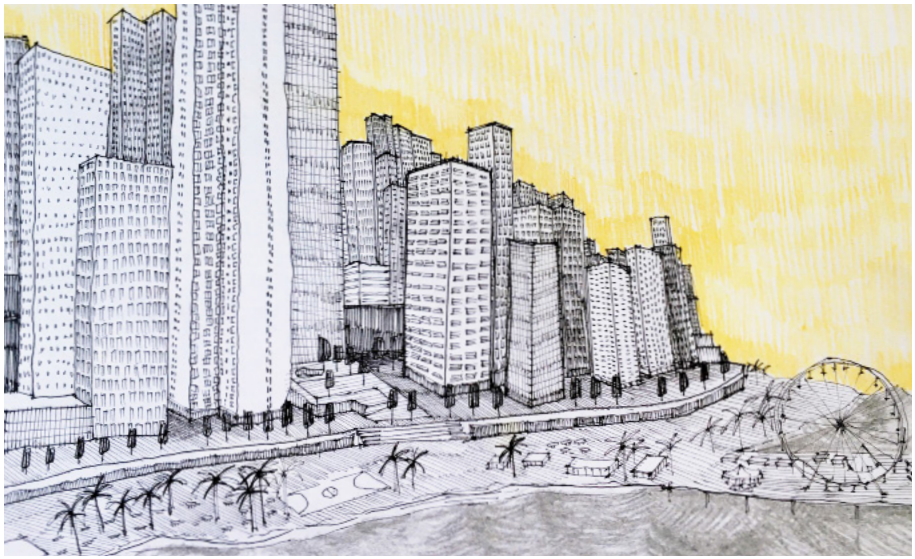
HONG KONG TOMORROW

145.777/ PU Hong Kong +

SS 2019



Bettina Glöckler
Zuzana Kropšová
Aline Lugner

145 Institut für Städtebau

AUTORINNEN

Bettina Glöckler
Mat.Nr. 01131491
Zuzana Kropšová
Mat.Nr. 11820428
Aline Lugner
Mat.Nr.1325647

145.77/ PU Hong Kong +
SS 2019
Wolfgang Dokonal, Ass.Prof.Dipl.-Ing.Dr.techn.

Institut für Städtebau
Technische Universität Graz
Rechbauerstraße 12/II
A-8010 Graz

INTRODUCTION

What we wanted to achieve?

Our project is basically our reaction to the planned project of an artificial island Lantau Tomorrow. We find such a massive land reclamation invasive and unsustainable. In the same time, we see potential in Hong Kong's already existing structures. We wanted to improve the current life conditions and add new housing developments into this rapidly growing metropolis. Our main aim was to offer more public space and greenery which is lacking in the densed urban areas but on the other hand is enormous on the surrounding hills. We wanted to make this beautiful greenery more accessible for everyone. We researched that almost all of the Hong Kong inhabitants either use public transport or walk. We find this behaviour outstanding and want to support it even more. For that reason, is human scale and pedestrian friendly environment the most important feature for us. The greatest potential for achieving all of this we see in capping the motorways. Capping the motorways is basically hiding the motorway in a tunnel and using the surface. This method is nowadys mostly used in the USA for building parks. Nevertheless, we would like to take this approach further. It is a very beneficial strategy. Thanks to capping the motorway we are getting rid of the barriers, which motorways undoubtedly are. Simultaneously, we are adding value to the surrounding properties and creating new land opportunities. Most importantly we create a healthier and relaxed enviroment for the inhabitants. At the beginning of our work, we were analyzing the map of Hong Kong in order to search for appropriate motor ways to cap. Then we decided on one particular option and on this example we wanted to show our strategy. This strategy can be afterwards (with some small adjustments) brought to other areas of Hong Kong City. The first part of our work is about analyzing and creating strategies. In the second part we were concentrated on more detailed planning of the main square . The third part is about searching the ways of building on the slopes.

„Why would you design something if it didn‘t improve the human condition”

Niels Diffrient

HIGHWAYS WORTH CAPPING

Possibilities of capping highways

Nevertheless, for our project we wanted to introduce one particular area (red line) to demonstrate there our idea about capping strategies and how to adapt them to a diverse and changing environment. We believe that our plan could be used (with certain adjustments) also in other marked territories. We also believe that this unique approach could make Hong Kong even more extraordinary.

SITE ANALYSIS

Our approach

In the following analysis, we described the current situation. We were considering three main factors in order to decide about the future possibility of housing development. The first factor is about topography. Whether the land is flat or if the highway finds itself on a slope. The second factor concernes the surrounding built environment. - Is it solely nature or housing? If there is a housing development, there is the further question about privacy. - Is it private or public? The third crucial factor was the situation on the coast (the part of the land that is directly facing the sea). - Is there a beach, are there any amenities, or is there just a highway? This whole analysis helped us to form the opinion about the entire development and the capping strategies.

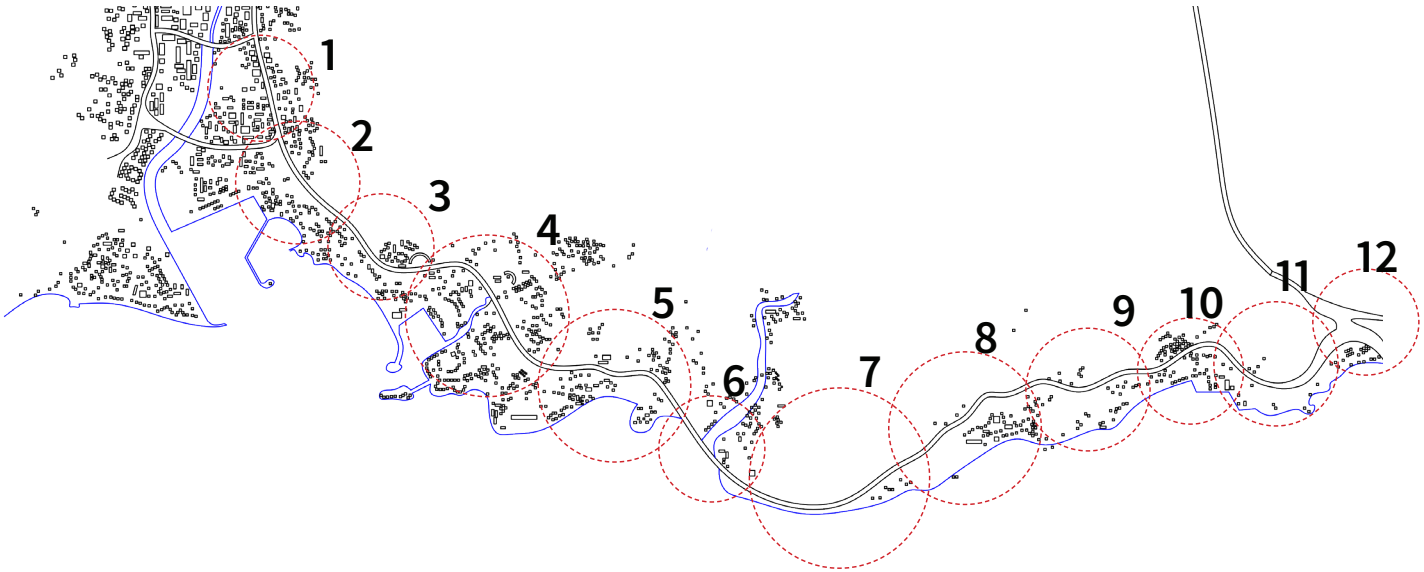
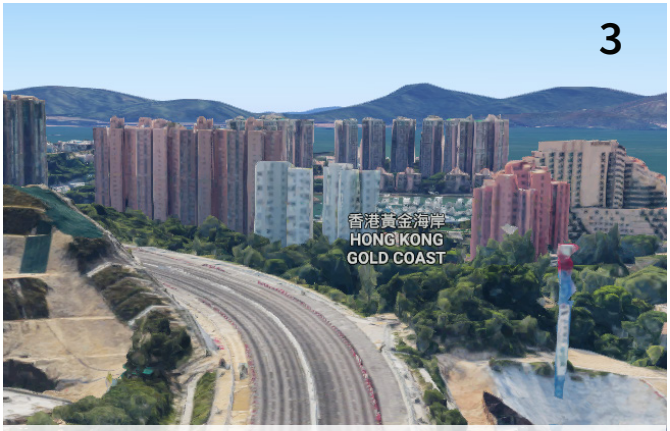


Photo documentation of the current state

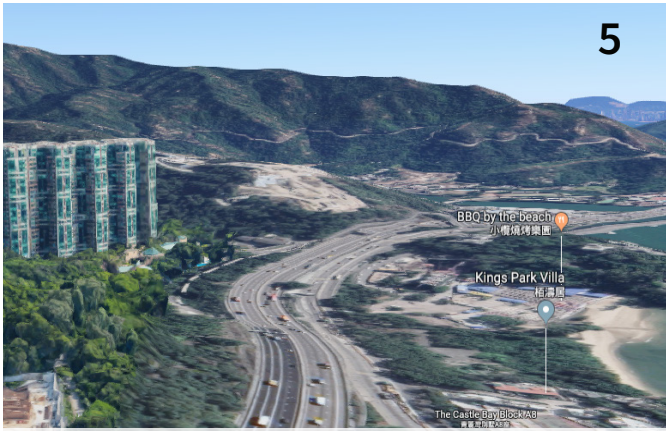
- flat
- densed urban area
- capped motorway with no addition function on the top

- slope
- no housing around the motorway
- greenery around the motorway
- the coast - private housing/ beach/harbour / promenade



- slope
- housing development around the motorway - high rise public
- the coast - high rise + low rise housing (public + private)

- flat
- low density - low rise housing around the motor way
- open motorway
- the coast - high rise + low rise housing (public + private)



5

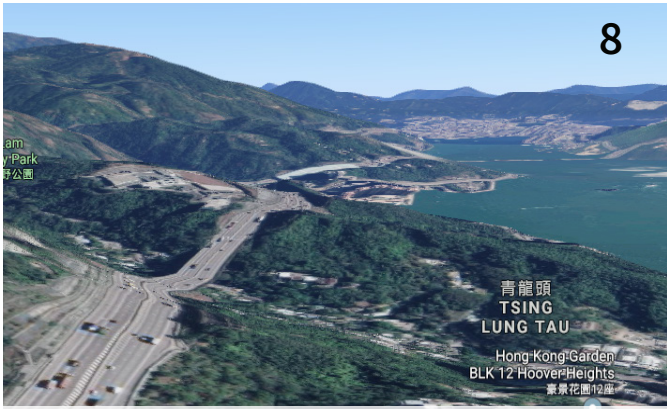
- flat
- high rise low density farer from the coast
- open motorway
- the coast - low rise private housing / beaches

6

- flat
- no housing
- connection - sea/ Tai Lam Chung Reservoir
- open motorway
- bridge over the sea

7

- slope
- no housing
- open motorway
- the coast - motorway



8

- slope
- no housing on the slope
- open motorway
- the coast - low rise private housing / beach

- slope
- no housing on the slope
- open motorway
- the coast - high rise public housing/ beach

- flat + slope
- no housing on the flat land, just the motorway and green
- open motorway
- the coast - slope- high rise (private + public) housing

- flat + slope
- no housing on the flat land, just the motorway, water treatment and greenery
- open motorway
- the coast - slope- high rise (private + public) housing

- slope
- densed urban area
- no housing on the slope
- open motorway

CAPPING STRATEGIES

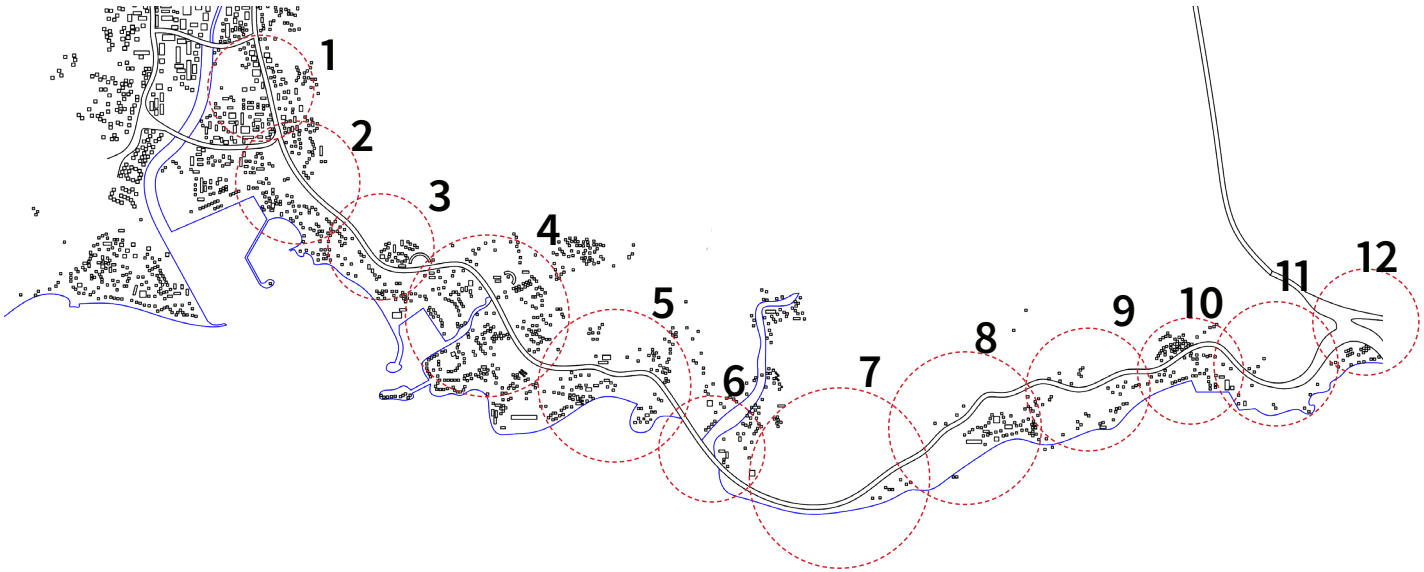
How can the highways be capped?

In the following schemes, we want to introduce our strategy for capping the highway, which is customized on each particular part of this stripe of land. The main aim was to connect the sea (the coast), housing and nature (which finds itself on the slopes). We saw the biggest problem in the barrier which was created by the highway. It means that if we cap the highways this barrier will not exist anymore and the connection can exist. The character of the top of the „tunnel'' changes based on the surroundings. In the dense areas we propose just parks/ public spaces and very less and tiny housing units which are not dense at all. On the other hand, in parts which are surrounded by nothing, we propose very dense and lucrative development.

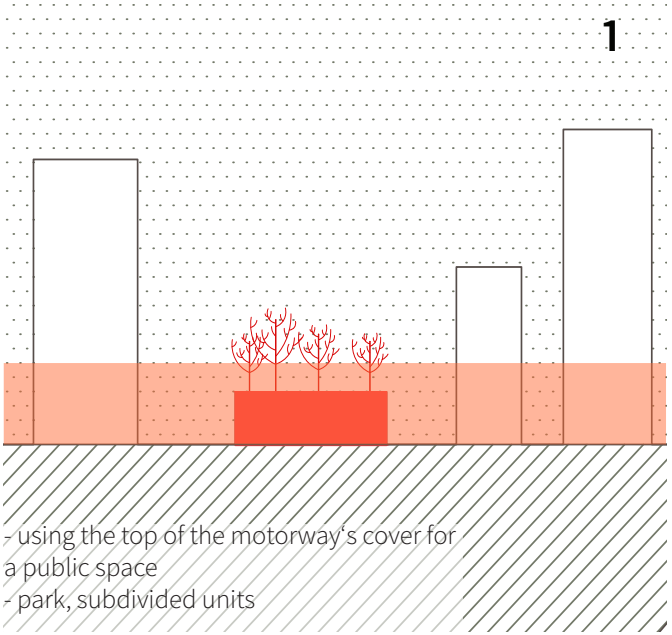
capped highway

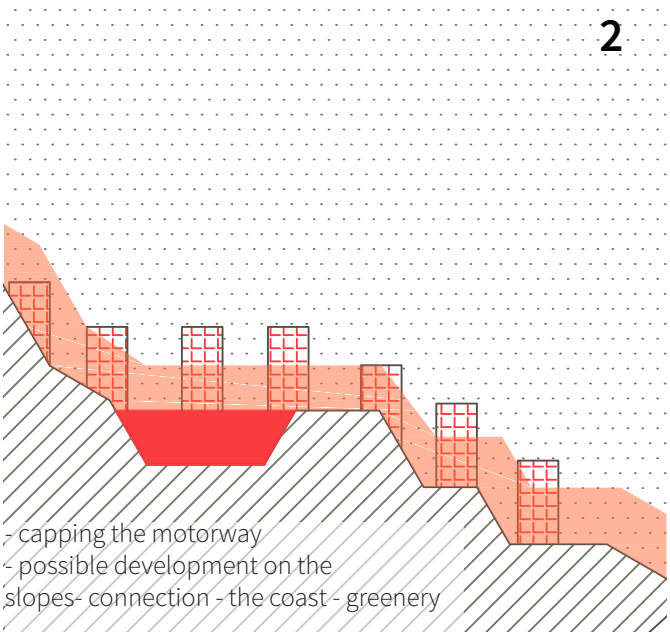
future development

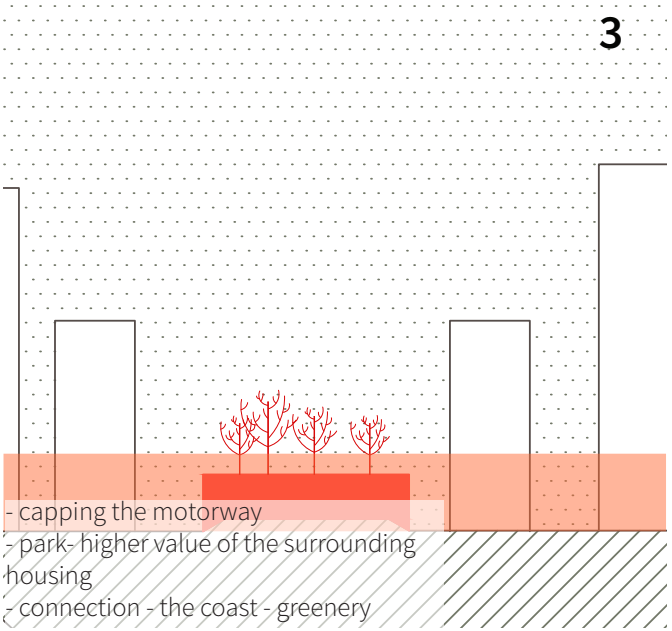
connection

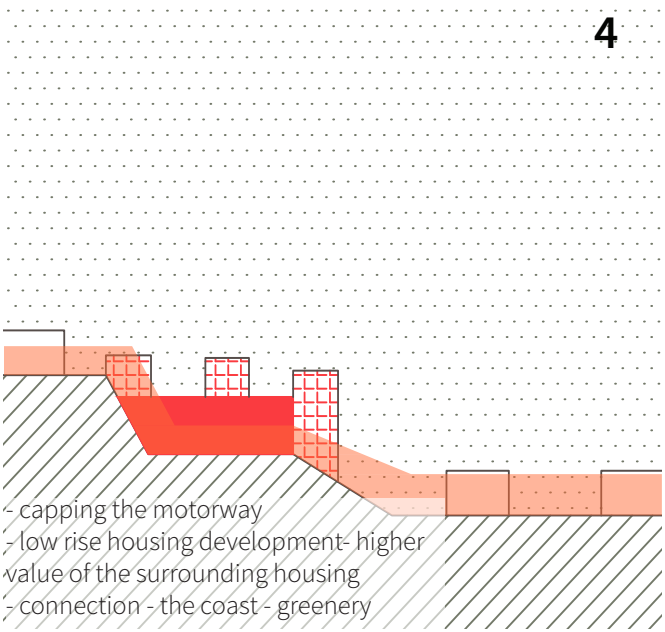


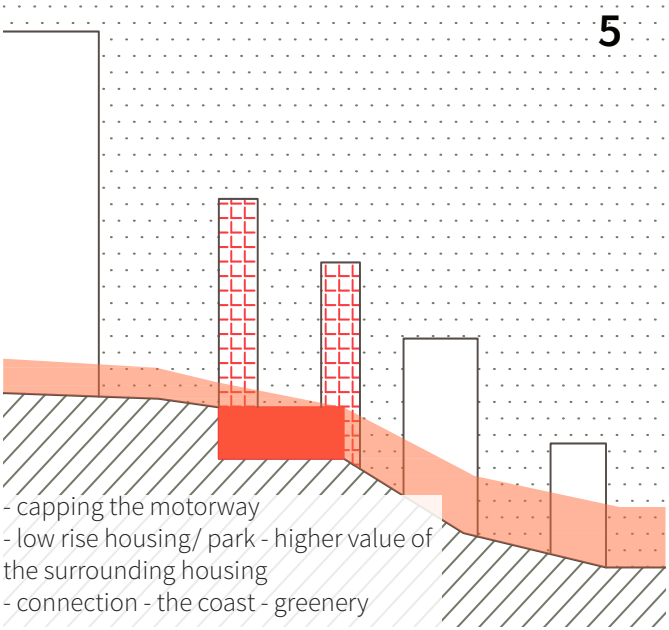
Schemes of the possible development

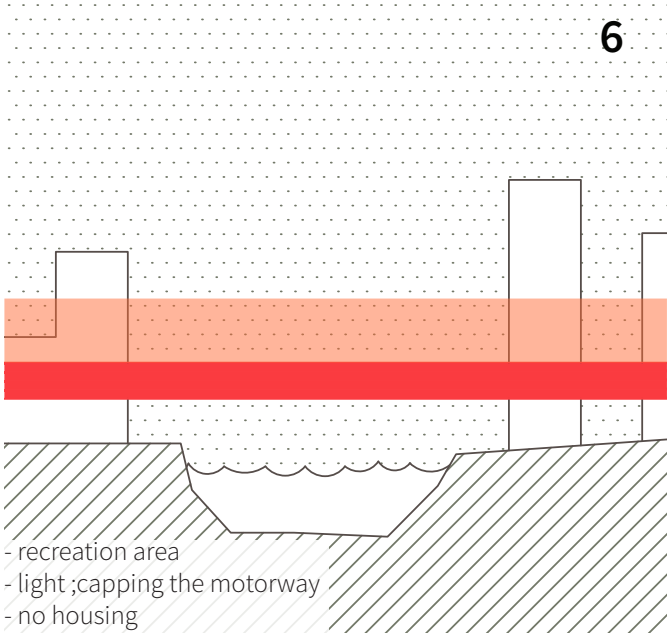


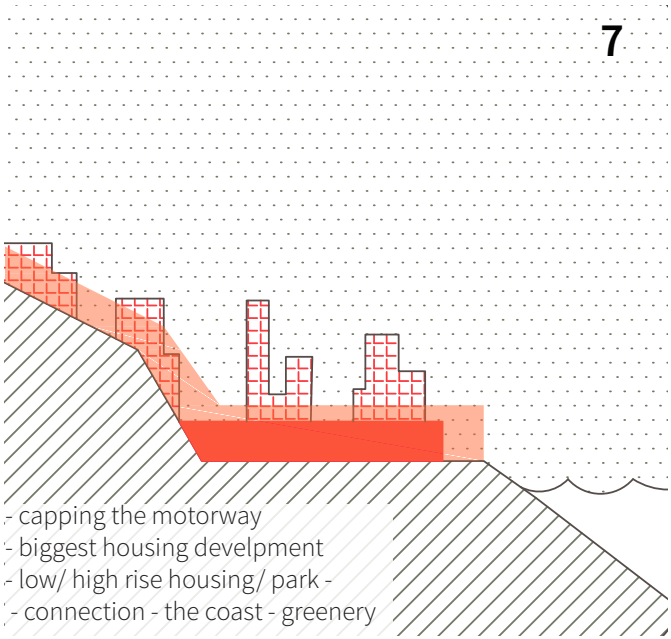


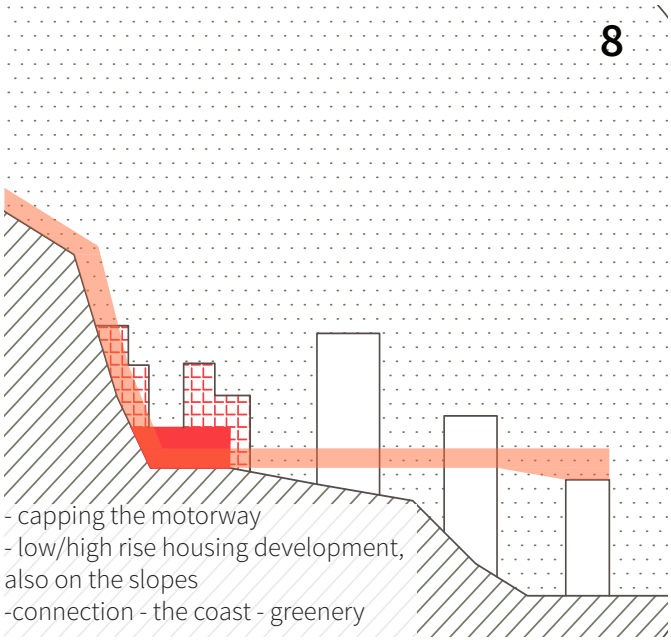


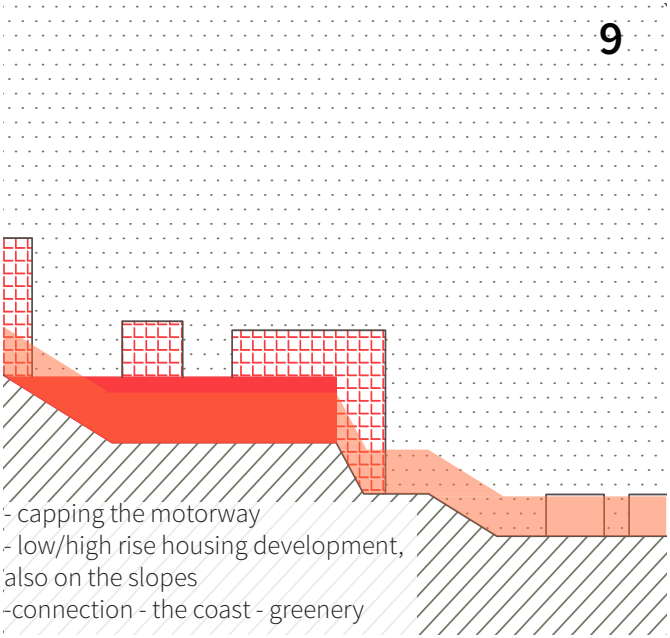


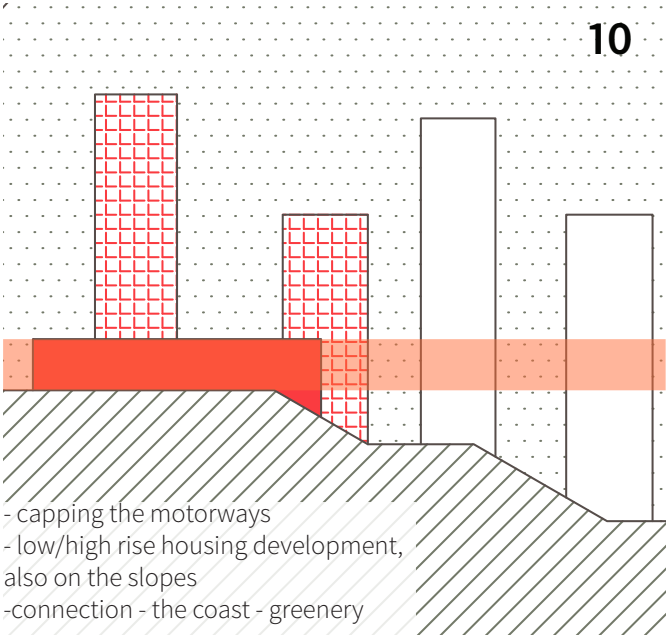

5
- capping the motorway
- low rise housing/ park - higher value of the surrounding housing
- connection - the coast - greenery

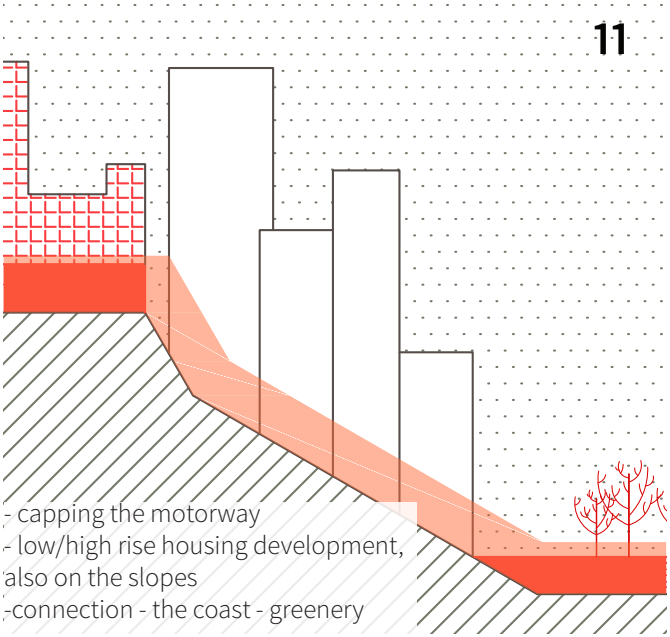

6
- recreation area
- light ;capping the motorway
- no housing

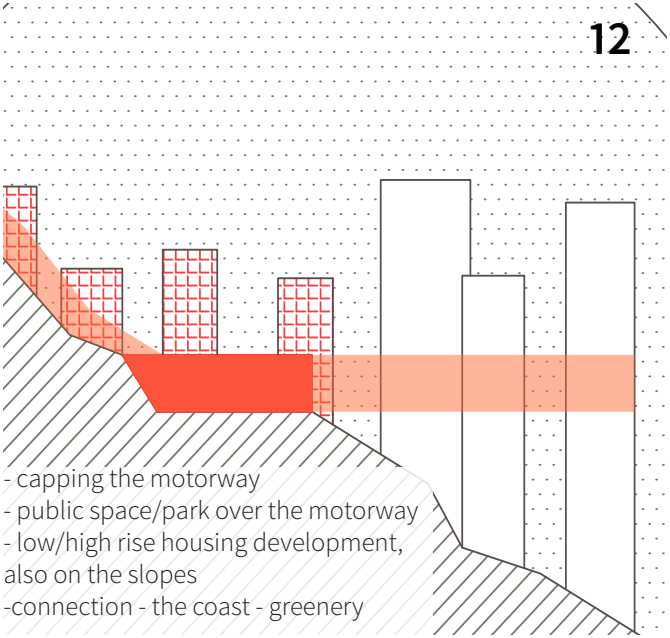

7
- capping the motorway
- biggest housing develpment
- low/ high rise housing/ park -
- connection - the coast - greenery


8
- capping the motorway
- low/high rise housing development, also on the slopes
-connection - the coast - greenery


9
- capping the motorway
- low/high rise housing development,
also on the slopes
-connection - the coast - greenery


10
- capping the motorways
- low/high rise housing development,
also on the slopes
-connection - the coast - greenery


11
- capping the motorway
- low/high rise housing development,
also on the slopes
-connection - the coast - greenery


12
- capping the motorway
- public space/park over the motorway
- low/high rise housing development,
also on the slopes
-connection - the coast - greenery

DISTRICTS DIVISION

The vibe of different areas

Each city has different districts with different vibes. This divisions help to recognise the city more, to create a character and identification. And it leads to the movement of people. It is also helpful for growing communities - people with similar interests live together - and community has the best environment to grow. For these reasons we wanted to create compact divisions and assign each small area of our proposal with a special character. The biggest development will happen in the central business district because of the most propitious situation there nowadays. There is literally nothing except of the highway. The district division is based on different environmental and surrounding situations of the present situation.

central business discrict
-private/public
-business, culture, retail

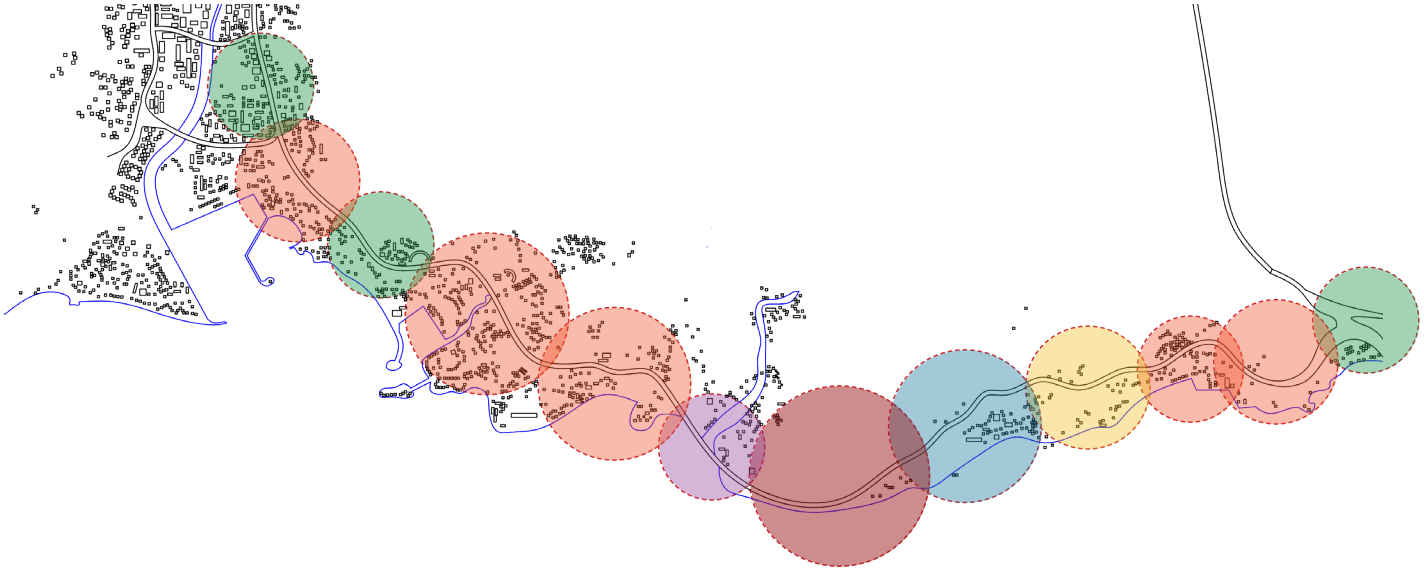
family district
-private/public
-families/seniors/sports

„silicon valley“
-private/public
-start-ups, innovation

recreation district
-private/public
-leisure/nature/sport

university district
-private/public
-students/artists/night life

park district
-private/public
-park/subdivided units



THE NUMBER OF INHABITANTS

The estimated number of inhabitants

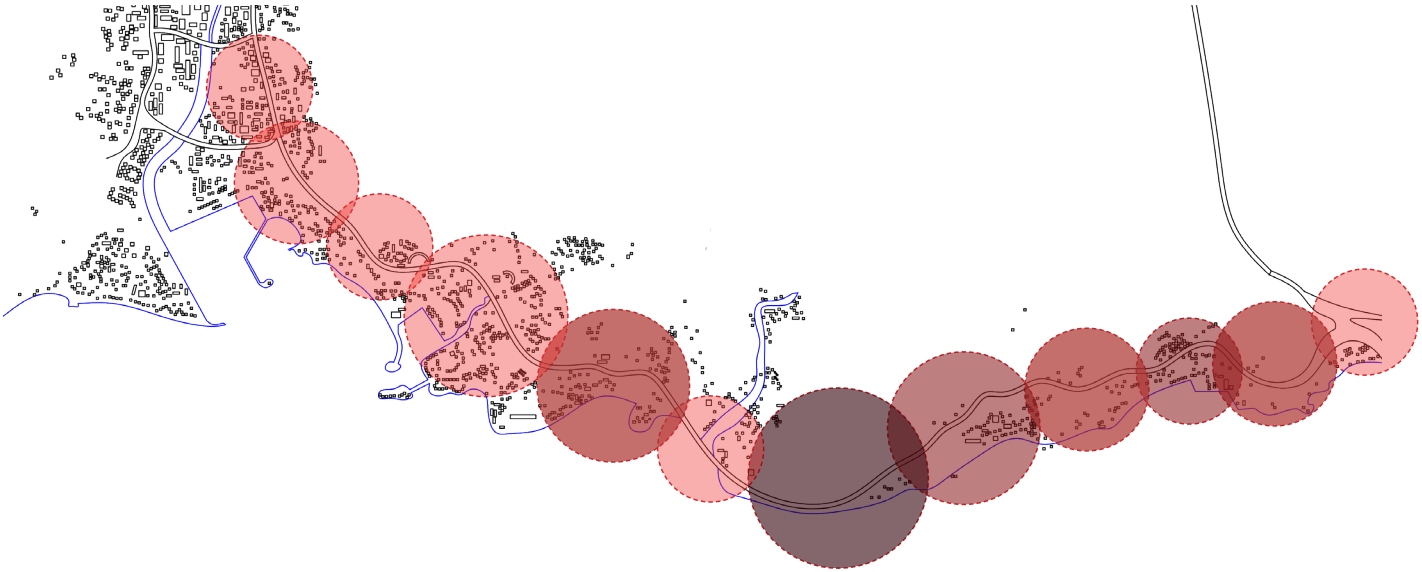
We estimated that in this 17,2 km long stripe could live 250 000 to 300 000 inhabitants. The number is based on calculation which was counted on just 2 km long stripe so the overall number may vary.

100 000

40 - 30 000

20 - 10 000

less than 5000



ENERGY

Green enery production

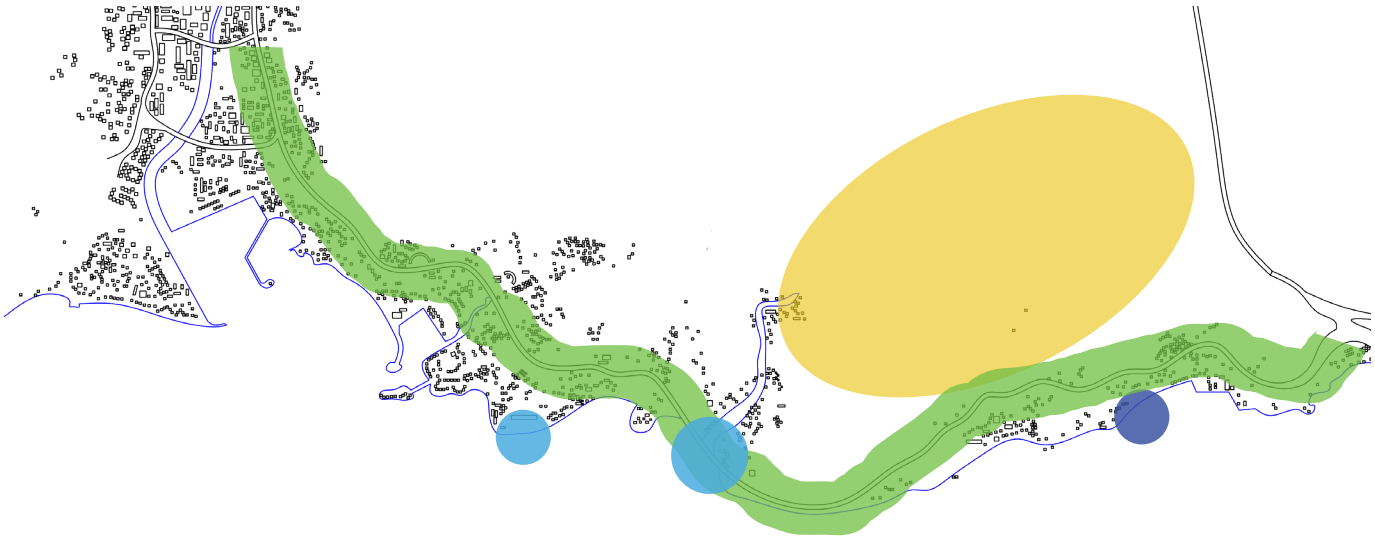
In order to achieve an eco-friendly sustainable development, the self-energy production is necessary. As the development is directly facing the sea, we suggest to use mainly the sea and wind energy. - Wind power plants and hydroelectric power. There would be also a system of pumping stations for non-drinkable water production. Each building would have a green roof with solar panels and a smart facade. All of the single buildings would be build according to passive standarts, to economize air conditioning. Each household would have a smart systems for water saving.

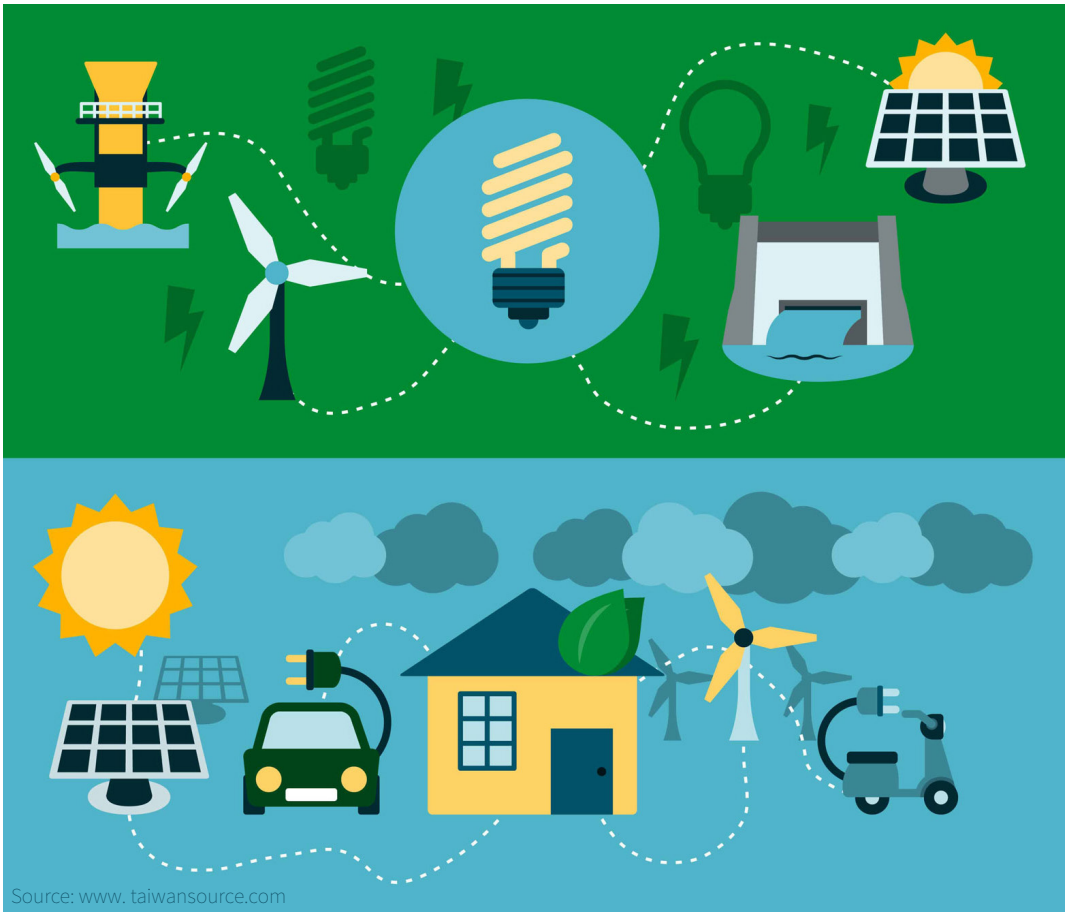
wind power plant

hydroelectric power

pumping station

green roofs with solar panels





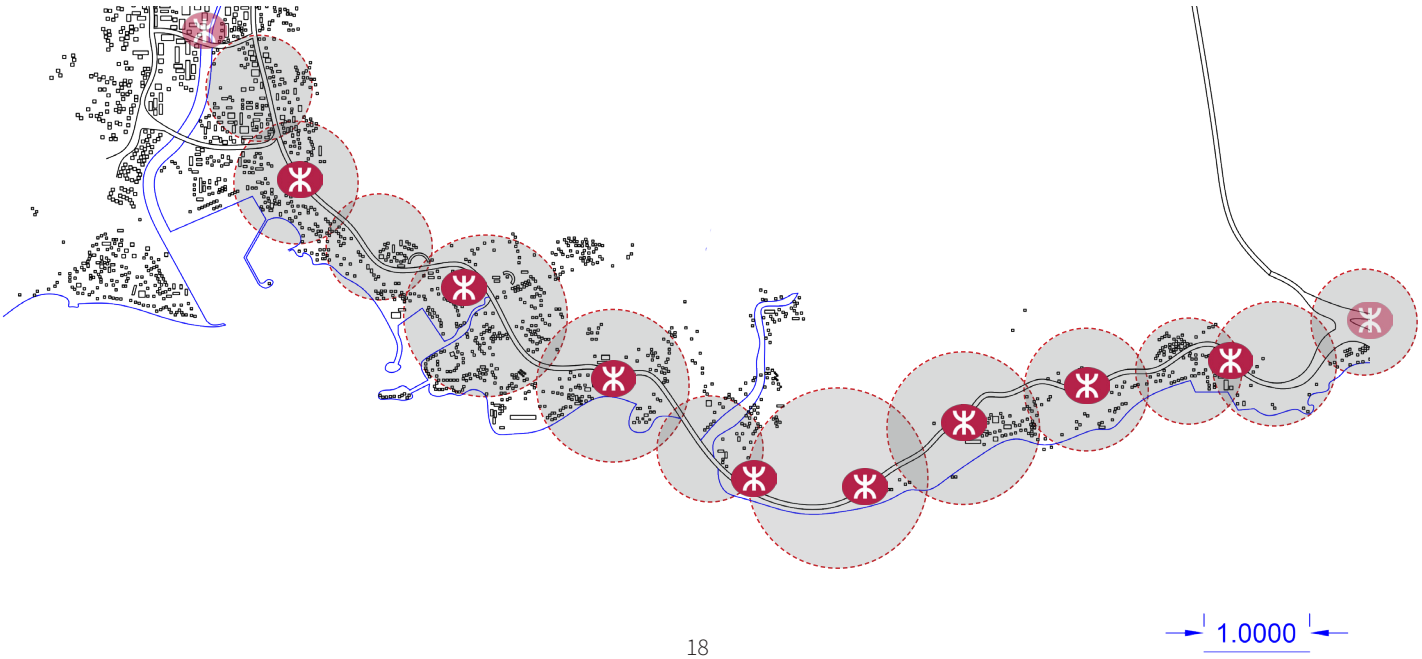
Source: www. taiwansource.com

TRANSPORTATION

The MTR

As the planned development is 17,2 km long, it was necessary to propose an MTR line. The MTR stops are placed in 1-2 km distance. The ratio was to put in each district at least one MTR. The whole system is connected with already existing MTR network. The connection is marked with lighter MTR sign.

MTR Station

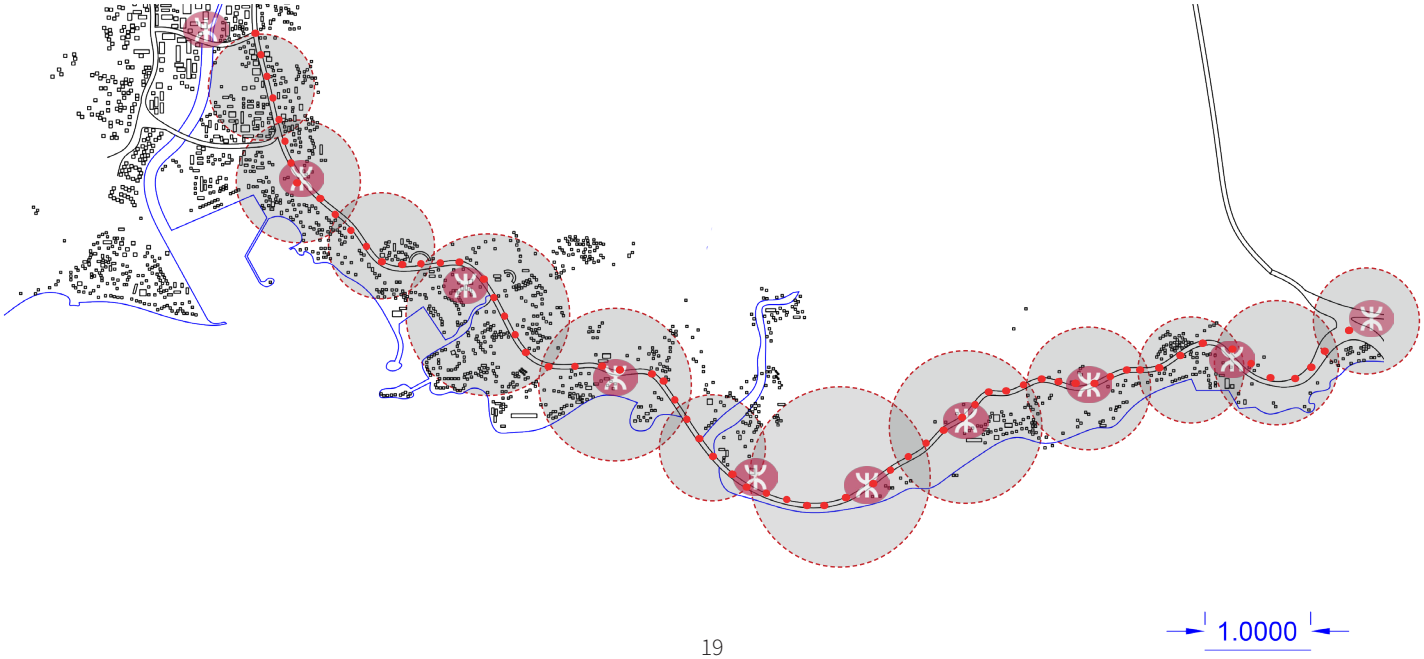


The tram

As the MTR is definitely not enough for this amount of people, we are also proposing a tram line which would provide better connection in each district. The tram stops would be in 300 to 500 meters distance. The tram line is marked with red dots.

MTR Station

Tram Stops

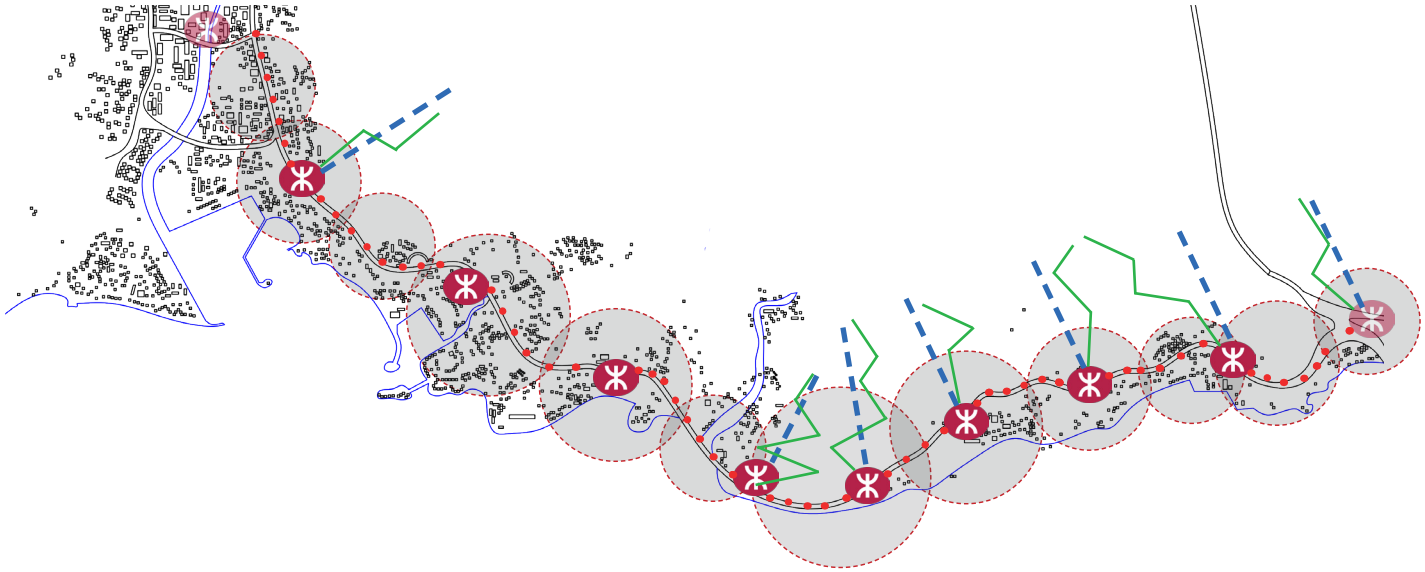


The cable cars + e-bus

In the areas where the building development on the slopes is possible, we propose a system of cable cars (blue lines) which are taking inhabitants to the middle of the housing developments on the slopes and then to the peak. This system is supported by e-buses (green lines), along routes that go on the ramps from the bottom to the peak. This whole mobility system on the slopes helps the inhabitants to get not just to the housing districts but also to the nature which finds itself on the peak. This solution could significantly enriched life of Hong Kong inhabitants.

Cable Car

e-Bus



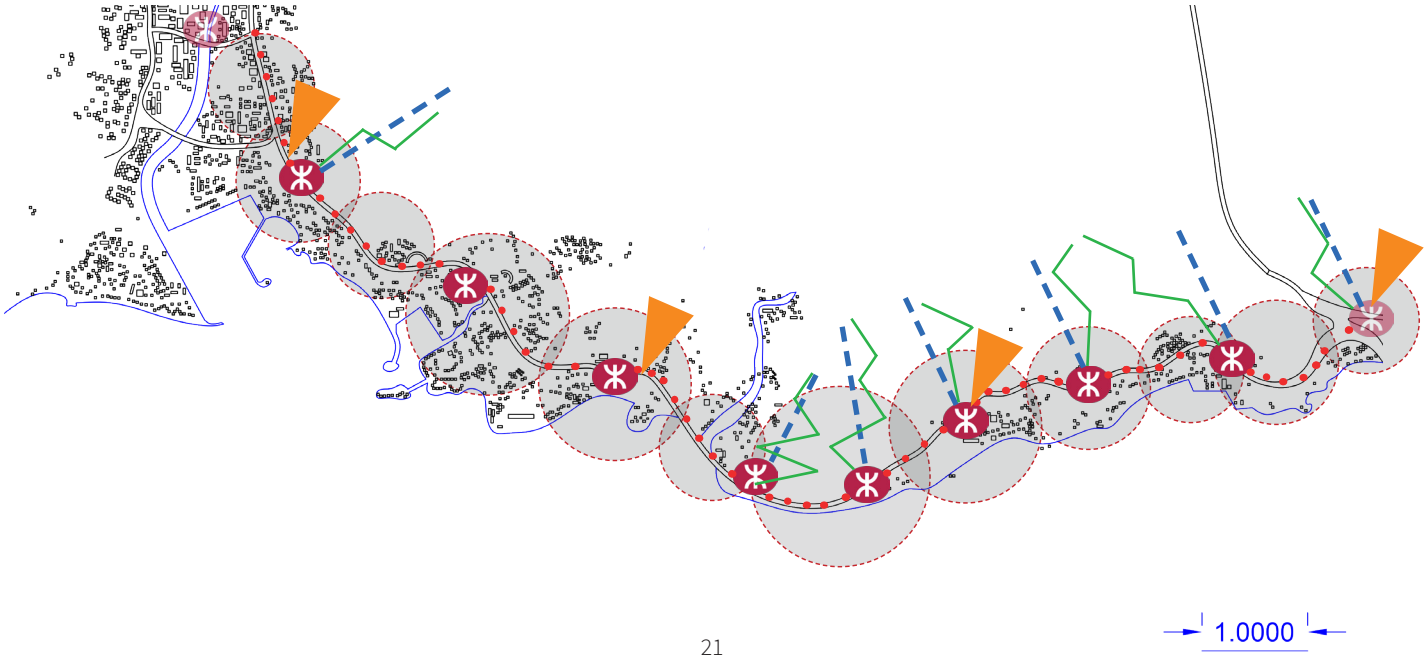
The parking garages

As our aim is to create a car free environment. We propose the park and ride system. Parking garages (orange triangles) which are situated on both sides, but still inside the „tunnel". We acknowledge that sometimes it is nessesary to use a private car, but we think of the ownership of a car as an expression of an unsustainable lifestyle. In order to support and encourage the inhabitants, not to own cars, we thought about car sharing or car renting, which would be concentrated in these parking garages. The whole surface of the „tunnel" would be car free.

Cable Car

E-Bus

Parking garages



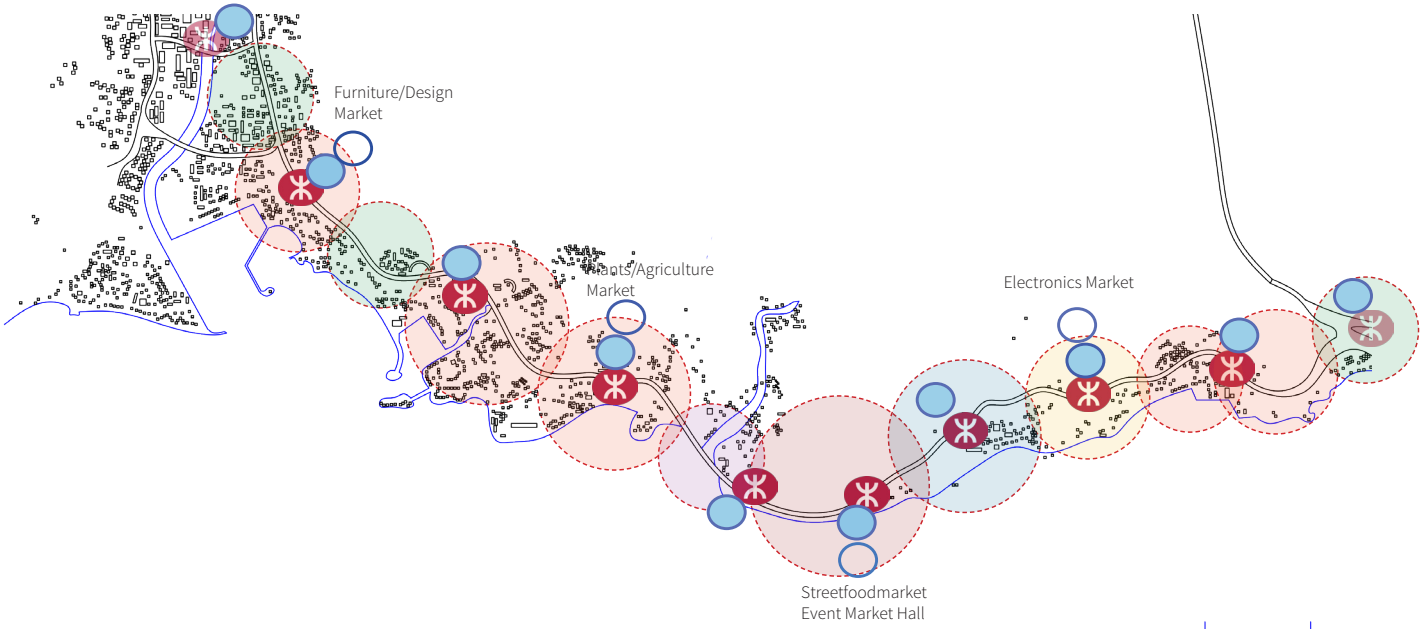
LOGISTICS

How will the goods be delivered?

For the delivering and distribution of goods we developed an alternative logistical system to adapt to the transportation concept of the area. Therefor we provide an logistic center at each Metro Stop, at a distance of 1km to 2km. Each contains a warehouse and distribution center. A separate delivery system distributes the goods in the area afterwards. Connected to the warehouse there are diverse shops and small markets to economize transportation. Every second logistic center provides an additional big market hall, adapted to the focus of the particular area. These market halls, if for electronics, or design and furniture, offer space with high sojourn quality, to attract not only residents of the close neighborhood. In particular the Streetfood Market, in the addressed „business-center“, is designed to also host major events.

main market hall

warehouse/ distrubution center



LOGISTICS

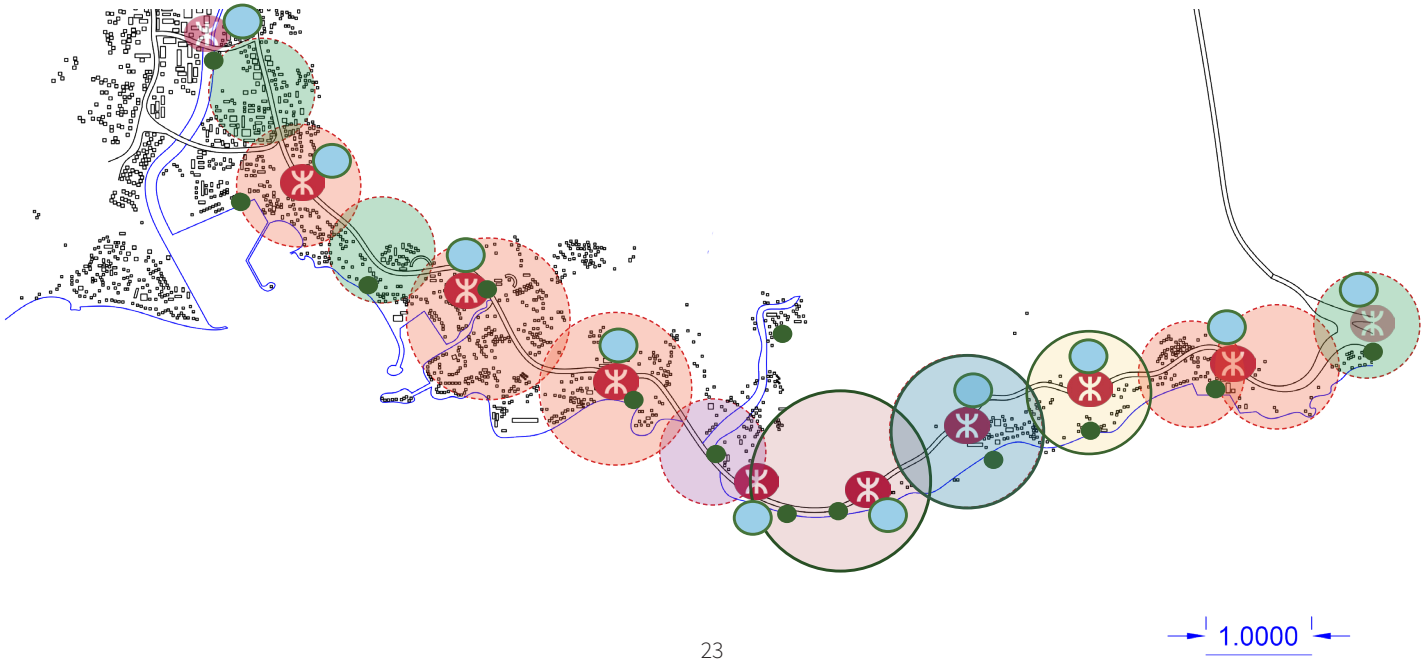
Production

Another part of the warehouses is intended for the storage and further dissemination of local produced goods. The main areas of production are located in the three districts with the focus in education, science and business and will provide correspondingly bigger warehouses. Produktion is to be enabled and supported in the whole area. Therefor additional to the logistic centers there are going to be diverse „Produktion Spots“ in every district. These Production Spots are public spaces, such as offices and laboratories, that can be rented, and shared. This shall make a wide range of tools and instruments available for all residents.

warehouse/assembly

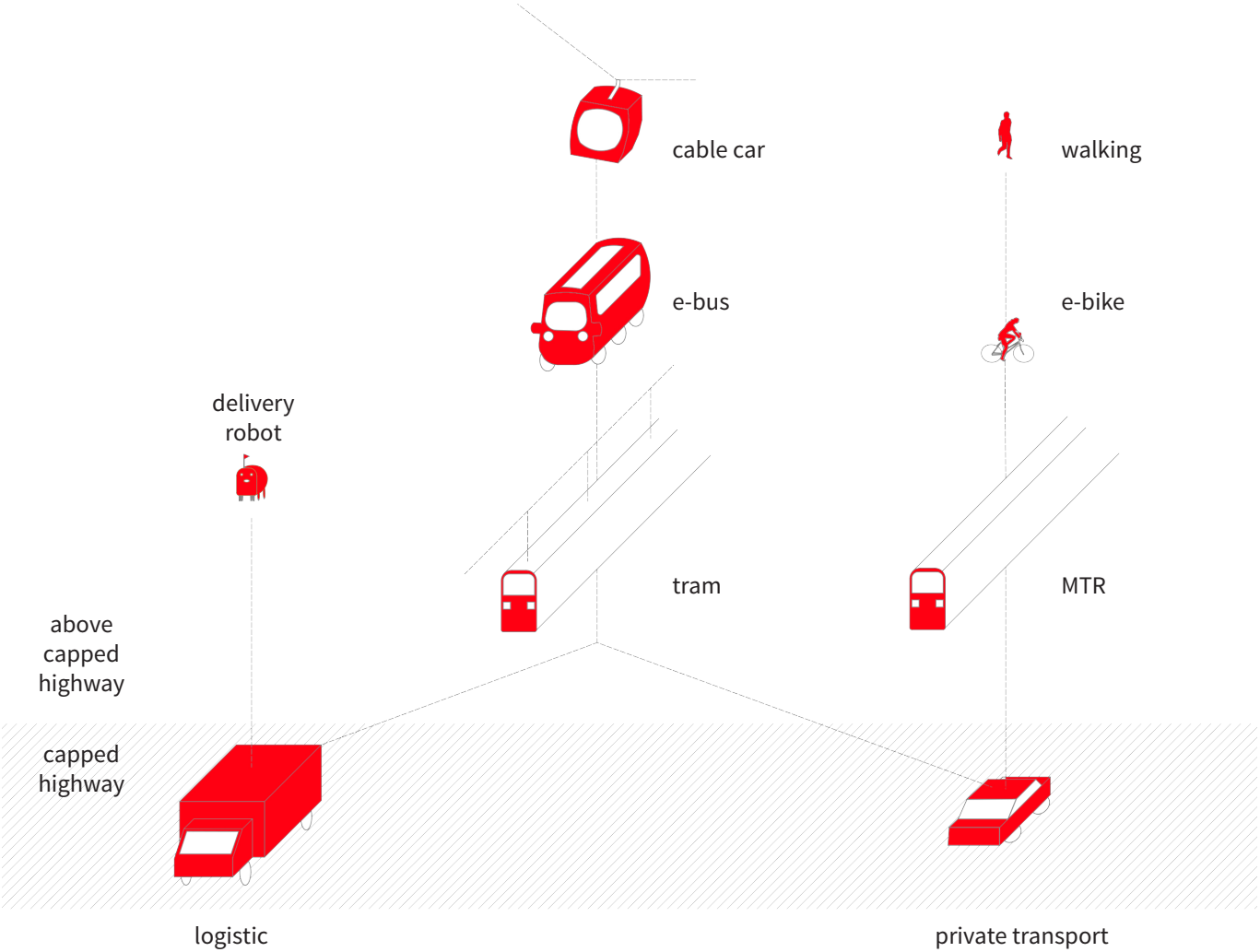
main production area

production spot



LOGISTICS AND TRANSPORTATION

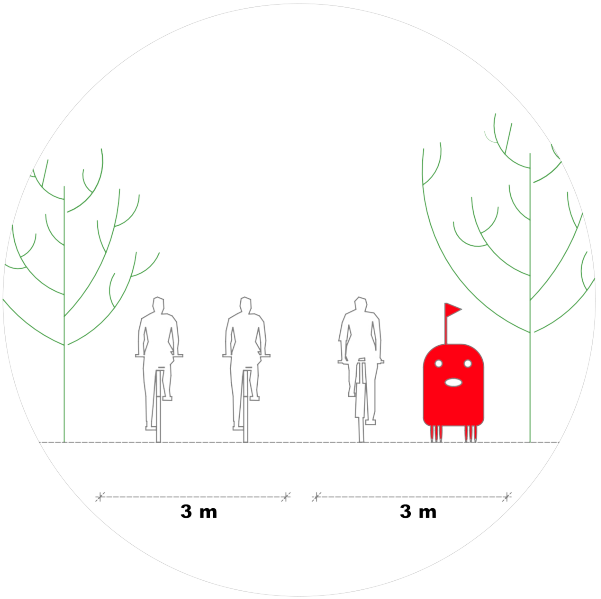
How do logistic and transportation work together?

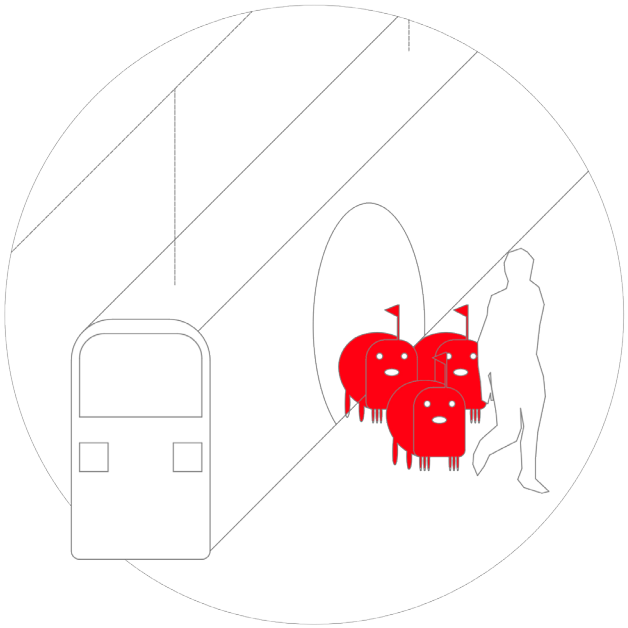


DELIVERY ROBOTS

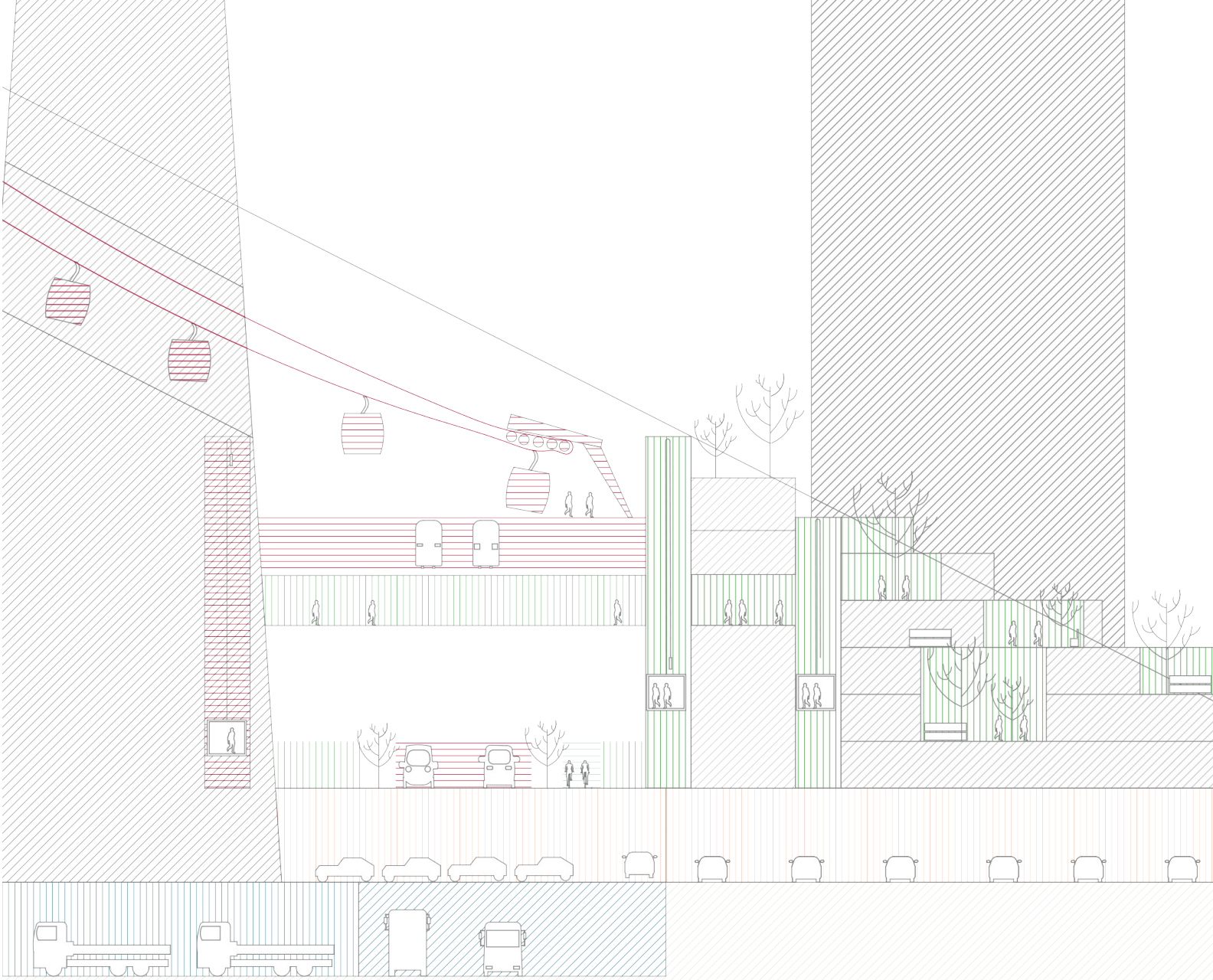
How do they work?

The width of the robot fits exactly in one bike lane, so they can move very flexible around the new infrastructure. A private person also has to leave the car behind, take a bike/E-bike or the mtg, tram, bus or gondola (up the mountain).



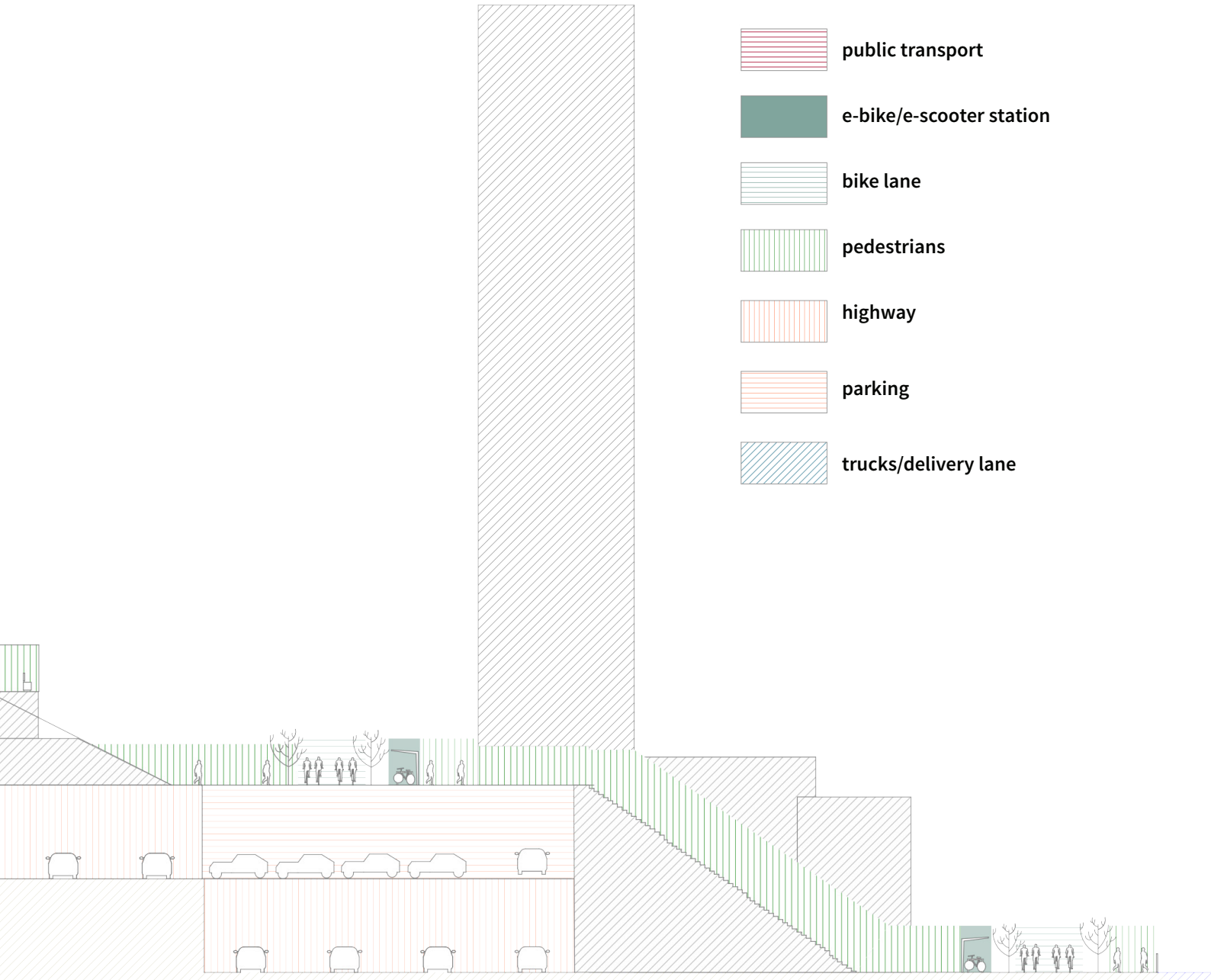


When a vehicle exits the capped freeway there are two options: Either it is a Truck delivering goods, who then will end up in the logistics center or it is a private car, who will end up in the parking garage. Either way, the way of transportation changes. The goods will be transported via a small delivery robot and/or the public transport like the bus, the tram and the gondola will also be used for that matter, for longer distances.



transportation section cut

1m 2m 5m 10m 25m


public transport
e-bike/e-scooter station
bike lane
pedestrians
highway
parking
trucks/delivery lane

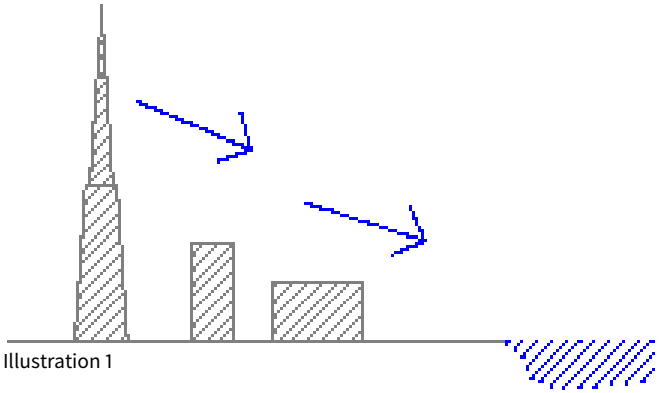


Illustration 1

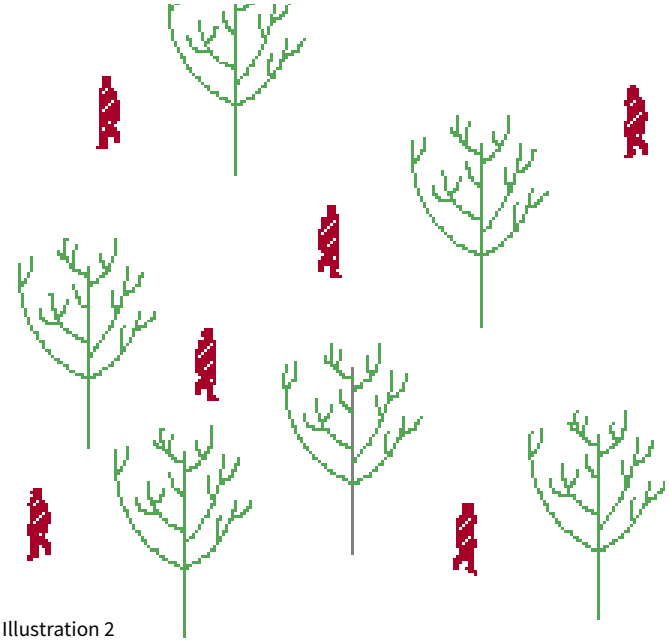


Illustration 2

Principles of the main square

Based on the Hongkong Guidelines for a Central Business District (CBD), the few most important principles were considered when designing the main square: identify suitable site for Mega Tower, create diversity in building height profile for visual interest, descent the building height to the water front, open space and countryside, maximise accessability to waterfront (Ilustration Nr.1). Design with pedestrian priority, fully utilise the podium for public space use (illustration 2).Encourage linkage to urban space and rural areas (Illustration 3).

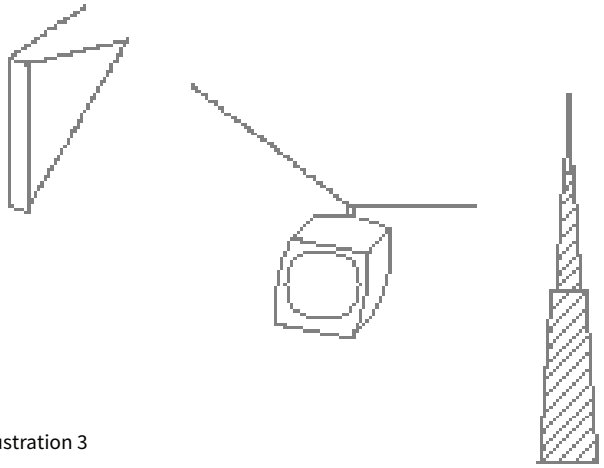
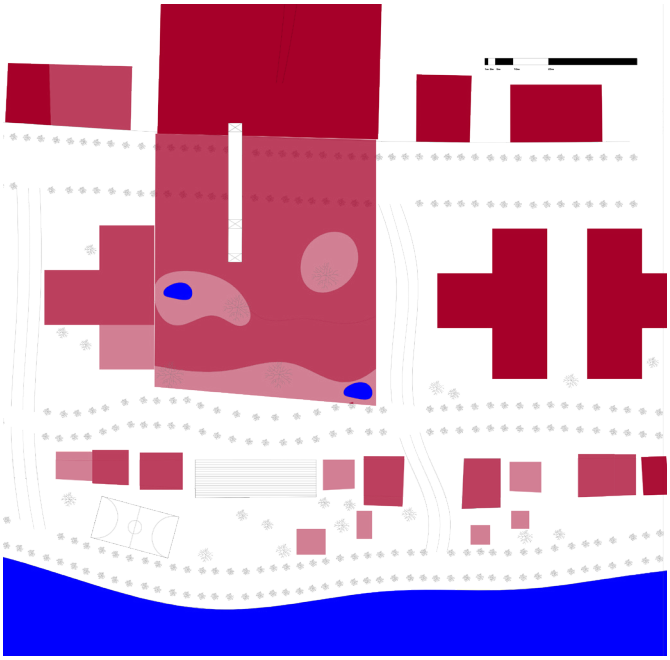


Illustration 3

The height + function disposal

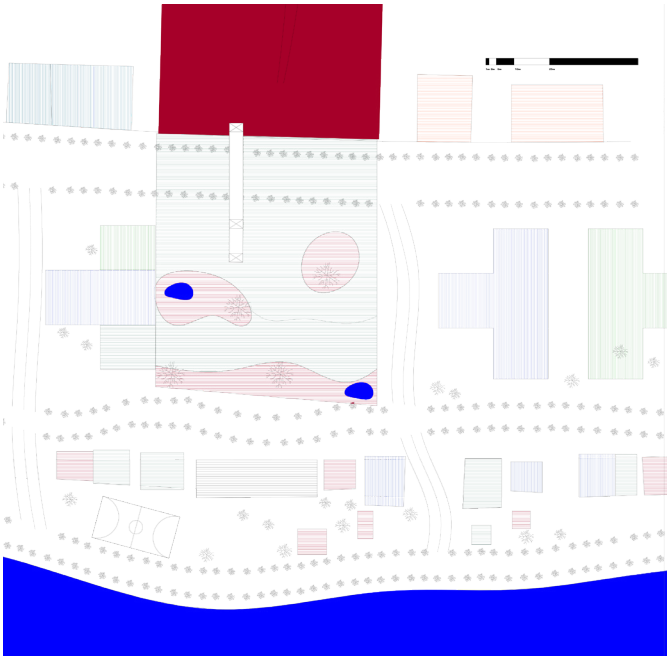
The landmark is by far the highest building around. It measures 300 m of height. The building-size decreases towards the waterfront. Along the waterfront you find only low to medium size buildings. The Main Square which is also the connection point of the landmark, waterfront, public transport, is also kept at low hight, so the accessability and connectivity are main elements. The other building surroundin the main square, are mixed use and vary in height.



high

medium

low



landmark

retail

housing

parking

logistic center

business

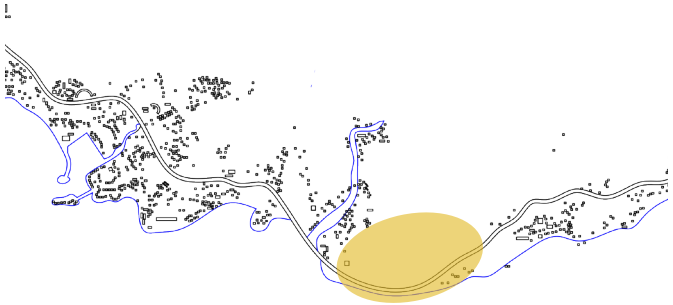
public amenities

main square axonometry

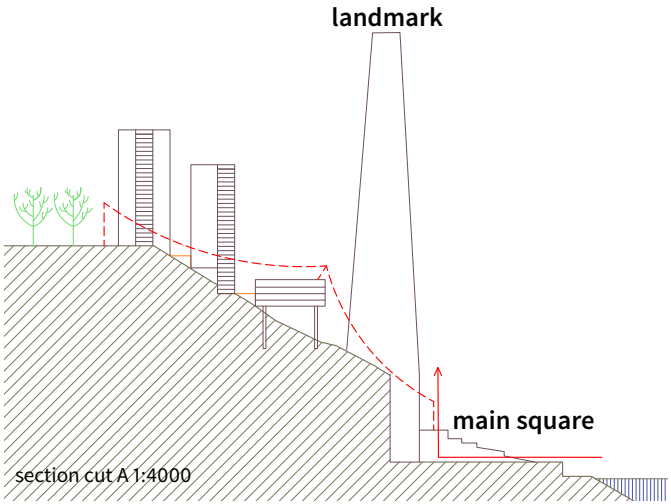
BUILDING ON THE SLOPES

Principle of the transportation

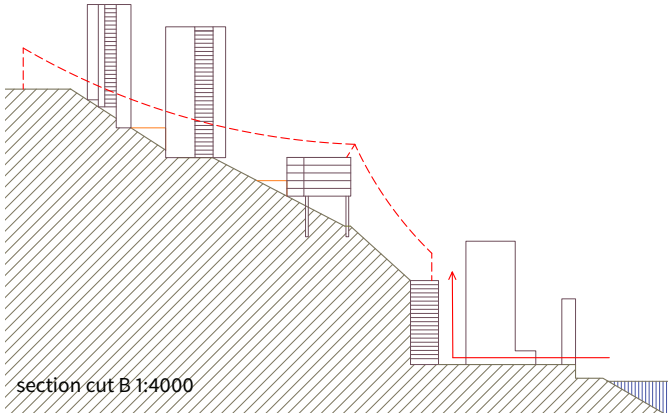
This proposal find itself on the least inhabited part of the site. There is larger space for future development.



the site



section cut A 1:4000



section cut B 1:4000

connection (public elevators)

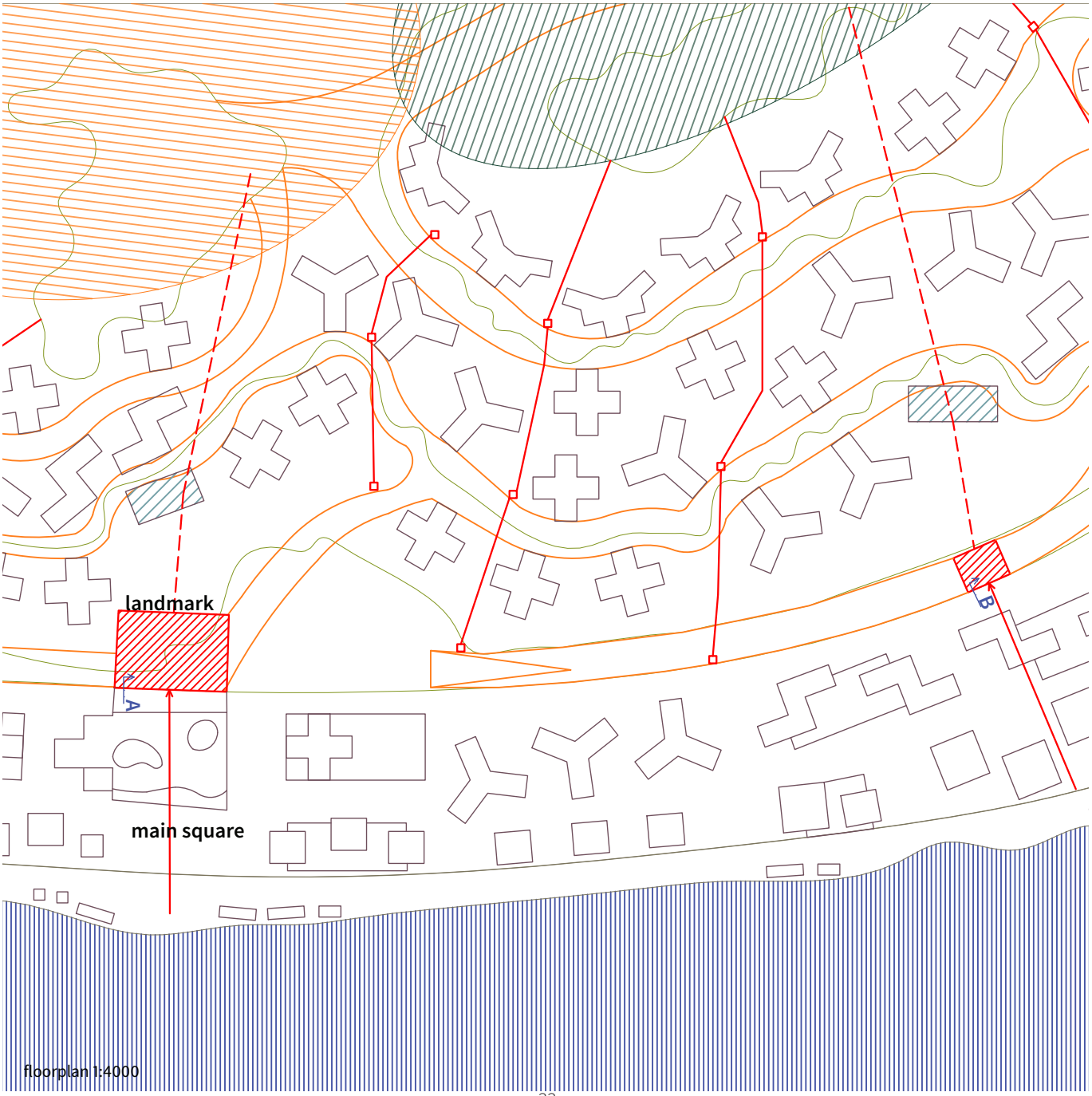
cable car

connective building

vertical public space/cable car station

pure nature

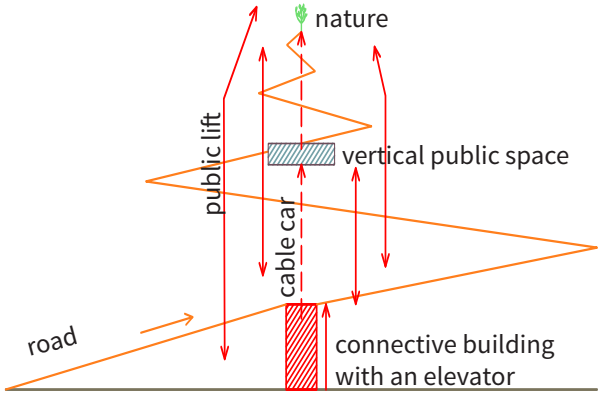
theme park

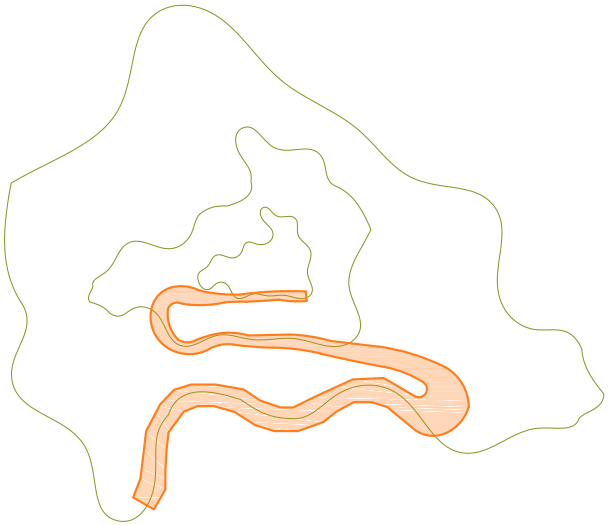

landmark
A
A
main square
B
B
floorplan 1:4000

BUILDING ON THE SLOPES

Principle of the transportation

The whole principle of the transportation roots in the concept of “connective buildings”. They are approximately 400 to 500 meters far from each other and they contain an elevator which brings people to the cable car stations which take them to the middle of the housing development and as well to the top of the hill. The middle station of the cable car is also used as a vertical public space/ shopping mall for the slopes inhabitants. Other way of transportation are roads for e-buses which can used by pedestrians and cyclists as well. The whole mobility is supported by public elevators which are placed between the buildings and serve as a smaller scale connection.



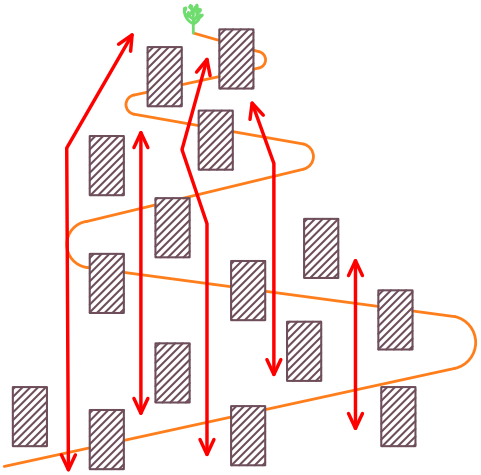


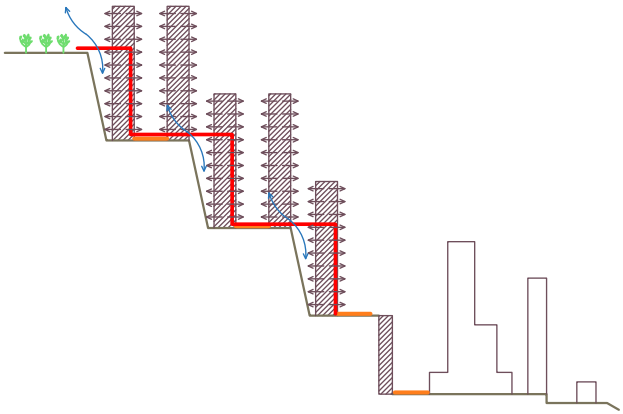
Principles of the roads location

The roads are following the contour lines. A contour line is drawn between points of equal height (so any single contour line will be at the same height all the way along its length). It means that if the roads are following the contour lines, the inclination of the roads should not be too large and so the movement along these roads should be more comfortable. The parts where the road is rising up will be designed as long as needed to guarantee smooth movement upwards.

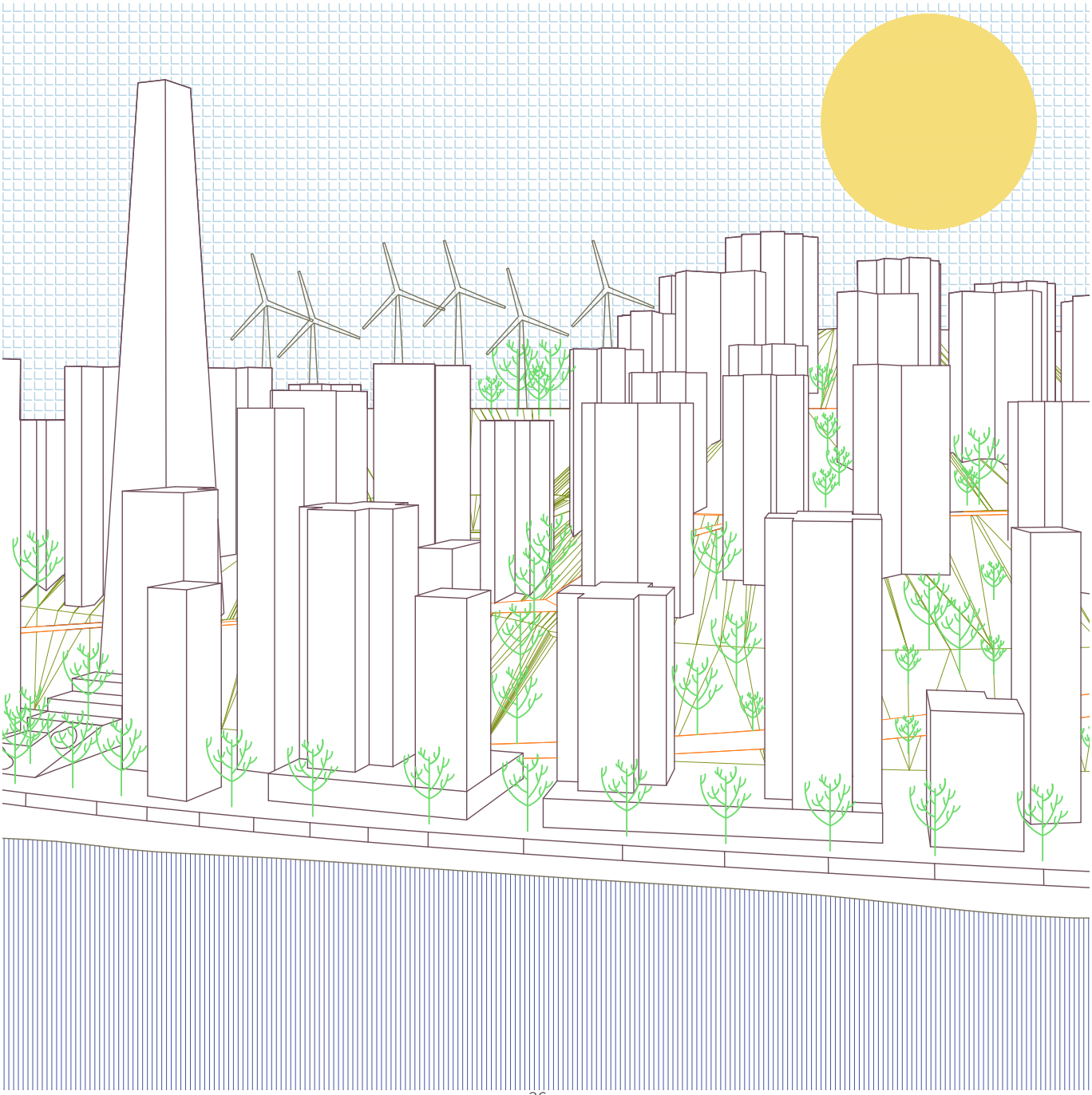
Principle of the buildings location

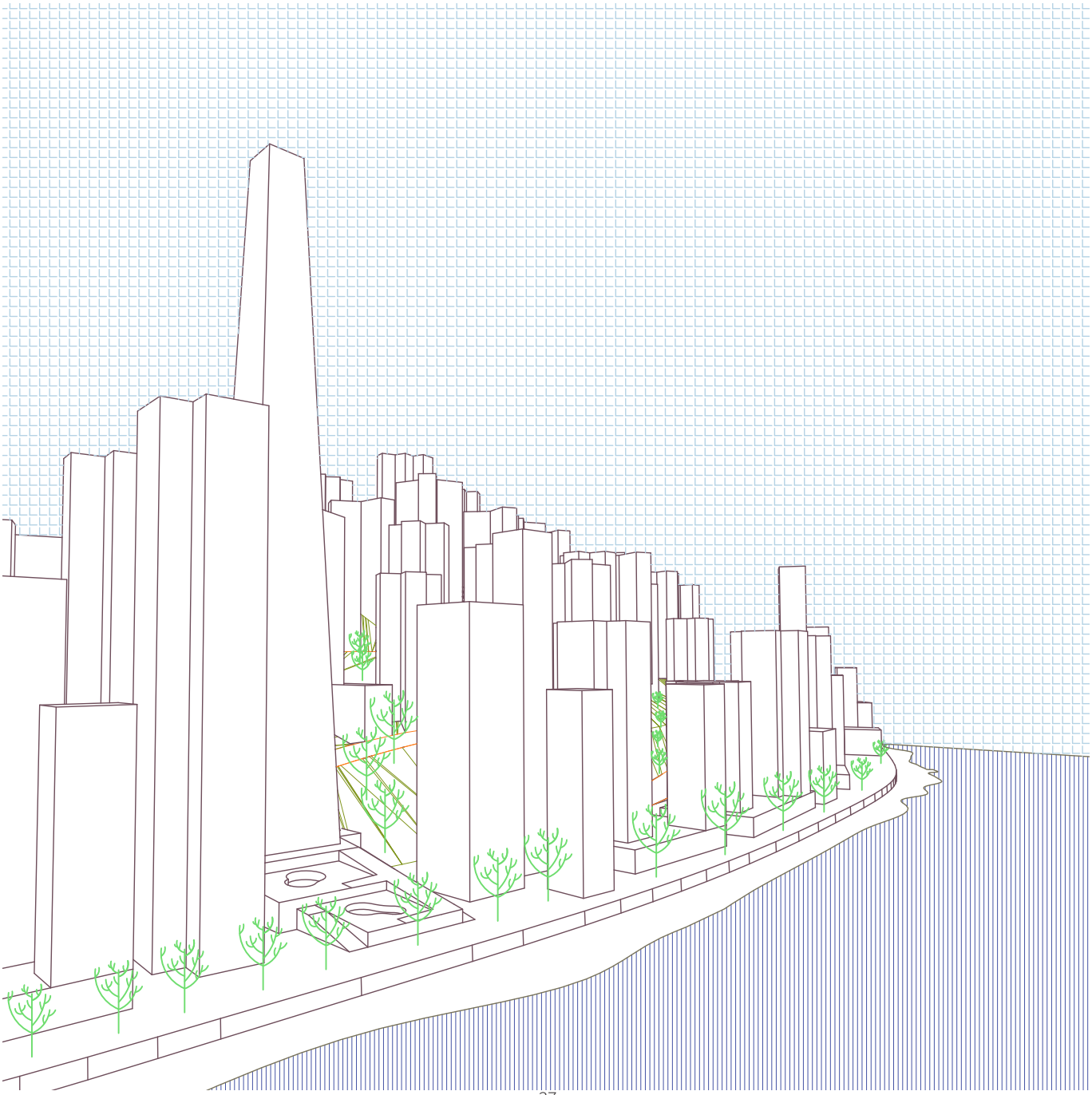
The location of the buildings is determined by the roads. They are surrounding the roads. The inhabitants are delivered to their flats by the network of public lifts and e-buses.





The scheme is showing an ideal situation which will be mostly impossible due to geological circumstances - not ideal slope/limited soil work. In this proposal we are operating with already existing Hong Kong building typologies. The buildings are orientated both sided (velvet arrows). The flats with beautiful seafew are ment to be private, the ones with less view are meant to be public housing/subdivided flats. As mentioned before the slope is connected by a network of public elevators (red line).

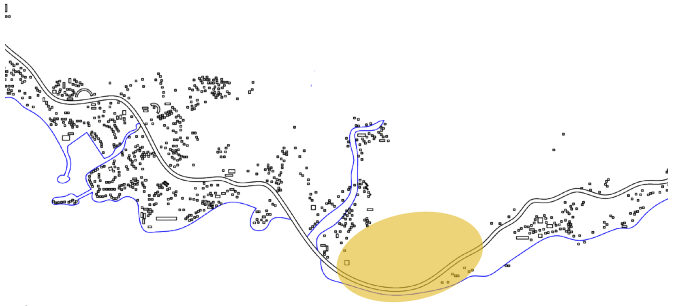




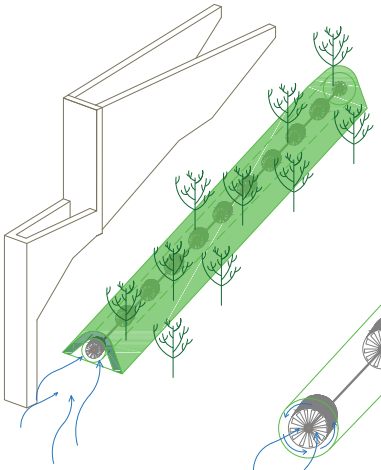
ALTERNATIVE BUILDING ON THE SLOPES

Principle of the transportation

This proposal find itself on the least inhabited part of the site. There is larger space for future development.



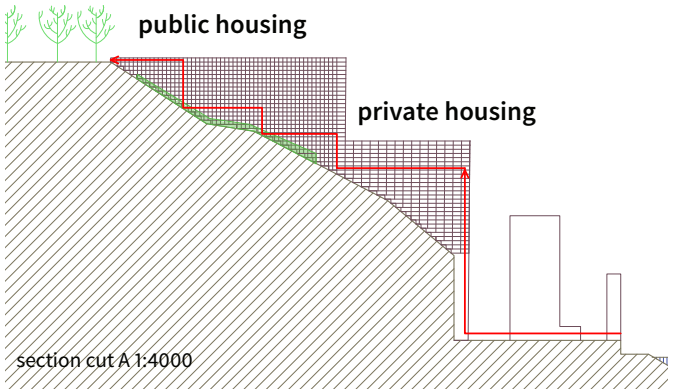
the site

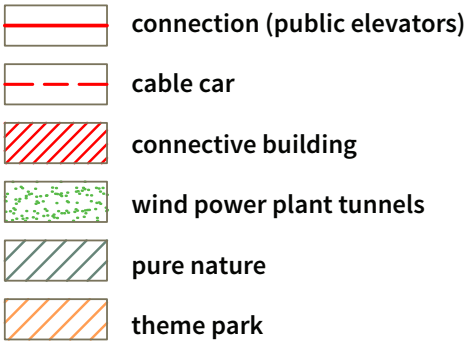


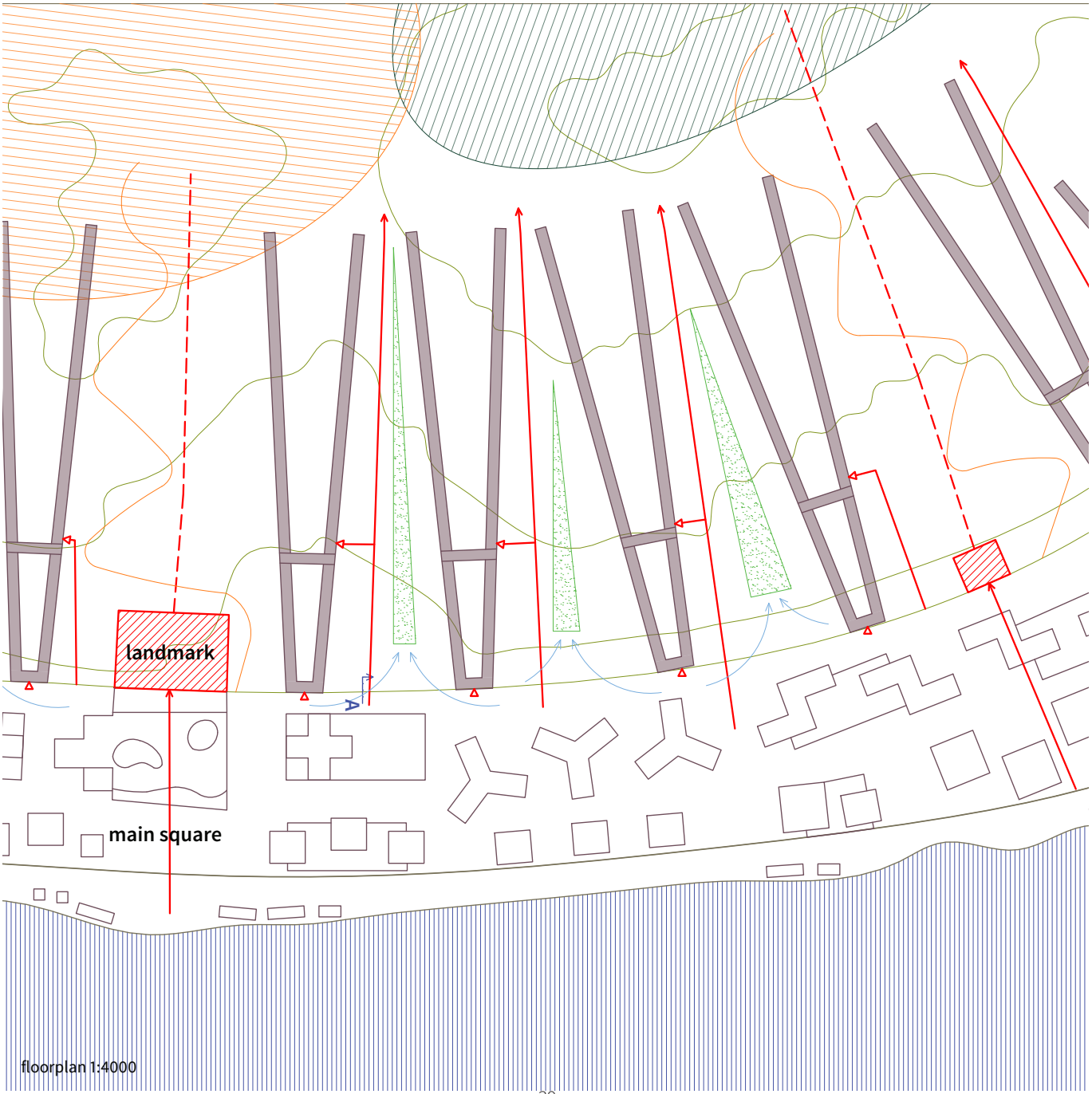
the tunnels are covered in greenery in order to avoid the aesthetic harm

the air is sucked to the tunnel and makes the turbines spin

tunnel principle



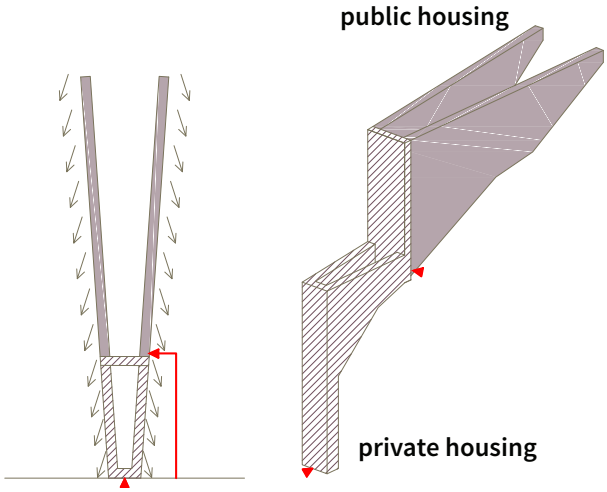


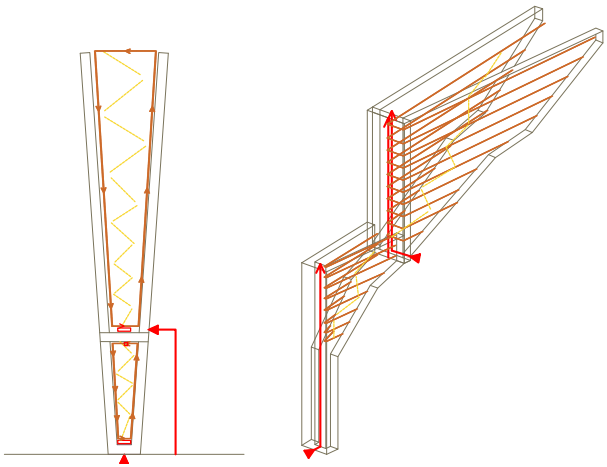

landmark
main square
floorplan 1:4000

ALTERNATIVE BUILDING ON THE SLOPES

Division of ownership

The volume is basically a slab situated perpendicular on the slope. The slab is divided in to two parts. The front part is meant as a private housing with extraordinary sea view. The back part is meant to be public housing. The inhabitants of these buildings are not sharing the same communication area. The private housing has the entrance directly from the main road. To enter the public housing, inhabitants use a public elevators situated between the buildings.



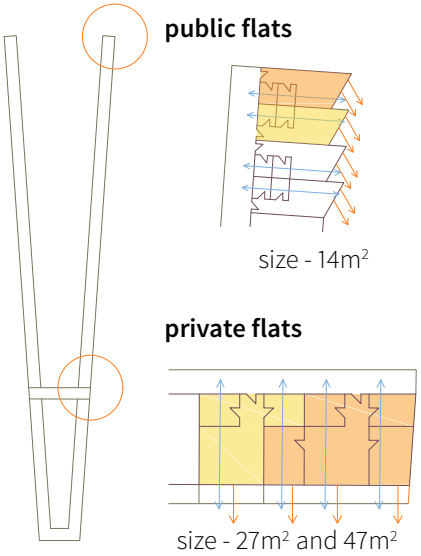


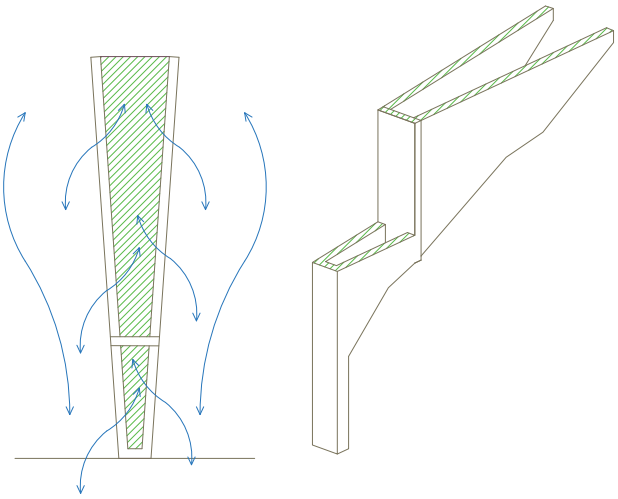
Communications inside the buildings

The communication strategy is based on composition of elevators and horizontal walking communications. There are elevators by the entrances. The elevators bring the inhabitants on the desired floor and there they have to walk to their apartment on a porch. Additionally, the horizontal communication areas are connected with a series of escalators.

The flats

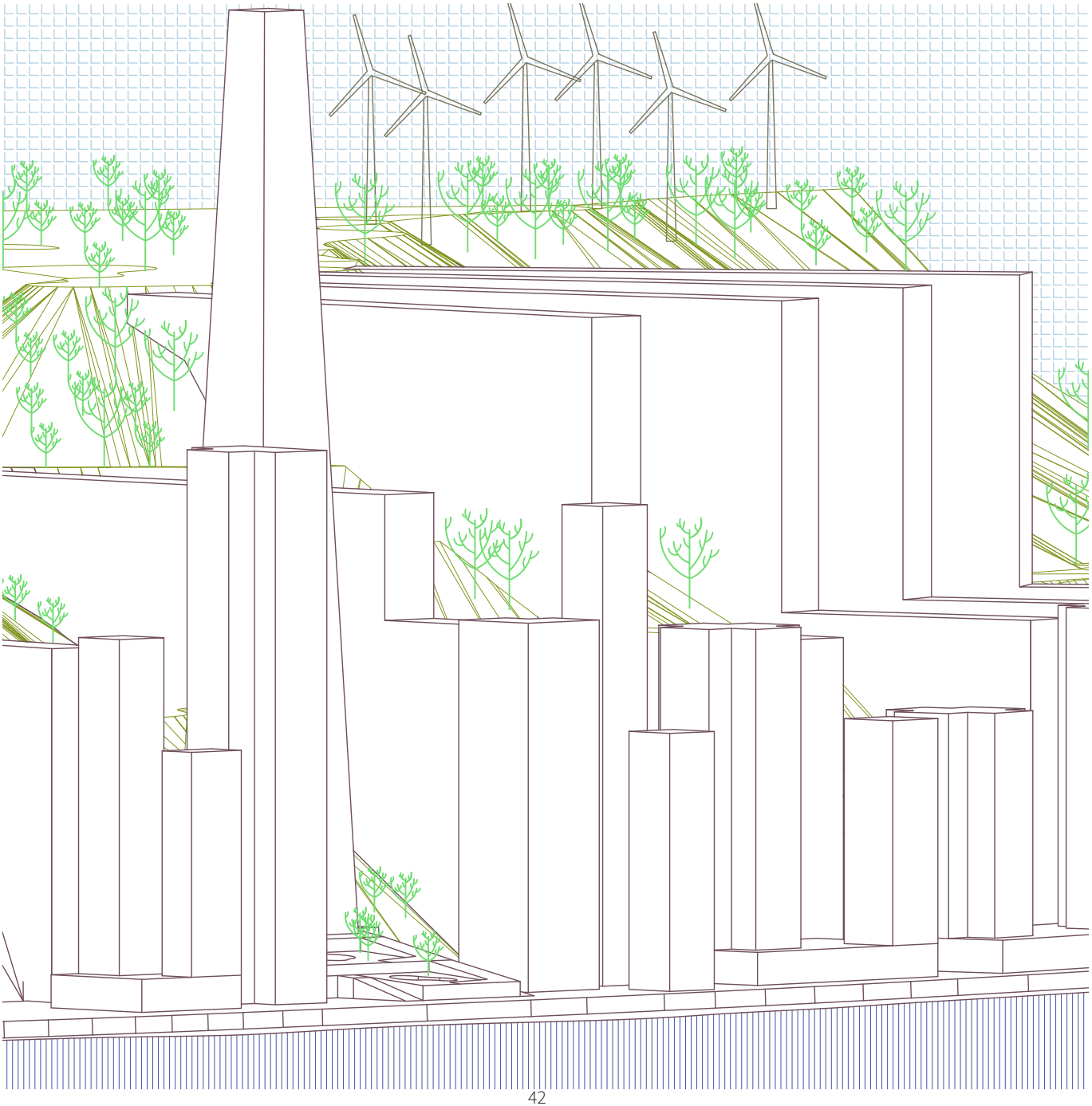
All of the flats are pushed outside and rotated in order to achieve the maximal possible sea view. The public housing flats are meant to be in traditional Hong Kong dimensions. The private flats are larger. All of the flats have very convenient feature and it is the possibility of cross ventilation as the entrance to the flats are from the outside porch. This feature is in the humid climate very important.

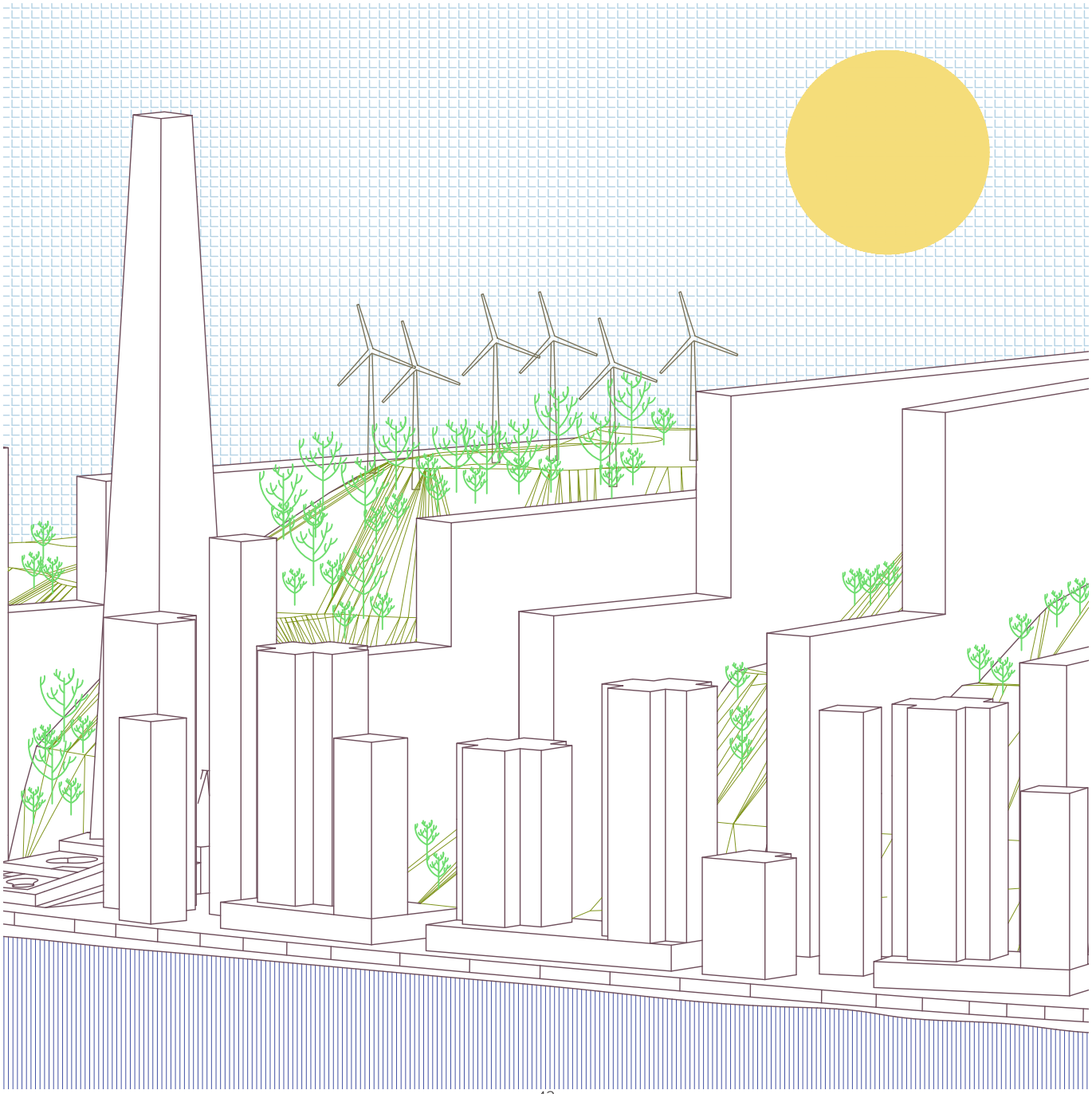




Greenery and ventilation

The atrium and as well the roofs are meant to be green. The roofs can serve for leisure time, urban gardening and also as a production for warm water with the use of solar panel. The big convenience of this design (as mentioned before) is the ventilation. Thanks to the open atrium it is possible to do the cross ventilation. As visible on the floorplan the buildings are placed in a position that intensifies wind force, so it can serve not just for ventilation but also for the energy production.





WHO IS THE DESIGNER? | 邊個係設計師?

Projektübung Hong Kong Tomorrow

Sommersemester 2019

Eva Huber-Groiß

145 Institut für Städtebau

AUTORIN

Eva Huber-Groiß
Mat.Nr. 01431514

Hong Kong Tomorrow
Sommersemester 2019
Ass.Prof. Dipl.-Ing. Dr.techn Wolfgang Dokonal

Institut für Städtebau
Technische Universität Graz
Rechbauerstraße 12/II
A-8010 Graz

„Hong Kong comprises very mountainous terrain, many coastlines and a good natural harbour.“ [1]

1) o.A.: Urban Design Guidlines Chapter 11: Hong Kong Planning Standards and Guidlines, November 2015 Edition, 2

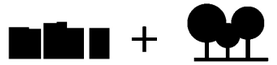
INTEGRATION 集成

Workshop in Hong Kong with Chinese students: Analysing Hong Kong and it‘s Islands and finding ways of integrating all aspects into the new development.

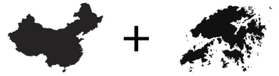
1

housing + public space

public + privat housing



city + nature



mainland + hong kong

locals + immigrants
all demografic groups

URBAN STRATEGY 城市戰略

The new urban development at Silver Mine Bay should strenghten the Peal River achsis and focus on a closer connection between Mainland China and Hong Kong.

2

3

MASTERPLAN 總體規劃

The Masterplan contains all the information about public transportation, housing, all other functions and the green space in the city.

Site: 2.191.632 m² // 219,16 ha
People: 500.000

current situation in Hong Kong:
People sharing a flat: 2,95
Average size of a public flat: per person: 12,6 m²
Average size of a subdivided flat per person: 4,6 m²

new city:
Ratio privat and public housing: 30% : 70%

LOCAL DETAILS 細節

I noticed a couple details like the steel fences, all the tiny tiles on the houses and in the outdoor areas and how beautifully they were arranged in each single home.

These things can be seen in Hong Kong City and the Public Housing Communities, Island Peng Chau and Cheung Chau and in Guangzhou as well.

4

5

LOCALS AS DESIGNER　設計師

The public spaces on the Islands were used by the people in a fascinating way - just provide some chairs and shadow facilities and everything else will be arranged by themeselves.

This urban planning strategy should include the inhabitans into the design process of the in between spaces.

GOALS:

urban planner 

designing the urban fabric

architects

designing the buildings

inhabitants 

designing the in between spaces - recognition factor adding there local details

geographical information systems

avoiding overcrowded places in the city,..

PUBLIC SPACE 公共空間

These places are the center points of the Central Business Districts - CBD's and have a direct access to the MTR System of Hong Kong. There are additionally two spaces close to the waterfront and the greenbelt.

6

HOUSING 房屋

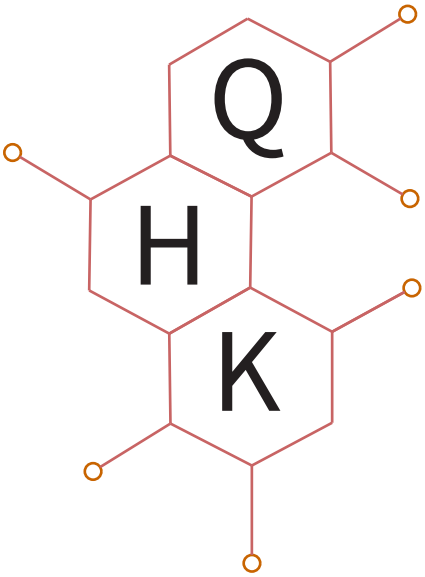
Private and public housing are still separated in different buildings, but share the same adress to avoid showing whether you are wealthy or not and try to intrgrate both into the urban fabric.

7

HIGH QUALITY in HONG KONG

Project SS 2019

Quality
High
in
Hong
Kong



Flora Flucher
Elisabeth Reisinger
Miriam Sengstbratl

UR3A Research TU Graz
145 Institut für Städtebau

AUTHORS

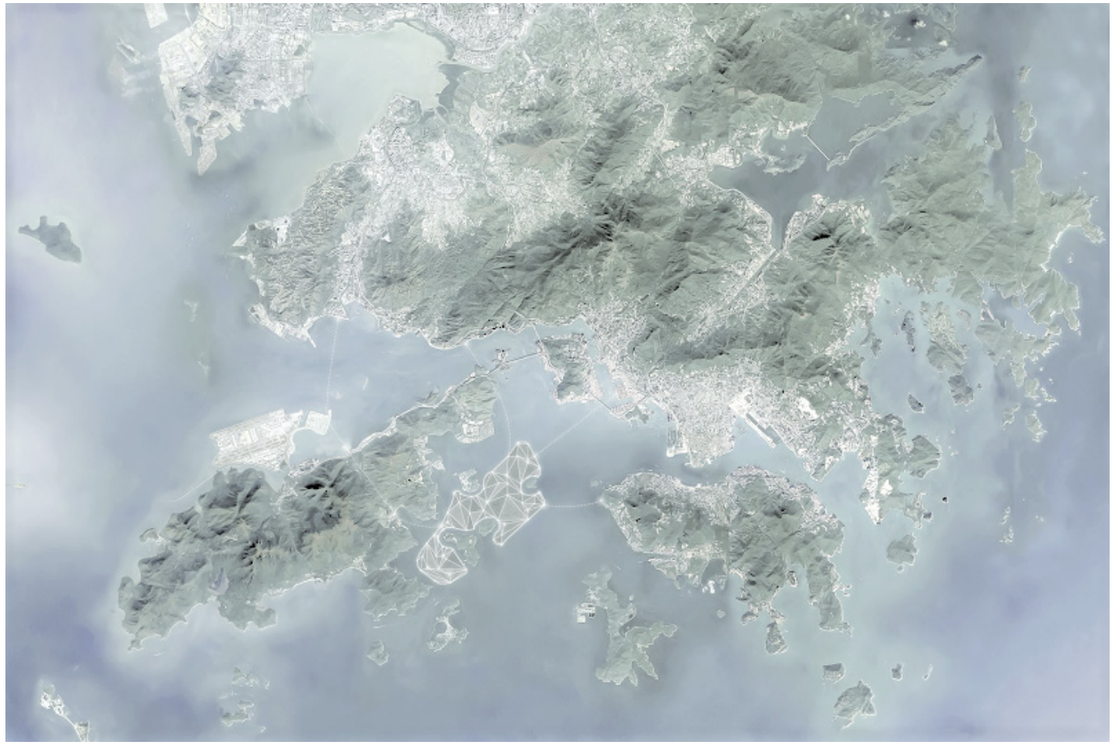
Flora Flucher
Mat.Nr. 01230796
Elisabeth Reisinger
Mat.Nr. 01130608
Miriam Sengstbratl
Mat.Nr. 01313064

Project
SS 2019
Ass.Prof. DI Dr.techn. Wolfang Dokonal

Institut für Städtebau
Technische Universität Graz
Rechbauerstraße 12/II
A-8010 Graz

INTRODUCTION

The population of Hong Kong suffers from extremely high housing costs and related poverty. In addition, a strong population growth in the next few years is expected. The land is small, very mountainous and the remaining green space is considered a naturereserve.AllofthesefactorsaredrivingHongKongtoaction. Lantau Tomorrow Vision is a development project launched by the government. It suggests the construction of artificial islands with a total area of about 1700 hectares through massive land reclamation in the eastern waters of Lantau Island. There have already been published several proposals, for example the Enhanced East Lantau Metropolis by the “Our Hong Kong Foundation”. The project meets with controversies and opposition for its high cost as well as environmental concerns. Therefore F.E.M. decided to research, take the challenge and to propose a more sustainable concept, to provide a smart and livable island. Two islands have been designed, with a total area of 400 hectares, which serves living space for about 300.000 people. During the development, one island has been picked and worked in detail, however it stands for the general concept. F.E.M. calls it Kidney Island. It is like an organ that is being needed in the whole system.



KEY DECISIONS

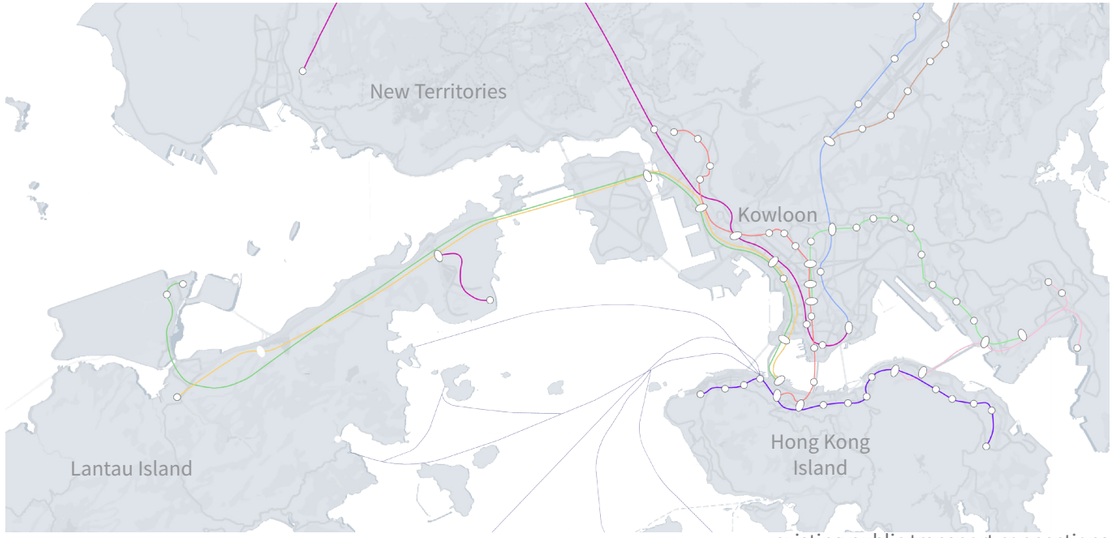
1

sustainability

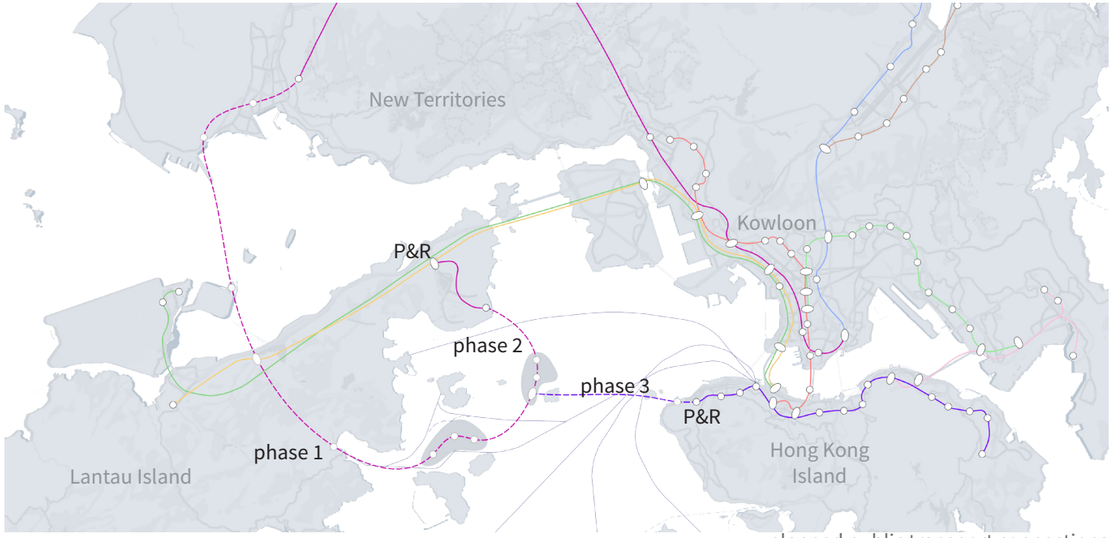
Sustainability must play a key role in every project development for the future of humanity. Even in Hong Kong, it is capitalized for the project of Lantau Tomorrow, but usually only circumscribed with great words, without mentioning specific proposals. Therefore, this project focuses on sustainable concepts and development in all levels.

placement & connection

The placement of the new islands plays a defining role for Hong Kong. Due to the fact that owning and using a private car is extremely expensive and road traffic is already overloaded, the metro is the city's main means of transportation. The new concept must take the current public transport into account. The proposed islands are placed for creating optimal cross-linking in three phases. Phase 1 connects the West Rail Line from the New Territories with the new Hong Kong Boundary Crossing Facilities, connecting Mainland China, Macau, and Hong Kong Airport. Furthermore, it links Lantau Island with - the at first built - Kidney Island. As phase 2, the same metro line will be extended to the other new island, until it finally merges with the existing Disney Resort Line. In a third phase, the Island Line from Hong Kong Island will be extended to the northern new island by the shortest and most favorable route. This creates a loop that complements the current metro concept best possible. Since the new islands are to offer an optimal quality of life and use the valuable space meaningfully, the ownership of private cars is completely omitted. In order to provide parking space for external visitors, Park & Ride facilities are being built at the most important connecting metro stations. Ferry connections for passenger transport are in addition very important for Hong Kong and therefore, the two new islands are located on the existing routes to Peng Chau, Hei Ling Chau and Lantau Island.



existing public transport connections

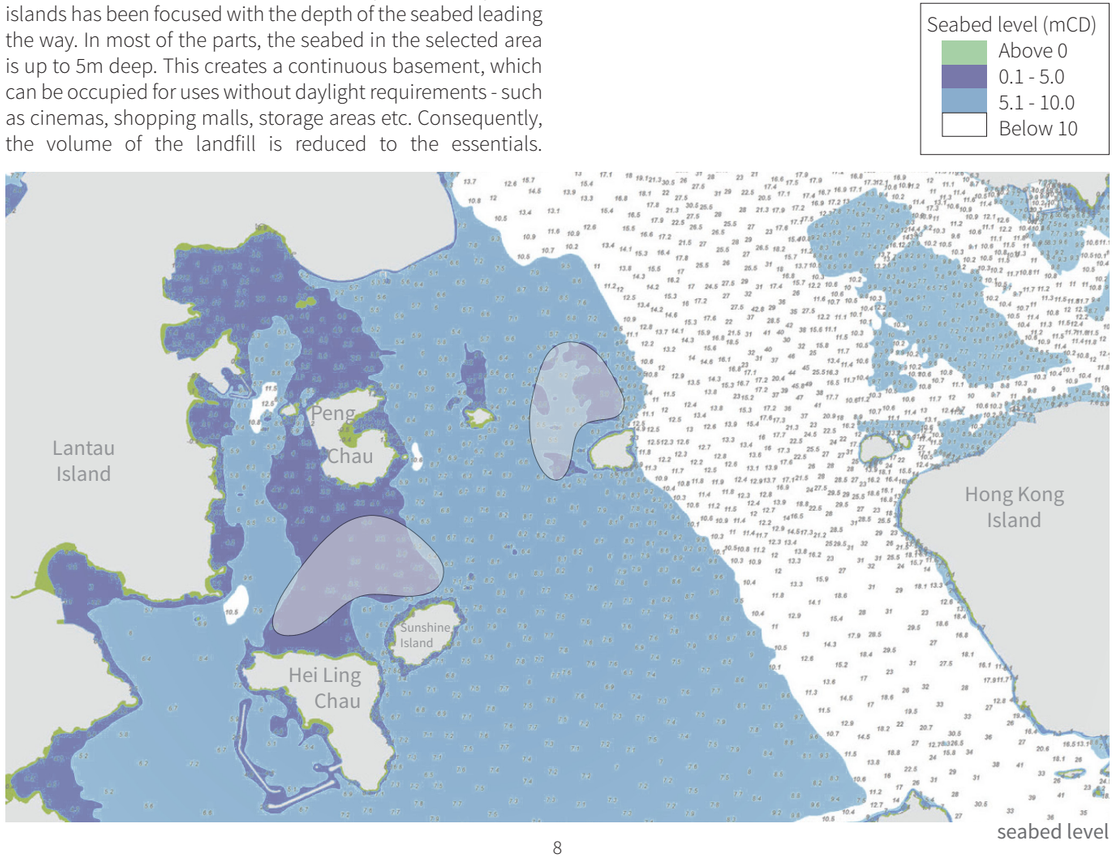


planned public transport connections

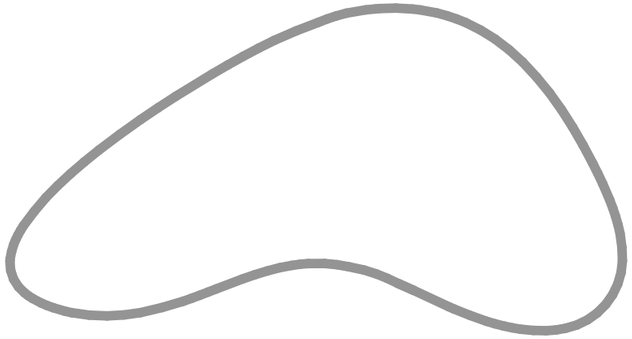
DEVELOPMENT OF 2 KIDNEY ISLAND

environmental influences

For F.E.M. the minimization of land reclamation plays an important role. For this reason, the positioning and shaping of the islands has been focused with the depth of the seabed leading the way. In most of the parts, the seabed in the selected area is up to 5m deep. This creates a continuous basement, which can be occupied for uses without daylight requirements - such as cinemas, shopping malls, storage areas etc. Consequently, the volume of the landfill is reduced to the essentials.

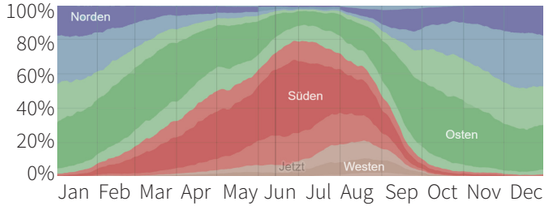


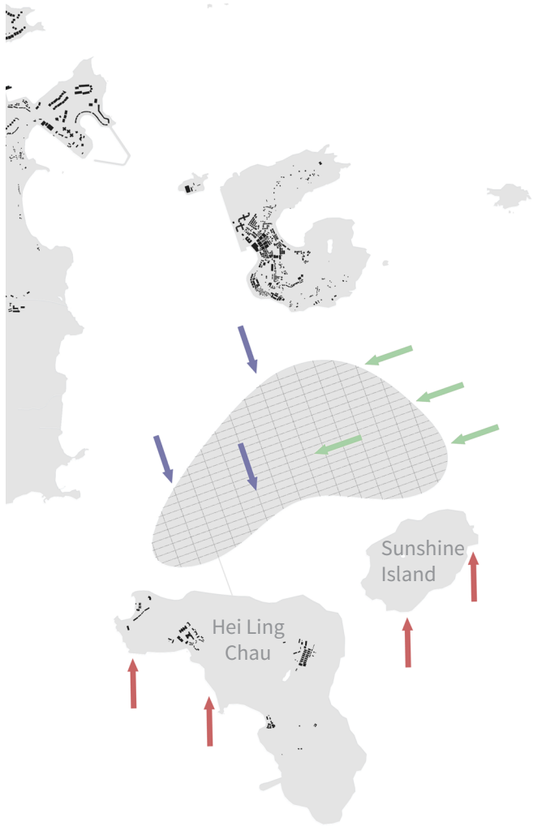
seabed level



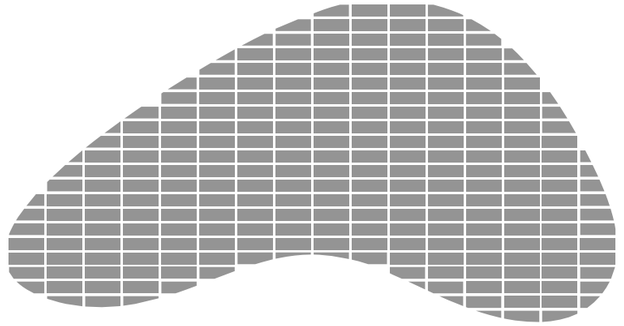
form

The main wind direction in Hong Kong, considered over the whole year, is from the east. In the winter months, the direction tends more from the northeast. So, the main grid was also aligned to the east, with a slight tendency to the north. Especially in the summer months, the wind from the south increases noticeable, but occurs in the monsoon time and therefore is accompanied by heavy rains. In extreme cases, when typhoons emerge, Kidney Island is protecting itself in the slipstream of Hei Ling Chau and Sunshine Island.





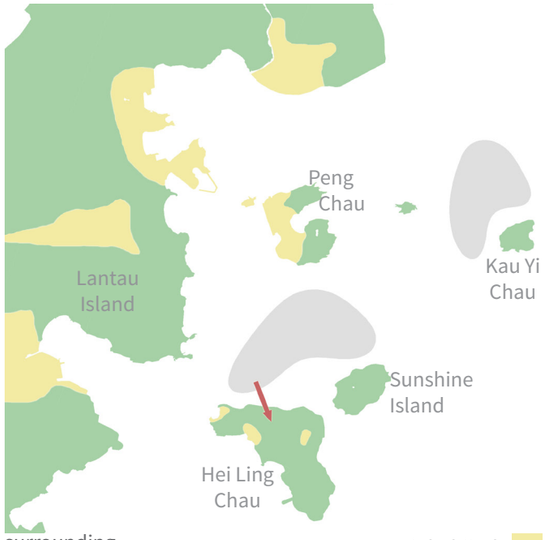
wind directions



grid

relationship with the surrounding

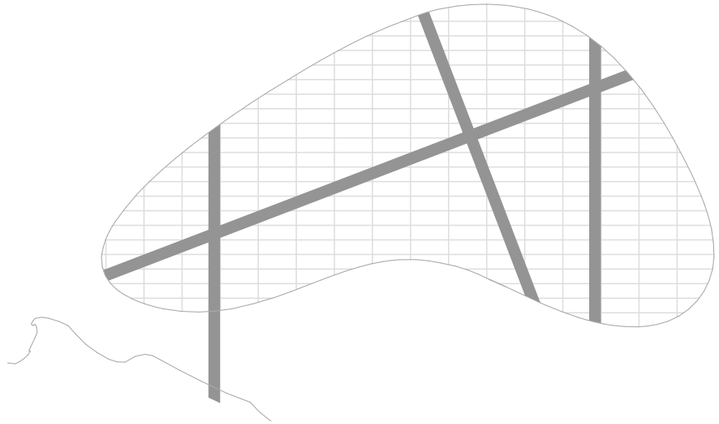
Many proposals for Lantau Tomorrow literally enclose the existing natural islands. With this project F.E.M. consciously decided against this approach, because the currently existing habitat for humans and the environment should be preserved in the best possible way. The pure green islands, Sunshine Island, Kau Yi Chau and Siu Kau Yi Chau, are currently untouched and should remain so, to protect flora and fauna. The north-located Peng Chau is an inhabited island with great charm. Its residents, they were interviewed during the excursion, obviously do not want a huge project which fences them. Therefore, to this island a respectful distance is kept and its only connection to Kidney Island is by ferry. The western Lantau Island is a partially inhabited large island. In its southern areas it is sparsely populated, offers a large nature and recreational area and therefore will be reachable by ferry and metro. The northern new island is as well connected via metro and ferry. On the southern Hei



surrounding

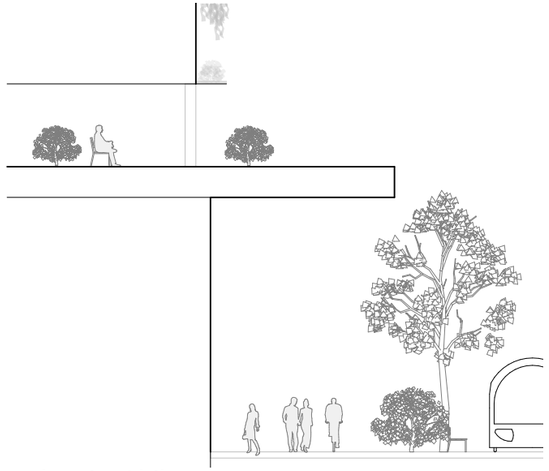
visual axes

Ling Chau are special facilities located, such as a rehab center and Hindu temples. Apart from that, the island has plenty of green space plus a beach and should therefore serve as next-door recreational area for the residents of Kidney Island. Thus, this island is developed with a drawbridge, so that ferries still can pass. Depending on the need, in addition to the pedestrian and bicycle path, the tram will travel over this bridge. But not only physical connections are relevant. Visual relationships are important connections that humans want to establish with their environment. The street lanes created by the grid basically offer four directions of view. These are reinforced by two extended north-south axes, which on the one hand emphasizes the connection with Hei Ling Chau, and on the other hand creates visual relationships with the directly neighboring islands Peng Chau and Sunshine Island. In addition, two, the grid cracking, axes were drawn, which open up further directions, including the second new island.

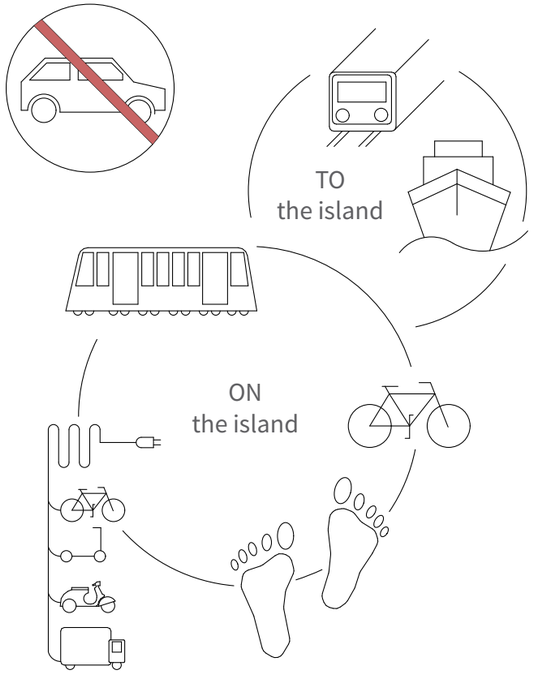


mobility

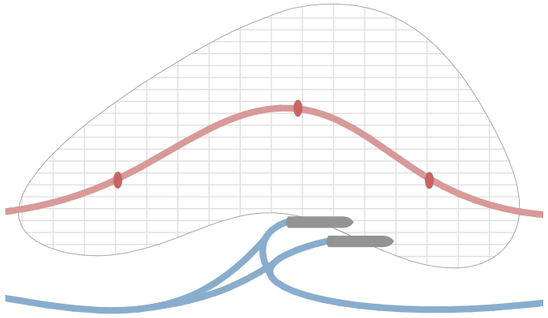
An effective mobility concept is a thematic priority of a new modern city. Fast moving in the most sustainable way was the goal. Consequently, the first step was to ban private cars from the island completely. The car traffic generates emissions, stresses the public space and requires space of the valuable habitat, which was a total dealbreaker. Therefore, the new island can only be reached by the metro system or ferry. The passenger port is protected and centrally located in the south. The three metro stations cover the entire new area. As a public transport for Kidney Island, F.E.M. developed an efficient and sustainable tram concept, which was inspired by the Chinese new ART tram (Autonomous Rail Rapid Transit). The islands new tram drives with wheels on the road instead of rails, to be more flexible and cheaper. It also doesn't need overhead lines because a battery is installed, which is loaded on its solar roof and it drives automatically. To make flexible disembarkation possible, the tram drives with about 10 km/h - a speed at which the majority of the population can easily hop on and off at any time. For elder people, women with baby carriages etc., there are stops where only on demand is stopped. On its route once around the island the tram needs 38 minutes, the longest connection from west to east takes 15 minutes and the central-line takes 6 minutes from one end to the other. On the main lines the trams are driving in both directions at the same time, on the secondary lines it drives one-way and at the end changes its direction. This concept can be extended at any time depending on the capacity utilization. For private transport, various means of traffic are available through the sharing concept. The electrically operated bicycles, scooters, mopeds and vans can be picked up at a variety of sharing stations. Vans will still be needed, for moving big things, for example changing residence, and can only be rented for that purpose. The private ownership of bicycles, which are the most environmentally friendly means of transport, is of course permitted and encouraged. Sheltered paths are formed for pedestrians and cyclists, so that even in the long rainy season dry moving is possible. For all other means of transport there is an asphalted lane in the middle of the street.



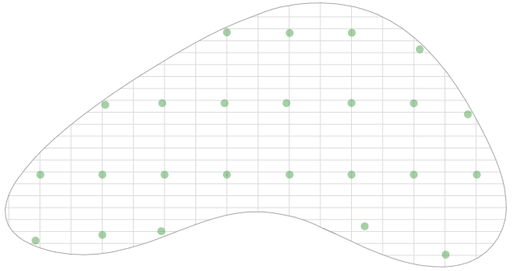
pedestrian&bike



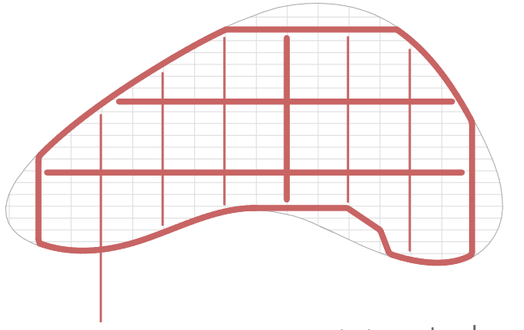
mobility concept



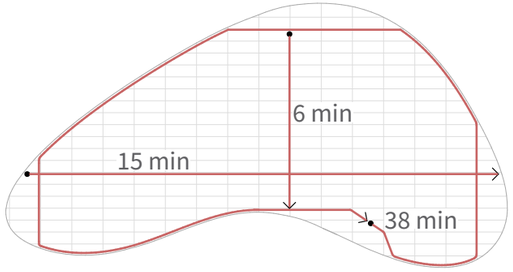
metro&ferry



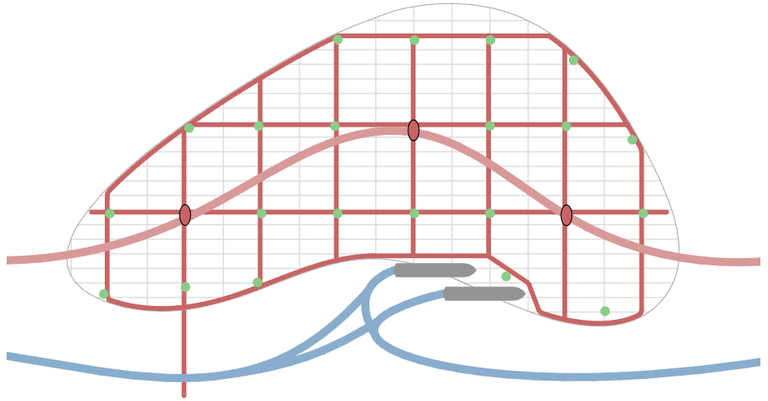
sharing stations



tram hop-on hop-off



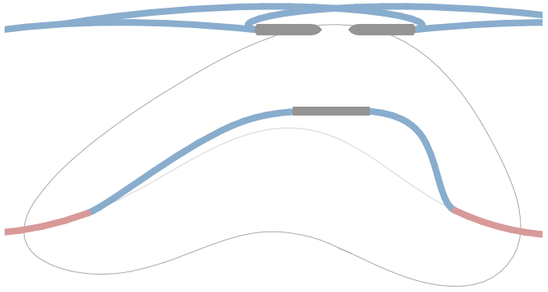
tram times



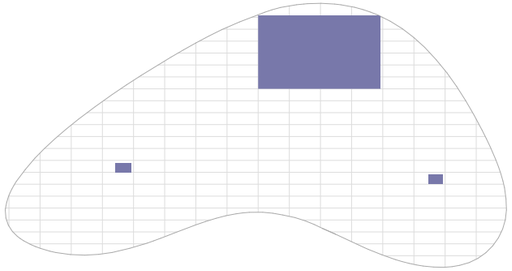
mobility all together

logistics

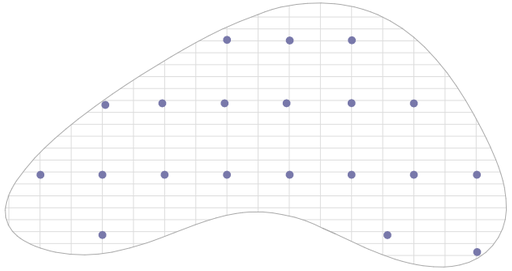
The concept of logistics is as well about sustainable efficiency. In order to guarantee the supply of Kidney Island goods can be imported and exported via two different ways. One would be through the cargo port located in the north of the island, the other one would be through the metro system. For this purpose, an extra track is built, which opens out before the MTR west station and again is discharged into after the MTR east station. Those two systems share the large-sized, underground main stock. From here, goods either can be delivered directly or be brought to the smaller distribution centers. The packages are then further delivered via electric tricycles to the shop or home. If there is no answer, the package will go to one of the many pick-up and drop-off stations, which are scattered all over the island. There can also be handed over letters or packages to be dispatched. Those stations are located in public space and should work automatically.



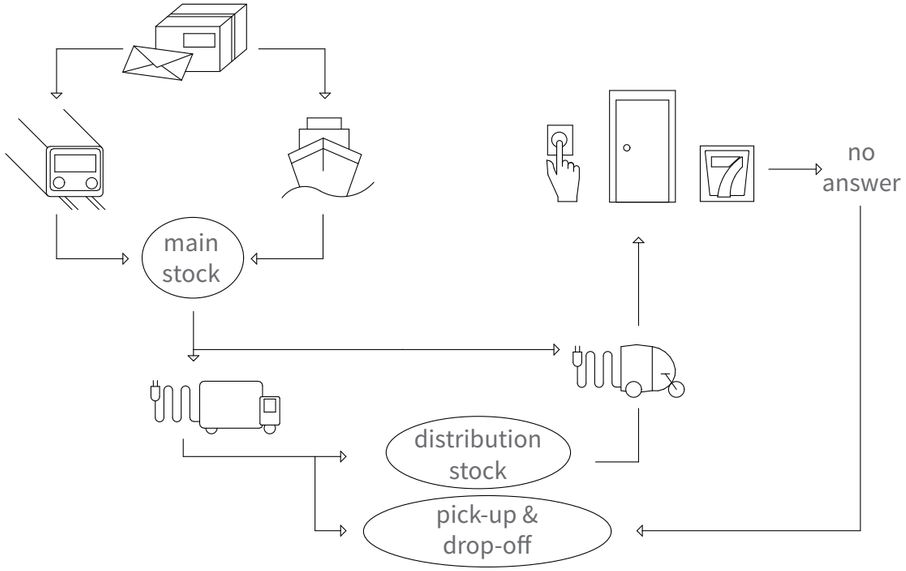
train&ships



distribution centres



pick-up & drop-off stations

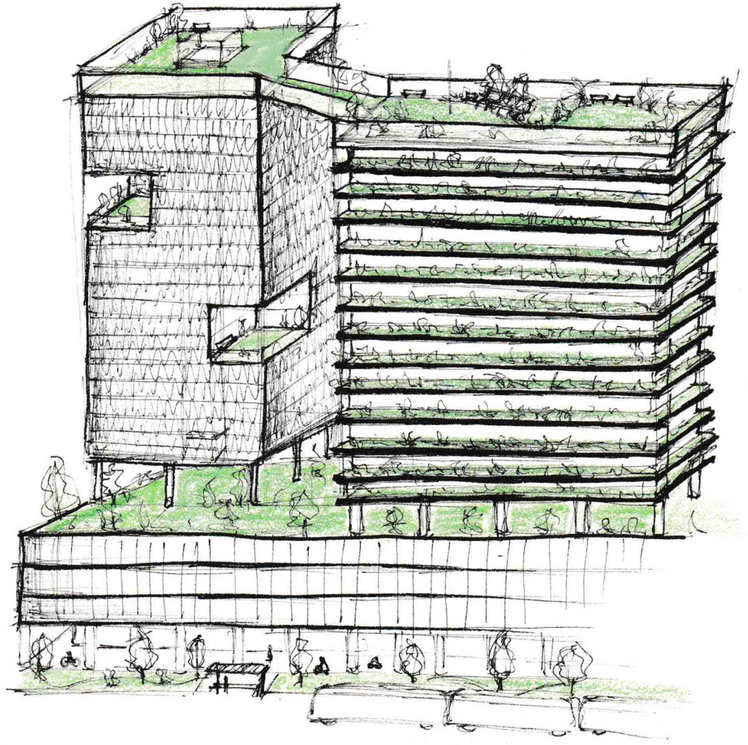


logistic concept

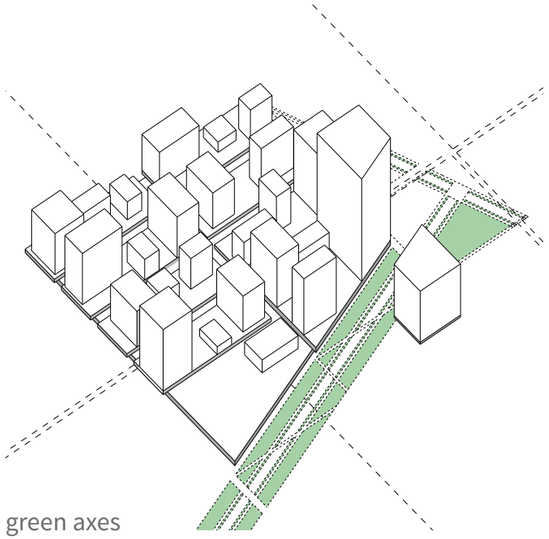
green areas

In general Kidney Island is full of green areas. Every street is an alley, with trees and recreational space on both sides. In the middle is a small road for bicycles, scooters, mopeds, vans or the tram. Pedestrians can walk on paths through the greens. Furthermore, there are great green axes generating elongated parks with channels in their midways. Large gardens are created at the intersections and arranged along them, but also in-between bigger and smaller public green space is being formed. Likewise, in the upper layers greens can be found. The lower platforms build a more private recreational area for the residents or users of those blocks, filled with relaxing areas and leisure facilities. Wherever it makes sense, the roofs are equipped with solar panels, otherwise they are green areas. Last but not least lots of the facades are occupied by plants, to not only ensure a good climate for the buildings, but as well for the humans.

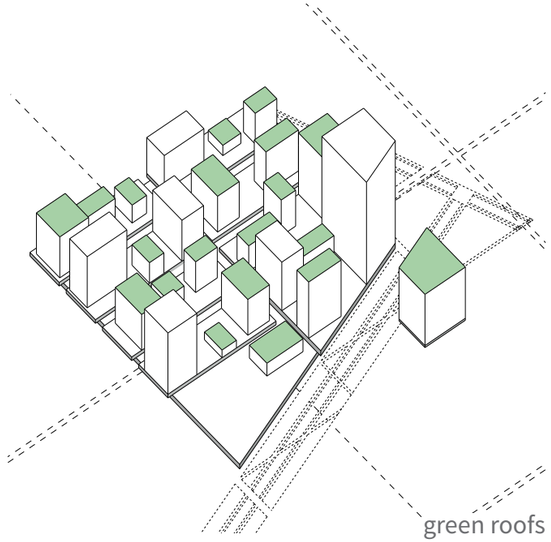
green streets



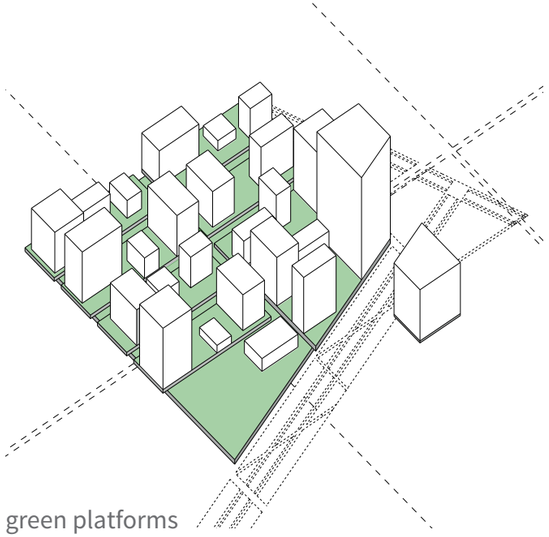
green in all levels



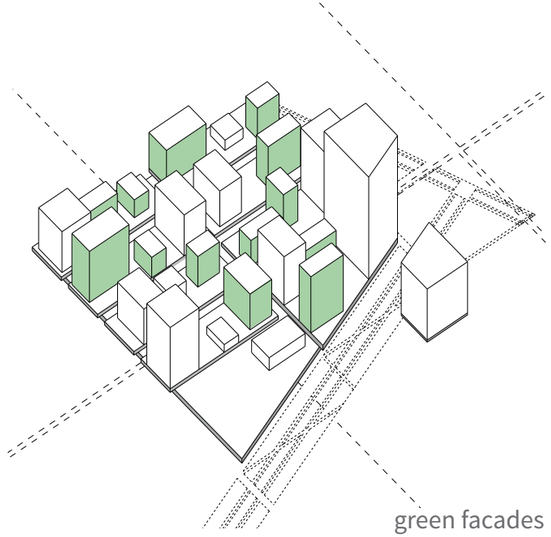
green axes



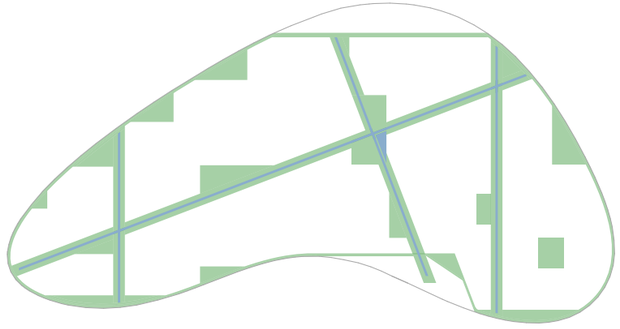
green roofs



green platforms



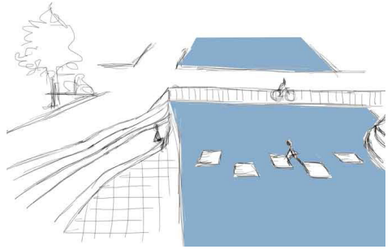
green facades



parks

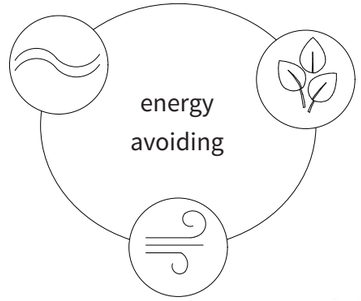
energy avoiding & energy production

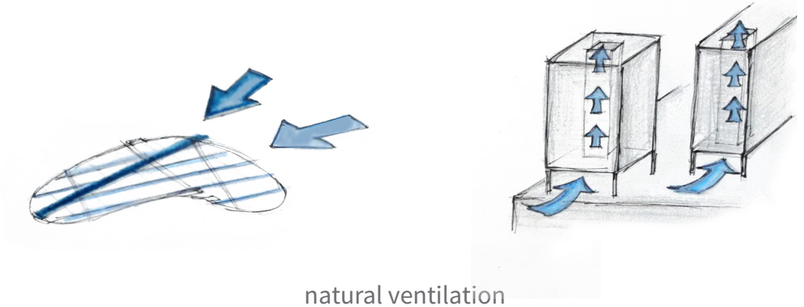
The hot, subtropical climate of Hong Kong in combination with the bad and dense development currently requires a gigantic consumption of energy through air conditioning. These in turn cause heating of the surrounding areas. Sustainability in terms of energy is therefore first and foremost to reduce the cooling load, which can be positively influenced by several factors. Across the whole island several channels extend, which not only create a pleasant atmosphere, but also cool off the environment by their evaporation chill. The water for this is drawn from the sea, filtered and slightly chlorinated, so that no impurities arise. Due to the lack of fresh water in Hong Kong, this efficient process is already being used for toilet flushing and, of course, continued on the new islands. The plants in front of the buildings cool the facade, shade the rooms behind it and cool by the water evaporating on their surfaces. In addition, plants filter fine particles, improve air quality and protect against noise. Of course, especially important is a good ventilation. This is given for the whole city by the correct positioning of the grid. Buildings can also be placed on pillars so that cooler air can enter below. Atria in the inner courtyard allow the warming air to flow upwards - the chimney effect is created.



channels

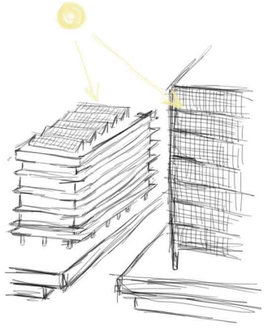
greens





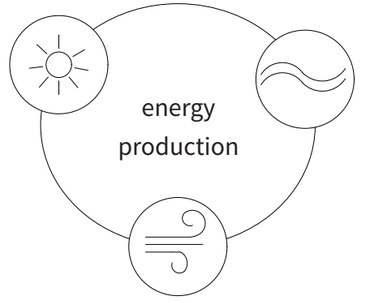
natural ventilation

Nevertheless, the modern WOman needs electricity for his everyday life. However, this energy should be generated as sustainably as possible. Therefore, arise on a variety of roofs solar systems. Facades of office buildings are provided with photovoltaic systems and even the tram drives with the solar energy generated on its own roof. Renewable energy is also generated in the new wind & wave park, which is being built for the purpose of the wind direction and of the ferry route to the east of Sunshine Island. This consists of wind turbines, which are ideal for the wind in Hong Kong, and Pelamis Wave Energy Converters, which can easily be placed between the wind turbines.

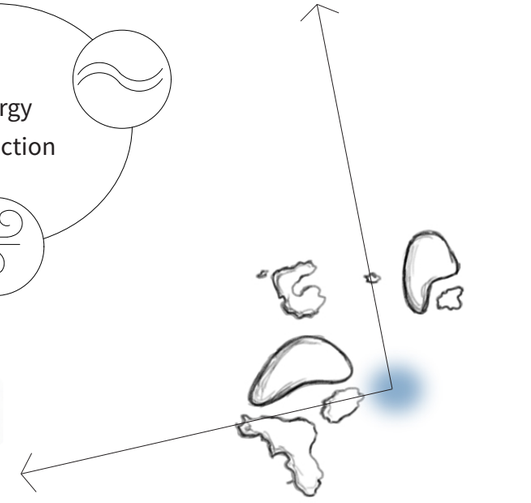


solar & photovoltaics

pelamis

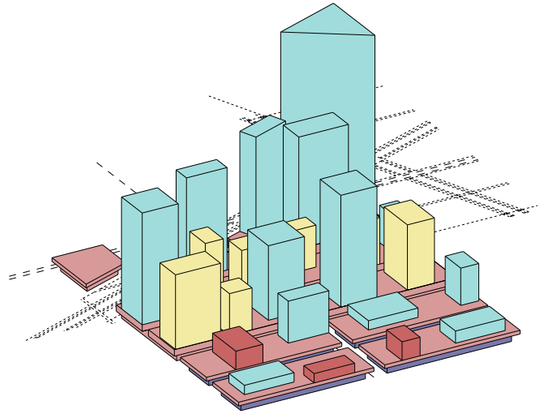


wind turbine



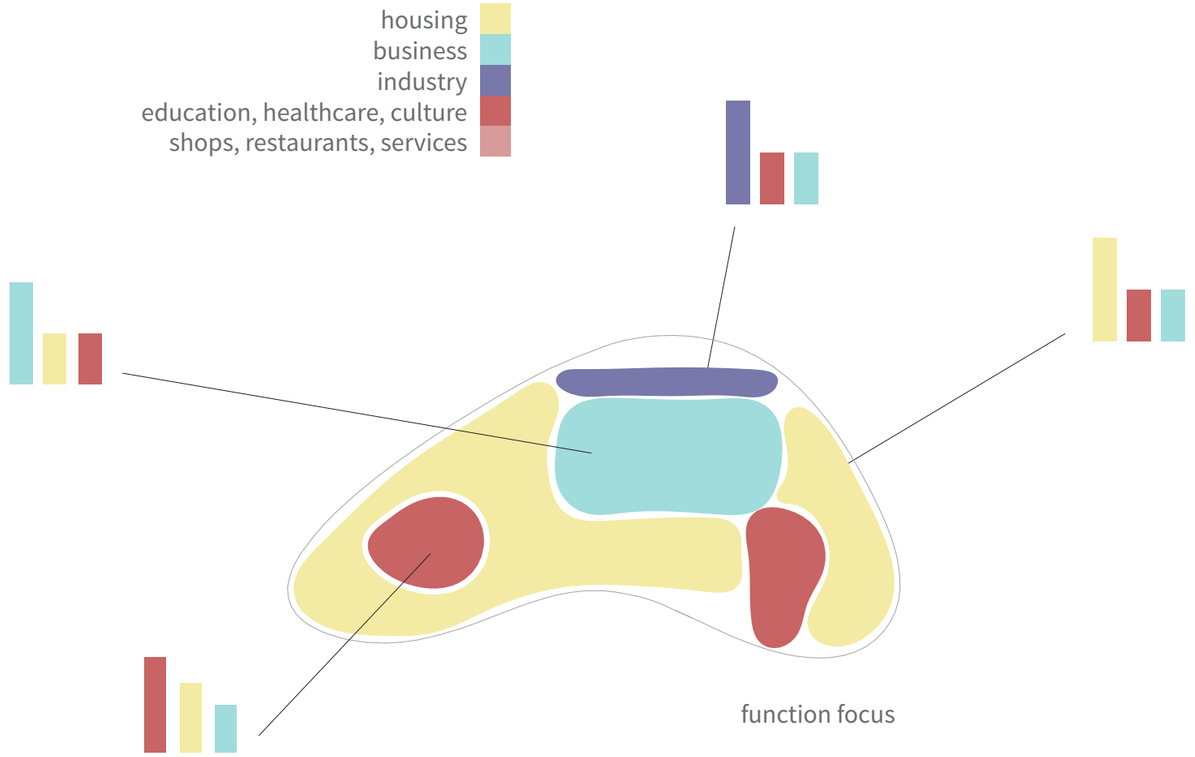
wind & wave park

functions

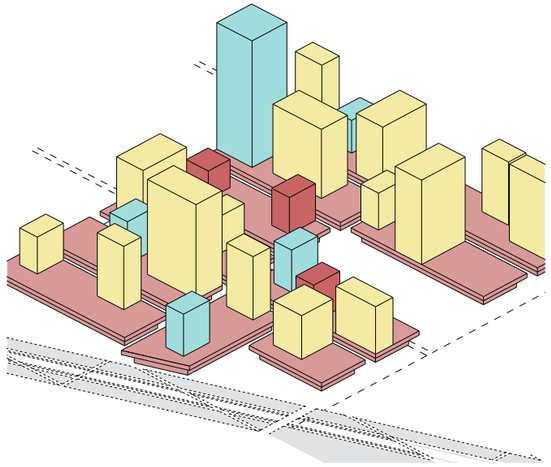


business focus

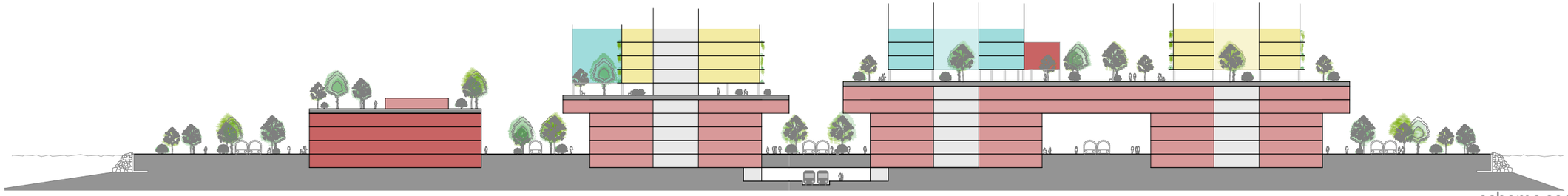
A city of short distances was one main topic for F.E.M.'s new city of Kidney Island. The goal is to reduce the need for transportation by shortening spatial distances between housing, work, local supply, services, places of leisure and education. Therefore, everything is everywhere. Almost all over the island the first few floors are a social infrastructure zone of shops, restaurants and services. Nevertheless, for the buildings above there are the focus areas for functions, for reasons of productivity. The focus on industry will be located on the northern port side. That's the only part where hardly no housing will occur. Instead, it will also be an area of business and leisure time like cinemas, bars, clubs etc. Around the central metro station will be the island's business district, which is very important to secure a place in Hong Kong's economy. The areas around the other two metro stations and around the passenger port focus on social infrastructure in terms of education, culture and health care. The remaining parts of the island are mainly for housing.



function focus



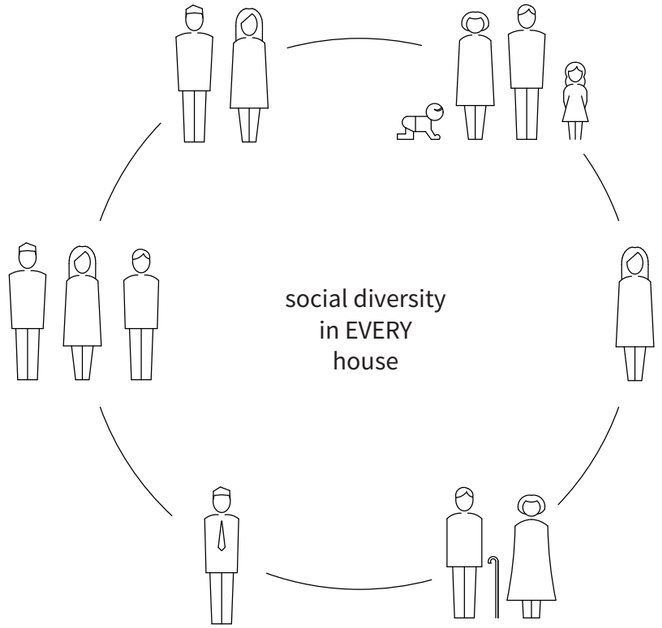
housing focus



schema section 1:1000

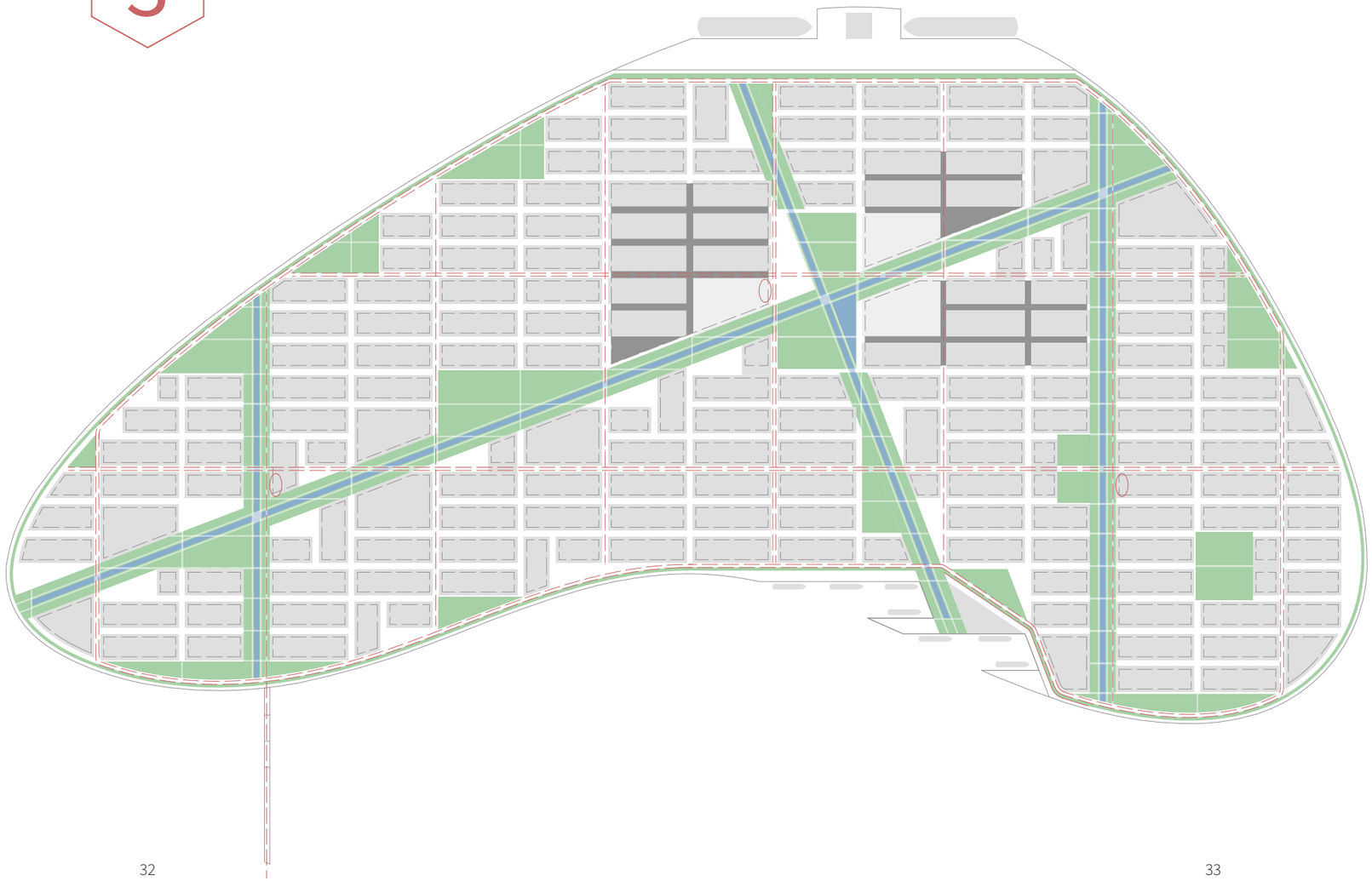
social diversity

The current situation of housing for Hong Kong's residents is complicated, difficult and unsatisfying. People are rated based on where they live, because their social class can be read from the buildings, they live in. That's why on Kidney Island there will be no public and no private housing. There will just be housing, but for all the diversity of people and social classes. Apartments should be built in different sizes and with different opportunities for all necessities. Upper-class people can have more space, or better views and therefore pay more. Elder or lower-class people can live in communities, share kitchens and community areas and therefore pay less. People can choose their living space in respect to their preference and their income and pay according to that. This creates houses with healthy social diversities.



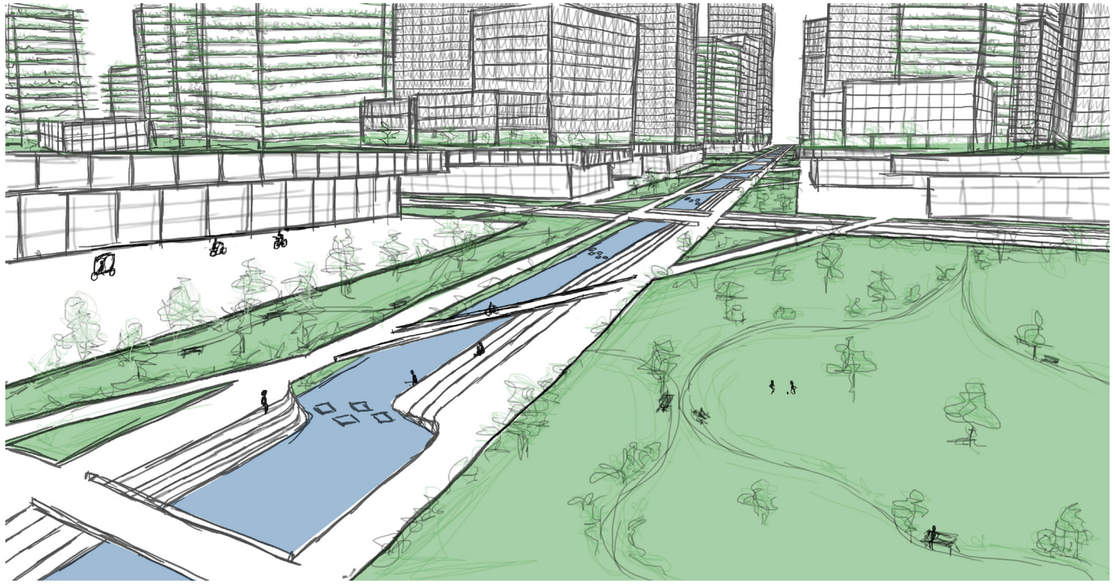
MASTERPLAN

3

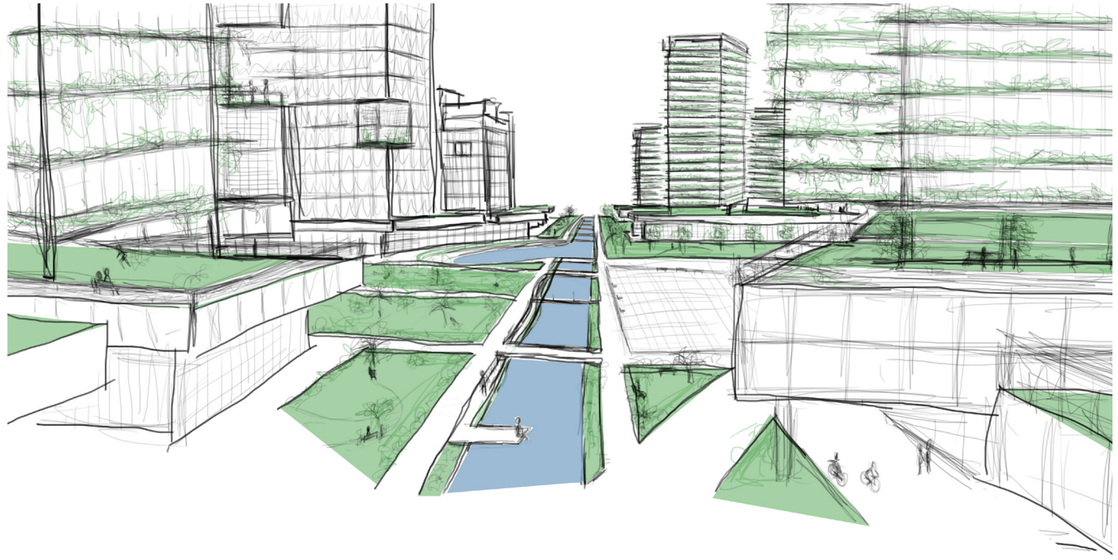


masterplan 1:10.000

atmosphere west park



atmosphere main square

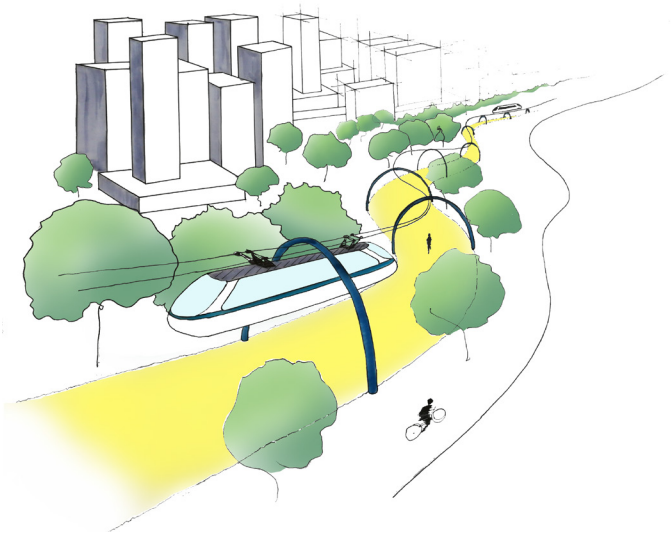


TO BE CONTINUED

GUL - GREEN URBAN LANTAU

Integral Desing Studio - Städtbau

SS 2018/2019



Alicia Albir Ribera
Cecilia Settimi
Gustavo Morais

145 Institut für Städtebau

AUTOR(INNEN)/AUTHOR

Alicia Albir Ribera
Mat.Nr. 11806982
Cecilia Settimi
Mat.Nr. 11807736
Gustavo Morais
Mat.Nr. 11805617

Integral Design Studio - Städtbau
SS 2019
Prof. Dokonal

Institut für Städtebau
Technische Universität Graz
Rechbauerstraße 12/II
A-8010 Graz

GUL | GREEN URBAN LANTAU

Concept

The project stems from the already existing idea in Hong Kong of the development of metropolitan areas on artificial islands in the Lantau area, called "Lantau Tomorrow Vision.

Our idea involves the construction of an artificial island of 700 hectares inserted between small pre-existing natural islands.
Everything stems from the idea of connection: connecting Kowloon, Hong Kong Island, Lantau, and the two small fishing islands Peng Chau and Hei Ling Chau.

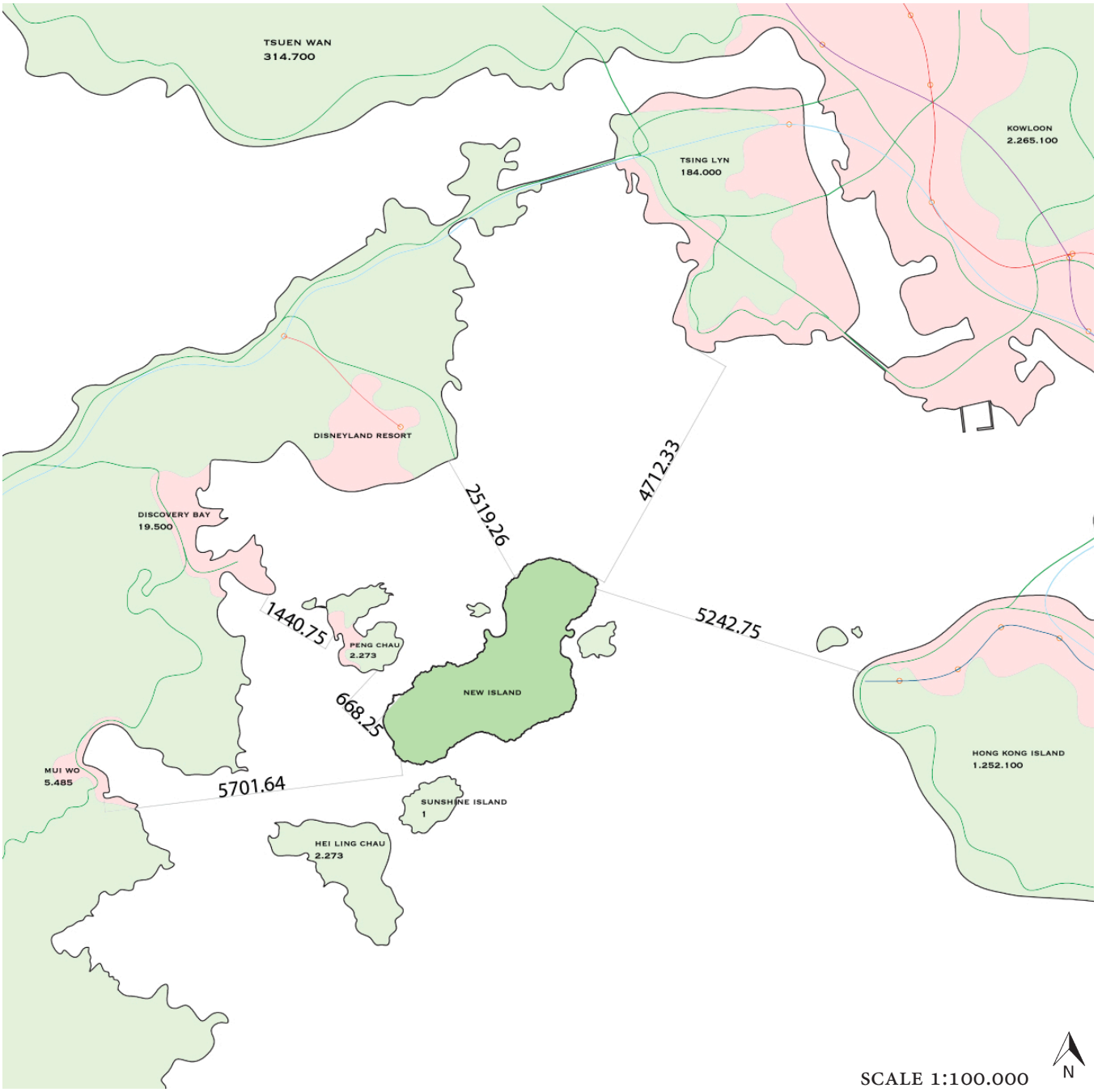
The island expects 70% of the area to be used for buildings while the remaining 30% for urban developments (10% streets, 20% others).

A total of 160,000 apartments will be available, including 110,000 public and 47,000 private, for a total of 600,000 inhabitants.

The name of the project is "Green Urban Lantau" is what characterizes the island and from which the name is to remain as eco-friendly as possible.
Don't create a city, but a place where you can always feel the touch of nature. Despite the skyscrapers and the very high density, the island includes many green areas, vegetation, renewable energy system for public transport especially as private cars are not allowed inside.

It's allowed to enter with the own car and leave it in the main center of the island in a large parking lot and then be able to take advantage of the innovative public transport available.

In the large car park, a total of 19. 450 cars were calculated, including 7,700 for families in social housing and 11,750 for families in private buildings.


TSUEN WAN
314.700
KOWLOON
2.265.100
TSING LYN
184.000
DISNEYLAND RESORT
DISCOVERY BAY
19.500
2519.26
4712.33
1440.75
PENG CHAU
2.273
5242.75
NEW ISLAND
668.25
HONG KONG ISLAND
1.252.100
MUI WO
5.485
5701.64
SUNSHINE ISLAND
1
HEI LING CHAU
2.273
SCALE 1:100.000
N

GUL | GREEN URBAN LANTAU

Analysis Underground and Roads

The first study carried out was on the pre-existing one.
We have studied and calculated the population of each island and district of Hong Kong; the distance between the future island and the existing islands.
Later we studied the route of the main roads and subway that cross the city.

We can see in the plan in different colour the green area and the develop of the city, in red.

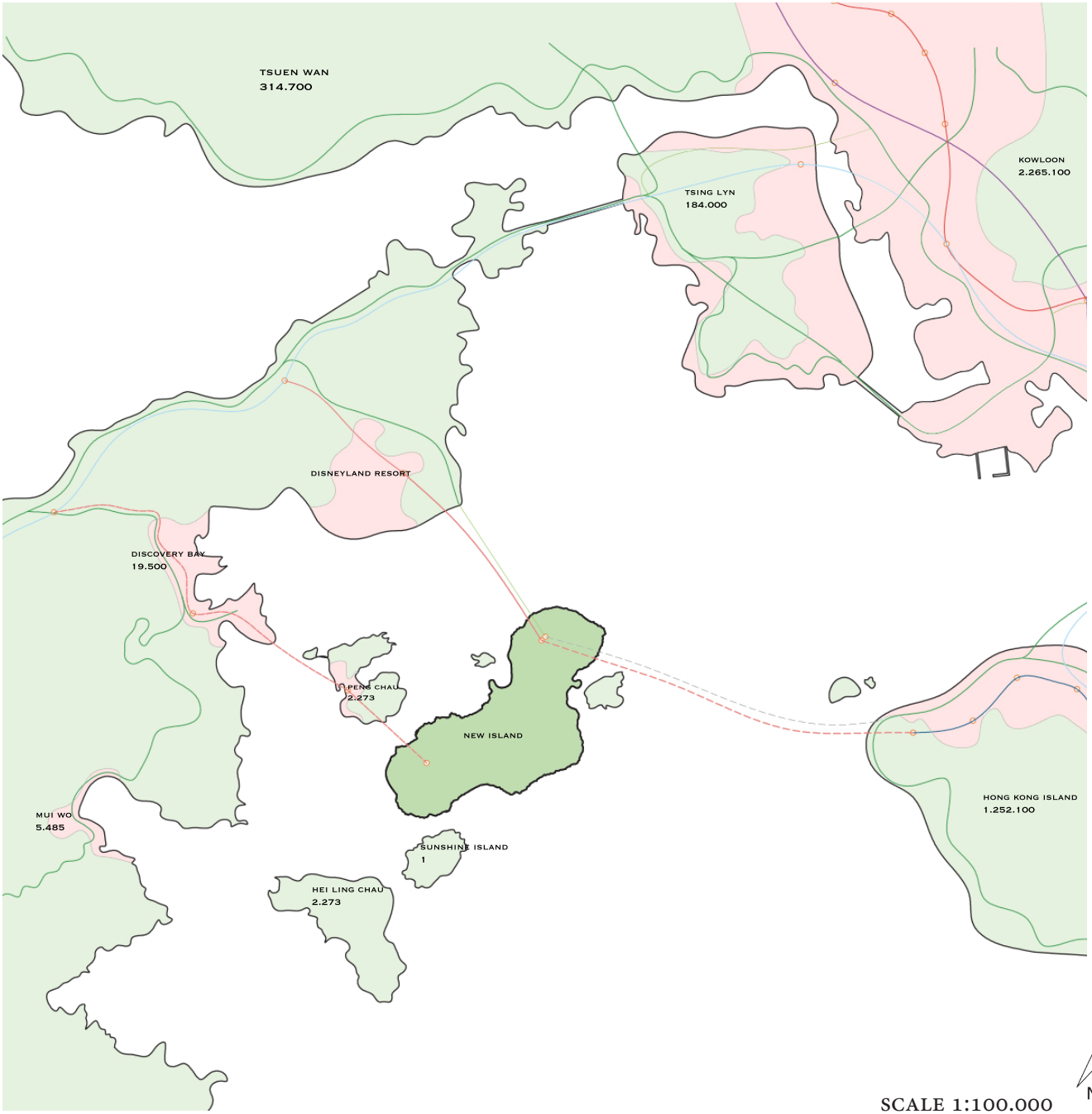
About the roads the principal are in green and then we can see the subway in different colours depending of the line of the MTR.

Later we tried to connect existing subway lines and roads with our new idea of connecting all neighborhoods in the fastest and most convenient way possible.

In the second plan we can distinguish the new connections through a main road that crosses the sea from Lantau Island and the new island, also with a train route, which from Disneyland station in Lantau connects our new island in its main connection center where you will find the private car park and the big commercial and office center of the island.

Beyond the car park we find the largest station to allow the inhabitants to move easily within the island, quickly and effectively.

With a dashed lines the possible future connections with Hong Kong island have been highlighted.

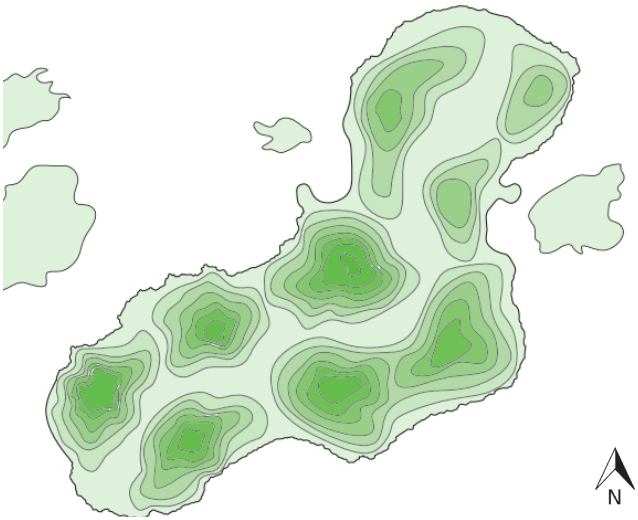


SCALE 1:100.000

GUL | GREEN URBAN LANTAU

Topography

The idea of topography is to create small hills and raised areas in each district.
The highest area of the district is located exactly in the center of an imaginary circumference where we find the commercial center of the district.
This makes it possible not to obstruct the view of the sea and the surroundings too much because commercial buildings and offices are the tallest buildings on the island.
The height difference map shows the contours of the land every 5 meters, for a maximum of 45 meters.



GUL | GREEN URBAN LANTAU

„The first rule of sustainability is to align with natural forces, or at least not try to defy them."

Paul Hawken

GUL | GREEN URBAN LANTAU

Energy Production and Concept

WIND POWER

Ewicon - electrostatic converter of wind energy, it uses the movement of electrically charged water droops to generate energy;

EcoBuild - infrastructure with wind turbines, using the parts between the structure to produce energy;

Wind Tree - made out of recycal material; this tree are spread through the city to collect energy;

Wind Turbins in Sea - with the lack of space in land, another alternative is to construct wind turbins in the sea or near the coast;

WATER POWER

Sea Turbins - using the sea current and mechanical turbins, it's possible to produce a significant amond of energy;

Wave Power Station - an enclose chamber with open part below the sea level, alowing to water flow in and out, the water level rises and falls with the rhythm of the waves, this makes the air goes forwards and backwards through the turbin;

SOLAR POWER

Photovoltaic Panels - solar cells, also called photovoltaic (PV) cells by scientists, convert sunlight directly into electricity, this panels will be mainly used for private energy;

Hybridvoltaic Panels - mix of photovoltaic panels with water tubes, they produce energy and heat the water for domestical uses; the water passing in the middle of the tubes is also used to store the energy;

Solar vehicles - public transport that take use of solar panels instaled in the top to be self-charger;

GREEN POWER

Smart Roads - for charging all electric vehicles using advance technology, this works while the vehicles are moving;

Pavegen - using force and weight of people walking, this floor technology can produce enough energy to cover the public spaces;

Biomass - with a mechanical generator, that is moved using steaming water, getting by burning the biomass near a water container;

GUL | GREEN URBAN LANTAU

Ewicon

The prototype EWICON (Electrostatic Wind energy CONvertor) was designed by Delft University of Technology in 2013. The revolutionary convertor transforms wind energy into electricity without the use of moving mechanical parts.

Eco-Build

Venger Wind is a large vertical axis wind turbine manufacturer based in Henderson,Nevada. Venger Wind vertical wind turbines have a unique look. The styling of the large, white wind turbines are more reminiscent of an art installation.

Wind Tree

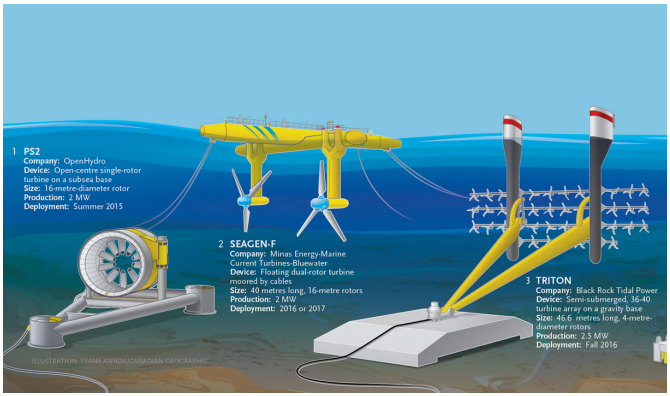
Inspired by trees, the WindTree is a complementary electrical produc;on system, based on a small vertical axis wind turbine called Aeroleaf. The Aeroleaf are all independant, which facilitates both production and maintenance.

Wind Turbines

All the largest offshore wind farms are currently in northern Europe, especially in the United Kingdom and Germany, which together account for over two thirds of the total offshore wind power installed worldwide.

GUL | GREEN URBAN LANTAU

Sea Turbins



Force is a non-profit organization that provides a testing site for tidal technology in four underwater, 200-metre-wide berths. Nova Scotians are about to receive a flicker of power from North America's first in-stream tidal turbine.

Wave Power Station

Wave power is the capture of energy of wind waves to do useful work. In 2000 the world's first commercial Wave Power was installed on the coast of Islay in Scotland. In 2008, the first experimental multi-generator wave farm was opened in

Hibrydvoltaic Panels

The technology allows a double production of energy, electricity and hot water, with one unique solar panel. It allows it to produce 3 times more energy than a standard photovoltaic panel.

Photovoltaic Panels

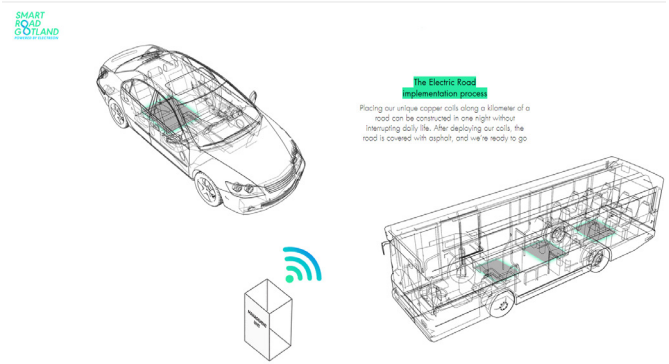
A photovoltaic system employs solar modules, each comprising a number of solar cells, which generate electrical power. PV installations may be ground-mounted, rooftop mounted or wall mounted.

GUL | GREEN URBAN LANTAU

Solar Vehicles

A solar vehicle is an electric vehiclepowered completely or significantly by direct solar energy. Usually photovoltaic cells contained in solar panels convert the sun's energy dirergy.

Smart Roads

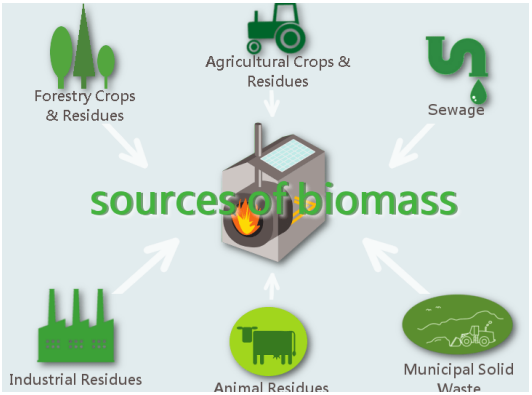


The E-road is being built by the Smart road Gotland consortium, in Sweden. In 2019 a prototype of this 4 km. It is possible charge the vehicle without the need to carry huge e batteries.

Pavegen

As pedestrians walk across the Pavegen system, the weight from their footsteps compresses electromagnetic generators below, producing 2 to 4 joules of off-grid electrical energy per step.

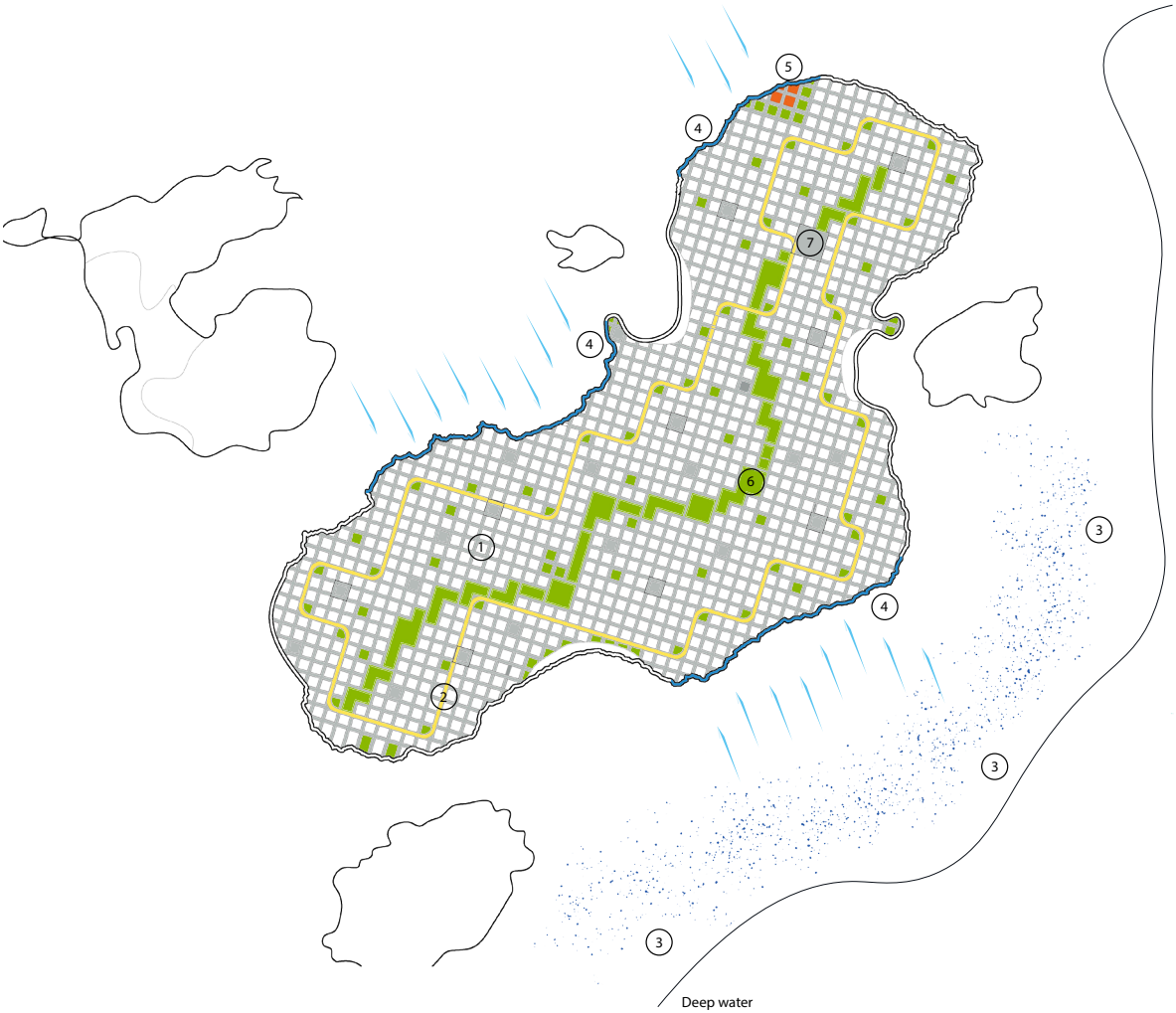
Biomass



Solid biomass, such as wood and garbage, can be burned directly to produce heat. Biomass can also be converted into a gas called biogas or into liquid biofuels such as ethanol and biodiesel. These fuels can then be burned for energy.

GUL | GREEN URBAN LANTAU

Plan of the energy system

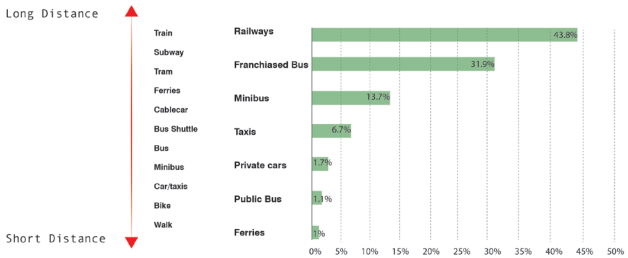


GUL | GREEN URBAN LANTAU

Analysis Public Transportation

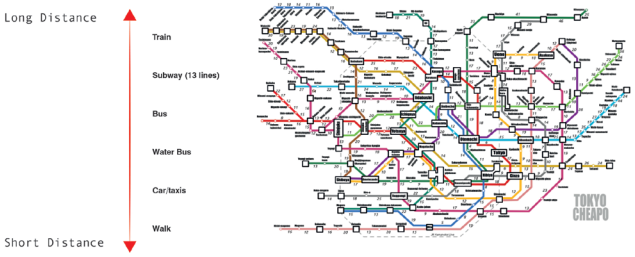
After a first inicial study and a thorough research on renewable energy sources, we move on to the study and research of public transportation. We have compared Hong Kong with two large cities like Seoul and Tokyo: we have compared their metros. About our island, we were able to analyze our means of transport according to speed and distance, divided into two important categories: people and delivery. Thanks to the analysis of renewable energies, we were able to insert completely new, almost zero energy transport vehicles.

Hong Kong



Seoul

Tokyo



GUL | GREEN URBAN LANTAU

Analysis Transportation System

People

Long Distance
(Faster)

- Subway - to connect the centers of each district with the main connection with Hong Kong;
- Tram - goes all along the island, connecting all districts;
- High Flying Caterpillar - a flying tram that connect two districts in pependicular to the Tram;
- E-Bus - there's three separeted networks of bus's (North, Center and South);
- Hamn - electric autonumous bus/taxi for private or shared trips all around the island;
- E-Bike & Scooters - for renting and travel anywhere in the island, using an App;
- High Speed Sidewalk - to walk faster and arriving quick to there's destination;
- Walk

Short Distance
(Slower)

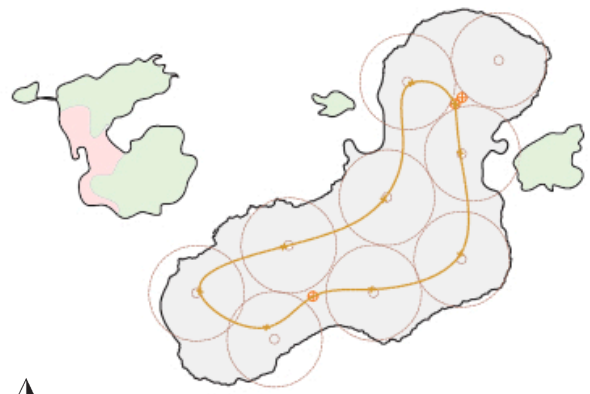
GUL | GREEN URBAN LANTAU

Subway

A new subway train, which consists of six carriages and features cutting-edge carbon fiber technology, completed its first trial run in Qingdao. Dubbed the “subway train of the future,” it represents the most advanced development of subway train manufacturing.

Tram

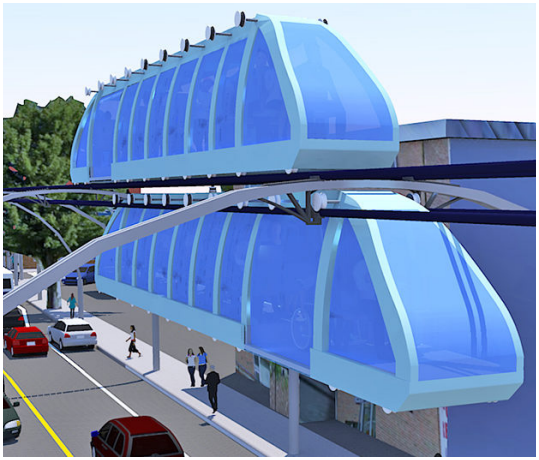
High-tech Tram like in Dubai, which will be the world’s first tram system to have sychronised automatic platform doors as well as automatic train protection and operation system that will assist drivers. It works since November 2014.



SCALE 1:100.000

GUL | GREEN URBAN LANTAU

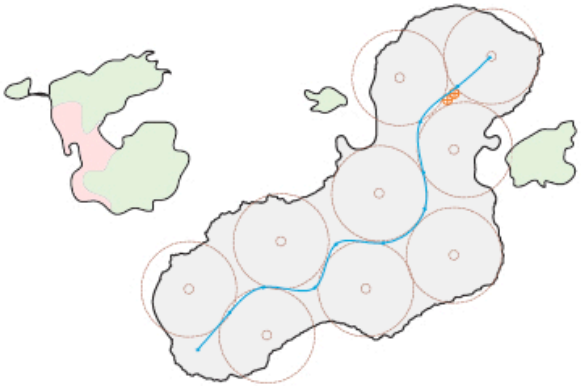
High-Flying Caterpillar

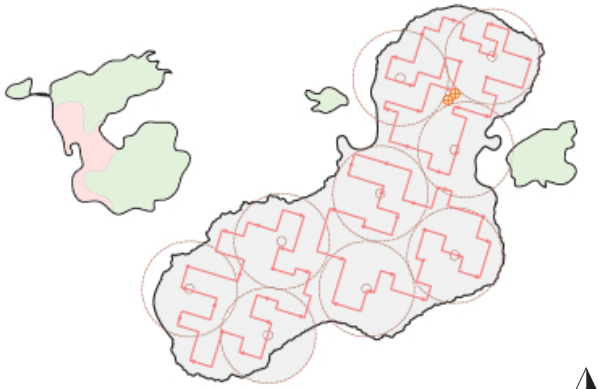


Caterpillar Trains has just won an Indian Railways engineer a global competition in Boston. Unlike the conventional metro system the C-Train would run on poles joined together to form an arch. The system would run on electricity, with each car equipped with a battery in case of emergencies.

E-Bus

A solar bus or Eletric bus is a bus which is powered mainly by solar energy. The use of the term “solar bus” normally implies that solar energy is used not only for powering electric equipment on the bus, but also for the propulsion of the vehicle.





SCALE 1:100.000

GUL | GREEN URBAN LANTAU

Hamn

It's an autonomous minibus with capacity for 12 passengers, some sitting and others standing, created in conjunction with KAMAZ. It would have autonomy of about 200 kilometers before needing a new recharge.

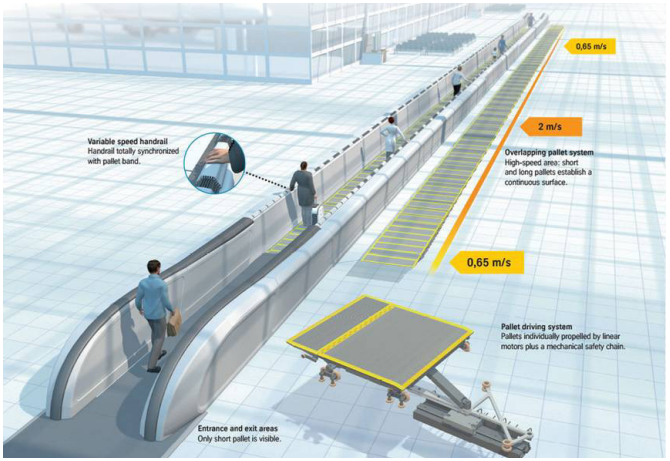
E-Bike

The electric shared bike is one of the sustainable mobility tools to increase the use of public transport vehicles by integrating them together and integrating them with the use of shared bicycles for proximity travel.

E-Scooter

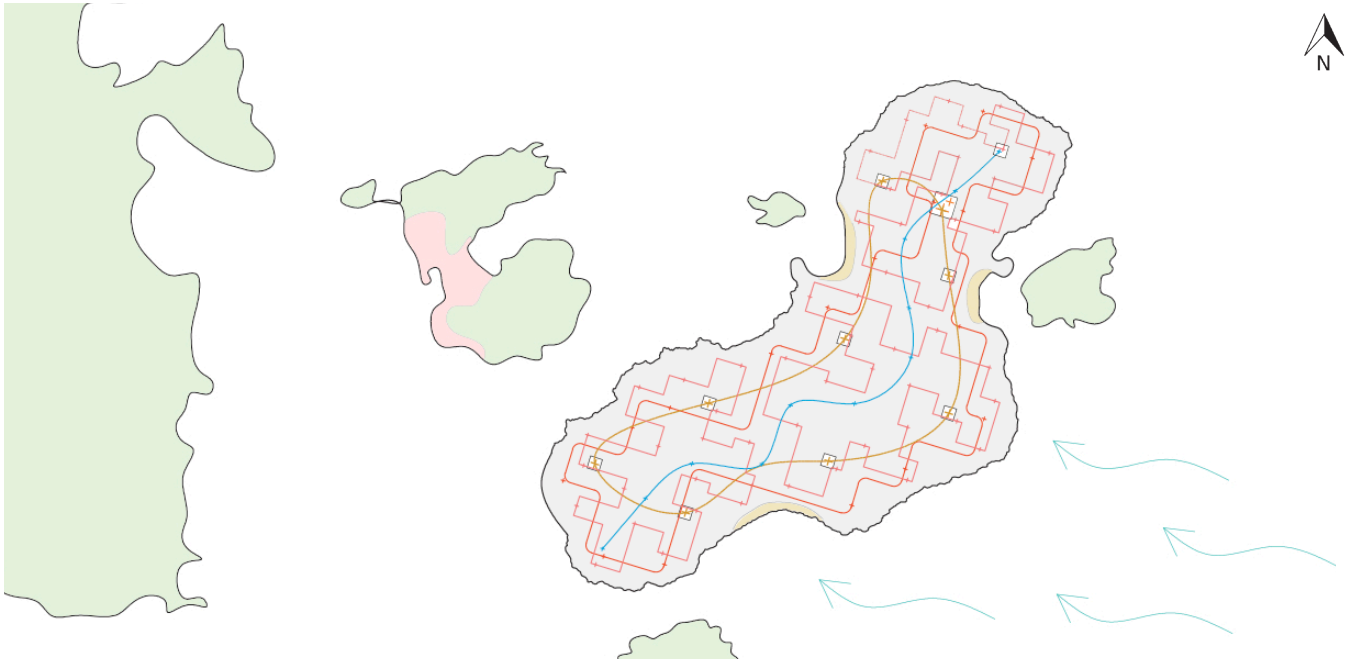
Basically it 's the same system of the E-Bike sharing but with a eletric scooter.

High-Speed Walkway



A moving walkway, also known as a travelator is a slow-moving conveyor mechanism that transports people across a horizontal or inclined plane over a short to medium distance.

Plan of the trasportation system



SCALE 1:50.000

GUL | GREEN URBAN LANTAU

Analysis Delivery System

Delivery

Long Distance (Faster)

Short Distance (Slower)

- Subway - third rail between the subway for trasporting goods along the island;

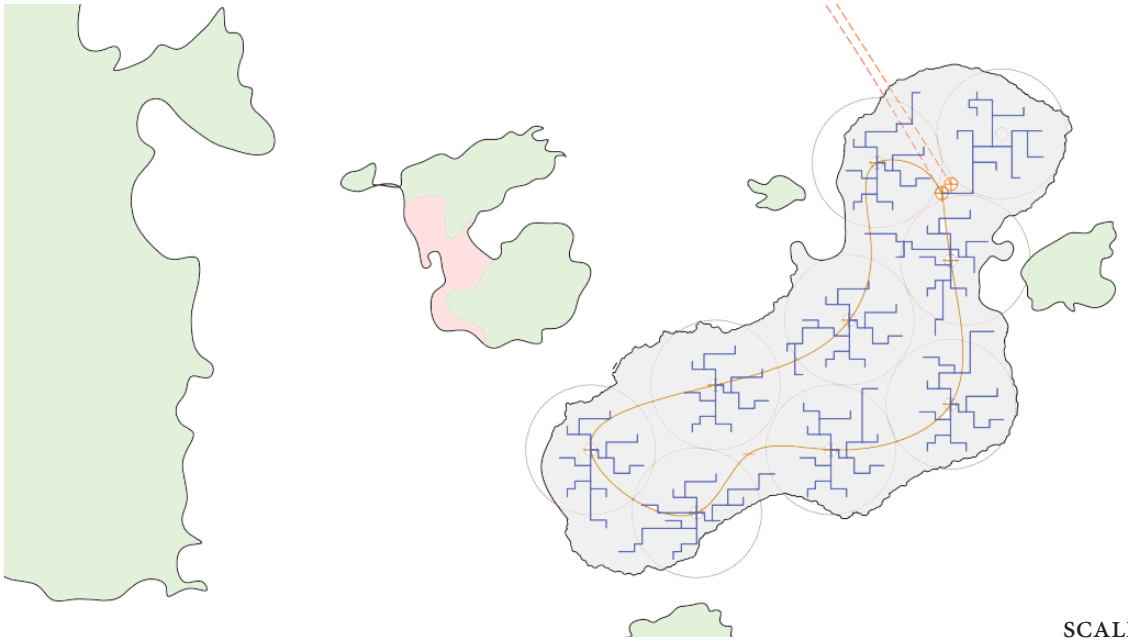
- Next - new concept of delivering around each district using an electric vehicle;

NEOTROPE® NEWS

Next

Next is an advanced smart transportation system based on swarms of modular self-driving vehicles, designed in Italy. Each module can join and detach with other modules on standard city roads.

Plan of the delivery system



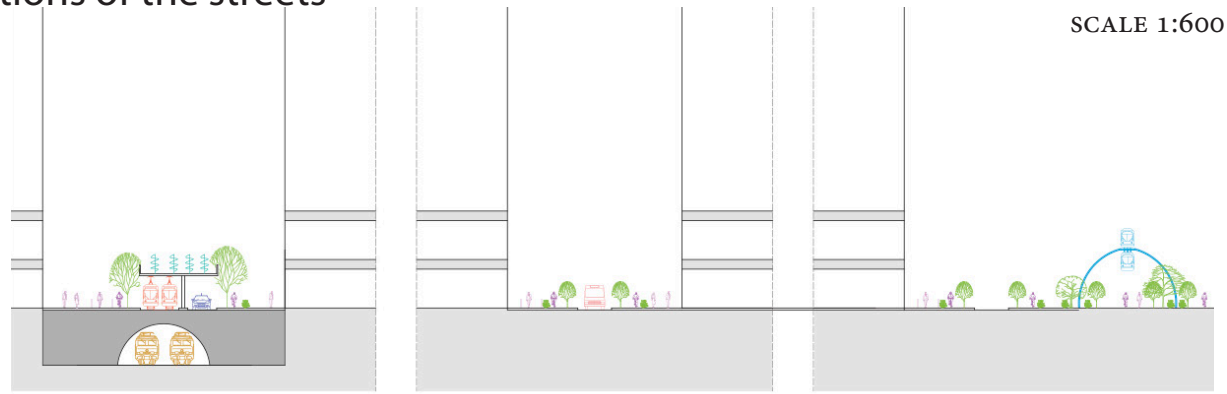
SCALE 1:50.000

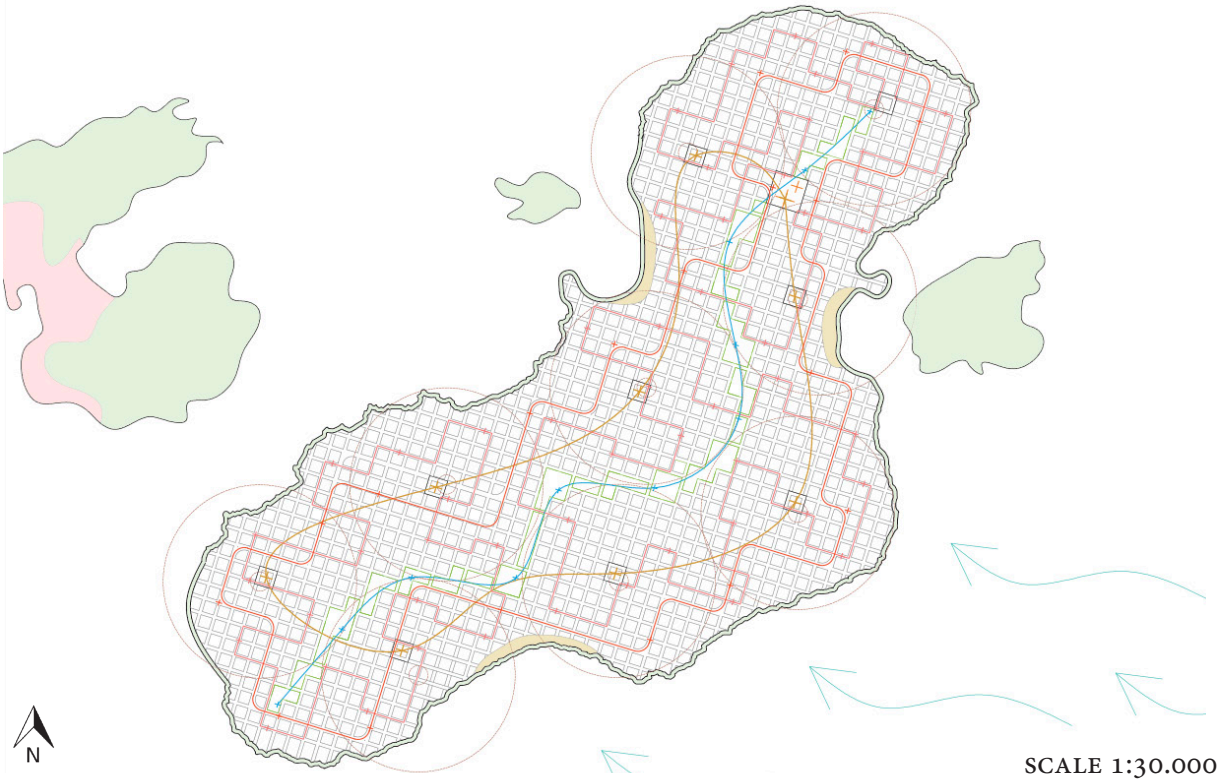
N

GUL | GREEN URBAN LANTAU

Sections of the streets

SCALE 1:600





SCALE 1:30.000

GUL | GREEN URBAN LANTAU

Analysis of the districts

Valencia

787.000 Inhabitants

19 Districts
11 Hospitals
2 Universities
50 Museums
18 Churches
9 Gardens
1 Airport
1 Harbour
88 Public Schools
18 Cinema
2 Conference Centers
8 Stadiums
66 Theaters

Lisbon

505.000 Inhabitants

5 Districts
8 Hospitals
4 Universities
31 Museums
36 Churches
11 Gardens
1 Airport
1 Harbour
770 Public Schools
27 Cinema
2 Conference Centers
5 Stadiums
61 Theaters

Graz

435.000 Inhabitants

17 Districts
9 Hospitals
6 Universities
26 Museums
13 Churches
7 Gardens
1 Airport
0 Harbour
215 Public Schools
11 Cinema
3 Conference Centers
5 Stadiums
20 Theaters

Lantau Tomorrow

600.000 Inhabitants

9 Districts
9 Hospitals
2 Universities
35 Museums
22 Churches/Temples
9 Gardens
0 Airport
1 Harbour
350 Public Schools
20 Cinema
2 Conference Centers
6 Stadiums
49 Theaters

1 Districts
1 Hospitals
4 Museums
3 Churches/Temples
1 Gardens
40 Public Schools
2 Cinema
5 Theaters

Now we were able to study three similar cities as far as the population is concerned. Thanks to this research we were able to estimate the public and private functions to be included in each of our districts. The island is divided into 9 districts and is characterized by a modular grid of streets. We calculated that each district need to have 1 hospital, 4 museums, 3 temples, 40 public schools, 2 cinema and 5 theaters.

The second step it was to study the different social housing in our island and calculated for each building the number of the floor and the people they live in one specific building.
We have in each district Work and produce buildings, offices, private and social houses, commercial services and public buildings like schools, hospitals, sports center.

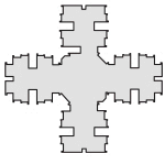
GUL | GREEN URBAN LANTAU

Analysis of Social Housing Buildings

Floor: 40

People each floor: 73

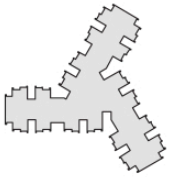
People: 2.920



Floor: 40

People each floor: 79

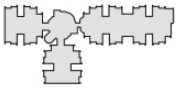
People: 3.160



Floor: 40

People each floor: 84

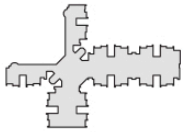
People: 3.360



Floor: 30

People each floor: 69

People: 2.070



Floor: 30

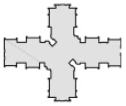
People each floor: 78

People: 2.340

Floor: 30

People each floor: 50

People: 1.500



Floor: 40

People each floor: 30

People: 1.200

Floor: 40

People each floor: 58

People: 2.320

Floor: 30

People each floor: 26

People: 780

Floor: 40

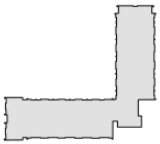
People each floor: 58

People: 2.320

Floor: 30

People each floor: 84

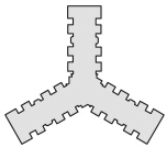
People: 2.520



Floor: 30

People each floor: 88

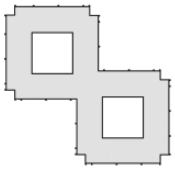
People: 2.640



Floor: 40

People each floor: 78

People: 3.120



Floor: 30

People each floor: 112

People: 3.360

GUL | GREEN URBAN LANTAU

work and produce

offices

private houses

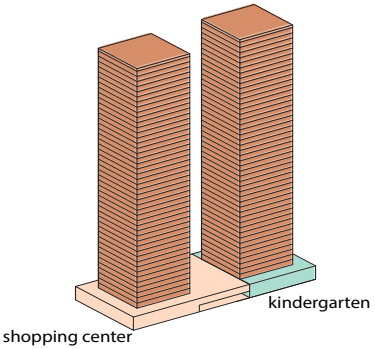
commercial services

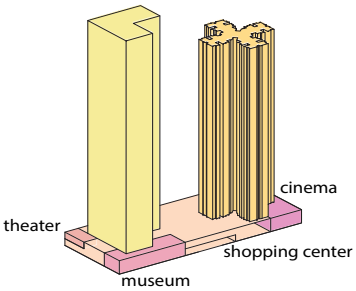
public houses

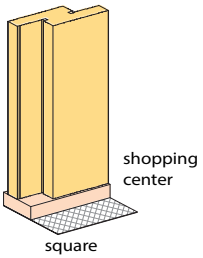
public buildings (schools, hospitals, temples)

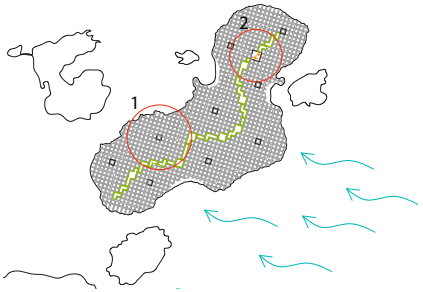
public spaces

pedestrian streets

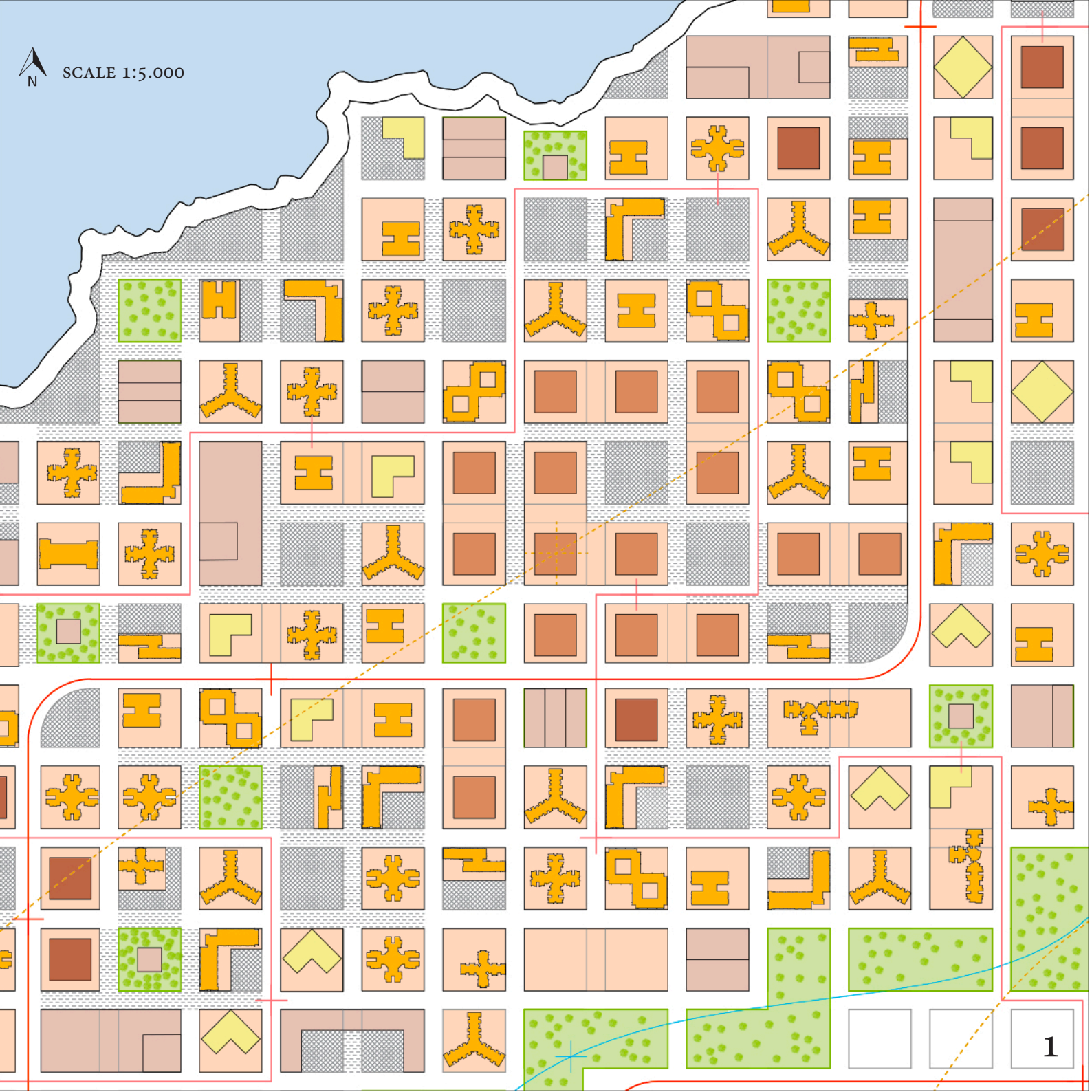




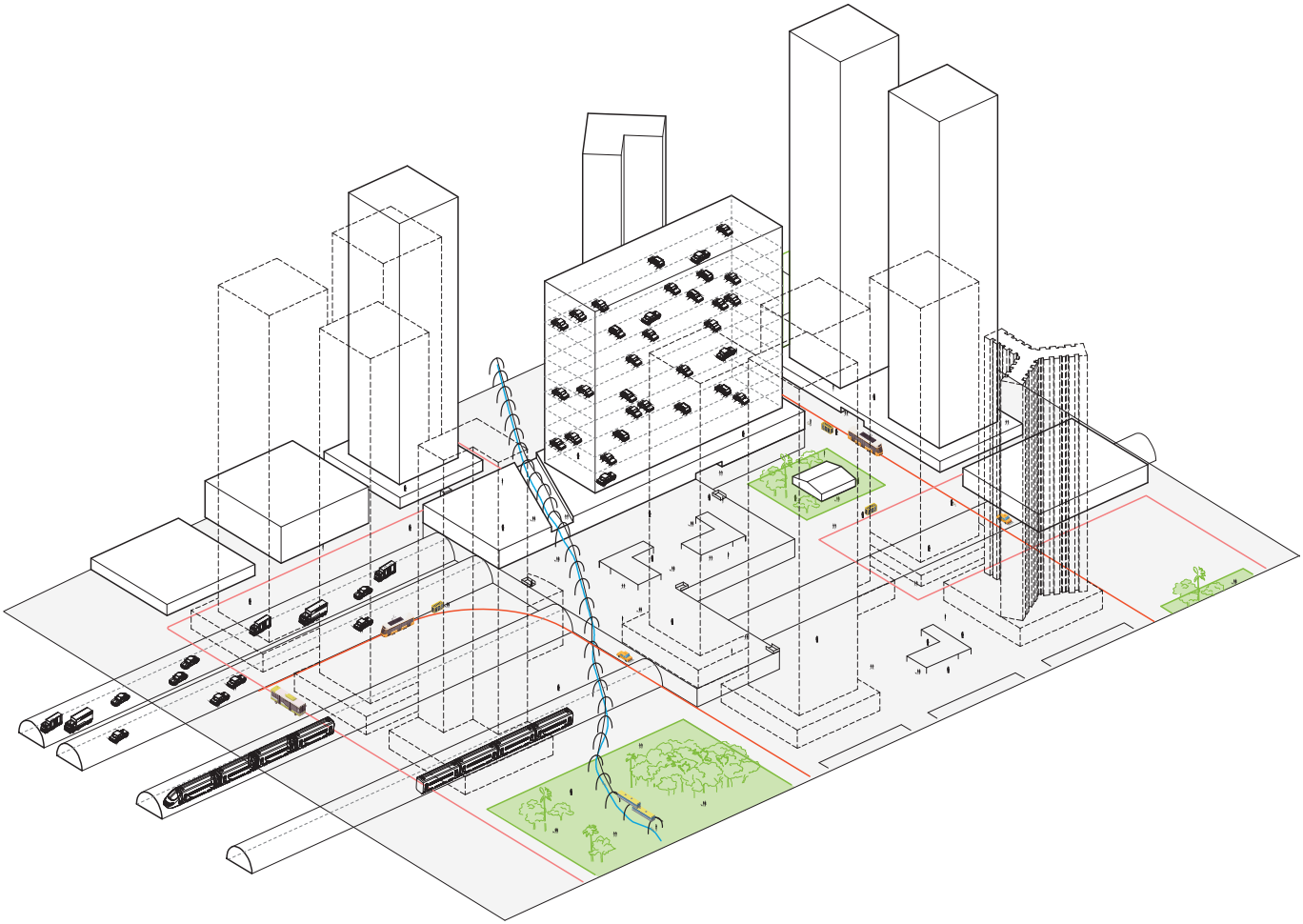




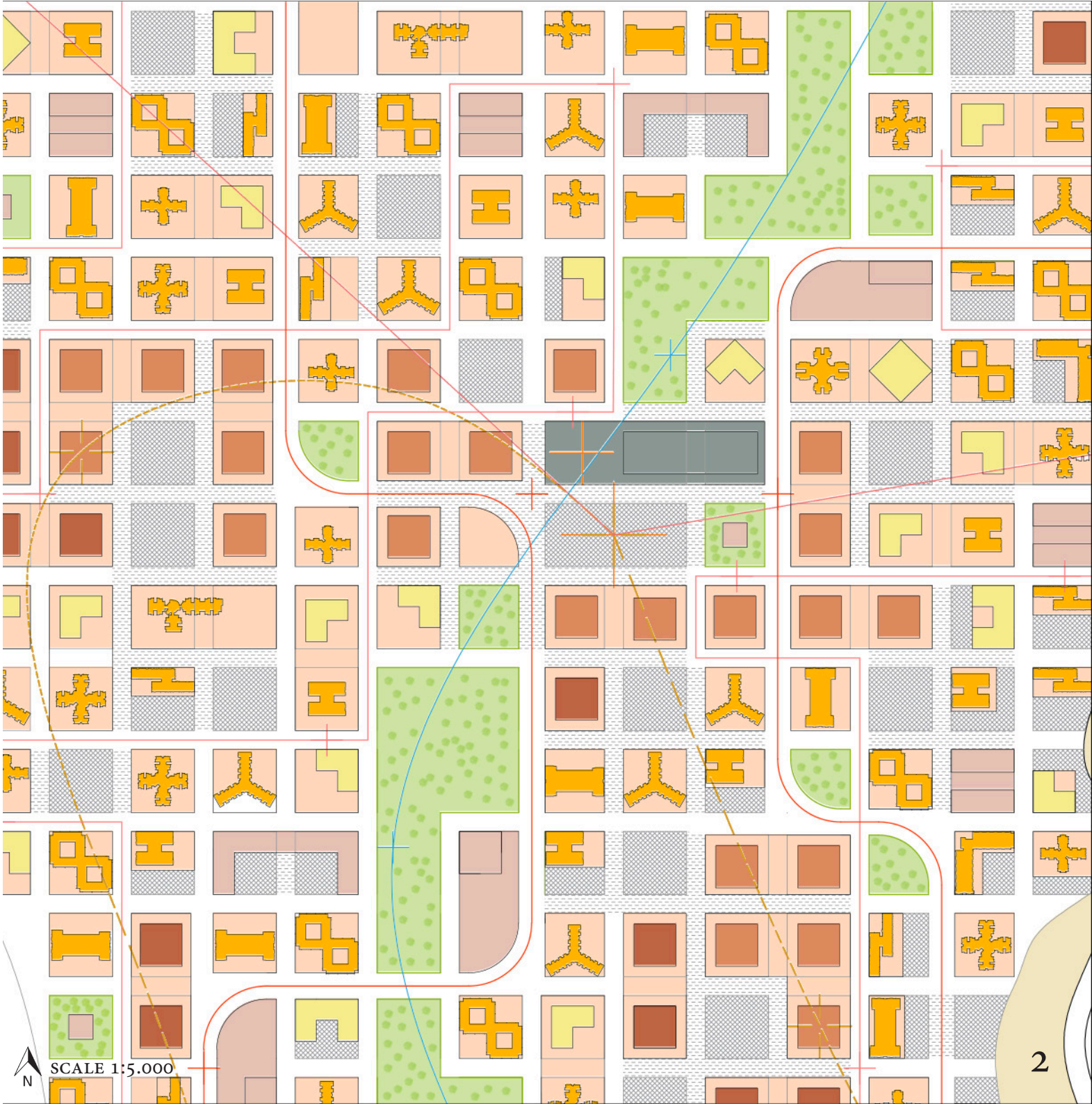
Floor Plan District and Building's tipology


N
SCALE 1:5.000
1

GUL | GREEN URBAN LANTAU



Floor Plan and Axonometry Connection Point


N
SCALE 1:5.000
2

GUL| GREEN URBAN LANTAU

Axonometry View District

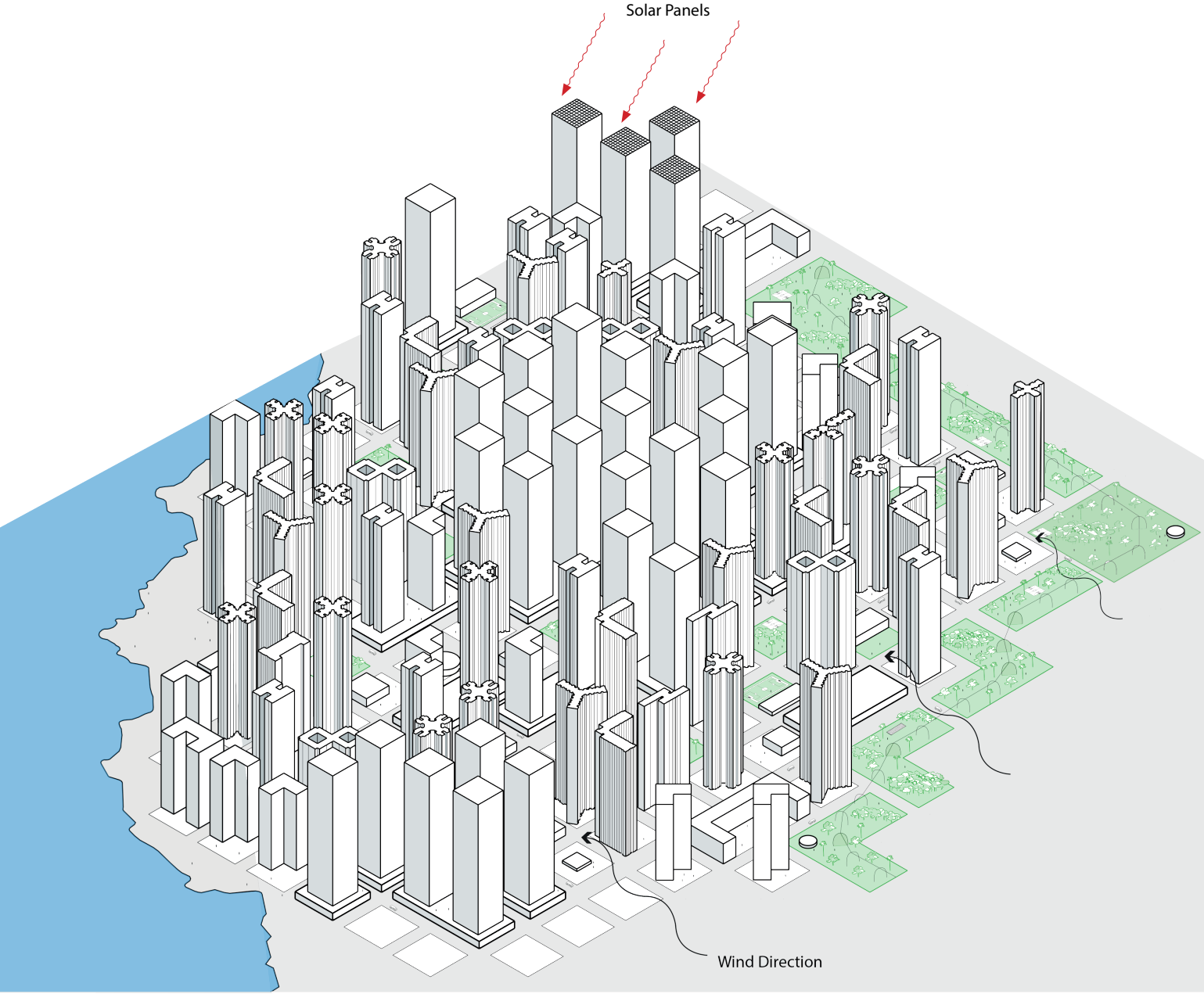
The island is characterized by a symmetrical grid. The squares of the grid are 60x60 m and we have two-dimensional roads: those without trams are 18 m wide and with the trams 25 m wide. Each road has sidewalks, cycle paths, traveletor and road for emergency vehicles and buses.

The grid was born from the direction of the wind that blows mostly from the South-East. This allows better air exchange inside the city. In fact our idea is also to install the wind turbines above the tram routes.

In detail we can see two zooms: one of any district, with private buildings, social housings, gardens, streets, podiums and differentiated public functions inside. The second most important zoom concerns our exchange and connection point. The center where private cars and subways arrive from the other islands and where there is a large parking lot where you can leave the car and take public transport. Each district has its center, topographically higher and where the offices and commercial buildings are present. When you go outside the circumference we find more private buildings and social housing.

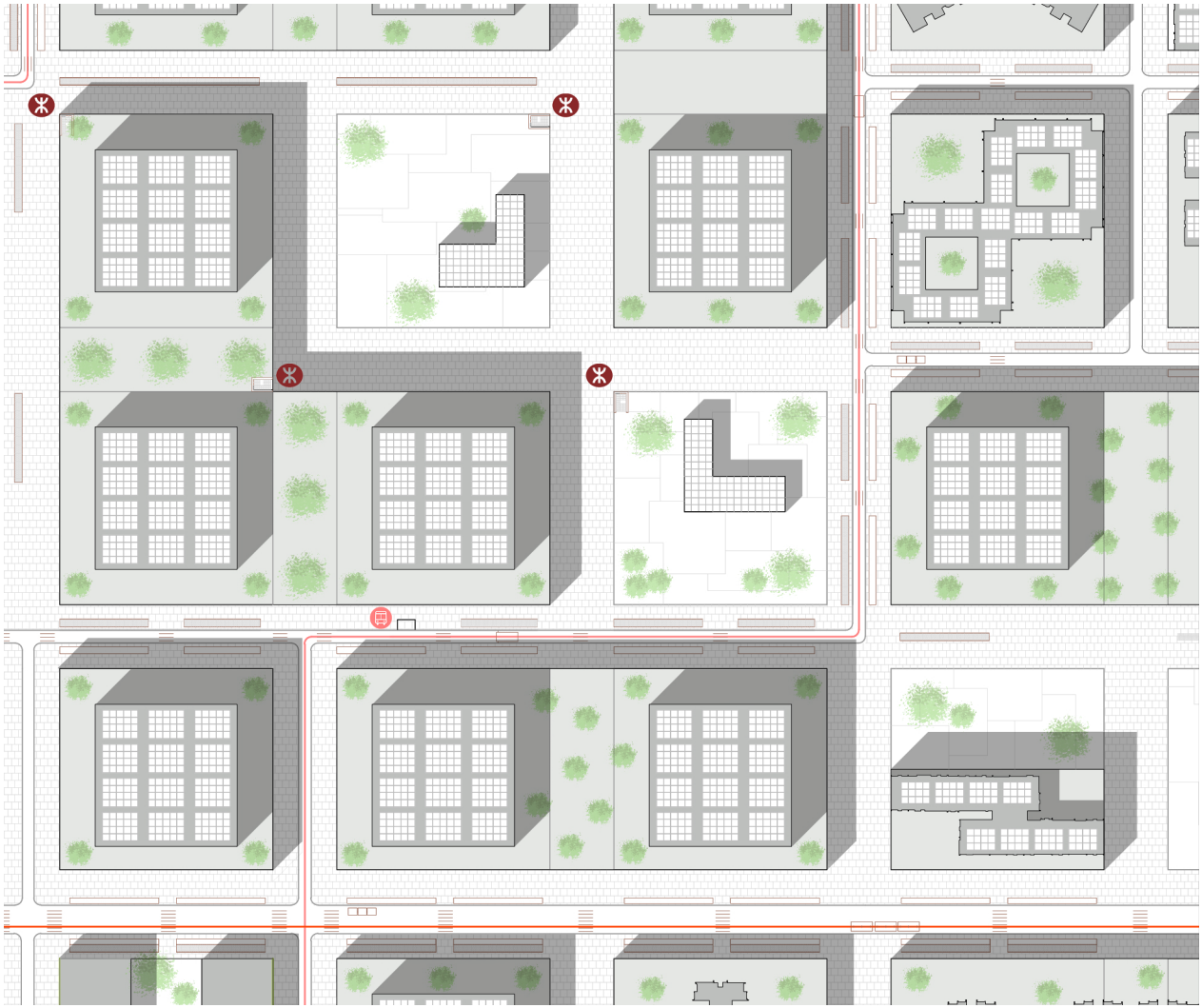
The main things about our project are public spaces and pedestrian areas to connect and integrate people between them. We tried to connect each square of the grid through public space, gardens or podium.

Green and vegetation also play an important role in the project. From the plant it can be seen how a long strip of greenery and gardens crosses the whole island longitudinally, connecting each neighborhood.


Solar Panels
Wind Direction

GUL| GREEN URBAN LANTAU

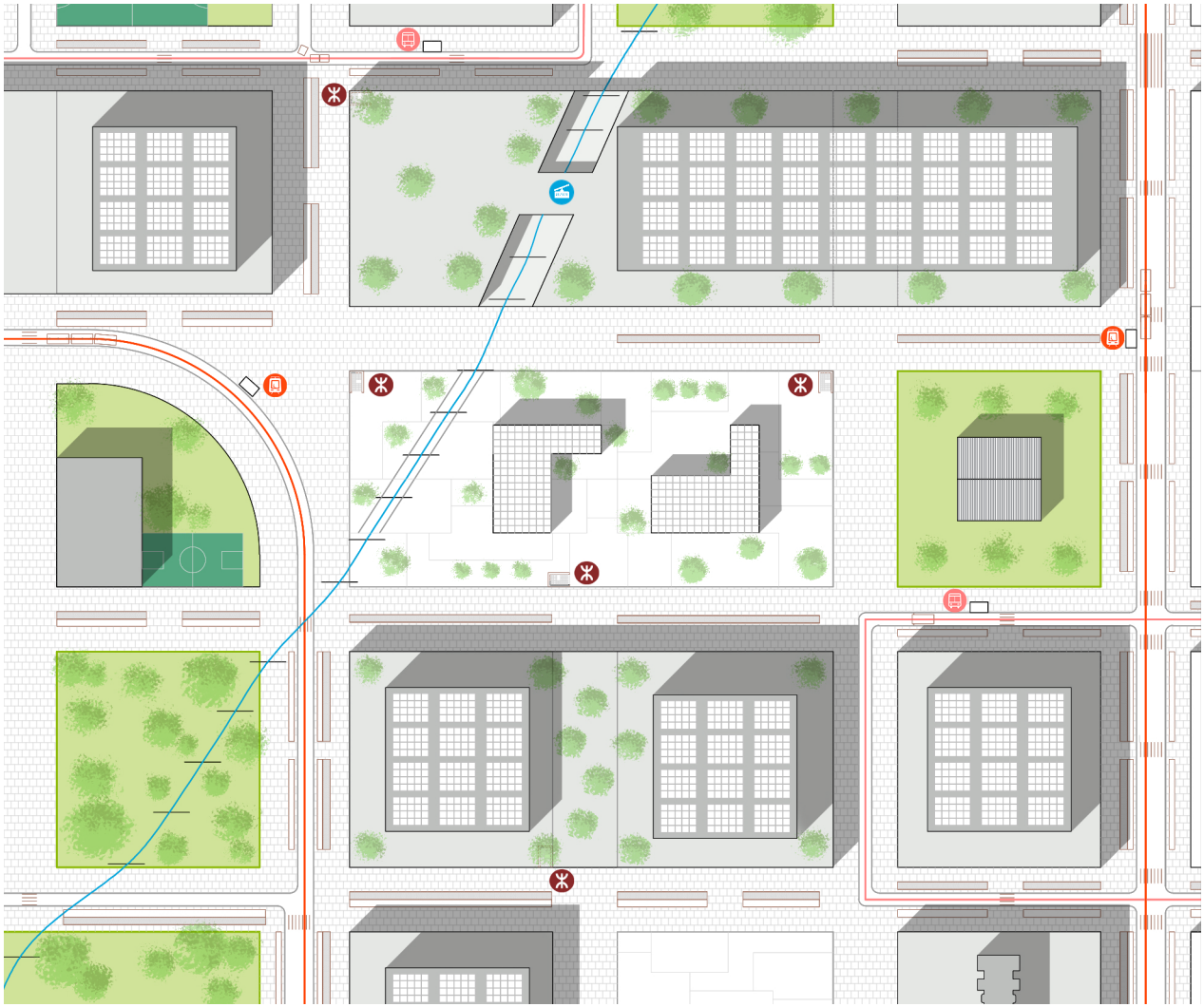
Floor Plan District



SCALE 1:2.000 N

GUL| GREEN URBAN LANTAU

Floor Plan Connection Point



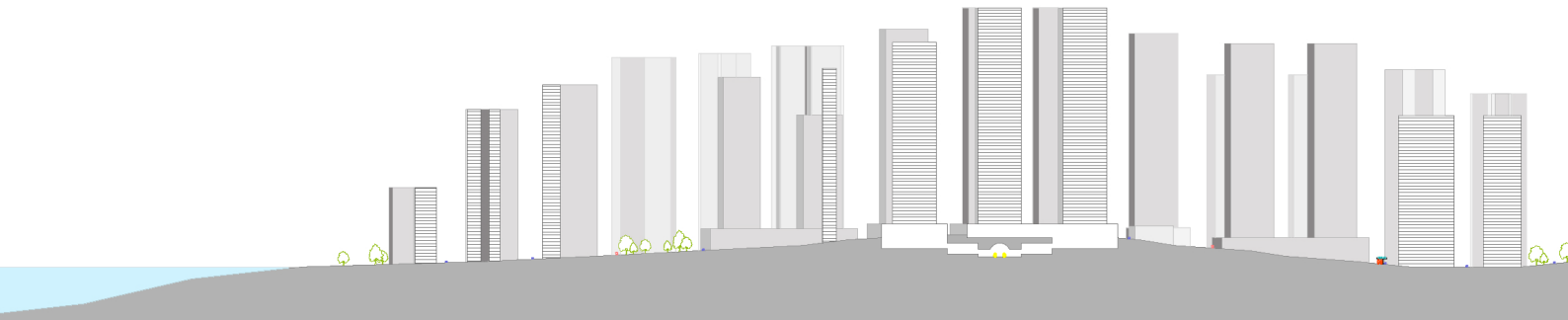
SCALE 1:5.000

N

GUL| GREEN URBAN LANTAU

Sections

SCALE 1:500

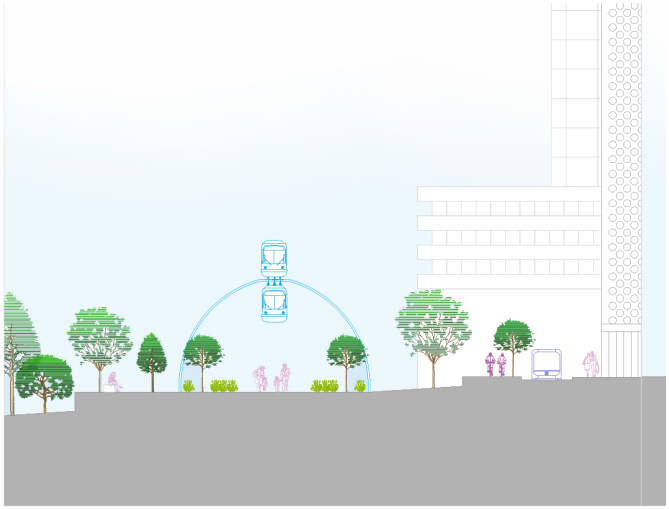


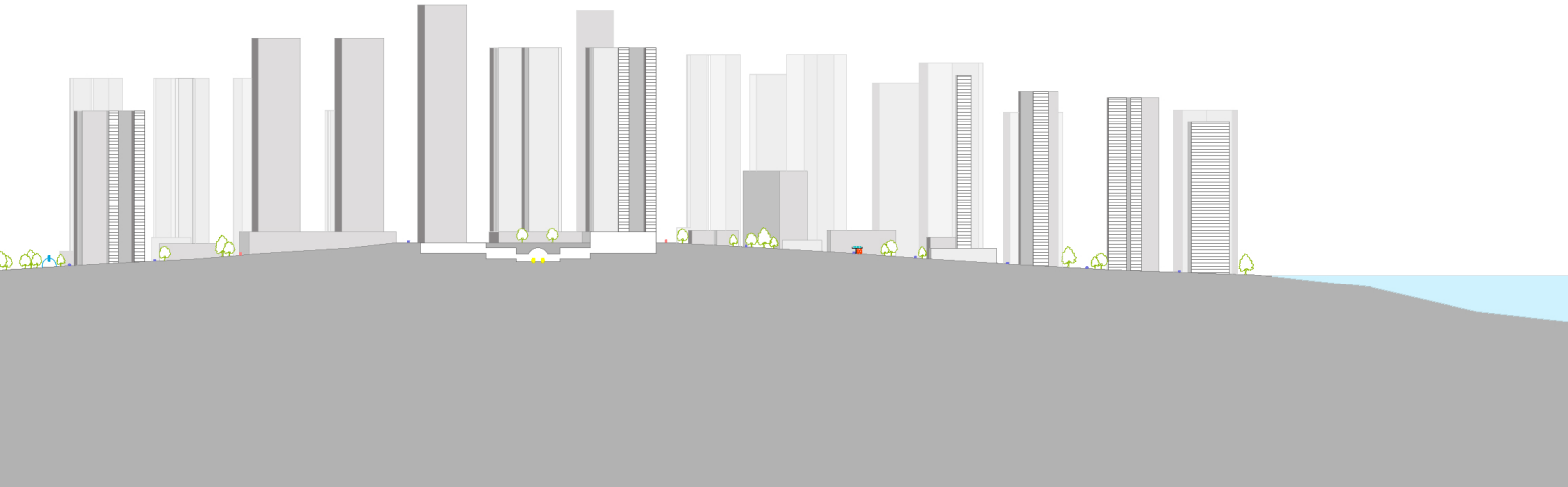
SCALE 1:20.000

GUL | GREEN URBAN LANTAU

Sections

SCALE 1:500





GUL| GREEN URBAN LANTAU

Perspective View

Quellen | sources

http://www.citypopulation.de
https://datosmacro.expansion.com
http://www.iaacblog.com
https://www.housingauthority.gov.hk
https://wwwhatsnew.com
https://www.smartroadgotland.com
https://www.next-future-mobility.com/
https://pavegen.com/
http://voith.com/corp-en/index.html
https://www.siemensgamesa.com/en-int
https://www.seia.org/initiatives/photovoltaics
http://newworldwind.com
https://www.mecanoo.nl
https://inhabitat.com/venger-wind-unveils-worlds-largest-rooftop-wind-farm-in-oklahoma-city/