Group 2B: Graft + Stitch

The Menara Sew-port
Sewing Seeds & Stitching Fabrics
Fig. 1 - (cover page) Motivational collage of stitching fabric through strengthening the existing agricultural corridor in the existing Menara airport site.
THE MENARA SEW-PORT
TEAM GRAFT & STITCH

POLITECNICO DI MILANO
SCHOOL OF ARCHITECTURE URBAN PLANNING AND CONSTRUCTION ENGINEERING
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THEMATIC STUDIO " IN-BETWEEN"
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INTRO
Fig. 2 - Parti diagram of the Menara Sew-port.
ABSTRACT

The Menara Sew-Port aims to stitch disconnected urban fabrics by transforming the existing airport and stretching the western agricultural corridor to decentralize Marrakech’s radial hierarchy. This is to be done by inserting new tissue, ‘The common-ground’, into the airport and military site located south-west of the Menara gardens. This is to exist in the form of agricultural re-migration, at formal (city agri) and informal (local agri) interventions with aims for cultural and economic stimulation, using a methodology of circular economy.

This project locates itself in a reality of the relocation of the Menara airport; disconnection in the urban landscape; historical agricultural migration out of the city; industrial under-use; and economic instability. This project answers directly to the goals of Plan Generation Green Maroc 2020-30, which aims to promote the human element; focus on the agricultural middle class; encourage young farmers; increase job creation; and boost agricultural GDP. A phasing approach is to be implemented to allow for sustainable economic and ecological development.

This report aims to motivate; explain; and substantiate the goals stated above in the form of analytical framework; issue identification; methodological approach; and critical conclusions.

KEYWORDS: Stitch; Agricultural re-migration; common-ground
The Analytical framework aims to investigate and uncover potential issues and opportunities for intervention. Analysis into historical phenomena; current revelations and realities; as well as future concerns are addressed.
Fig. 3 - Agricultural migration phenomena. Comparing 2006 and 2020 imagery. Google Earth
AGRICULTURAL MIGRATION

In our analysis of Marrakech’s urban morphology we found pivotal functional changes in its urban fabrics. Due to the rapid rate of urbanization the city has been subjected to, most of the existing urban landscape outside of the Medina walls was previously devoted to agriculture and cultivation.

Territorial, urban and local scales have been considered in our analysis, firstly highlighting a general phenomenon of Agricultural Migration on the territorial and urban scales, and a deep functional and morphological conversion on the local scale. For this last lens, we analysed the historical evolution of two different case studies: the Golf City, in the south-eastern part of the Menara district; and the Four Seasons Hotel, to the west of the city walls (see Fig. 3).

Following this analysis we found it crucial to develop a project which would allow for a partial reversal of the agricultural migration. An opportunity to provide and enhance an agricultural corridor that could both serve and be served by the city, as well as aid in a decentralization process shifting the morphological, historical, cultural and functional focus from the Medina towards the neighbourhood of Menara.

Thus came about the proposal for a new centrality to re-connect the disconnected landscape of its peripheral districts with through a new agricultural corridor.
To gain an understanding of the agricultural requirements in the Marrakech region, we felt it crucial to study the existing gardens and their dynamics. As part of the state-of-mind of the thematic studio, it was also crucial to perform a deep study of the local infrastructure of the city’s gardens in order to ensure a contextually sensitive approach. Two examples were considered due to their scale and original functions.

**AGDAL GARDENS**

The Agdal Gardens are located south of the Menara walls, spanning 3.64km². Originally established with the purpose to supply clean water and fresh food for the people of Marrakech, they also served as the royal family’s private pleasure garden. The gardens have now mostly fallen into disrepair and are no longer capable to fully perform their original function. (Med-O-Med, n.d.)

It’s however, in its original purpose and layout where we can extract crucial information regarding the crops, irrigation and circulation systems in Marrakech. Organised as a patchwork of smaller gardens, typical of Hispano-Mauresque style, all the paths are lined by a single row of olive trees planted at 10m intervals, beyond which lay orchards of lemon, cypress, olive and orange trees. In addition to the orchards, a wide variety of local crops could be harvested, including asparagus and figs. (Archnet, n.d.)

The most notable element of the Agdal Gardens was its irrigation system which took advantage of a slight incline towards the north as Marrakech lies at the foot of the Atlas Mountains. Two large reservoirs lie in the southern portion of the gardens, fed by a system of khettras and irrigation channels that would divert snow and rain runoff from the mountains to Marrakech. This not only provided irrigation to the gardens, but also potable water to the residents of Marrakech. (Marrakech Tricks, 2020)
MENARA GARDENS

Substantially smaller in scale, the 1km2 Menara Gardens lie to the west of the Medina. Originally connected by a direct road to Bab al-Mahzan, the gardens today are connected to the Medina by the Avenue de la Menara, linking directly to the southern edge of the gardens most prominent feature: the Menara Basin. (Med-O-Med, n.d.)

Originally fed by the same irrigation system used in the Agdal Gardens, the Menara Basin provides irrigation for the gardens through a complex network of underground water channels which rely on the land’s topography. (Archnet, n.d.)

The surrounding orchards of olive, cypress and fruit trees are planted on a ten-meter grid, bordered by a network of ten-meter wide dirt paths. The regular grid interrupted by the entrance path connecting the elevated reservoir to the Medina, hosted by a small sub-garden planted with a lush variety of trees and flowering plants, functioning as a conceptual threshold between the city and water basin. (Archnet, n.d.)
Fig. 4 - Project Scheme. Key aspects of decentralization; cultural corridor; and agricultural corridor
In our search for the most critical space in which to intervene, with initial considerations made on Place de la Jeunesse, the guest lecture held by Mr. Karim El Achak and Andrea Mannocci provided us with clarity and local knowledge. Thanks to their scientific contribution to the experience of the studio and some revelations, our attention shifted towards the most important and relevant location: the Menara Terminal Airport.

After the presentation by Mr. Karim, he pointed out that the plan of the government is to transfer the airport from the current Menara district location in order to improve the city’s infrastructure, vital in a city where tourism is a fundamental part of the economy. Thus, our attention shifted towards the terminal area, aware of the near future plans and trying to provide an alternative solution for the transformation of the area.

The Menara Airport, currently host to one of Morocco’s international air terminals, and the adjacent military grounds, span an area of 5,77km2. With the 2025 transfer of the airport terminal to an alternate site and the resultant move of the military quarters, the resultant void will provide an opportunity to stitch together what are now a series of fragmented urban fabrics.

The first exercise in this sense has been to collect the technical documentation about the airport buildings, spaces and services specifically for the Menara terminal – in this way we could start thinking about which facilities could remain and be reused. With the use of a series of detailed drawings and aerial analysis, we identified spaces that could be converted and used to support the proposed functions. We also identified the existing airport infrastructure, such as the underground water system, crucial in an agricultural system.
Fig. 5 - Water and waste system overview. Existing water and waste network + proposed water and waste network
EXISTING SYSTEMS

Our proposal relies on natural resources as its drivers, considering water and agricultural infrastructure as the backbone of the whole project development. Due to the climate conditions these were really peculiar aspects to consider. This was emphasised by Prof. Cecilia Fumagalli at the final seminar held on December 21st 2020: nothing is more important for this typology of project than considering the actual conditions of implementation of the natural infrastructure, not only throughout the space, but also considering time (seasons and day-night time).

WATER SYSTEM

Marrakech water supply is managed by two firms, namely Onee and Radeema. Radeema is responsible for most water supply to the urban areas and the city, while Stepp covers some agricultural areas in the west (Figure 5: blue indicates water distribution area by Radeema) (World Bank, 2017).

For the purposes in understanding the existing water network, this study will focus on the resources available in the Radeema water infrastructural network. Currently, Marrakech is supplied by two primary water sources: the Sidi Driss dam fed by the larger Hassan dam in the east; and the Lalla Takerkoust dam in the south (Radeema, 2021). Gravity pipes are used to transport the water across great distances to WTP Rocade distribution point; where it is stored, treated, and dispersed (World Bank, 2017)(Radeema, 2021). In 2016 Marrakech’s demanded water supply was 66 Mm3/year, with the two dams supplying 57 Mm3/year (World Bank, 2017). To make up the remaining 9 Mm3/year, Marrakech uses freshwater allocations from the irrigation sector (World Bank, 2017).

By 2050, the water demand is expected to be 93 Mm3/year with the increase of population – and issues regarding silting are starting to affect the existing dams that supply Marrakech (World Bank, 2017). The city already has plans to add the large Al Massira dam in the north, by developing a 100km long pipeline network to reduce stress on the water system (World Bank, 2017).

AGRICULTURAL SYSTEM

In Marrakech, agricultural production exists in the form of citrus, olive, date, wheat, and sugar beets. These are done at large scales, and contribute towards the economy (NGA, 2021).

The growth cycle and yield times can be seen in figure 6. While agricultural activity exists in Marrakech, it is dominated by large scale farmers, with very few agricultural activities devoted towards small scale middle class, something highlighted in Plan Generation Green Maroc 2020-30 (Philip, 2020).
Fig. 6 - (left) Green systems. Harvest table and Yield table. (right) Planting table and irrigation schedule.
Fig. 7 - Analysis of industrial underuse and agricultural migration
INDUSTRIAL UNDER-USE

In the area surrounding Marrakech’s train station and yards, an industrial area is present, which currently exists as largely underused.

Many former factory buildings exist as empty lots, a line of them existing along the N8 (see figure 7). As well as underused industrial facilities, many empty lots and brownfields exist in this area, creating a fragmented landscape. We see the aftermath of an era of industrial decline and are faced with challenges in adapting these spaces to better contribute towards future Marrakech.

The relocation of the Menara Airport may echo the effects that decline in industrial necessity had on the landscape—a new void in the landscape. The military area, which occupies most of the land north of the airport, is expected to move with the airport, with many of their operations dependent on the airport’s runway. This area will soon fall too in a classification of ‘underuse,’ but now on a scale far greater than the industrial phenomena (an area greater than five times that of the Menara Gardens).

The airport exists as a barrier between two de-centralized residential fabrics: Menara West and Menara South West (see figure 7). The new activities and interventions that arise out of new land, should answer to connect these disjointed fabrics, and perhaps de-centralize the Medina orientated urban landscape.
Here, key issues extracted from a broader analytical investigation are presented. These key issues are to be expanded upon and helped to inform the brief our project answered to.
ISSUES
WATER SYSTEM

Morocco is a water stressed nation, with dams filling to only 45% in 2020 (Kasraoui, 2020). New and innovative approaches to water collection and reuse are a top priority. Morocco World News reports a loan from the Spanish government to build two seawater desalination plants in the Guelmin-Oued region and Marrakech-Safi region (Kasraoui, 2020). With regards to Marrakech, the Moroccan government has plans to add the large Al Massira dam in the north, by developing a 100km long pipeline network to reduce stress on the water system (World Bank, 2017).

Seawater desalination has been a means for Morocco to gather water for a while, and there are plans to link a seawater de-salination plant (Safi and el Jadida), currently linked to the Massira dam, directly to Marrakech (ibidem). The world bank also motivates for the desalination of brackish water for aquifer recharge, and has identified 3 sites for optimal yield: Oued Rherhaya; Oued Ghdat; and Oued Zat. Marrakech already makes use of an innovative water recycling facility (WTP Stepp), in the north of Marrakech. This waste-water treatment plant uses organic matter to treat polluted water (Mandi and Ouazzani, 2013). While the process is of great interest, it is limited to a capacity closer to current water consumption rates, and may not be able to keep up with expanding populations.

Focusing on our site, our project considers the newly available water supply chain and non-conventional methods are to be employed as water collection strategies for the large agricultural area we propose. Our project revolves around two water collection and distribution points in the east and west ends of the site, with a channel connecting them for distribution (see figure 5).

Fog harvesting has proved to be a good method for water collection in arid climates, with very little infrastructure required (Dar Si Hmad, 2015). The largest fog collecting system is located in Morocco, supplying water to rural villages in the Anti-Atlas mountains (ibidem). The requirement is a difference in temperature between the low and dew point of 2°C, which Marrakech meets for more than 6 months of the year (WeatherSpark, 2020). Residential southern expansion fringes will be equipped with gravity inspired grey-water systems, using the natural land-gradient to replenish water supply.

Aquifer recharge by means of brackish desalination has already been motivated as a high yield, low cost method for water supply, and due to it’s low visual impact and benefits, we propose to integrate one on our site. To alleviate stress on the Waste-water treatment plant (Stepp), we plan to introduce a new one, which will use the organic matter supplied form the agricultural activities on site. Our site also employs natural treatment methods: the use of a wetland both increases biodiversity, but also acts as a natural filter for semi-polluted water.
AGRICULTURAL SYSTEM

Plan Generation Green Maroc 2020-30 builds on the previous green plan of 2008, which now aims to have agriculture as driving force in job creation and GDP (Philip, 2020). Goals of this plan include the promotion of the human element and an agricultural middle class; young farmers; job creation; and a 250 Billion contribution to GDP in 2030 (Philip, 2020).

Our project aims to respond to this call, employing a methodology of circular economy as well as urban residential development. To the South-west of the Menara Gardens, we install and agricultural CBD, using existing warehouse infrastructure and with a direct route to the train station for distribution. Crops have been organized into categories using yield time; seasonality; and user as key sorting elements (fig 6). These have been ordered and orientated in proximity to the Agri CBD, taking dependency and frequency into account. Categories include (from closest to furthest from Agri CBD): ‘city fast crop’; ‘city slow crop’; ‘local allotment’; and ‘local subsistence’. Figure 6 shows how all these crops are organized; what crops exist within each category; as well as what irrigation infrastructure and water supply each group of crops requires.

The existing terminal building is to become a sustainable institute, which will have a direct hand in both education, and the managing and observation of agricultural activities. Public buildings for the exchange of knowledge and agricultural products/resources are placed strategically to allow for a common ground between the two separated residential neighborhoods to the north and south. The agricultural CBD is responsible for the growing and production of all ‘city’ related crops; while the ‘local’ crops are categorized into two uses: allotment based growing and subsistence based growing. The idea here is to enable and encourage local middle-class farmers to grow produce at the center of this operation, but also cater for those who are only interested in growing for themselves (fig 6).
Fig. 8 - Circular production and distribution economy. Water system and organic waste system.
A key-element of the project, as part of the process to understand the socio-cultural aspect of the space in which we propose to intervene, is the identification of circular economy strategies in order to maximize the profits and minimize the impacts. In this regard, we put a lot of attention on the economy of water as one of the drivers of the project, as well as the waste and production cycle, to have a green infrastructure that serves and is served by the city.

The first, related to water, deals with the backbone of the project and follows the system from the collection of the natural resource up to the final disposal and reuse process. In an agricultural project it is crucial to understand not only the source and availability of water, but also how to implement it and the actual needs of the project. In the Fig. 8 we can see the different steps of the water management: starting at a dedicated infrastructure it is transferred to the highest point of the area (on the east side) to be distributed along the main spine of the project to all the agricultural fields; to then be redirected to the recycle plant through a series of dedicated pumps in the lowest point (on the west side).

Simultaneously, Fig. 8 shows the cycle concerning crop production and waste recycle system: from crop production, through processing, transport, and eventual recycle (or disposal). The various facilities present in the project allow for all the aspects of food management to be involved, including commercial and secondary sectors.
Due to the large scale of the project; and the many layers involved in the objectives and aims, we saw it necessary to develop a methodology. This aimed to facilitate in programmatic functions; phasing time line location; and identify actors involved for each action we chose to impose.
METHODOLOGY
Botanical garden, based on local flora. Recreational walk and wandering activities. Education area for smart, water wise plants. Sustainable institute involved in study and maintenance. Therapeutic environment for hospital (trauma patients).

Program matrix
Array of functions that compose card and masterplan element

Program
Colour and graphic of program shows origin, allowing user to understand actions in each masterplan element eg. walk / wander; bicycle path from Park: Rec. card

Detailed timeline location
Location of card use, in overall phasing logic

Card title / category
Colour, symbol and title as found on masterplan

Card Description
Brief description of card contents

Card timeline location
Phase location and progress bar

Card fold-out
Card to fold out to revel contents

Fig. 9 - Card: Park Botanical
dissection and explanation
CARDS

We developed a series of ‘cards’ to be used as methodological devices to organize and program areas of use. The devices employed, actors involved, as well as the location on the phasing strategy is stated. The categories of the cards follow the logic indicated by the masterplan and were used as organizing elements to deal with a project at such a vast scale. These cards were used to inform and were unpacked in explorations through sections and 3D visualizations. The card categories and descriptions are indicated below (cards are annexed at the end of this report)(see figure 9 for dissection of card):

AGRI: LOCAL ALLOT.
Local agricultural growing, based on allotment allocation. Combination of fast and slow yields. Recreational walking and wandering activities. Pedestrian bicycle lanes. Focus on public interaction and community ownership.

AGRI: LOCAL SUB.
Local agricultural growing, based on subsistence needs. Fast, low maintenance yields, to be used by residents, in new and existing urban fabrics. Focus on public interaction and community ownership.

AGRI: CITY FAST
City agricultural production based on a quick yield rate. Recreational walking and wandering activities. Pedestrian bicycle lanes. Sustainable institute involved in study and observation of growing and produce.

AGRI: CITY SLOW
City agricultural production based on a slow yield rate. Fog harvesting introduced. Recreational walking and wandering activities. Pedestrian bicycle lanes. Sustainable institute involved in study and observation of growing and produce.

AGRI: UTILITIES
Agricultural utility area, for technical monitoring and support of agricultural activities, across all agricultural scales. Livestock to aid agricultural product. Storage of machinery, tools, seed and fertilizers. Sustainable institute in-site research and observation.

PARK: BOTANICAL
Botanical garden, based on local flora. Recreational walk and wandering activities. Education area for smart, water wise plants. Sustainable institute involved in study and maintenance. Therapeutic environment for hospital (trauma patients).
PARK: REC.
Recreational park area, with focus on leisure activities. Recreational walking and wandering activities. Pedestrian bicycle lanes. Running path / track. Focus on public interaction and community ownership.

PARK: ECO.
Eco wetland park, to improve biodiversity of area. Focus on attraction of animals / insects associated. Wetland as natural filter. Recreational walking and wandering activities. Sustainable institute involved in study and maintenance.

PARK: SPORT
Sports park area, with focus on fitness / active activities. Recreational walking and wandering activities. Pedestrian bicycle lanes. Running path / track. Muced campus sports and fitness area.

WATER

RE-USE
Water + organic recycling plant. Focus on water treatment and re-use. Involvement of natural wetland as filtering process. Organic matter recycled and turned to fertilizer. Sustainable institute involved in study and management of water re-use.

AGRI CBD
Agricultural CBD, with focus on the management, selling and export of agricultural goods. Residential mixed use. Office and light industrial. Agricultural and water management. Agricultural facilities and utilities. Sustainable institute involved in study and observation of growing and produce. Focus on public interaction and community involvement. Recreational walking and wandering activities. Accessible by pedestrian bicycle lanes.

PUBLIC
Public facilities, with focus on community development; exchange; space for conversation and the buying and selling of goods. Space for exhibition and events. Recreational walking and wandering activities. Accessible by pedestrian bicycle lanes.
EDUCATION: S.I.
Sustainable university institute, with a focus on education, the study, and management of the agricultural network and systems. Experimental grow and research areas. Involvement in water and agricultural management and re-use.

EDUCATION: HEALTH
Medical university campus and residence around existing hospital. Residence to have local agricultural opportunities.

STRETCHABLE FABRIC
Residential neighbourhoods, with focus on local agricultural opportunities, community development, and economic opportunities for commercial activities. Stretchable and malleable to needs of the city during phasing timeline.

SERVICE
Service areas, for assistance to cars and pedestrians.
Fig. 10 - Phasing approach for project proposal
In order to approach a project of such a scale, we found it crucial to set out a proposal for a phased approach, spanning over the course of thirty years. Not only do we find this approach necessary due to the time span required for the natural elements of the agricultural landscape to truly embed themselves into the environment, it also establishes a self-financing cycle.

The initial phase of the development, beginning in 2025 once the airport terminal has officially moved to its new location, begin to establish an ecological cycle, providing the foundations of the agriculture and water reuse systems. The establishment of agricultural plots provides inhabitants, smaller and larger businesses the opportunity to rent the available allotments. This both provides the necessary funding for the further development of the grounds, whilst also offloading the tasks of developing the land to the local population, who in turn will be able to self-sustain or sell their produce. Alongside the development of the natural landscape, we propose the repurposing of the existing terminal building into a sustainability institute, on the one side providing crucial innovative research on local sustainability resources, on the other hosting a large multifunctional space, to be used for international conferences, innovative expositions and the like.

Following this initial phase, we propose the introduction of public infrastructure on the grounds. This includes spaces where local farmers, both independent and local businesses, can sell their goods and produce to the people of Marrakech, providing increased accessibility to local markets for the inhabitants who find themselves in the western outskirts of the Medina.

With the relocation of the military base, currently located north of the airport terminal buildings, we propose the introduction of education facilities, on the one side hosting functions linked to the sustainable institute, on the other the establishment of a health campus adjacent to the existing hospital.

Due to the predicted length of the construction period, the outer edges of the development have been considered as ‘stretchable fabric’. Where we propose, in the current social and economic climate, the development of new residential fabrics, the phasing plan allows for these fabrics to be flexible in their function, responding to socio-economic changes in the context. This ensures that the finished proposal in 2050 will not stale, responding to the needs of 2020, but one which will have evolved alongside its context and will have responded to contemporary socio-economic demands.
Here we aim to reflect upon some of the findings which came out of investigation, as well as our experience of the course. Comparing our approach and understanding from beginning to end is done; a reflection on the skills learnt and knowledge gained.
OBSERVATIONS
CLOSING REMARKS

The experience of the Thematic Studio was critical in our learning as it provided an alternative architectural lens to what would otherwise be a widely Eurocentric curriculum. Whilst doing a project in a context we were unacquainted with and were not able to visit, the active critical questioning of our biases was not only more crucial, but also more challenging.

As future architects, studying a Master’s in Architecture and Urban Design, we must be acquainted with designing at an architectural scale, observing the built environment, as well as understanding social space. An aspect which has proven to be extremely relevant in all moments of design, from analysis, to final proposal, is that of socio-spatial contextualization. As architects we cannot de-contextualise our proposals, expecting them to fit in any location. We must design thoughtful and context sensitive spaces which respond to specific social, political and physical landscapes.

The Menara Sew-Port project, as well as the preliminary research activity (ndr. Stage 01 – The report), paid careful consideration to the socio-spatial landscape of Marrakech, considering the notion of ‘in-between’ through a series of lenses: from a geographical point of view connecting the different scales of the project, from territorial through to urban and local; as well as considering the cultural and functional elements of the city. The proposal in this case makes use of corridors, specifically the agricultural corridor, that serves and is served by the city. This not only focuses on a decentralization of the city from the Medina towards the Menara district, but also “stitches” together different realities in the multifaceted city that is Marrakech.

We have observed how the Menara is a critical cross-way of different conditions, functions and neighbourhoods that are spatially or socially segregated. The Menara Sew-port provides and equilibrium for these aspects, responding to the perspectives of residents from a variety of socio-economic backgrounds.

The guest lectures and experiences offered in this course provided us with the key ingredients to propose a project which would act for the people of Marrakech, whilst at the same time grounded in the in the context of the city: a site poetically designed by the city itself, conceived not as an island, but as an extension of Marrakech, as an organic and natural flow.

In conclusion, what we take home from this 6-month experience is the ability to design through contextually sensitive processes which enable the final product to both serve and be informed by its context and people. A crucial shift in perspective from that of Eurocentric architectural attitudes, towards one of Global architectural consciousness.


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ANNEX

Cards 1-17, with programatic functions and descriptions.

**AGRI: LOCAL ALLOT.**

Local agricultural growing, based on allotment allocation. Combination of fast and slow yields. Recreational walking and wandering activities. Pedestrian bicycle lanes. Focus on public interaction and community ownership.

1-2: drip irrigation; water visual
3-6: citrus; olive; date palm; sugar beet
7-13: peas; carrots; tomatoes; beetroots; peppers; potatoes; turnips
14-15: onions; melons
16: mint + herbs
17-18: walk/wander; bicycle path
19: community ownership

**AGRI: LOCAL SUB.**

Local agricultural growing, based on subsistence needs. Fast, low maintenance yields, to be used by residents, in new and existing urban fabrics. Focus on public interaction and community ownership.

1-2: water visual; local irrigation
3-10: peas; carrots; tomatoes; beetroots; peppers; potatoes; turnips
11-12: onions; melons
13: mint + herbs
14: community ownership

**AGRI: CITY FAST**

City agricultural production, based on quick yield rate. Recreational walking and wandering activities. Pedestrian bicycle lanes. Sustainable institute involved in study and observation of growing and produce.

1-2: drip / tech / hydro irrigation; water visual
3-10: peas; carrots; tomatoes; beetroots; peppers; potatoes; turnips
11-12: onions; melons
13: mint + herbs
14-15: walk/wander; bicycle path
16: S.I study + observation

**AGRI: UTILITIES**

Agricultural utility area, for technical and water management. Agriculture to aid agricultural production. Involvement of natural wetland as habitat.

1-3: chichen coop; silk worm farm; seedling storage / prep area; seed storage
4-7: poppy; net; water visual
8: community events
9-10: seedling bank; water management
11-12: green house; agri r&d; S.I study + observation
13: university campus; educational institution
14: gray water reuse
15-16: university residence; local agri: agricultural network
17: university residence; local agri: agricultural network
18: commercial mixed use; office + residential
19: community development
20: medical campus sports area
21-22: running path; skateboard park
23: community events
24: residential fabric; local agri: management, selling and export of agricultural goods. Residential mixed use. Stretchable and malleable to needs of the city during phasing timeline.

**THE MENARA SEW-PORT**

Irrigation methods. Water sources. Water distribution, collection and management. Water system. Focus on collection, distribution; ex water collection / irrigation storage; material storage
9-10: irrigation storage; material storage
11-13: irrigation storage; material storage
14: community events
15-16: irrigation storage; material storage
17: water recycling
18: car parking
AGRI: CITY SLOW

City agricultural production, based on a slow yield rate. Fog harvesting introduced. Recreational walking and wandering activities. Pedestrian bicycle lanes. Sustainable institute involved in study and observation of growing and produce.

1-3: fog harvest; drip / tech irrigation; water visual
4-7: citrus; olive; date palm; sugar beet
8-9: walk/wander; bicycle path
10: S.I study + observation

AGRI: UTILITIES

Agricultural utility area, for technical monitoring and support of agricultural activities, across all agricultural scales. Livestock to aid agricultural product. Storage of machinery, tools, seed and fertilizers. Sustainable institute in-site research and observation.

1-3: chichen coop; silk worm farm; donkey paddock
4-5: Irrigation storage; material storage
6-8: machinery storage; tool storage
9-10: seedling storage / prep area; seed storage
11: S.I study + observation

PARK: BOTANICAL

Botanical garden, based on local flora. Recreational walk and wandering activities. Education area for smart, water wise plants. Sustainable institute involved in study and maintenance. Therapeutic environment for hospital (trauma patients)

1-3: drip / tech irrigation; evaporation net; water visual;
4-7: waterwise aloe + succulants
8: poppy
9: rose
10-11: walk/wander; bicycle path
12-13: Educational outing; S.I study + observation
14: Therapeutic garden for trauma patients
PARK: REC.

Recreational park area, with focus on leisure activities. Recreational walking and wandering activities. Pedestrian bicycle lanes. Running path / track. Focus on public interaction and community ownership.

1: water visual
2-3: relaxation areas; outdoor cinema; open usable area
4-5: walk / wander; bicycle path
6: running path
7: community events

PARK: ECO.

Eco wetland park, to improve biodiversity of area. Focus on attraction of animals / insects associated. Wetland as natural filter. Recreational walking and wandering activities. Sustainable institute involved in study and maintenance.

1-2: water recycle; water visual
3: wetland
4-7: insects; fish; frogs; birds
8-9: walk/wander; bicycle path
10-11: Educational outing; SI study + observation
12: Therapeutic garden for trauma patients

PARK: SPORT.

Sports park area, with focus on fitness / active activities. Recreational walking and wandering activities. Pedestrian bicycle lanes. Running path / track. Med campus sports and fitness area.

1-4: football / sports; outdoor gym; running path; skateboard park
5-6: walk / wander; bicycle path
7: Med campus sports area
Water + organic recycling plant. Focus on water treatment and re-use. Involvement of natural wetland as filtering process. Organic water recycled and turned to fertilizer. Sustainable institute involved in study and management of water re-use.

1-2: water recycling; wetland filter
3-4: plant re-use; fertilizer production
5: agricultural material re-use
6-7: SI study + observation; agri CBD management

Agricultural CBD, with focus on the management, selling and export of agricultural goods. Residential mixed use. Office and light industrial. Agricultural and water management. Agricultural facilities and utilities. Sustainable institute involved in study and observation of growing and produce. Focus on public interaction and community involvement. Recreational walking and wandering activities. Accessible by pedestrian bicycle lanes.

1-2: residential fabric; local agri substance
3: commercial activity
4-5: community development; meeting and discussion / business exchange
6: office / work
7-8: logistics for agri transport network; water management
9-10: irrigation storage; material storage
11-13: machinery storage; tool storage
14-16: seedling storage / prep area; seed storage; SI study + observation
17-18: walk / wander; bicycle path


1-3: water visual; new water collection / distribution; ex water collection / distribution
4-6: water management; sustainable institute involvement; agri CBD involvement
7-10: drip / tech / hydro irrigation; drip / tech irrigation; drip irrigation; local irrigation
11-13: fog harvest; gray water system; aquifer desalination recharge
14-16: (new) massira dam; (ex) sidi driss dam; (ex) lalla takerkoust dam
17: water recycling
Public facilities, with focus on community development; exchange; space for conversation and the buying and selling of goods. Space for exhibition and events. Recreational walking and wandering activities. Accessible by pedestrian bicycle lanes.

1-2: local irrigation; water visual
2-5: conversation / interaction; community development; trade; exchange
6-7: exhibition; event area
8-9: walk / wander; bicycle path

Sustainable university institute, with a focus on education, the study, and management of the agricultural network and systems. Experimental grow and research areas. Involvement in water and agricultural management and re-use

1-3: water collection; gray water re-use; water visual
4-5: university campus; educational institution
6-7: university residence; local agric subsistence
8-10: green house; agri r&d; SI study and observation
11-12: seedling bank; water management

Medical university campus and residence around existing hospital. Residence to have local agricultural opportunities.

1: gray water reuse
2-3: university campus; educational institution
4-5: university residence; local agric subsistence
6: existing hospital
Residential neighborhoods, with focus on local agricultural opportunities, community development, and economic opportunities for commercial activities. Stretchable and malleable to needs of the city during phasing timeline.

1-2: local irrigation; water visual
3: gray water re-use
4-5: residential fabric; local agr: substance
6-7: commercial mixed use; office + small business
8: community development