of house storage areas with fresh air, from where it will passively extract through the shopfront openings. Furthermore an extractor hood and duct is proposed above the induction stoves within the kitchen area. This duct will service out to the exterior façade, from where its visibility will be concealed with a branded element detail (*figure 5.3.1: diagram 2 & 3 and figure 5.2.2*). Both of the ventilation systems require the approval and installation of a certified engineer.

The interior consists of both natural and artificial lighting. Artificial lighting will provide the interior with the minimum specified lighting levels, independent of the natural lighting. Different types of LED lighting strategies are placed within the interior environment for different moods or tasks, adding to the sensory experience. A smart lighting system will furthermore control some of the spatial zones.



Diagram 5.3: Exploration of the lighting strategy of different LED's with different moods or tasks

TYPE	SYMBOL	LAMP SPECIFICATION	LUMINAIRE SPECIFICATION	COLOUR RENDERING	ENERGY RATING (per Pharox)
Ambient lighting		Pharox 300 downlight, dimmable, 38° beam angle	Recessed in bulkheads, GU10 normal fitting (in bulkhead 1, 2 & solo panel)	3000 K, warm white	A: 85%
Mood lighting (A)		Pharox 400 Classic	Suspended lamps, E27 normal fitting (at working & standard booths, infarm, fresh produce mesh)	2800 K, warm white	A++: 90%
Mood lighting (B)		Pharox 400 Flame, dimmable	Suspended lamps, E27 normal fitting (between baffle ceilings: pods)	2200 K, ambience	A: 80%
Task lighting		T8 LED tube, 600mm length, 150° beam angle	Surface mounted, G13 normal fitting, powder coated, white (tubing/hinge frame, refer to kitchen interface detail 3)	5000 K, cool white	A+
Grow light		Lemnis Orion Retrofit LED growlight, 120° beam angle	Suspended lamp, E27 normal fitting (refer to infarm: detail 2)	90:10 Combi, (red:blue) Pink hue	(refer to appendix B)

Table 5.3.1: Lighting specifications

ELECTRIC LEGEND

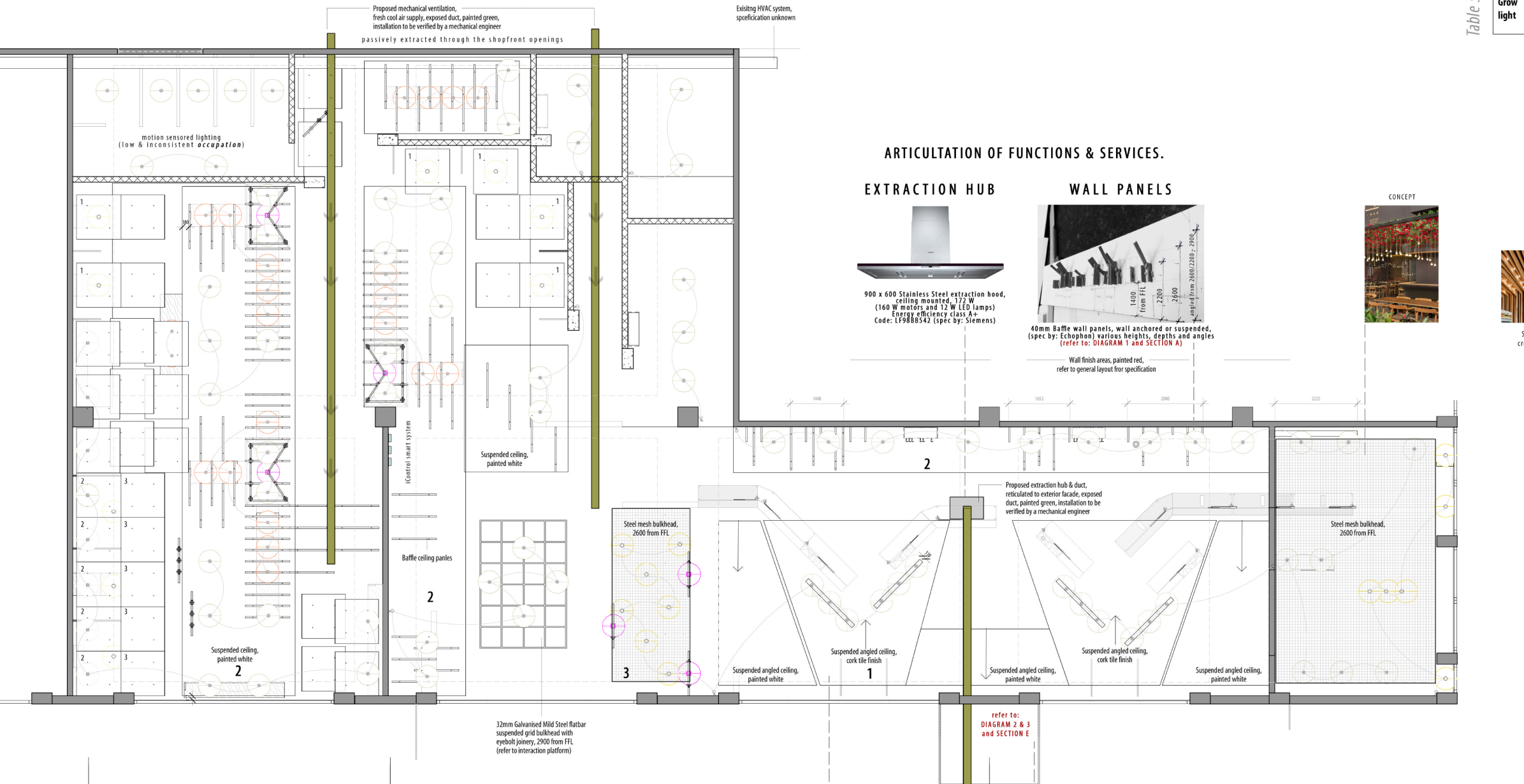
- SA/Slimline combo socket, stainless steel cover plate screwless base plate (spec by: CBI electric)
- 1 or 2 Lever light switch (2x4 switch) 2-way, 240V AC, SA85 164 stainless steel cover plate, screwless base plate (spec by: CBI electric)
- Control system, Automated lighting control distribution board with a detached iPad, all lighting circuits in the seating areas are connected to this smart system. Manufacturer: ILED  
**NOTIFICATION BOARDS INDICATE:** lighting placement: open seating, power consumption and waste accumulation

CEILING LEGEND

- 100mm indentations articulations in existing concrete slab
- 1** Angled bulkhead (indicated with arrow), 2900mm-4000mm angle from FFL (DIAGRAM 2) acoustic absorption & diffusion (spec by: Ecophon). With recessed downlights as wayfinding devices.
- 2** Horizontal bulkhead, 3300mm from FFL, acoustic absorption tiles (spec by: Ecophon) cable tray frame within for recessed downlights
- 3** Mesh bulkhead, REFER TO SECTION A 2600mm from FFL (infarm & produce zone) suspended mood lighting (A) & downlights in overhead cable trays
- SOLO BAFFLE CEILING**  
REFER TO SECTION A (spec by: Ecophon) installation: adjustable wire hanger and hook, glass wool core, certified
- Light reflectance**
- 49% 1200mm x 600mm x 40mm, 2600mm from FFL, Akutex FT colour: Pure Olive (S2010-Y)
- 75% 1200mm x 300mm x 40mm, 2900mm from FFL Akutex FT colour: Pale Garden (S1005-G10Y)
- SOLO PANELS**  
VARIOUS HEIGHTS & ANGLES (spec by: Ecophon) Solo Square panel, 1200mm x 1200mm x 40mm, installation: connect adjustable wire hanger & absorber anchor, Akutex FT colour: White Frost (S0500-N)
- 2300mm x 2600mm angled from FFL, some contain recessed downlights
- 2300mm from FFL, with centred suspended mood lighting A
- 2700mm from FFL with equally spaced intervals of downlights, mood light A suspended within centre of booth
- 2700mm x 2900mm angled from FFL

FRAME LEGEND

- REFER TO SECTION C Suspended frame structure, 2100mm from FFL, suspended from 3300mm bulkhead, located within the pod seating for the fixing of hydroponics infarm systems
- REFER TO PROTOTYPE Freestanding moveable frame structure, 1200mm x 2000mm, on castor wheels, for the fixing of hydroponics infarm systems

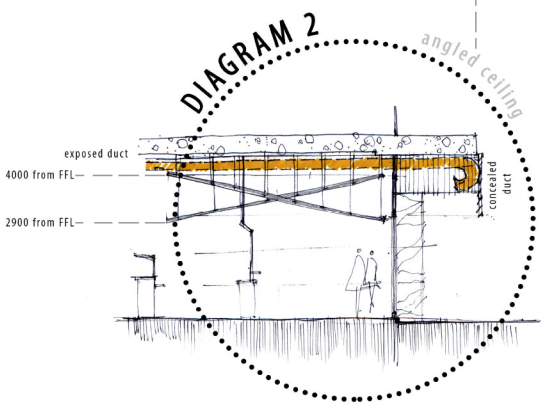
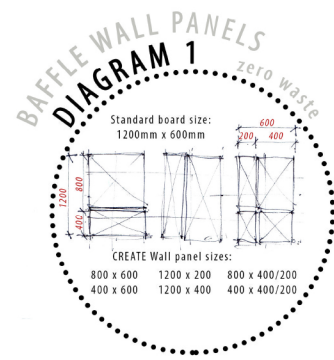
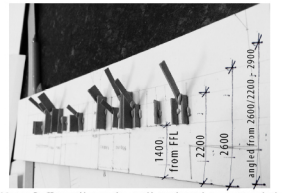


ARTICULATION OF FUNCTIONS & SERVICES.

EXTRACTION HUB



WALL PANELS



CEILING & LIGHTING LAYOUT

0 1 2 scale meters  
cut-plane, 2400mm above FFL  
REFER TO SECTION A

### 5.3.1 LIGHTING CALCULATIONS

The different lighting specifications are given. All of the lamps are LED retrofit globes, specified by Pharox and distributed by NTL Lemnis South Africa.

TYPE	QUANTITY	WATT	LUMINOUS FLUX (lumen)	EFFICACY (lumen/watt)	TOTAL LUMINOUS FLUX	AREA (m <sup>2</sup> )	ILLUMINATION (lux)
Ambient lighting	84	5.5 W	300 lm	55 lm/W	25200 lm	Total: 435	58
Mood lighting (A)	22	4 W	440lm	110 lm/W	9680 lm	n/a	-
Mood lighting (B)	22	8 W	400 lm	50 lm/W	8800 lm	n/a	-
Task lighting	11	9 W	855 lm	95lm/W	9405lm	Kitchen: 112	84
Grow light	6	12W	300lm	25lm/W	1800 lm	n/a	-

Table 5.3.2: Lighting calculations

Illumination calculation is compiled for the kitchen, seating areas and elements within the fresh produce and purchase zone. It indicates that the required levels are achieved for the various tasks.

**Illuminance calculation:** 
$$lux = \frac{\text{luminous flux (lumens)}}{\text{area (m}^2\text{)}}$$

SPACE OR TYPE OF ACTIVITY	REQUIRED ILLUMINANCE LEVEL (Lux)
Kitchen: preparation	500
Kitchen: general area, food stores	100 -150
Cafeterias, dining rooms	100-200
Retail shop: counters or wall display	500
Offices, general working surfaces or counters	300-500

Table 5.3.3: Illumination requirements

(Compiled by author with reference to (Saflii, 2003) (Pioneerlighting, n.d.) (Lamps & Lighting, 2016))





KITCHEN	SEATING
<p><b>Kitchen worktop interface:</b> <b>TASK LIGHTING</b> (Required illumination: 500 lux)</p> $\text{lux} = \frac{855}{(1.6 \times 0.6)}$ $= 891 \text{ lux}$	<p><b>Pod table surface (2 seats):</b> <b>MOOD LIGHTING (TYPE B)</b> (Required illumination: 100-200 lux)</p> $\text{lux} = \frac{400}{(0.75 \times 0.6)}$ $= 889 \text{ lux}$
<p><b>Kitchen area:</b> <b>TASK LIGHTING + AMBIENT LIGHTING</b> (Required illumination: 100 -150 lux)</p> $\text{lux} = \frac{(11 \times 855) + (22 \times 300)}{122}$ $= 143 \text{ lux}$	<p><b>Standard booth table surface (2 seats):</b> <b>MOOD LIGHTING (TYPE A)</b> (Required illumination: 100-200 lux)</p> $\text{lux} = \frac{400}{(0.75 \times 0.6)}$ $= 978 \text{ lux}$
	<p><b>Work booth table surface (4 seats):</b> <b>MOOD LIGHTING (TYPE A) + AMBIENT LIGHT</b> (Required illumination: 300-500 lux)</p> $\text{lux} = \frac{(1 \times 400) + (2 \times 300)}{(1.5 \times 0.6)}$ $= 1111 \text{ lux}$
<p><b>Purchases seasonal display trolley:</b> <b>MOOD LIGHTING (TYPE A)</b> (Required illumination: 500 lux)</p> $\text{lux} = \frac{440}{(0.4 \times 0.4)}$ $= 2750 \text{ lux}$	<p><b>Laptop table surface (4 seats):</b> <b>AMBIENT LIGHT</b> (Required illumination: 300-500lux)</p> $\text{lux} = \frac{(2 \times 300)}{(3.0 \times 0.4)}$ $= 500 \text{ lux}$
<p><b>Fresh produce POS counter:</b> <b>AMBIENT LIGHTING</b> (Required illumination: 300-500 lux)</p> $\text{lux} = \frac{(2 \times 300)}{(1.75 \times 0.4)}$ $= 857 \text{ lux}$	<p><b>Seating area:</b> <b>MOOD LIGHTING (TYPE A &amp; B) + AMBIENT LIGHTING + GROW LIGHTS</b> (Required illumination: 100 -200 lux)</p> $\text{lux} = \frac{(9 \times 440) + (22 \times 400) + (32 \times 300) + (3 \times 300)}{173}$ $= 134 \text{ lux}$

Table 5.3.4: Illuminance calculation

5.4.A  
INDOOR ENVIRONMENTAL QUALITY

**Acoustic absorption:**

Various ceiling types and wall panels  
(refer to figure 5.3.1)

**Air quality:**

Extraction hub above the hot areas (kitchen)  
Mechanical cool air supply (seating areas)  
Indoor farming systems

**User connection to nature:**

improves air quality  
+ adds natural green elements  
connects users with nature

5.4.B  
OPERATIONAL FRAMEWORK

**WASTE**

Consider the recycling of packaging and the composting of organic waste. The Inside will also function as a food bank which donates excess food, and a drop-off and collection point for general waste from where it will be recycled or re-used.

**COMMUNITY**

1. Making of the brand elements (menu, packaging, cutlery and crockery).
2. Supply cycle of produce: The urban farms in the surrounding context and proposed at Sparks School.
3. Work within the restaurant, trained to prepare the fresh produce, educated about seasonal produce, recycling systems and farming systems.
4. Interventions as roll-outs of the Inside, such as speciality foods (pickling or pesto making) or medicinal herb health products.

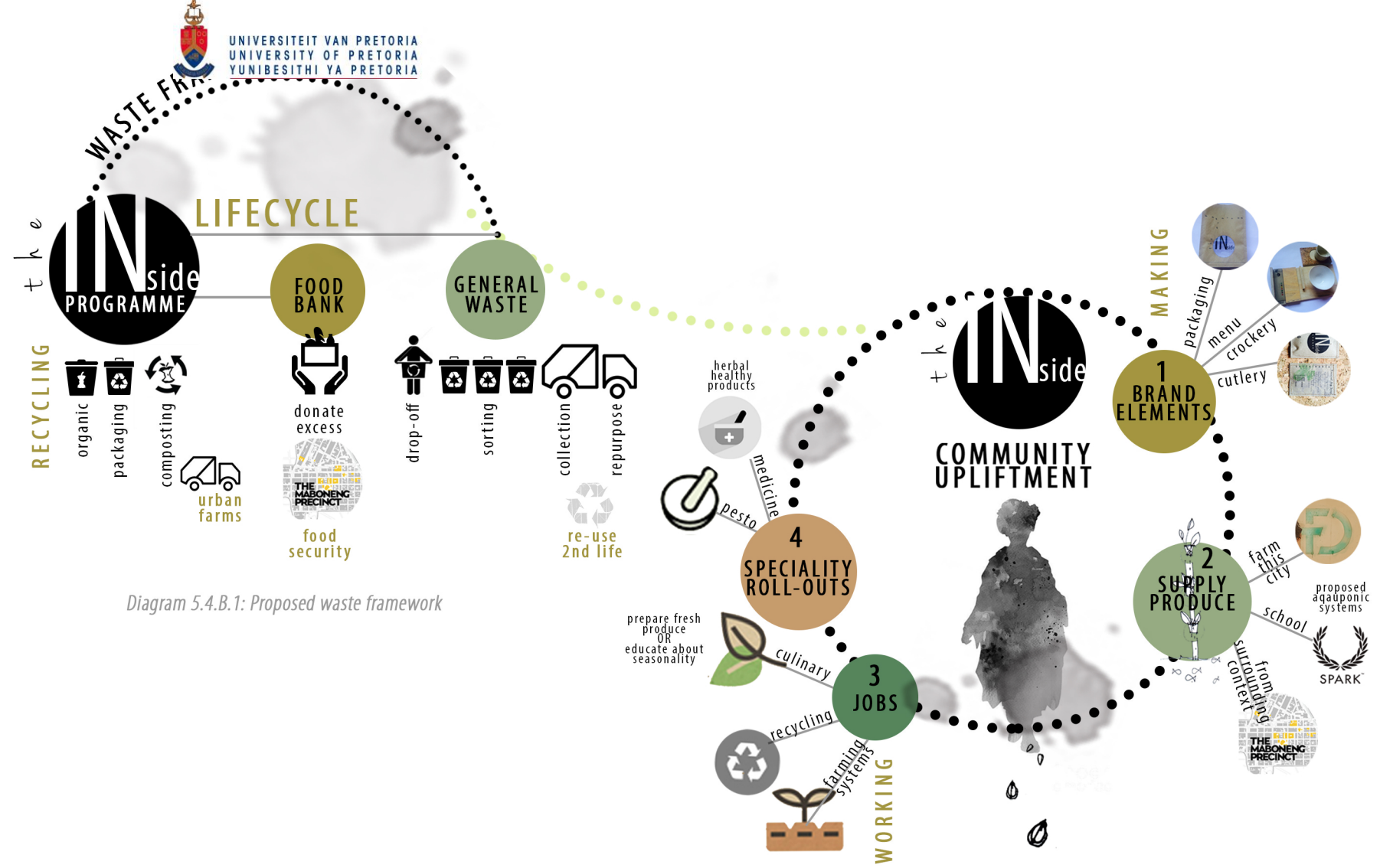


Diagram 5.4.B.1: Proposed waste framework

Diagram 5.4.B.2: Frameworks encouraging community upliftment

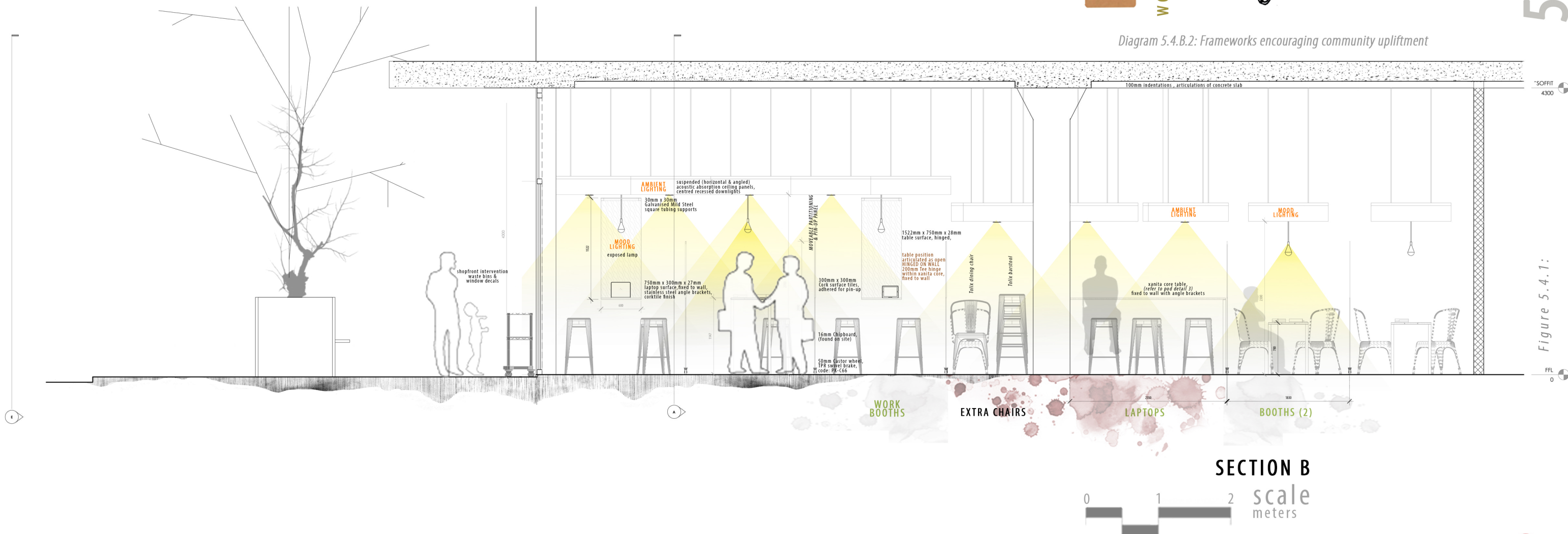


Figure 5.4.1:

### 5.4.C SECONDARY FUNCTIONS

**Primarily function: the inside restaurant**

**Flexibility & changeability  
of interior elements & spaces**

**Secondary functions:**

#### 1. Raw food cooking classes.

Users can interact with the chefs or can prepare or compete. Chairs and trolleys (designated to the users by containing the equipment and ingredients) will be arranged around the kitchen stations.

#### 2. Exhibition space.

The kitchen interface will be the social area. The seating and infarm areas can be rearranged for exhibitions. The adaptable partitioning boards, moveable frame structures and the joinery elements of the interaction platform can be appropriated.



Diagram 5.4.C: Secondary functions of the interior

### 5.4.D WATER

**Hydroponics systems are recycling systems; Soilless systems, closed-looped.**

**Rainwater collection:**

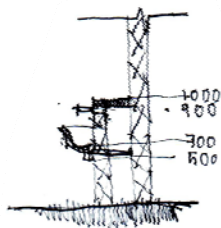
**Open rooftop space of Access City**  
(reticulated down the courtyards).

**Excess water: serviced to Sparks School.**

*The entire installation & specification verified and implemented by a qualified engineer.*

#### **RETICULATION**

Service wall sinks within a cavity wall  
(requires fall of 1:60 to the service shaft)



$$\frac{1000}{60000} = \frac{x}{(16000+10100)}$$

$$= \frac{26100}{60}$$

$$= 435\text{mm height needed for fall}$$

**COMPLY:** Height of the service traps and pipes are 500mm above FFL.

The grey water from the sinks will be serviced in the cavity wall to an existing service shaft, from where it will be recycled to the ablutions, which will be connected to the existing services within the deliveries courtyard.

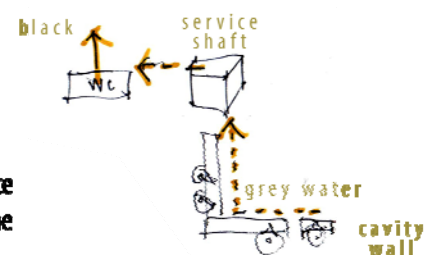
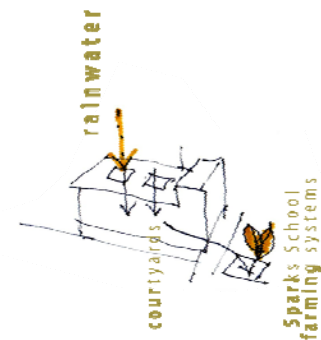


Diagram 5.4.D: Diagrammatic water reticulation

## 5.5 RATING

As part of the technical development, the programme and its context are rated in term of sustainability. The sustainable building assessment tool (SBAT) and the Green Building Council of Southern Africa: GreenStar Interior tool was used.

It has a high rating in waste and education as specific strategies were proposed. The urban context greatly influenced the social rating with the integration of Sparks School, Trim Park and the community framework. The water rating is very low, as showers and hot water services was not considered.

As conclusion, the results indicate a holistic sustainable approach achieved, as all of the design considerations were based on sustainable principles.

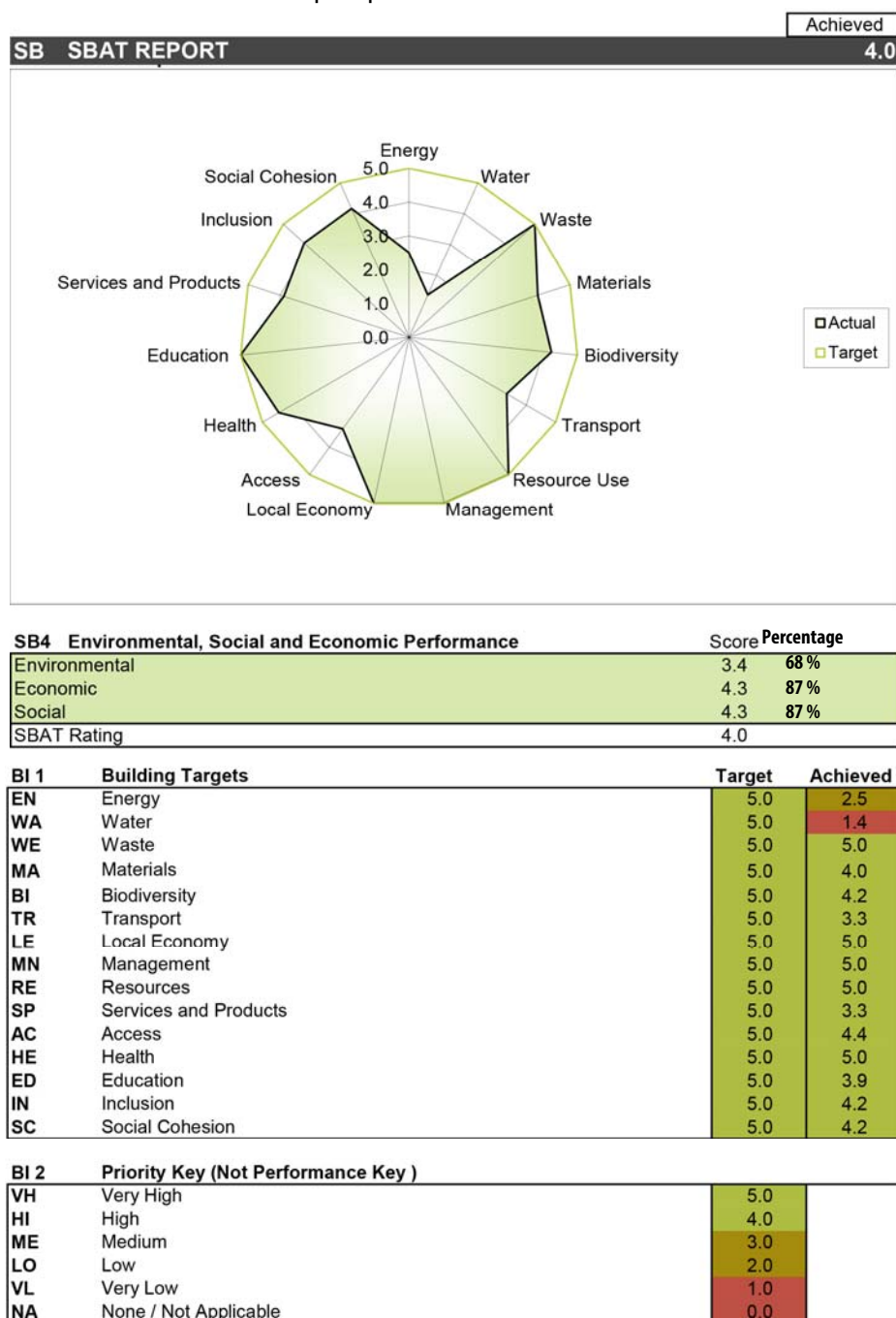


Table 5.5.1: SBAT rating



Score Sheet

Green Star SA - Interiors v1

Credit	Credit Name	Aim of Credit	Points Available	Points Targeted
<b>Management Category</b>				
Int-Man-1	Green Star SA Accredited Professional	To encourage and recognise the engagement of professionals who can assist the project team with the integration of Green Star SA aims and processes throughout all stages of a fitout's design and construction phases.	1	1
Int-Man-2	Commissioning & Tuning	To recognise effective commissioning and tuning processes during a project's design and construction phase that ensure all services and installations can operate to their optimal design potential.	2	1
Int-Man-3	Occupant Users' Guide	To encourage and recognise the provision of information to fitout owners and users that helps them understand a project's systems, environmental attributes, and maintenance requirements.	1	1
Int-Man-4	Environmental Management	To encourage and recognise the adoption of a formal environmental management system in line with established guidelines during construction.	1.5	1
Int-Man-5	Construction Waste Management	To recognise and encourage management practices that minimise the amount of demolition and construction waste going to disposal.	2	2
Int-Man-6	Workspace efficiency	To recognise the design of workspaces that provide spatial efficiency and improve productivity and occupant performance.	2	2
Int-Man-7	Green Lease	To recognise and encourage collaboration between the building owner and tenants in order to manage and operate the building along environmentally sustainable principles whilst realising mutual benefit.	2	2
Int-Man-8	Learning Resources	To encourage and recognise sustainability initiatives implemented in the development as learning resources for building users and visitors.	1	1
<b>Management credits</b>			<b>12.5</b>	<b>11</b>
<b>Indoor Environmental Quality Category</b>				
Int-IEQ-1	Quality of Internal Air	To encourage and recognise projects that provide high quality air to occupants.	4	3
Int-IEQ-2	Thermal Comfort	To encourage and recognise fitouts that achieve a high level of thermal comfort.	2	1
Int-IEQ-3	Lighting Comfort	To encourage, recognise and reward well-lit spaces that provide appropriate levels of lighting comfort to occupants.	3	3
Int-IEQ-4	Visual Comfort	To recognise the delivery of well daylight spaces that provide high levels of visual comfort and views to fit-out occupants.	3	3
Int-IEQ-5	Acoustic Quality	To encourage and recognise buildings that are designed to provide appropriate acoustic qualities to enable the functionality of the space.	2	2
Int-IEQ-6	Reduced Exposure to Air Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	5	3
Int-IEQ-7	Mould Prevention	To encourage and recognise the design of services that eliminates the risk of mould growth and its associated detrimental impact on occupant health.	0.5	0.5
Int-IEQ-8	Ergonomics	To recognise the choice of equipment and design of spaces that promotes wellbeing, efficiency and effectiveness.	2	2
Int-IEQ-9	Indoor Plants	To encourage and recognise the installation of indoor plants that improve indoor environment quality and also provides occupants with a connection to nature.	1.5	1.5
<b>Indoor Environmental Quality credits</b>			<b>23</b>	<b>19</b>
<b>Energy Category</b>				
Int-Ene-1	Greenhouse Gas Emissions	To encourage and recognise projects that minimise the greenhouse gas emissions associated with tenant fitouts.	12	9
Int-Ene-2	Electrical Sub-metering	To encourage and recognise the installation of electrical energy sub-metering to facilitate on-going management of electrical energy consumption.	2	2
<b>Energy credits</b>			<b>14</b>	<b>11</b>
<b>Transport Category</b>				
Int-Tra-1	Commuting Mass Transport	To encourage and recognise developments that select a site near public transport and facilitate the use of mass transport.	1	1
Int-Tra-2	Local connectivity	To encourage and recognise projects that are located within walking distance of high quality amenities such as shops and parks, thus reducing private vehicle use and the associated negative environmental impacts.	1	1
Int-Tra-3	Alternative Transport	To encourage and recognise projects that promote and facilitate the use of alternative modes of transport over the use of private cars.	2	1
<b>Transport credits</b>			<b>4</b>	<b>3</b>
<b>Water Category</b>				
Int-Wat-1	Potable Water	To recognise projects that minimise potable water consumption.	6	4
Int-Wat-2	Water Sub-metering	To encourage and recognise the installation of sub-metering to facilitate on-going management of water consumption.	2	1
<b>Water credits</b>			<b>8</b>	<b>5</b>
<b>Materials Category</b>				
Int-Mat-1	Operational Waste Management	To encourage and recognise developments which include space and an operational waste management plan that facilitates the recovery of resources used within the developments to reduce waste going to disposal.	2	2
Int-Mat-2	Furniture	To recognise the selection of fit-out furniture that has a reduced environmental impact when compared to available alternatives.	8	6
Int-Mat-3	Assemblies	To recognise the selection of fit-out assemblies that have a reduced environmental impact when compared to available alternatives.	8	6
Int-Mat-4	Flooring	To recognise the selection of flooring that has a reduced environmental impact when compared to available alternatives.	6	5
Int-Mat-5	Wall coverings	To recognise the selection of wall coverings that have a reduced environmental impact when compared to available alternatives.	3	3
Int-Mat-6	Local Sourcing	To encourage and recognise the environmental advantages gained, in the form of reduced transportation emissions, by using materials and products that are sourced within close proximity to the site.	2	2
Int-Mat-7	Sundries Materials Sourcing	To recognise the selection of fitout finishes that have a reduced environmental impact when compared to available alternatives through responsible manufacturing, product stewardship and resource efficient design.	1	1
<b>Materials credits</b>			<b>30</b>	<b>25</b>
<b>Land Use and Ecology Category</b>				
Int-Eco-1	Site selection	To recognise and reward a tenant for selecting their space in a building that reduces their environmental impact due to the building's base building design attributes.	4	1
<b>Land Use and Ecology credits</b>			<b>4</b>	<b>1</b>
<b>Emissions Category</b>				
Int-Emi-1	Impacts from refrigerants and insulants	To encourage and recognise developments that minimise light pollution into the night sky.	3	1
Int-Emi-2	Light Pollution	To encourage and recognise the avoidance of substances that contribute to the deterioration and long-term alteration of the Earth's atmosphere.	1.5	1.5
<b>Emissions credits</b>			<b>4.5</b>	<b>2.5</b>
<b>Innovation Category</b>				
Int-Inn-1	Innovative Strategies & Technologies	To encourage and recognise pioneering initiatives in sustainable design, process or advocacy.		4
Int-Inn-2	Exceeding Green Star SA Benchmarks	To encourage and recognise projects that achieve environmental benefits in excess of the current Green Star SA benchmarks.		
Int-Inn-3	Environmental Design Initiatives	To encourage and recognise sustainable building initiatives that are currently outside of the scope of this Green Star SA rating tool but which have a substantial or significant environmental benefit.		2
<b>Innovation credits</b>			<b>10</b>	<b>6</b>
<b>TOTAL POINTS AVAILABLE</b>			<b>100</b>	<b>83.5</b>

Table 5.5.2: GreenStar rating

## 5.6

### CONCLUSION

---

The programme and all of its interventions were developed, with a focus on the identified sustainable approaches and principles.

The final general layout as well as a ceiling layout showcases the various movements and articulations. Various drawings and perspectives furthermore explained the intended concepts, specifications and joinery details of the spatial interventions. The views and details were identified as: the kitchen interface, the indoor farming area, interaction platform and the seating configurations.

Together with the detailed design development, the materials, finishes, lighting strategies, equipment and frameworks for the operation of the programme were specified.