





PLANNING & DESIGNING A CITY

MUMBAI'S EASTERN WATERFRONT PLAN AND CASE STUDY

Lucerne University of Applied Sciences and Arts
HOCHSCHULE LUZERN
Technik & Architektur
FH Zentralschweiz

PURDUE UNIVERSITY

DUBLIN TECHNOLOGICAL UNIVERSITY DUBLIN

Coventry University

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Mumbai, the capital city of Maharashtra, is a busy urban area with an estimated over 22.8 million inhabitants. It is the largest metropolis in India with rich cultural and religious diversity. It is also one of the most densely populated megacities on the planet: on average a Mumbaikar has only 1.24 square meters of public space.

Although the city is found on the top 15 wealthiest urban areas in the world, approximately 42% of Mumbai's population live in slums (Census 2011). Many problems arise within these areas such as:

- LACK OF SANITARY FACILITIES
- DISEASES AND LACK OF MEDICAL FACILITIES
- OVERCROWDING
- LACK OF TRANSPORT CONNECTIONS
- POOR HOUSE STRUCTURES
- LACK OF NEARBY SCHOOLS AND CULTURAL SPACES
- POLLUTION AND LACK OF GREEN SPACES
- AND MANY MORE ...

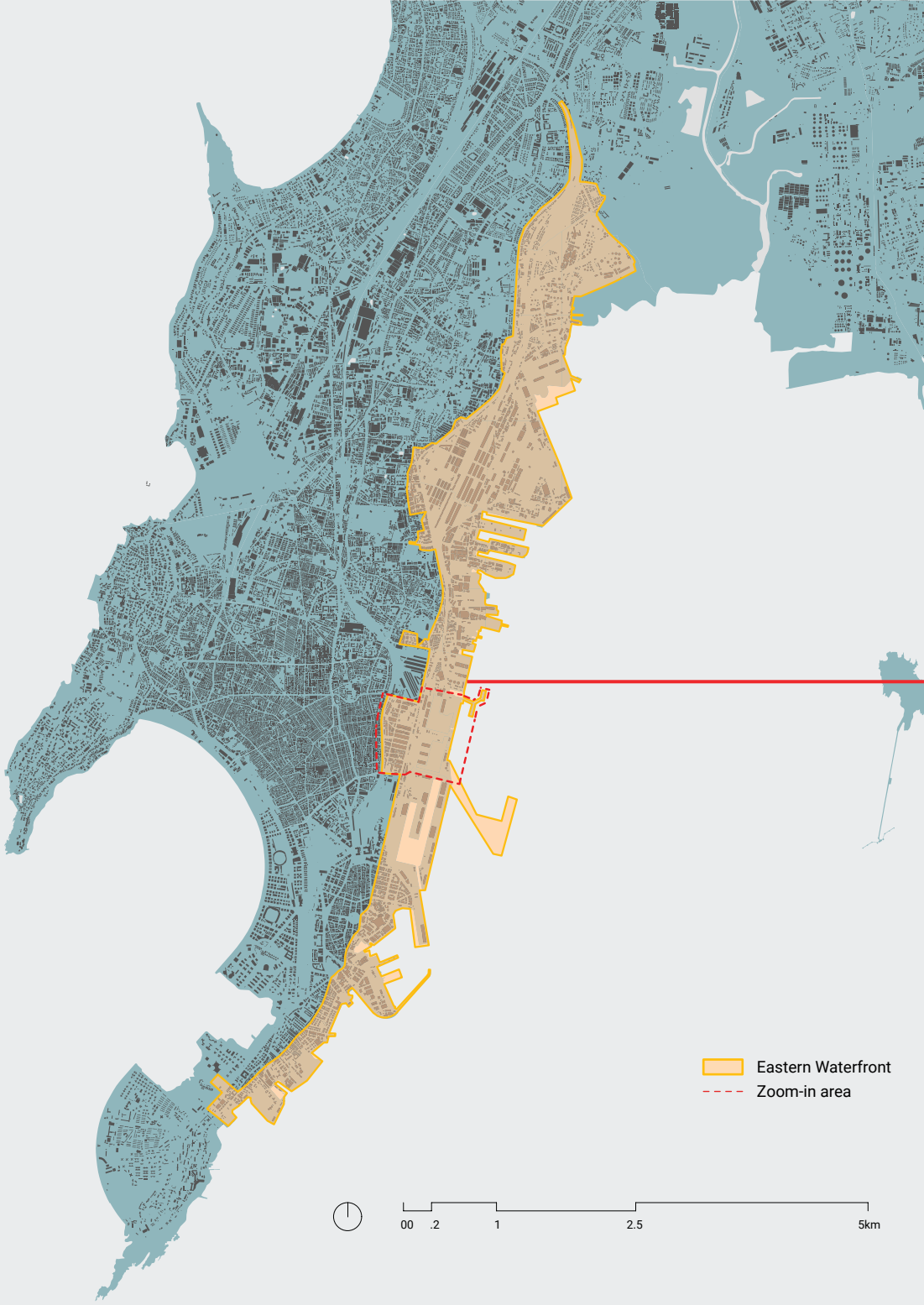
Mumbai's climate is humid and warm. The average humidity goes up to 90% and the average temperature goes up to 35°C and does not fluctuate dramatically throughout the year due to its coastal location. Mumbai is under the influence of Indian summer monsoon, a rainy phase between July to October which bring up to 700mm of precipitation per month due to the movement of the Intertropical Convergence Zone from the Indian Ocean.

This document describes how a group of six students tackled these issues in a determined area of Mumbai's **Eastern Waterfront** using the Leapfrogging stages of Development.

THE EASTERN WATERFRONT

Located in Mumbai we find the Eastern Waterfront, a land of approximately 18 km between Wadala (North) and Colaba (South). Most of it belongs to the Mumbai Port Trust (MbPT). The area has been used mostly for port activities and storage, but Mumbai's industry is shifting from dry goods to oil, petroleum, chemicals and others. Shipbreaking is also one of the activities in the area, a factor that contributed to the development of slums in areas such as Coal and Lakdi Bunder.

In this area we find Mumbai's main train station (Chhatrapati Shivaji Maharaij Terminus), ferry stations, the development of a new metro line connecting North and South and the creation of an International Airport across the bay.



ZOOM-IN AREA

The Schindler Global Award 2019 proposes the revitalisation of the zoom-in area at the Eastern Waterfront. Currently (July 2019) the area is closed and no activities or inhabitants are permitted at the premises.

During the Lucerne Summer School (Switzerland), a cross-disciplinary team of six students were assigned the task of developing this area of 1 km^2 considering the four core elements of the Schindler competition:

MOBILITY PUBLIC SPACE HOUSING CLIMATE

Before its closure, the area was used mostly for port activities, storage and containers. Pollution, waste, noise and nearby slums were part of the local issues. Our proposal involves the creation of green parks, green belts, sustainable local economy, alternative methods of education for both young and adult, direct advantage of the local people's skills, abandoned buildings, unused containers and tourism in the port area. The competition also focuses on the approach of **Leapfroggin Development**.

Leapfrogging Development

Leapfrogging, in Sustainable Development, means skipping inefficient, expensive and/or environmentally damaging approaches. By learning from the mistakes of communities, industries and cities and researching about successful plans, the team was able to move faster when working on the designated area of the Eastern Waterfront.

VISION

Our vision is to ensure that the Eastern Waterfront community is respected, sustainable and self-sufficient by giving them the power of using their existing skills and diversity to provide an environment of well-being for its residents and a new route for tourists.

GOALS

Provide sustainable housing, food, security and businesses to current nearby residents.

Revitilise the port area for local and touristic activities.

Empower the locals with their own skills and **educate** the next generation with an alternative skillset.

Embrace and capitalise from the diversity of the local people.

NUMBERS

10,000
POPULATION

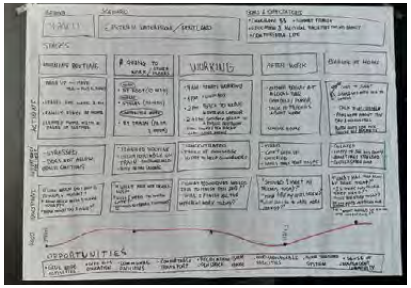
2,000
RESIDENTIAL HOMES

1,000
BUSINESSES

DESIGN PROCESS

The team decided to develop the project using the **Design Thinking** framework as the core methodology for understanding the people, the area, its strengths and constraints in order to develop a sustainable community, and **Leapfrogging** stages of development.

1. EMPATHISE



Team working on persona development and journey map

During the **Empathy** phase of the project the team reflected on the current problems of Mumbai's slums, the people who live around the area and the impact of the environment on their daily lives. We had the chance to understand the people based on previous interviews made by one of the team members in the Eastern Waterfront region.

A range of techniques and existing references helped the team visualise the scope of work such as a **Persona, Journey Map and Empathy Map.**

PRIMARY PERSONA

RAVII

Profile

Age: 35 years old

Job: Metal Fabricator

Religion: Hindu

Family: Wife and 2 children (7 & 12 years-old)

Frustrations

- Can't provide good quality education for his children
- Lack of sanitary facilities near home and work
- Lack of a variety of social activities in his family free time

Goals

- Bring food to his home everyday
- Provide shelter and education to his family

"My name is Ravii and I work as a metal fabricator and I usually make $3 a day, which is enough to bring a bit of food everyday to my wife and kids, but not enough to take them to a better school or a nice trip. After work I usually go gambling to see if the luck gives me more money and enjoy some time with my friends. Sometimes I don't feel too great since I smoke, but that's the only way I can cope with stress since I can work from early morning until late at night. Although very skilled, sometimes I need to borrow money as my wife is not allowed to work, but she does help with maintaining the house and collecting recycled metal so we can sell again."

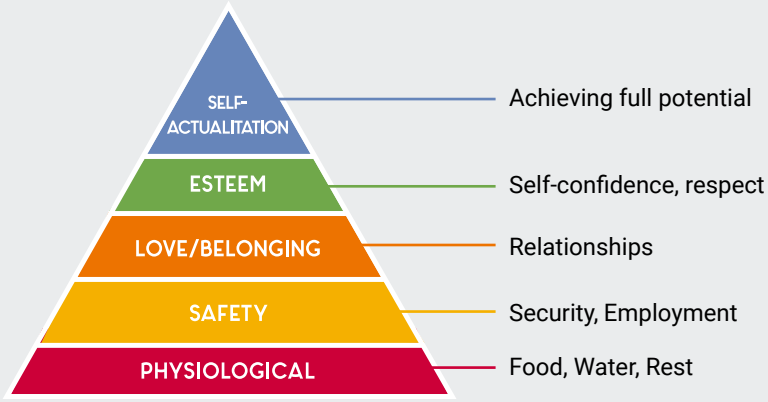
2. DEFINE

Team working on Affinity Diagram

During the **Define** phase of the project the team reflected on the current problems of Mumbai's slums, the potential of the area, climate, transportation, constraints and on the successful and unsuccessful projects around the world.

We worked on an **Affinity Diagram**, analysing what the people's needs are in order to frame the problem with a **How Might We?** statement.

Maslow's Pyramid



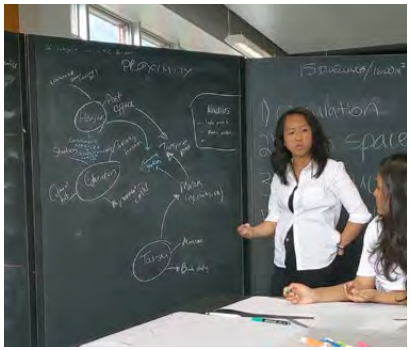
The Abraham Maslow's Pyramid depicts the hierarchy needs of the human being. Without fulfilling the basic physiological needs one can't reach its full potential of self-realisation. We used this methodology to create the ideal urban community that would enable people to create their own economy and develop a sustainable and self-sufficient community.

Affinity Diagram

Click here to see it larger

"How might we redevelop the Eastern Waterfront designated area as a sustainable and profitable community for the local people?"

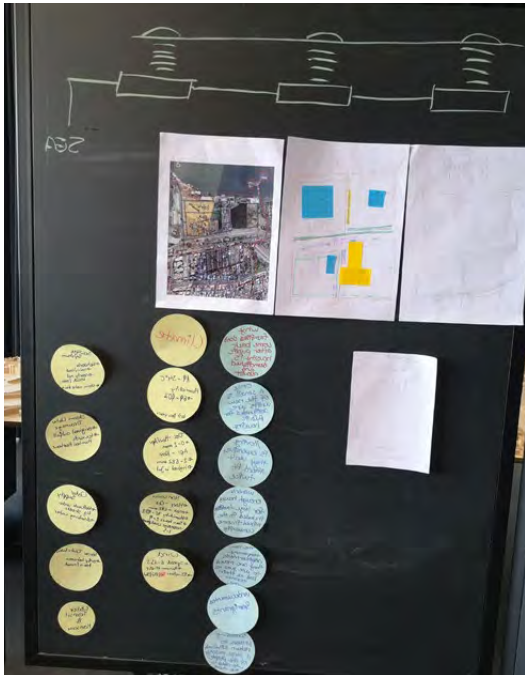
3. IDEATE



Team working on first iterations and Mind Map

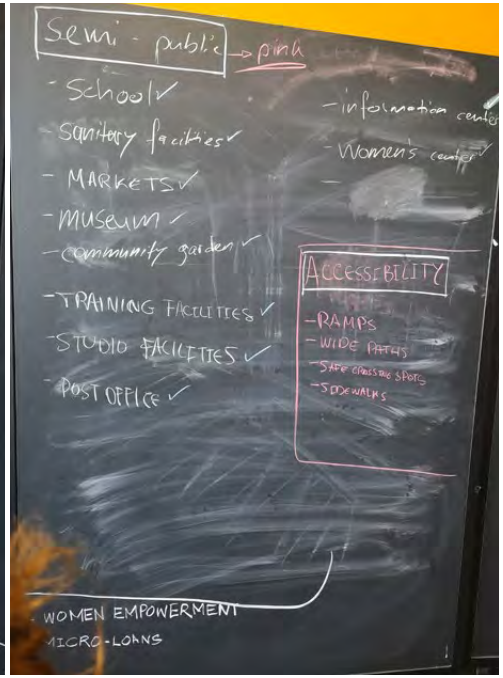
The first step of the ideation phase was familiarising the team with the site on a small scale. The team was divided into three groups of two people to work on the first iteration of where roads, housing, businesses and other amenities should be.

After these reflections the team started the **Master Plan**. All the amenities were divided into **Public, Private** and **Semi-Private.** Then the group worked on a **Mind Map** calculating circulation and proximity between services. Constraints in regards to **Climate** and **Why Families Don't Return** to revitalised areas were considered.

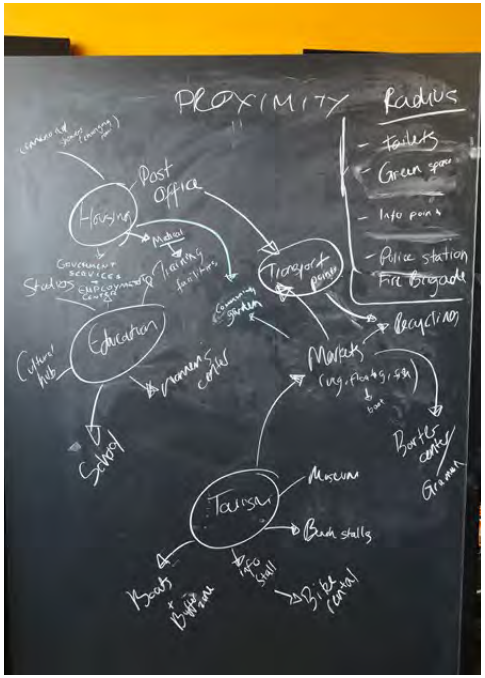


First 3 iterations, Climate and Reasons Why Families Don't return to revitilised areas

Public and Private Facilities



Semi-Public facilities and Accessibility factors



Mind Map

4. PROTOTYPE

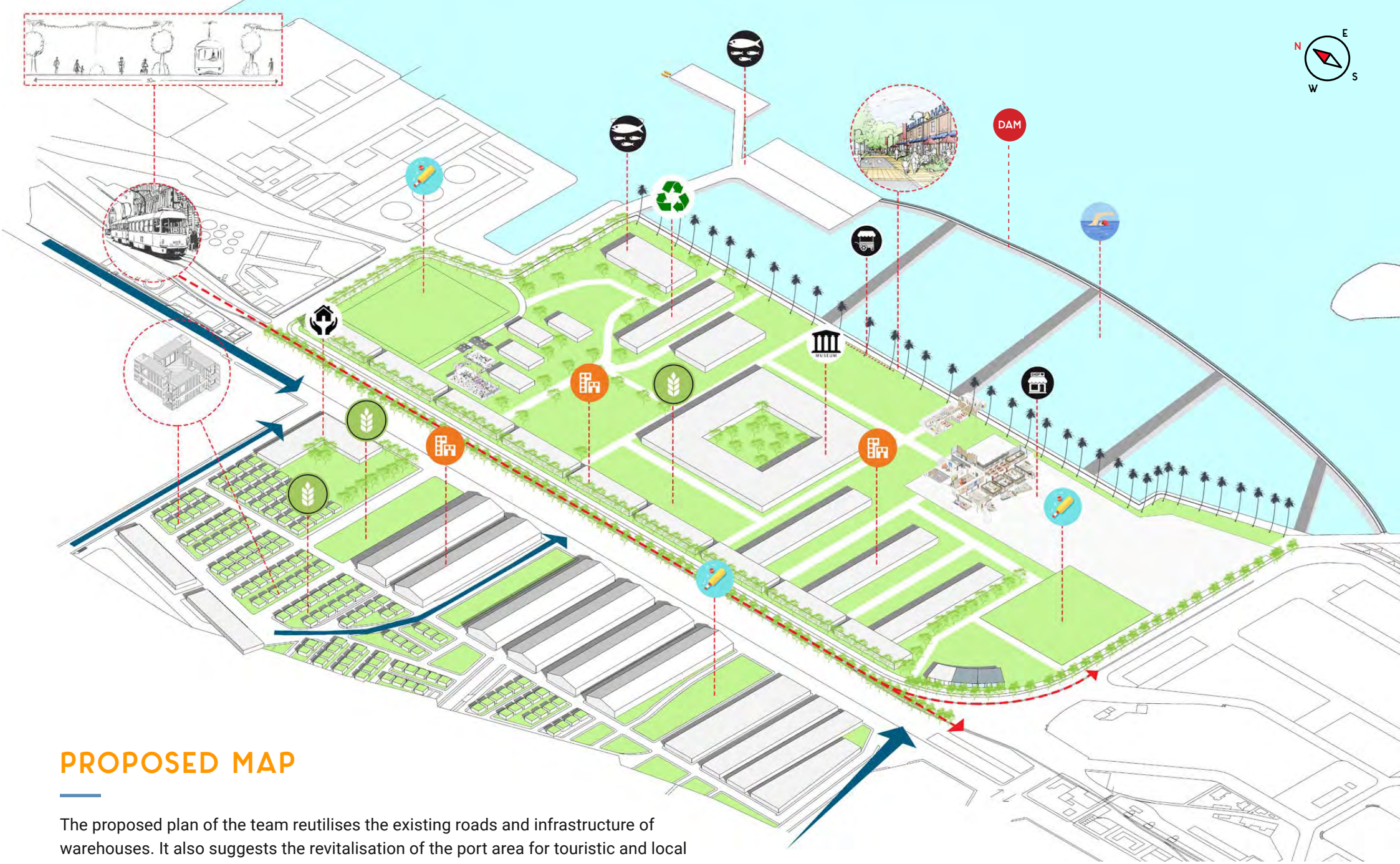
Team working on scaled prototype

After all of the assesment and iterations, the team regrouped for one final prototype to scale (1:1000). The first steps were planning the city first by **Circulation**, followed by **Open Spaces** and then **Infrastructure**.

Before adding all the buildings and roads to the map we had to calculate the population, potential amount of residents, estimate of students in schools and spaces between each building.

Circulation, Open Spaces and Infrastructure Planning

Scaled Map Prototype



PROPOSED MAP

The proposed plan of the team reutilises the existing roads and infrastructure of warehouses. It also suggests the revitalisation of the port area for touristic and local economy. Green spaces are part of the entire community and we also add alternative transportation methods such as diverted roads to focus on pedestrianised and cycle paths, a Dam connecting the North and South areas and a tram line on existing tracks.

PROPOSAL

MOBILITY

Roads and railway lines cannot accommodate for the rising commuters leading to a high number of accidents and congestion occurring throughout the day. The group focused on minimising private vehicles by adding a tram line on an existing route in the center of the zoom-in area, mobilising flows along the Eastern Waterfront and lessen air pollution. This central transport line will also have pedestrianised paths and cycle lanes separated by green space to minimise accidents. Tram stops are located near major roads with bridge links connecting to the western side of the city. The tram system is influenced by the Curitiba (Brazil) case study. Our proposal incorporates efficient exits and entrances on the tram.

There are 3 existing roads from the West via bridges which will be utilised in the design. The central bridge is maintaned for the Market, Recycling and Monitoring services. North and South bridges diverge around the area, avoiding the concentration of cars in the center of the zoom-in area.

A pedestrianised promenade is implemented near the waterfront with a cycling path which will cater for touristic activities. Parallel to this is a dam that features a 2-way road on the ocean.

Proposed Layout

Tram Line (India)

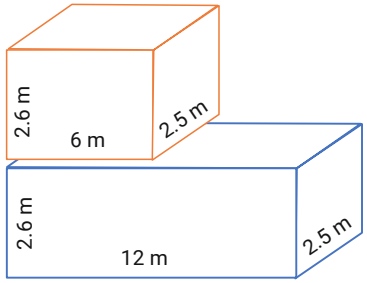
Marina Barrage (Singapure)

Walking and Cycle Green Path (Japan)

HOUSES

There will be 2 proposed housing types that will accommodate **current dwellers** and **newcomers**. Existing cargo containers from the site will be used to provide 2 different types of accommodation. Refurbishment will include re-painting surfaces to increase their albedo and minimise heat absorption. The **big containers** will accommodate for big families up to 8 people, while **small containers** will house a maximum of 4 people.

Configuration 1:
Community Garden/Container Homes



Configurations can include stacking a small and big container to accommodate for multiple-generation large families. Between lines of container homes will be community gardens whereby residents can plant their own food or cash crops that can be sold at the local market. This in addition to the green space roofing above containers to grow pot plants aided by a rainwater harvesting system on each individual container.

Configuration 2:
Ground floor business

The second configuration is typically used around Mumbai. It is a 3-storey design whereby the 2 upper floors will be used for housing whilst ground level will be utilised for businesses owned by residents. The roofing will also be an area used for pot plants.

SANITARY FACILITIES

Communal sanitary facilities are of a special importance when private sanitary rooms are hard to provide. By combining individual sanitary facilities the cost of maintenance and the area used is reduced. The planned facilities will be divided into toilet buildings and shower buildings. Each toilet building contains 9 toilets and 5 sinks, whereas the shower buildings contain 10 showers for each gender and two showers for families. Calculating the necessary space and amount of facilities required the use of the New York City building codes.

To maintain these facilities, an already used business model was incorporated. The residents of the area would pay a monthly fee to use the facilities and several citizens would be paid for maintenance. These sanitary facilities not only create a safe space for daily hygiene but also assist economic growth.

Proposed Layout

Public Shower (Dharavi, India)

RECYCLING AND WASTE

The waste management in the area can be divided into two categories: the **recycling system** and the **canal system**.

Situated to the West of the site is a center that recycles dry materials whilst another center to the East recycles wet materials.

The canal system consists of 3 systems. The sewage system, the water supply system and the storm water drainage system are located under the former main road and extend sporadically under the west of the site and similarly with the ground-level power supply system. The current system will expand to the east where new infrastructure such as schools and tourist attractions will be located.

Proposed Layout

Recycling facility at Elkridge, Maryland

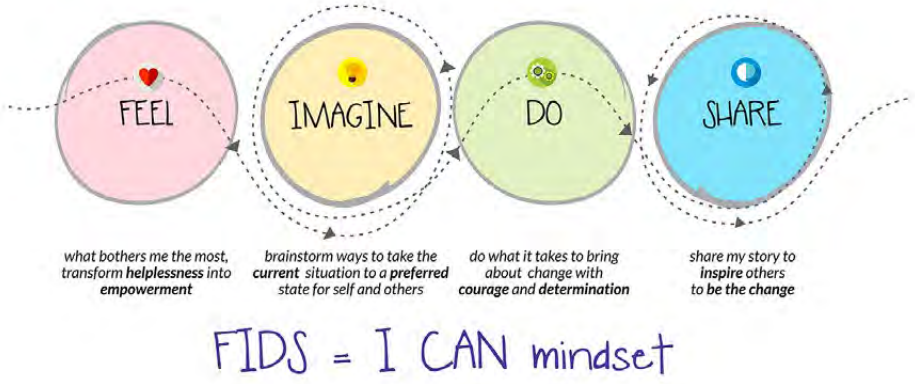
EDUCATION

The proposal involves the creation of an alternative method of education focusing on the local economy and demographics.

An elemetary school comprised of 6 buildings located northeast of the site is designed to cater for approximately 3,000 student aged between 6 to 12 years old. Apart from the playground are within the school premises students can benefit from the cricket field adjacent to the school. Meanwhile another school located southwest of the tram line will cater for students aged 12 to 18 years of age.

During the day teachers and volunteers use a similar **Creative Framework** already implemented in India at the Riverside School. The curriculum would involve classes about Sustainability, Citizenship, Equality, Creative Practice, English, Emotional Development, Physical Development, etc.

Plus evenings and the weekend the school is utilised as a training centre to teach about Entrepreneurship, Child and Elderly Care, English, Sustainability and others.



GREEN SPACE

As a densely populated city with heavy congestion, the team decided green space is of great importance. Not only does it benefit the physical environment through aesthetics, by filtering particulate matter and minimising the urban heat island effect; it also contributes towards human physical and mental well being by facilitating recreation spots and relaxation. This will be achieved by creating communal gardens, parks, the promenade and open space within facilities. Examples include the courtyards in the Women's Center and Museum. Cricket and football fields will offer room for exercising and will assist creating close community feel.

Several communal gardens will be used to break up the container lines in the east of the site. Parks will be used to create a recreation space between buildings and to open up the structure of the indoor market. The promenade will be planted with palm trees and mango trees and papaya trees and will function as a green space for tourists.

Proposed Layout

Community Garden (USA)

Community Garden (Unknown)

Park (India)

Soccer Field (India)

Cricket Field (India)

Promenade with Palm Streets and Stalls (Croatia)

ECONOMY & TOURISM

Given the current circumstances in the area, a pending concern is to create and maintain a healthy and growing economy. One way to do this would be to secure the already existing jobs, which could be done by reopening the fishing port and giving the fishermen a place to sell their catch.

Another way to create the wanted economy would be to give the residents the possibility to work with the skills they already have – most of the nearby residents come from rural areas. This will happen, for example, by giving them the chance to harvest plants in community gardens and sell them on the market, or by giving them the chance to work in the recycling or sanitary facilities. In addition to that, new jobs will be created by opening up business in the 3-storey buildings (Configuration 2 of Housing), the bike rentals next to the tramline as well as the post office and fire station.

Aside from that the youth, as well as the adults, can improve and learn new skills by taking advantage of the educational programs and the Employment Training Centers.

Integrating touristic spots in the area will not only attract investment but also create jobs within the area for residents. This will be achieved by creating a Museum highlighting the diversity within the area, the physical and social history of Mumbai. A night market will take place Southwest of the promenade attracting tourists through selling authentic street food made locally. Along the pedestrianised palm tree promenade will be a beach with complimented stalls selling local products from the area such ceramics from Dharavi and handcrafted souvenirs.

EQUALITY: CULTURE, GENDER AND INTERGENERATIONAL CARE

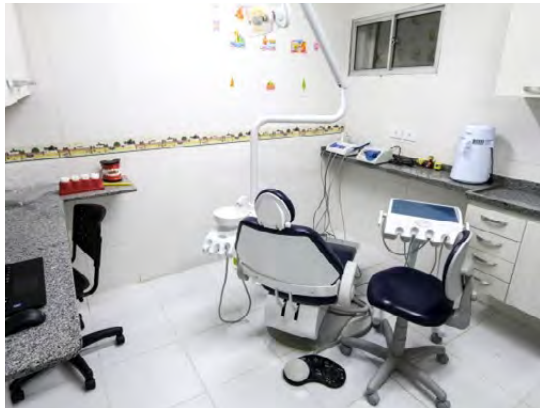
Regarding the social structure of the area it is important to provide support for all kinds of residents.

In the Northwest of the site there will be an Elderly center combined with a Daycare to promote intergenerational well-being, a Cultural Hub (special for the local residents) and community garden as well as a monitoring center with a training center and a small post office integrated.

The Southwest of the site will house an indoor recreation center, football fields, a small medical center, a school for older children and adults as well as room for employment training and communal work studios and government offices, like an immigration office.

In the middle of the Eastern area a Cultural Hub (focused on the tourists) will be integrated to the Museum (page 18) and a Women's Center. Not only to educate and empower the residents but also to attract and inform tourists.

These also apply to the buildings on the Northeast of the area, where the Elementary School (page 16), a Public Library, a Sea Themed Employment Training space as well as a Rehab Center are planned to support the educational and economic growth of the community.



CONCLUSION

As the team reached the end of the project, the ideas and designs started to become clearer and they could see actually the impact on the Waterfront area. Culture and diversity is improved and capitlised while improving the quality of life of the nearby residents. Even though this competition is over and the design can't actually be implemented, the team still learned different ways to make a sustainable community.

If society doesn't shift its focus on sustainable and educational ideas, the planet will face more difficult challenges to solve and a legacy of destruction will be left to our next generation.

We challenge the world to start thinking on a global scale and make sure every community has the ability to thrive. You can use our methods or some of your own to create something big.

A PROJECT CREATED BY:

CHARLOTTE POLANSKY
DARAKHSHA DANDEKAR
MADDIE SHELTON
QUIZZA LYNNE BUYAGNO
SAYONARA BITTENCOURT
TOBIAS BAUMGARTNER

WITH THE SUPPORT OF:

KIRK ALTER
PAMELA ALTER

LISTEN TO OUR PODCAST

OR ACCESS ON **THIS LINK**

PLANNING & DESIGNING A CITY

MUMBAI'S EASTERN WATERFRONT PLAN AND CASE STUDY

Lucerne University of Applied Sciences and Arts
HOCHSCHULE LUZERN
Technik & Architektur
FH Zentralschweiz

PURDUE UNIVERSITY

DUBLIN TECHNOLOGICAL UNIVERSITY DUBLIN

Coventry University