

# Deep Streets

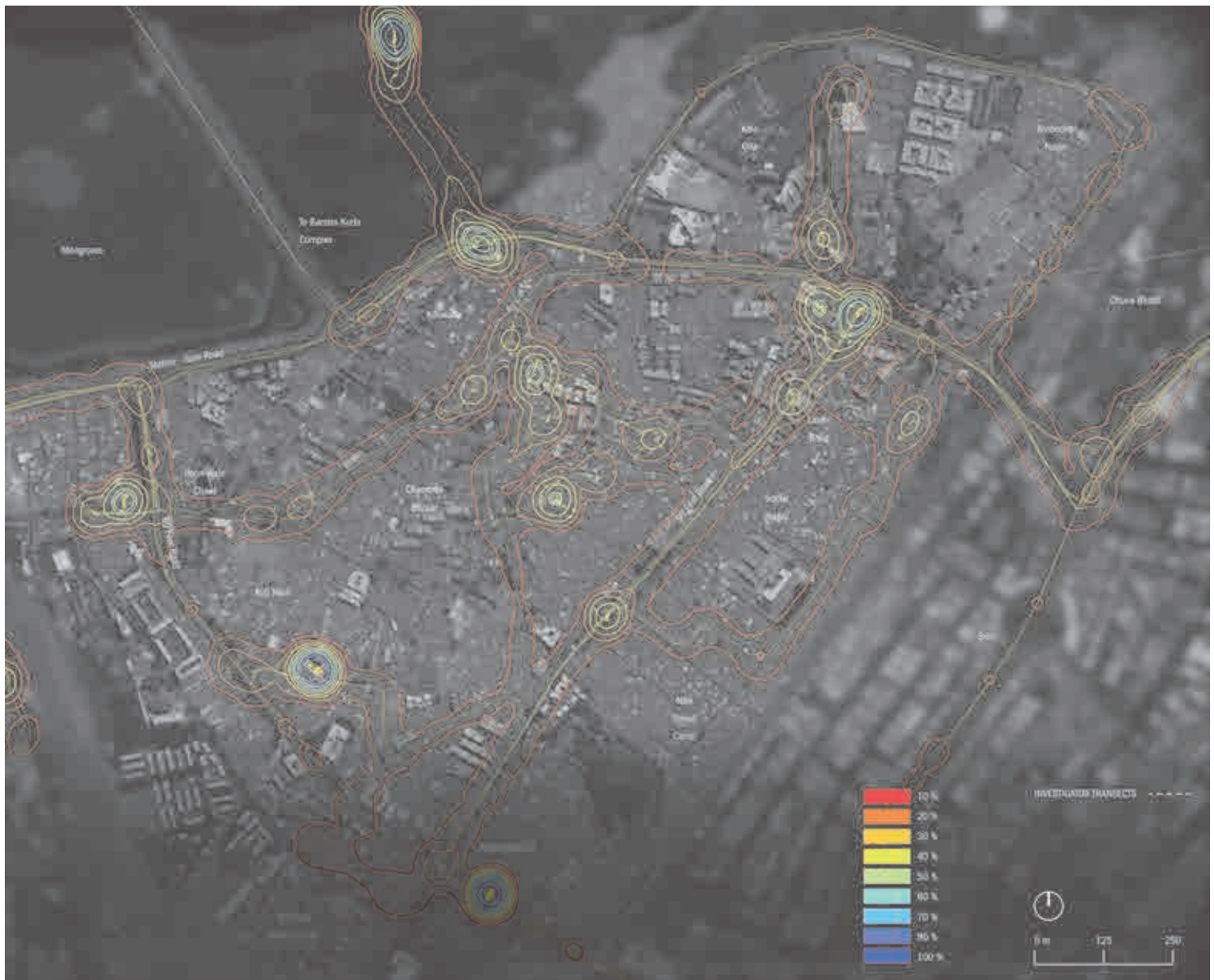
## Speculation and Slow Violence in Dharavi

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SHORTLISTED

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The team extensively analyses the Dharavi Redevelopment Plan and responds to it through their own ethnographic research. It seeks to introduce new agents into the ecosystem of Dharavi that may gradually disrupt, redirect and transform those systems. The jury found the proposal strong in enunciating the fundamental principles of allowing residents to improve their conditions incrementally with social and technical support. It appreciated the clarity the proposal expresses in not imposing physical solutions and in its mapping of contaminations as a tool to understand Dharavi. However, the proposal was adjudged weak in terms of implementable solutions.



## PREMISE

Reinventing Dharavi has become a spectacular issue, in the sense of being driven by an image of total decay and unfathomable risk which must be hedged and transformed into new development.

The establishment of the Dharavi Redevelopment Project (DRP) signalled the level to which Dharavi has become a spectacle in which Government, media and developers joined together to produce and reproduce an image of Dharavi as an utterly unsustainable neighbourhood in its entirety. This familiar strategy of blighting and redlining has fuelled gentrification in many cities, particularly in Euro-America.

The various proposals put forward for reinventing Dharavi during the last decade have focused squarely on rebuilding and increased densification of an already dense neighbourhood, leveraging the displacement of people into the construction of new built environments.

The new built forms projected by these proposals also function as derivatives in another sense: they enable the illusion that private developers are assuming at least some of these risks and thus deserve to be rewarded for their risk-taking allowing them to transact land and circulate land backed assets.

This form of development - involving public-private partnerships, adjudications of eligibility, forced displacement and migration - is an algorithm driving the production of a new city, rooted in abstract financial calculations, chimerical projections and speculation across Mumbai.

Dharavi must be viewed as one experiment within this meta-project of urban transformation through mass rebuilding or through the deployment of "weapons of mass construction," as anthropologist Arjun Appadurai has put it.

In response to the various proposals put forward by the Dharavi Redevelopment Plan (DRP), different critical perspectives have emerged. These responses can be grouped under the following broad types, categorized roughly according to the disciplines that have put them forward :

### **Normative Conditions and Responses**

Those put forward mostly by sociologists and political scientists, which focus on the normative mapping of conditions, rules and relationships leading to the discovery of the effects of direct and indirect norms governing displacement and the communities affected by those processes. These critical responses closely follow and critique the dominant policy frameworks that aim to turn Dharavi into a residential zone for eligible, current residents and high-end commercial zone to serve as an extension of the Bandra-Kurla Complex CBD.

### **Romanticising**

Other responses, coming from a spectrum of humanists, anthropologists and designers rely on a romanticism of existing ecologies as arrangements that only need to be perfected.

### **Reinforcing**

In a different vein, urban design interventions dedicate themselves to reproducing the unique ecosystems cultivated in Dharavi as the bedrock of the neighbourhood's success as an industrial zone within a global commodity system. Even

policy makers are beginning to focus on these kinds of interventions in lieu of the complex planning involved in residential redevelopment of slum neighbourhoods.

Such interventions include the Maharashtra Government's most recent efforts to initiate an Industrial Training Institute in Dharavi with links to the National Institute of Design for upgrading local skills and speculating on emergent global markets for Dharavi's goods. In recent years, Dharavi has become an experimental site for a number of design schools, both Indian and foreign although their interventions have remained speculative at most.

Each of these critical responses share the fundamental assumptions about urban form that are embedded in the DRP generated proposals. While the latter are driven by profit, their critics are driven by the desire for social justice and inclusive development. Nevertheless, there is a bias towards directing process that underlies both the development proposals and their critics.

The strategies make two broad assumptions:

One, that Dharavi must be split open and uprooted in order to remedy the violence and indignity that the landscape imposes upon its residents.

All images, including the sector-wise map popularised by the DRP's initial master plan for Dharavi, portray it as a bounded spatial entity, whose transformation is not only necessary but also possible because it is so bounded.

The other assumption that modern built form of the multi-storey tenement or apartment complex can be transformed into a type of financial derivative or a form of contract into which various kinds of risks are bundled and thereby hedged.

When compared to the spectacular and fast-paced volatility of abstract financial contracts however, the multi-storey building is a physical instrument of slow volatility. The building serves as an image that mitigates the risk of displacement by producing an equivalence between the number of people displaced and the amount of developable space.

Nevertheless, it conceals and bundles several different types of risk, including :

#### **Risk of Displacing**

Vast numbers of people from their livelihoods and homes.

#### **Risk of Introducing New Materials and Forms**

Whose effects are unpredictable.

#### **Risk of Further Ecological Transformations**

With unpredictable impact on the immediate natural ecology of Dharavi as well as the city as a whole.

#### **Risk of Introducing New Densities and Adjacencies**

That are radically different from those found in contemporary Dharavi.

Detailed ethnographic research reveals an intricate interlacing of different forms of originality within Dharavi, driven by intergenerational memories of what Dharavi was and its future potential. These forms of originality defy classification as "local" derivatives of global practices.

Building on this research, which reaches back at least five years before the date of this ideas competition, the aim is to add a new approach to the above critical repertoires, one that attempts to respect the heritage of memory and materiality that various residents of Dharavi have voiced to us and shown us throughout their constructions of the neighbourhood.

In the interviews, focus was mainly on first and second-generation entrepreneurs and business owners as well as workers across a variety of industries including plastic and glass recycling, leather, pottery, snack manufacture and makers of small, seasonal festive objects and the attempt was to use the thoughts and ideas shared generously by these individuals to advance different positions.

The examples in this proposal are chosen specifically for framing our ideas for Reinventing Dharavi.

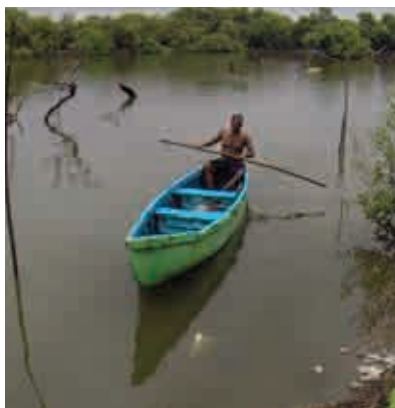
While the DRP had made provisions to relocate various industries, our ethnographic research revealed the extent to which industry and manufacture is embedded in the everyday lives of all residents, even those holding white collar jobs and those second and third generation families whose children received higher education and had now moved into white collar jobs. Thus the focus was specifically on the nexus between industry and life in Dharavi and to follow the extent to which these elements intersect in the very landscape of Dharavi.



## Our Core Questions:

Is it possible to delink industry and life and still have a viable neighbourhood?  
Is it possible to have a viable city in which deep social dependencies are so intimately linked to memories of industry, labour and environments crafted by the circulation of toxic materials?





Our classificatory analysis shows a hierarchy of central actors as follows:

### 1. Entrepreneurs

Own factories in Dharavi – both large and small scale. In interviews, many indicated that they have already purchased plots in industrial estates to the north-west of the city, extending into the region that borders Gujarat.

### 2. Strugglers

The term "strugglers" is initially identified with micro-entrepreneurs or marginal capitalists who are self-employed individuals who offer a living wage to three or four other individuals.

### 3. Toilers

A term coined by Sandeep Pendse who originally used it to describe a kind of abject labour whose time and space is totally colonised by work and whose existence is hand to mouth.

## GUIDING PRINCIPLES

### Through conversations we discerned two ideas calling for our attention in reinventing Dharavi:

First, the importance of speculation as a heterogeneous field of action, cutting across classes and groups of people living and working in Dharavi

And Second, the subtle yet repeated gestures towards recognising the "slow violence" of life in Dharavi

These insights lead us to question how the environment - as an effect of industry and as the memory of subjects - itself is a distributed agent in social networks and formations.

Between industry, environment, speculation, originality and degraded labour Dharavi presents a thorny conundrum that

fundamentally challenges our ability to work on existing planning propositions which rely primarily on visibility while rendering invisible the forms of slow violence that infuse lives, memories and landscapes of Dharavi. What forms of repression are necessary to contain the effects of that violence?

The framing questions and points of departure are therefore as follows :

1. Conflict is endemic and normative, therefore how do urban negotiations work in the face of conflict?
2. Industry creates an intricate network of socio-environmental dependencies - how will moving industry out of Dharavi change this entire systemic chain of production and dependence?
3. Every urban negotiation has a scalar tolerance - so what happens when practices of negotiation are scaled up or down?
4. Dharavi is depicted as a totalised field of contamination - yet our research reveals that it is in fact a variegated field of contamination, dependent on numerous

factors such as wind, drainage, topography etc. - how do new interventions become possible based on this empirical recognition?

5. What is valued as city? Is it just the form of the city? If Dharavi functions as an economic success but its form is a failure, should we develop a city that looks formally as a success but is an economic failure in terms of long term value creation?
6. What are other ways of creating value in the city beside real estate formation? How are these alternatives possible or viable, given the level of contamination?
7. What differences arise between subtraction and erasure on the one hand and surgical identification and remediation of areas most in need of transformation?

Thus, our strategies are as below:

**1. The street is the critical spatial device in Dharavi. Street is the armature for entrepreneurship, daily civic exchange and homes.**

- It is the flow path for all of Dharavi's life and connects Dharavi physically and conceptually to the rest of Mumbai and India.
- Improvements to houses or shelters will upgrade a family or sector but may have no effect on the resilience of people in Dharavi.

**2. We design within the urban ecosystem.**

- Our proposal occupies the place at the intersection of social and environmental processes, at the cusp where tangible and intangible networks meet and where forms of administered planning and autonomous development intersect.
- Dharavi is an ecosystem, not merely a spatialisation of pre-existing vectors of poverty but rather a node in the production of poverty through active denial and deprivation.

**3. Dharavi is already a powerful economic force.**

- Mumbai, thanks to it, is unique in that it recycles a higher percentage of its waste than most progressive global cities. Our strategies derive from an understanding of local strengths and the power of current operations.
- Dharavi's future should not be held hostage to the abstraction of the financial market.

**4. We assert both an economic and ethical stance by recognising that human displacement will also have deleterious economic impacts.**

- Dharavi cannot be made to conform to western urban models.

- Rather than upgrade the physical area as an object, we seek to stimulate transformation in the dynamic realm of livelihoods and lifestyles by enhancing health, economic and socio-cultural opportunity.
- We are deliberately agnostic about social programming because we do not believe in directing process. Our aim would be to catalyse socio-cultural processes through physical space akin to a satellite campus, bringing together leading schools of social science, social work and design.

**5. The deep streets we propose can be built in Dharavi by the people.**

- Top-down planning takes the form of recognition of hot spots of contamination that most urgently need to be mitigated and in what circumstances industries should be financially accountable for their emissions.
- Bottom-up negotiation determines the organisation, phasing, financing and sequencing of local construction.

Our design proposal is thus based on these principles. Drawing on our fundamental understanding that slum settlements similar to Dharavi represent a set of operations rather than merely the spatialisation of poverty, we focused our research on those processes.

We advocate in situ transformations precisely because of Dharavi's iconic status within the universe of similar settlements.

**By moving from the DRP towards the Deep Streets strategy, we mean to evoke and activate local infrastructure making capacities that historically enabled Dharavi's incremental growth.**



## GOVERNANCE

### Social Infrastructure

Our ethnographic research reveals a complex field of fertile networks which will continue to be in operation into the foreseeable future. These networks are communities that share risk taking and claims making vehicles. Innovation and change through these networks is a matter of the painstaking and patient work of cultivating the network, first and foremost for its own sake.

Although much of this social infrastructure is easily visible in the neighbourhood, it remains hidden as a resource as redevelopment projects focus on creating new spatial and social architectures for fostering networks on larger and more transparent scales. Our counter-proposition is that these infrastructures gain strength precisely because they are fragmentary, flexible and opportunistic and must be recognized as vital archives of affect, memory and potential action. Our proposal for Dharavi would include identifying and recording the heritage of these networks, projecting them as strong, vital and possible vehicles for reinventing Dharavi.

The following meta-classifications provide a lens into the possibilities for understanding how the proposals might trigger new opportunities and resilience within Dharavi and serve as examples beyond Dharavi.

### Infrastructure Collectives

These are groups and individuals who pool their resources to obtain decentralised infrastructure services, fragmenting and coalescing opportunistically within lanes and streets.

### Religious Spaces

Dharavi hosts vast numbers of religious institutions and spaces, both permanent and temporary spaces that pop-up during festivals and other important occasions. Similar to "social work" networks, these spaces offer community to new residents and old through trust and belief. They perform vital functions in fostering relations between communities and are, as such vital nodes within all of the other networks that operate in Dharavi.

### Industrial Collectives/ Associations

Similar to infrastructure collectives, these associations function more as representatives of specific industrial groups and lobby for facilities from the government. An example of such a collective is the All Plastics Recyclers Association.

### Social Work Networks

Although amorphous and heterogeneous, these networks are distinct from larger, structured civil representation groups such as registered NGOs. Primarily constituted by men, many now middle-aged, they build on an equal measure of friendship and trust as on the desire for social inclusion and justice and act both in individual and collective interest.

## ENVIRONMENT

### Mapping Contamination

In addition to identifying social infrastructure, our mapping was directed towards revealing public health impacts within the community with the idea of finding new ways of remediating contamination.

We used two strategies of mapping - the first was archival, based on secondary sources while the second represents a dynamic, geotagged itinerary through some of the key industrial sites in Dharavi.

### Our archival maps are:

Land and Intertidal Zones

Water

Air

Labour



Salvaging



Garments



Recycling

### Labour

Our ethnographic research show that individuals relate to production in three distinct classes - entrepreneurs, marginal entrepreneurs or strugglers and toilers. Each group organises infrastructures for increasing productivity (material flows, access etc.) and decreasing risk (removal and quarantining of toxins).

Existing production based organisations such as the All Plastics Recyclers Association manage these infrastructures and spaces constituted by individuals who identify socially by community and form of labour. Thus forms of organisation, labour and community identities, habitation and governance of infrastructure in space are intimately and inextricably linked.



### Land and Intertidal Zones

Site research was framed by an assessment of circulation: roads, streets, lanes and key open spaces where industrial activity or storage was taking place.

There is much activity in the intertidal zone with new anthropogenic structural interventions occurring through land-filling. In addition to such new construction, there are also conversions from one function to another as old tanks for brewing illicit liquor are converted into fish farms and the soil dug out of the creek to maintain these tanks is turned into urban gardens.

### Vegetation

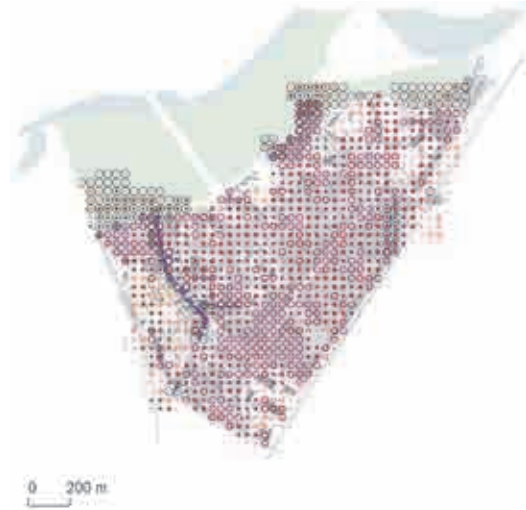
Since 1975 vegetative land cover has decreased significantly in intertidal wetlands such as the landscape in which Dharavi operates. This loss increases the possibility for violence experienced with sea level rise, rapid construction and drainage from monsoon rains.



### Flow Direction and Accumulation

Drainage from monsoon rains accumulates in areas of low elevation. In Dharavi this is not due to inundation from the sea but seems to stem from low pressure sewerage and drainage infrastructures with slow flow rates. Stagnation and contamination by septic systems intensifies risks.





### Water

Our research included elevation data (ASTER point file and DEM), Flow Accumulation calculations and Flow Length Calculations as the basis for speculation on Dharavi's complex runoff flows to assess impacts on the public where contaminated water might be pooling on the surface or where ground water might be subject to contamination.

We also factored in vulnerability to sea level rise. Various industrial flows (those known to release waterborne toxins into surface runoff, streams, and ground water) were documented with point distribution plots using the GIS data as a background for mapped industrial sites. Septic waste flows were also plotted based on the GIS data and an assessment of areas where communities are under-served by toilet facilities and where toilet facilities are likely to be overtaxed and therefore subject to overflow.

### Latrines

Releases coliform bacteria and other bio-hazards into surface and subsurface waters.

Areas with toilets: point source during flooding and with mechanical failure, excludes high-rise occupancy and industrial facilities areas (<200 m R)

Areas with little access to public toilets (>200 m away)

Contaminants near major open water / creek lands by basin

Contaminants in areas prone to flood / up-welling by basin (>10 mel)

Contaminants in areas of accumulated flows

Areas in basins with contaminate potential from runoff



## Industries in Dharavi

### Pottery Industry

CO<sub>2</sub>, crystalline silica dust, Lead, pigment dusts

### Plastics Recycling

Carbon monoxide, dioxins and z, poly-nuclear aromatic hydrocarbons, volatile organic compounds, particulate matter, aldehyde, heavy metals, DEHP, hydrogen chloride

### E-Waste Recycling

Lead, mercury, cadmium dust, hexavalent chromium, barium, beryllium, polyvinyl chloride, everything associated with plastics recycling

### Leather Tanning/Material Production

Acid vapours, solvent vapours, methane, CO<sub>2</sub>, hydrogen sulphide, sulphur dioxide, chrome dust, bio-hazards

### Leather Finishing

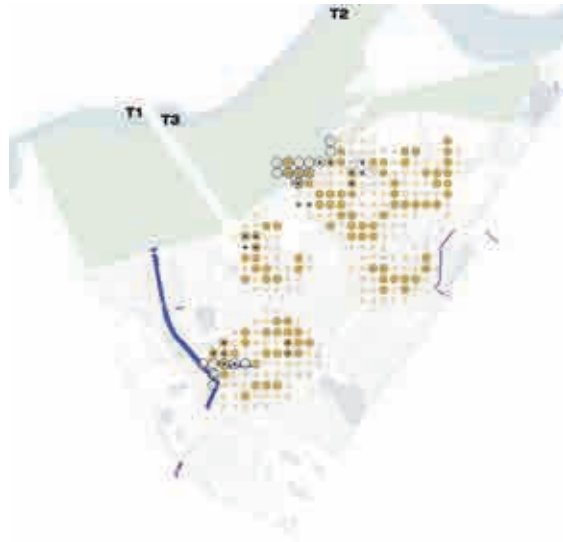
Leather particulate matter, chrome dust, pigment dust

### Textile Industry

Volatile organic compounds, methane, CO<sub>2</sub>, solvent vapours, formaldehyde vapours, pigment dust

### Heavy Exhaust Vehicle Fumes

Carbon monoxide, nitrogen oxides, phenol, formaldehyde, poly-nuclear aromatic hydrocarbons, particulate matter



### Air Contamination in Dharavi

#### Air

We generated maps of airborne contaminant release from plastics recycling, e-waste recycling, leather tanning/finishing, textiles, and pottery industries as well as traffic exhaust. Like the waterborne contaminants maps, these reveal a varied pattern of hot spots and areas of little contamination. In both cases, there is not a uniform distribution of contamination throughout the settlement.

The maps make clear that Dharavi's particularity cannot be contained within its spatial bounds and that contamination itself is contingent on different factors such as wind, drainage, and economic boom and bust-all conditions that change over time. Dharavi cannot be considered universally "dirty" or "toxic," it is a complex field of various hazards that can be dealt with at the micro scale.

#### Leather - Post Tanning/Finishing

Releases particulate matter, pigment dust, oil and grease, and chromium into water sources through runoff.



### Plastics Recycling

Burning and stockpiling plastics releases ash which flows with runoff and blows into waterways contaminating the surface and groundwater with dioxins and furans, polynuclear aromatic hydrocarbons, volatile organic compounds, particulate matter, aldehydes, heavy metals, DEHP, and hydrogen chloride.

### Pottery Industry

In ceramic making, liquid effluent contributes suspended solids of fine clay particles and salts. Water recovered from the filter press contains mineral particles and dissolved chemicals, and glaze preparation contributes heavy metals and hazardous pigments.

### Textile Industry

Affects water quality parameters like pH, turbidity, suspended solids, BOD, and COD. Also impacts aquatic habitat with high phosphate, grease/oil content, and chlorinated solvents as well as the presence of metals like copper, cadmium, mercury, arsenic, zinc, and chromium.




# SERVICE INFRASTRUCTURE

The deep streets we propose can be built in Dharavi by the people of Dharavi. Top-down planning takes the form of recognition of hot spots of contamination that most urgently need to be mitigated and in what circumstances

industries should be financially accountable for their emissions. Bottom-up negotiation determines the organisation, phasing, financing, and sequencing of local construction.

**FILTERING AIRBORNE CONTAMINANTS** at their source will allow Dharavi residents to remain in their communities and continue to participate and work in traditional industries.


**GROUND CONDITIONS**




**LANES**  
Mobile filtration systems sited in small alley ways will mitigate contaminants produced by the large number of small scale industries.

**STREETS**  
Street systems are modelled after the mobile lane units, but will allow for filtration of greater emissions and at greater distances.


**WORKSHOPS**  
Workshops will utilize fully enclosed air filtration systems to prevent the mitigation of contaminants




**AIR CONTAMINANTS**




**POTTERY**




**PLASTICS RECYCLING**




**HEAVY VEHICULAR EXHAUST FUMES**




**LEATHER TANNING**



**LEATHER FINISHING**



**TEXTILES & GARMENTS**



**E-WASTE RECYCLING**

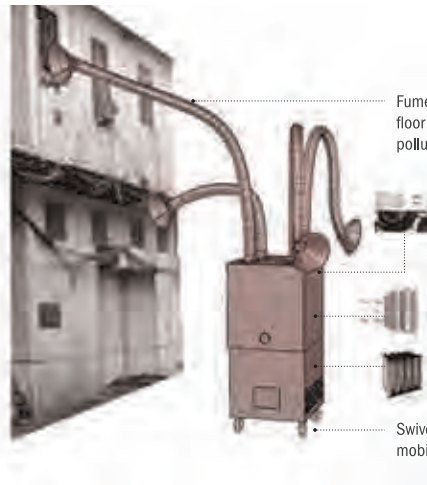
The **MOBILE AIR FILTRATION SYSTEMS** include two stages of mechanical filtration followed by a third stage of activated charcoal (carbon) for control of gaseous contaminants.

<p><b>AIR FLOW RATE</b> Lanes System: 800 CFM Streets System: 2700 CFM</p>	<p><b>2014 COST</b> INR 1.4 - 3.1 lakhs</p>
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The **FACTORY AIR FILTRATION SYSTEM** is designed for ambient air cleansing applications within environments involving grinding, weldind, foam cutting, rubber extruding, injection moulding and dust associated with warehousing facilities.

<p><b>AIR FLOW RATE</b> 5500 - 6000 CFM</p>	<p><b>2014 COST</b> INR 9.2 - 18.5 lakhs</p>
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**PURIFICATION SYSTEMS**



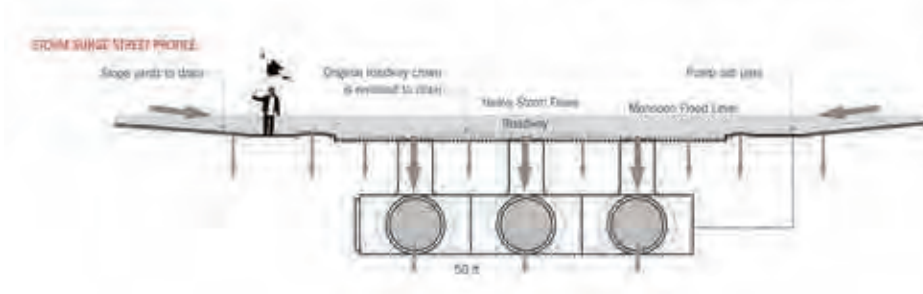
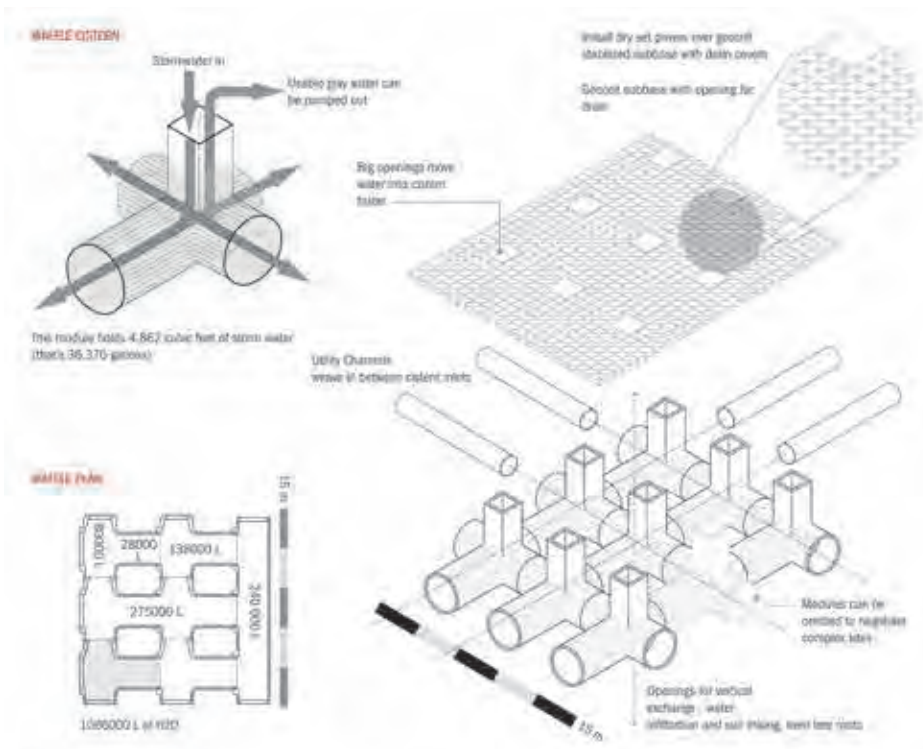
- Fume arms extend to first and second floor industries to capture air pollutants at their source.
- Adjustable motor sheave allows for field adjustments to the rated air flow
- Activated carbon attracts and traps passing chemicals to its surface.
- Filter media has an area of 20 S.M.
- Swivel Castors with brakes for eased mobility.



Prefiler traps large particles



Micro-glass filter removes particles with 99% filtration efficiency



**'DEEP' LANE MODULAR FLOW DIAGRAM**

