

Design Summative Criteria A

Selected Zone: Zone 3 | Ward H east | Dharavi

Strand i. - Explain and justify the need to solve a problem for a specified client/target audience.

What is the problem?

Dharavi, famous for being the world's largest slum area, having a land area of 2.39 square kilometres and home to about a million residents ([Source](#)) and 13000 small businesses ([Source](#)), has a range of problems regarding sustainability, ([Source](#)) . i.e.

- Lack of good infrastructure
- Overcrowding
- Cleanliness & sanitation
- Waste disposal



Who is it a problem for?

The problems are for the residents of Dharavi, in addition to the country as a whole, the economy of which would benefit with Dharavi having better infrastructure.

Where is the problem occurring?

- Due to the local river and public water sources in Dharavi being extremely polluted ([Source](#)), in addition to the sewers leaking into the water pipes, diseases are common among residents of Dharavi ([Source](#)).
- Dharavi, due to being an informal and unplanned settlement, is overcrowded and most of the narrow roads in residential areas have barely space for even a small or medium sized car to go through, especially with there being no footpath for pedestrians ([Source](#)). Even on average, 10x10ft houses in Dharavi house 10-12 people ([Source](#))
- Speaking of the residential areas, due to the average low income, many houses in Dharavi aren't sturdy, being made of wood, plastic sheets, metal from drum barrels and thin iron structures ([Source](#)), making them prone to damage during floods, which are more common in the rainy season ([Source](#)).

What is the cause of the problem?

- A lot of the above problems stem from Dharavi being an unplanned settlement.
- Its origin lies in the migration of workers from different parts of the world to the fishing village now called Dharavi, until so many came (and are still coming) that there is no free space or infrastructure such as schools, hospitals and even washrooms to meet the needs of the population. Due to this it does not have proper tools that cities have such as a good sewage and drainage system and a clean source of water. ([Source](#)).

What effect is the problem creating?

- The lack of proper infrastructure, facilities and design in Dharavi causes an unhealthy lifestyle for its residents.

Why do I need to design something?

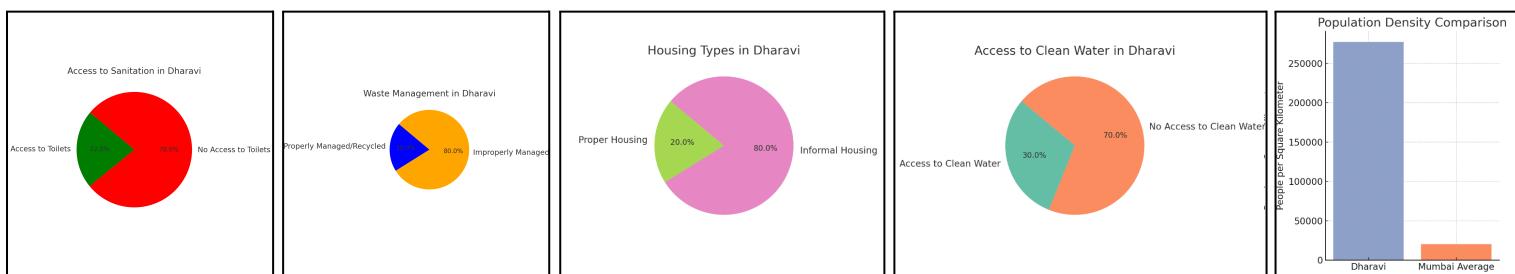
- The first proposal of Dharavi's redevelopment into a set of well-planned houses was in 2004. Ever since, due to political shifts the redevelopment of Dharavi has been delayed to the point that now, in 2025, a little more than 2 decades later, nothing has been done ([Source](#)). The citizens of Dharavi are as much citizens of India as the rest and have the right to have all the facilities that help to live a healthy life. 2 hospitals for 1 million people aren't enough. In addition to that, better infrastructure directly contributes to the economic growth of the country ([Source](#)). Hence the improvement of Dharavi's infrastructure will not only help the citizens of Dharavi, but will also help the economy grow. Furthermore, this will be the beginning of a slum-free Mumbai and will mark a major shift in the real-estate market ([Source](#)).

What are the problems that could be helped with design?

- I believe that since the problems of Dharavi stem from a lack of infrastructure, a design that improves infrastructure should be sufficient to solve most of the problems. Though I see one problem arise. That is that the new design needs to make sure none of the small businesses are disrupted. For example, pottery and papad-making are common businesses in Dharavi. They involve drying the goods outside on the street ([Source](#)). Hence something like a vertical housing structure will have to be designed around the intention of both improving living conditions and supporting businesses.

Justifies the need for a solution to a problem for a target audience (Dharavi residents)

Graphs to understand the situation: ([Source](#))



Brainstorming ideas: Ideas that have come to my mind that will be organised & developed in the coming steps.

- Vertical houses with windows in order to provide more space on the street.
- Solar energy to make it a system independent from the grid.
- Free space and greenery throughout the region.
- A sufficient number of hospitals, washrooms and ways to access clean water.

Strand ii. - Constructs a detailed research plan

Step	Research	Purpose	Timeline	Priority
Conducting a telephonic Interview with Mr.Dipak Bhoir (driver), who lived in Dharavi for 27 years, now residing in Thane, with his parents living in Dharavi at the moment. The questions and responses can be seen below in the primary research section.	Primary	To understand the problems that the residents of Dharavi face.	22nd Jan	1st priority. To find what residents think of redevelopment was the base of my research.
Compiling and analysing interviews/surveys of Dharavi residents regarding redevelopment from across the internet.	Secondary	To know what more of Dharavi residents think about redevelopment	22nd jan	1st priority. To find what residents think of redevelopment was the base of my research.
In-depth research on Dharavi's problems from the internet:	Secondary	To know about Dharavi's situation.	24th jan	2rd priority. To find out what is happening in Dharavi was a base to my research.
Pi Charts from the internet showing Dharavi's current condition.	Secondary	To know about Dharavi's situation.	24th Jan	3rd priority. Supplementary to the previous step.
Interview with Mr. Rohan Savanth living in Sion, a redevelopment investor who lives and owns an office in Sion, near Dharavi. The questions and responses can be seen below in the primary research section.	Primary	To know what an outsider/ expert thinks about this redevelopment.	25th Jan	4th priority. To find what an expert's take on the redevelopment is. It is last since it is a more external view of the problem.

Primary Research
<u>Interview with Mr. Dipak Bhoir, formerly living in Dharavi Age: 28 Occupation: Driver</u>
Following are the questions asked: I have designed them based on this interview by The Quint
1) Do you own a house in Dharavi or have a house of rent? For how many years have you lived in Dharavi? Yes, my parents own a house in Dharavi. I lived there for 27 years (till December 2023) before moving, but my parents and my brother still live there.
2) How many of the people you know in Dharavi have access to clean water? Some houses have a water supply, but it is not enough for the large number of people. We manage to store the water in drums in our house. A lack of maintenance also leads to a lot of the water being murky a lot of times.
3) How many of the people you know in Dharavi have firmly built houses? The oldest houses in the deeper parts of Dharavi, where I lived, are firmly built. But even they have degraded over time and take damage such as leakage from the ceiling during the monsoon.
4) How many people in Dharavi have washrooms in their house? Very few, I estimate only 10% of the houses have washrooms in them. Most people tend to use the public toilets, which have very long queues to get through and are not clean or well-maintained.
5) How is waste usually disposed of in Dharavi and does it have anything to do with the recycling industry? Very few people actually go to the designated municipality spot where trash is supposed to be thrown. Instead, people pile trash up

in places as per their convenience.

6) What are some problems in Dharavi that are very obscure outside of it?

Many households steal neighbors' electric supply, resulting in the neighbors getting a larger electricity bill. If they don't pay it their line is cut. There are also a few houses who never receive an electricity bill, but they always have electricity. God knows where that electricity is coming from?

7) Should Dharavi be redeveloped, What are the common reasons supporting redevelopment?

Yes, definitely. Why would we say no if we get a good house, clean water and proper toilets.

8) What are the concerns people have over redevelopment?

Some people don't have their house documents. They either lost them, never registered them or have illegal huts. Additionally, some people have small businesses that they run on the footpath. If they are shifted to a vertical settlement, how will they survive?

9) Why did you leave Dharavi?

We belong to the Koli, fisherman community and we have been living here for many generations. But now it has become really overcrowded and is no longer what it used to be. There isn't much unity due to the constant arrival of more and more people and that causes a lot of quarrels and it is not safe for kids anymore.

Here Mr. Dipak Bhoir has shed light on why Dharavi really needs redevelopment from the point of view of a resident.

Interview with Mr. Rohan Sawant, living in Sion near Dharavi | Age: 54 | Occupation: Investor/Builder

Following are the questions asked:

1) Should Dharavi be redeveloped?

Yes, definitely, because it would improve the lives of a lot of people who stay there. Additionally, the improved roads will really help people who have to regularly pass through Dharavi.

2) Where does Dharavi come into your everyday life?

While travelling from my home in Sion to my office in Bandra east and back, I travel from a road that passes through Dharavi.

3) What are the problems you face due to Dharavi?

Because the roads are not properly planned, I encounter traffic problems everyday. On that road I see crowds of people and handcarts. In addition to that, a lot of bikers there do not follow traffic rules, creating a nuisance. The roads seem very unsafe to pass through, especially at night.

4) To what extent will the redevelopment of Dharavi help you?

It will decrease my and other peoples' travel times, make the roads safer to travel through and increase the real estate prices. Additionally, it will be another step for the country towards development.

Here Mr. Rohan Sawant has shed light on why Dharavi should be redeveloped from the point of view of an outside expert.

Secondary Research

Analysing interviews surveys of Dharavi residents:

[Survey by The Quint](#)

[Interview of a resident](#)

[Interview of a resident by CNN](#)

What is the overall reaction of Dharavi's citizens on redevelopment?

There is a mixed reaction for redevelopment among Dharavi residents.

Why do Dharavi's citizens support redevelopment?

Those who support it cite the fact that so many don't have basic amenities in their homes. Due to the houses being built so close together, there are areas in Dharavi which virtually no sunlight touches because of how narrow they are in addition to being filled with filth, and if the youth of Dharavi wish to fulfil their dreams, a better infrastructure would definitely help them greatly.

Why do Dharavi's citizens oppose redevelopment?

Those who oppose redevelopment, are worried about having to relocate their businesses or about the cut-off date which states that only people with evidence of their house being in Dharavi before 2000 will get a new house in Dharavi itself for free. And while that is true, people have said that a lot of the criticism and controversy regarding redevelopment stems from misinformation and the correct information not being spread enough.

What is my conclusion on this?

In conclusion, people want redevelopment, but such that their own lives won't be greatly disturbed.

In-depth research on Dharavi's problems from the internet:

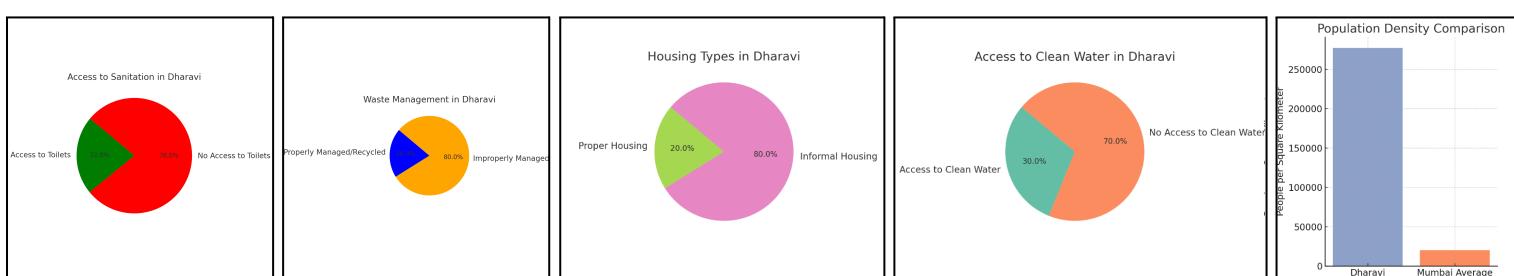
What are the origins of Dharavi? How did it become a slum?

Once a fishing village in the heart of Mumbai, founded during the British colonial era, the Koliwada eventually became a cheap way for people to come over and live in Mumbai, spreading it and bringing its population up to a million people living in only 2.39 square kilometers, with many not even having access to basic amenities, making it infamous as the world's largest slum, Dharavi ([Source](#)).

What are some problems faced by residents of Dharavi?

- There is very little infrastructure in Dharavi for the amount of people. 2 hospitals, out of which 1 is private, aren't enough for 1 million people ([Source](#)). In addition to clean water and hospitals, not even washrooms are available in every household.
- Speaking of the residential areas, due to the average low income the more you move away from the center of the region, houses get less sturdy, being made of wood, plastic sheets, metal from drum barrels and thin iron structures ([Source](#)), making them prone to damage during floods, which are more common in the rainy season ([Source](#)).
- Due to the river Mahim creek and standpoints for water in Dharavi being extremely polluted ([Source](#)), in addition to the water from sewers and water pipes mixing at times due to infrastructural weaknesses, diseases are common among residents of Dharavi ([Source](#)).
- After independence, empty spaces in Dharavi, which are now scarce, started being used as dumping grounds ([Source](#)).
- Dharavi, due to being an informal and unplanned settlement, is overcrowded and most of the narrow roads in residential areas have barely space for even a small or medium sized car to go through, especially with there being no footpath for pedestrians ([Source](#)). Even on average, 10x10ft houses in Dharavi house 10-12 people ([Source](#)) and so there are too less resources to sustain that amount of people.

Graphs to help understand the situation: ([Source](#))



In conclusion:

- My interview with a resident of Dharavi reveals the internal everyday struggles of residents, such as a lack of access to clean water, a lack of washrooms, individuals with legally dubious housing and sources of electricity and concerns regarding redevelopment along with hopes for a better future.
- My interview with an outside expert shows how even people other than residents and even the real estate market will benefit from the redevelopment of Dharavi from a slum to a city where people have all they need to survive.
- With support from many past surveys and studies, my secondary research further backs the primary research.
- Redevelopment will really solve a lot of problems. Not only will it provide Dharavi's residents with the basic amenities such as firmly-built houses, clean water and enough washrooms, but will also control the area's constant spreading and the illegal housing problem in Dharavi.
- The above interviews, statistics and secondary research shows the need for redevelopment from the perspectives of both residents and outsiders. They really help you visualise the extent of the need for development in Dharavi and are enough to convince one to look beyond all the political difficulties and for once make a redevelopment plan for Dharavi that helps everyone.

Strand iii. - Analyses a range of existing products that inspire a solution to the problem in detail

Comparative Analysis

Sustainable City	Greenery & infrastructure	Waste Management	Renewable Energy	Public Transport	Unique Feature
Singapore	Vertical greenery, urban farms, sustainable water management	Smart waste collection system, recycling programs	Solar power, energy-efficient buildings, Carbon neutral policies	Highly efficient transit system, buses, and shared mobility options	Urban tech integration
Copenhagen	Extensive green spaces, pedestrian-friendly areas	Advanced waste-to-energy plant, high recycling rates	Wind energy, carbon neutrality goals	Cycling-focused, electric buses, metro	World's most bike-friendly city
Amsterdam	Green rooftops, sustainable urban development	Circular economy approach, waste reduction policies	Wind and solar energy, energy-neutral buildings	Extensive cycling infrastructure, public trams & buses	Doughnut economy leader
Curitiba	Large parks, sustainable urban zoning	Successful waste-for-food exchange program	Hydropower, focus on energy efficiency	Bus Rapid Transit (BRT) system, affordable transport	Innovative public transport model
Freiburg	Eco-friendly neighborhoods, strict zoning laws	NGO-based waste management	Solar energy leader, renewable energy investments	Tram system, pedestrian-friendly city	Leading solar city in Europe

SWOT Analysis of Singapore

Strengths:	Weaknesses:
<ul style="list-style-type: none"> ➤ First to implement a cap and trade system, where the government issues a particular amount of emission allowances for carbon emitters that they are taxed for. Emitters are free to buy or sell allowances. ➤ Singapore uses natural gases rather than fossil fuels. ➤ They have closed the water loop and reuse water. (Source) 	<ul style="list-style-type: none"> ➤ Lack of funds ➤ Lack of financial incentives ➤ Lack of user demand (Source) ➤ The plan is made on the premise that they will have the resources for their plan at the time.
Opportunities:	Threats:
<p>They are currently working on the future goals of:</p> <ul style="list-style-type: none"> ➤ Planting 1 million more trees. ➤ Quadrupling solar energy deployment by this year. ➤ Reducing the waste sent to landfills by 30% by 2030. ➤ Have at least 20% of schools be carbon neutral by 2030. ➤ Have all newly-registered cars be cleaner-energy models by 2030. (Source) 	<ul style="list-style-type: none"> ➤ As is said earlier, the plan is built on the premise that Singapore will have the resources to accomplish their plan in the future. This makes the achievement of their goals in the future slightly uncertain.

SWOT Analysis of Copenhagen, Denmark

Strengths:	Weaknesses:
<ul style="list-style-type: none"> ➤ Copenhagen has invested a lot in sustainability initiatives. Some of these are: ➤ Building 546 km of bike tracks in an effort to encourage travel on bikes rather than automobiles. This is very effective since Denmark already has a huge cycling culture. ➤ “Smart street lights” have been installed all over the city. With their ability to turn their lights off when no one is passing by, they have reduced the city’s lighting bill by 76%. (Source) 	<ul style="list-style-type: none"> ➤ Copenhagen has a shortage of housing and even finding an affordable rental apartment can become a challenge. (Source) ➤ Due to being built on a coast, Copenhagen is vulnerable to water-related natural dangers such as storm surges, which may damage infrastructure. (Source)
Opportunities:	Threats:
<ul style="list-style-type: none"> ➤ Due to Copenhagen’s already huge cycling culture, it is easier for them than other places to try and further encourage cycling. They plan to become completely carbon neutral by 2025. (Source) ➤ In addition to that, being one of the leading sustainable cities in the world is another thing that may encourage people to be more sustainable. 	<ul style="list-style-type: none"> ➤ Due to being built on a coast, Copenhagen is in threat of having infrastructural damage during storm surges. (Source)

SWOT Analysis of Amsterdam, Netherlands

Strengths:	Weaknesses:
<ul style="list-style-type: none"> ➤ First city to adopt doughnut economic models, which makes sure all the basic needs for good standards of living are met while respecting the limits of the natural resources of the planet. (Source) ➤ Due to being vulnerable to flooding, Amsterdam has flooding defences. (Source) 	<ul style="list-style-type: none"> ➤ Though not too often, floods still occur, with the most recent occurring as recently as 2023. (Source) ➤ Amsterdam has a huge amount of overtourism, leading to the displacement of local families and making it really difficult to find affordable housing. (Source)
Opportunities:	Threats:
<ul style="list-style-type: none"> ➤ Since Amsterdam already has really good cycling infrastructure, it could emphasize that aspect of sustainable travel through campaigns and encourage cycling more. ➤ In order to improve, Amsterdam must try to control tourism by promoting responsible tourism and promoting off-season tourism in order to spread it out more evenly throughout the year. 	<ul style="list-style-type: none"> ➤ Overtourism is a huge problem and in addition to displacing local families could one day make Amsterdam so expensive that it is impossible to live in.

SWOT Analysis of Curitiba, Brazil

Strengths:	Weaknesses:
<ul style="list-style-type: none"> ➤ Being one of the greenest cities in the world, Curitiba has 52 square metres of green space for every individual of its population. Not only does the green space make the city more sustainable, it also doubles as a natural flood water management system. (Source) ➤ The city has made sure to keep its local river's pathway untouched by barriers or walls in order to preserve nature. 	<ul style="list-style-type: none"> ➤ Curitiba is not very well-connected to other major cities in Brazil, leading to people having to take connecting flights when travelling to other cities. (Source) ➤ Due to massive deforestation during the early 20th century, Curitiba still faces some problems with corroded soil and impure rivers. (Source) ➤ The job market is not as strong as other major Brazilian cities with Curitiba having lower wages. (Source)
Opportunities:	Threats:
<ul style="list-style-type: none"> ➤ Since Curitiba is already leading in sustainable urban design, they can easily work more on green rooftops, vertical gardens and eco-friendly buildings. 	<ul style="list-style-type: none"> ➤ Increasing population density may become a strain on water supply, public transport and waste management.

SWOT Analysis of Freiburg, Germany

Strengths:	Weaknesses:
<ul style="list-style-type: none"> ➤ 40% of the city is forested with 56% of the forests being protected areas. ➤ The nearby river is allowed to flow freely without human intervention like barriers or damming. (Source) ➤ It generates 50% of its energy from natural gas. (Source) ➤ According to German mandates, new homes must not use more than 75 kWh/m^2 of energy annually. (Source) 	<ul style="list-style-type: none"> ➤ Freiburg faces problems with expensive houses. ➤ According to German mandates, new homes must not use more than 75 kWh/m^2 of energy annually, which may be disruptive for some. (Source)
Opportunities:	Threats:
<ul style="list-style-type: none"> ➤ Since the city is vulnerable to heatwaves, implementing natural urban cooling solutions such as green roofs will be a benefit to them. (Source) 	<ul style="list-style-type: none"> ➤ Freiburg is looking to decrease the limit of energy permitted to be used annually by new houses to 55 kWh/m^2, which will require higher construction costs to be put in to implement the required technology.

Strand iv. - Develops a detailed design brief

Summary of Research about Dharavi
Dharavi faces issues with a: <ul style="list-style-type: none"> ➤ Lack of proper housing ➤ Lack of access to clean water ➤ Lack of washrooms ➤ Lack of electricity ➤ Lack of free space on roads ➤ Lack of greenery ➤ Lack of proper waste disposal ➤ Legally dubious housing ➤ Legally dubious sources of electricity
Summary of Research about other Sustainable Cities
Cities such as Singapore, Copenhagen, Curitiba, Amsterdam and Freiburg ensure sustainability via: <ul style="list-style-type: none"> ➤ Innovative sustainability policies ➤ Efficient, good-quality public transport ➤ Greenery ➤ Natural energy ➤ Promoting cycling and public transport ➤ Natural-disaster defences

Design Brief - The New Dharavi

Learning from both Dharavi's needs and what other sustainable cities have done best, here is a design brief of the New Dharavi

Residential Infrastructure

- Firmly-built vertical buildings/towers for people to live in, with vertical parking spaces spanning 2 floors enough for 2 and 4-wheeler vehicles.
- All homes will have access to clean water and washrooms.
- All buildings will have solar panels installed.
- Green rooftops.

Public Infrastructure

- Proper water pipeline
- Proper sewage system.
- Public centres such as parks, gardens, theatres, etc.
- More hospitals will be built, enough for the population of about a million.
- Vertical building will allow for broader roads with enough area for a bus to pass through with a footpath.
- A square will be carved into the roads every 10 meters to allow for trees, carved on alternate sides as to not hinder space.
- Dedicated underground and vertical parking for private and commercial vehicles spaces in several areas.
- Skywalks installed throughout the area to make more space for pedestrians.
- Underground Work spaces for small-scale businesses such as leather-making and pottery
- A dedicated market place where locals can buy everyday goods & a shopping centre where tourists can buy local products.
- Petrol pumps and EV charging stations.

Sustainable policies

- An opportunity Dharavi has is to increase its already significant recycling industry. Recycling jobs could be paid higher in order to give people an incentive to participate in sustainable practices such as recycling.
- The government could set policies to promote sustainability. For instance, the government could pay the people who contribute to the cleanliness and sustainability of the area. They may also set certain anti-littering laws and fine individuals who don't follow the sustainability rules, starting from small amounts, and increasing it every time the crime is repeated.

Transportation

- Affordable, well-maintained public transport like buses or monorails that connect the whole area as well as go to the Sion station (nearest train station to Dharavi).
- Cycling tracks for short routes.
- Skywalks

Energy-efficiency

- Primary source of energy will be solar energy.
- Rain-water harvesting.
- Things like street lights and other public electrical amenities will be replaced by "smart counterparts" which only operate when there are passers by.

Natural disaster defences

- Dikes (heightened walls) around the Mithi river in order to prevent flooding (which Dharavi is prone to).

Renaming:

‘Dhar’ and ‘vi’ mean ‘stream’ and ‘place’, respectively, with Dharavi meaning stream settlement. Using the same naming scheme, I feel that the perfect renaming for the new and improved Dharavi would be “**Harithdhara**”, meaning green stream, both literally green with its focus on sustainability and figuratively being an evergreen, everflowing, stream of success.

In Conclusion, this is how Dharavi could go from the world’s biggest slum to a sustainable city. It would take some time and effort, both to make the change and accept it, but in the long term this could make big impacts on the lives of tens of thousands of people for the better.

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