



**Slums and informal settlements**  
**An evidence-based approach to**  
**sustainable upgrading and development**

**“1 billion people currently live in slums, this is set to double over the next 30 years.”**

**“Slums are a physical and spatial manifestation of urban poverty and intra-city inequality. However, slums do not accommodate all of the urban poor, nor are all slum dwellers always poor.”**

The challenge of slums,  
UN Habitat

**Approaches to improvement typically follow insitu upgrading or forced eviction and redevelopment.**

**Both of these approaches focus on short-term solutions which fail to address the core spatial problems of these areas.**

**Space Syntax occupies a middle ground by concentrating vital spatial intervention in the key areas which deliver long-term benefits.**

### **Space Syntax**

Space Syntax provides a unique, evidence-based and industry-leading approach to the planning and design of buildings and urban areas. Combining technology, ability and extensive global experience, we target the social and economic value that good planning and design bring.

We show how value can be created through the analysis, understanding and skilful manipulation of space. We are expert, independent and widely respected for the support we provide to public, private and community-based decision makers.

# Slums and informal settlements

## An evidence-based approach to sustainable upgrading and development



### The challenge

Worldwide, cities are being forced to accommodate rapid urban growth. In many instances this takes the form of slums or informal settlements, which bring with them multiple complications:

- the **physical** fabric is often of low quality, with inadequate provision of infrastructure, services, utilities or sanitation
- well established **social** networks coexist alongside problems, which include (the perception of) high crime levels
- land is typically **illegally** occupied by residents who are unprotected by the law
- **political** pressure to address these areas is high and can result in the implementation of under-developed solutions
- major private **economic** investment is required to help fund improvement

If left unaddressed, these areas become an increasing cost to the city.

### How do we meet these needs?

By using a set of cutting-edge spatial design tools we are able to maximise the improvement of unplanned areas, while minimising the disruption to existing inhabitants and stakeholders.

We work through all the design stages of an upgrading strategy, from analysis of existing conditions to development of detailed design proposals. We are equally happy leading a design team or contributing as a specialist consultant.

We help to optimise investment by resolving existing problems in the short term without compromising long-term stability.

The work we produce helps develop solutions which are socially, economically and environmentally sustainable.

# Evidence-based approach

## Space Syntax is based on a unique methodology developed during twenty years of empirical research

A

### Informal settlements

Typical conditions combine physical, social, economic and legal issues with political pressures.

B

### Spatial analysis

Spatial accessibility analysis showing the isolation of informal settlements from the wider context.



A



B

### Approach

At the core of Space Syntax's approach is a methodology which measures the impact that spatial configuration has on issues of urban sustainability: movement patterns, land use distribution, density distribution, land value, and crime.

The technique primarily measures space, with supporting elements added as required. These elements could include land use, building quality, utilities provision, public realm condition, or access to social infrastructure.

Space Syntax has worked in over 50 informal settlements to date, identifying a set of spatial relationships at the heart of the slum condition.

We develop spatial solutions which remove this condition and set in place the relationships needed to support long-term social, economic and environmental sustainability.

### What are the benefits?

This approach allows us to address short-term physical problems without compromising long-term objectives:

- the contribution these areas make to the wider city can be measured, and the **long-term sustainability** of the city improved

- **public investment in these areas can be optimised** by categorising settlements according to their attractiveness to private development

- the level of intervention in each settlement can be tailored to the current conditions, **reducing resident displacement, disruption to social networks and political pressure**

- a spatial plan allows **large-scale private development to be accommodated**, so as to contribute to the overall city, while preserving the positive local qualities of these areas

- our **design proposals have an inherent flexibility** which allows them to adapt easily to changes in economic, social and political conditions

- **long-term economic sustainability** is improved, hence repeated investment in upgrading projects is not required

# Delivering long-term sustainability

## Space Syntax techniques work with the fundamental processes which organise a city

C

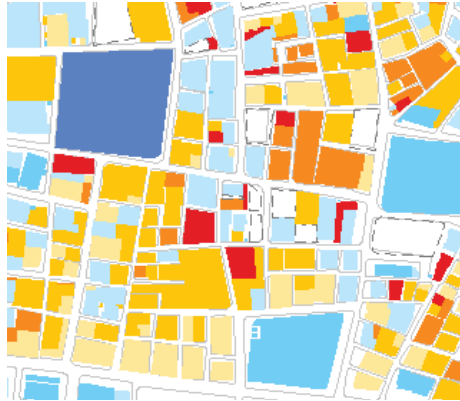
### Transformability index

Detailed spatial analysis to identify how “transformable” a plot is based on building construction, age, height, use etc. Red plots are easily transformable, blue plots should be retained.

D

### Area action plan proposal

Extract of spatial intervention based on reconnecting a settlement and retaining existing buildings of adequate quality. Orange plots are more accessible and receive higher FARs and commercial use, while yellow plots are less accessible and receive lower FARs and less commercial use.



C



D

### Consultancy packages

We offer the following consultancy packages which can be tailored to the requirements and budgets of each city:

#### Strategic spatial analysis

Provides a spatial overview of the city to explain the relationships between informal settlements and the wider city. Can be used to contribute to large-scale planning policy such as growth strategies.

#### Spatial profiling

Uses detailed spatial analysis of each settlement to benchmark current conditions and compare areas. Can be applied to prioritise areas for intervention, and identify delivery processes and level of intervention required.

#### Spatial improvement plan

Proposes large-scale spatial intervention to be implemented through longer-term planning policy.

#### Urban development framework

Combines a proposed spatial structure with outline development allowances to coordinate and inform mid-term private development at the scale of the urban block.

#### Area action plan

Develops detailed spatial plans to coordinate and inform shorter term public and private development at the scale of the individual plot.

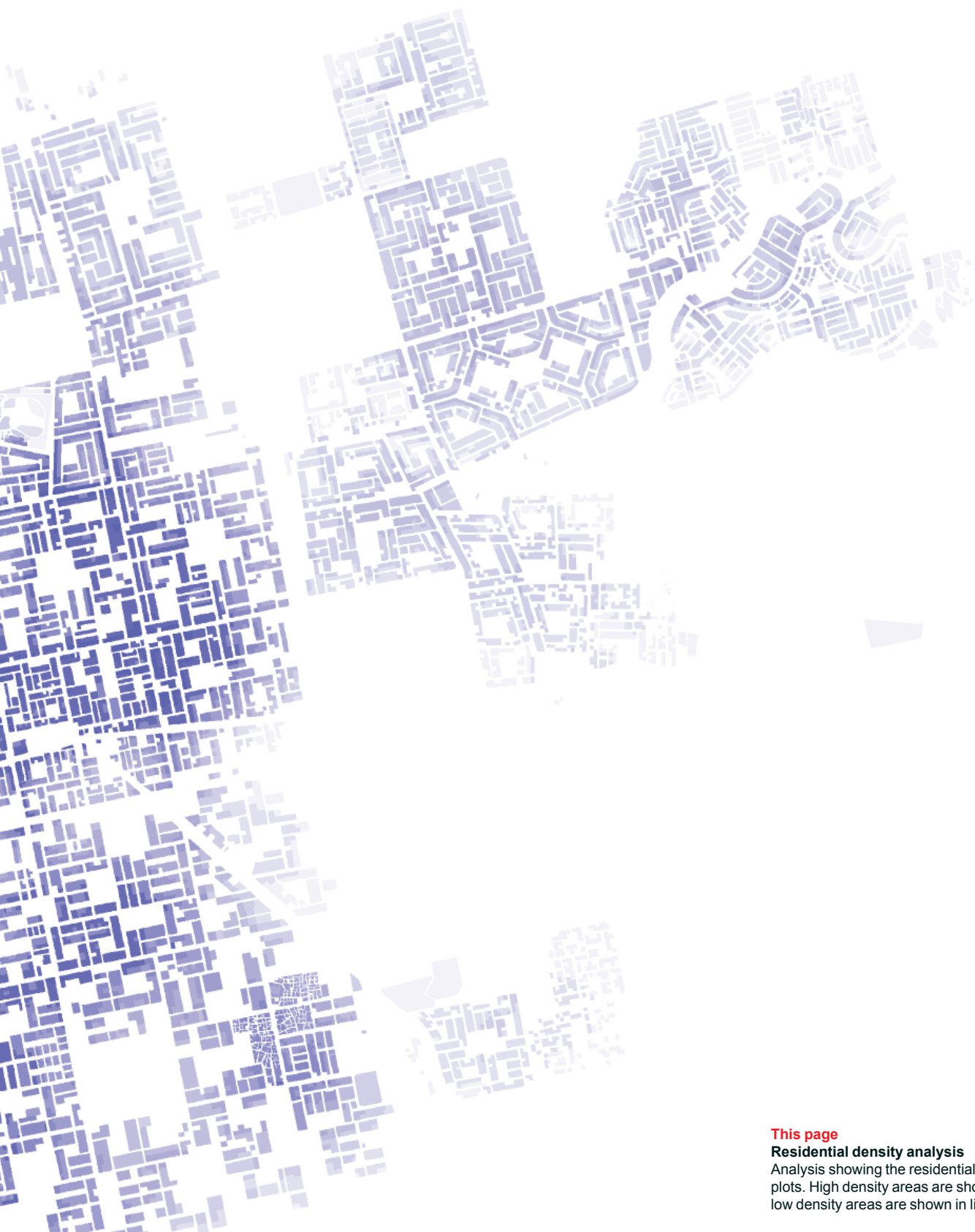
Our suite of products can be applied flexibly so we can address your needs while working to your budget. Prices are driven by the number of components required and by certain features such as the size of the wider city, the area of the settlement, the population, etc.

In cases where funding is sought from multilateral development agencies, we can provide material to support the application process.

The time required for each stage of the process also varies in response to the size and density of each settlement however, for a typical settlement of 30,000 inhabitants and 100 hectares, each consultancy package would require approximately two to four months.



# Approach



## This page

### Residential density analysis

Analysis showing the residential density of existing plots. High density areas are shown in darker blue, low density areas are shown in lighter blue.

# Strategic spatial analysis

Provides a spatial overview of the city to explain the relationships between informal settlements and the wider city. Can be used to contribute to large-scale planning policy such as growth strategies.

Typical scale  
1:100,000  
1:50,000  
1:25,000  
1:10,000  
1:5,000  
1:2,500  
1:1,000



## Deliverables

Spatial model of city.  
Strategic spatial analysis.

## Programme

Three months

## Project objective

**How can an improvement programme respond to the conditions of the wider city in terms of immediate improvement and future slum prevention?**

While local living conditions create a requirement for short-term settlement improvement, development potential is influenced by wider-scale relationships. The long-term success of improvement relies on developing a settlement vision which proposes overall land use mixes and densities consistent with the wider-scale role.

Rapid urban growth is a major contributor to slum formation. City growth needs to be structured globally and locally to help prevent the formation of new slums. Failure to understand this key relationship will result in unsuitable and unsustainable projects, requiring significant reinvestment over the long term.

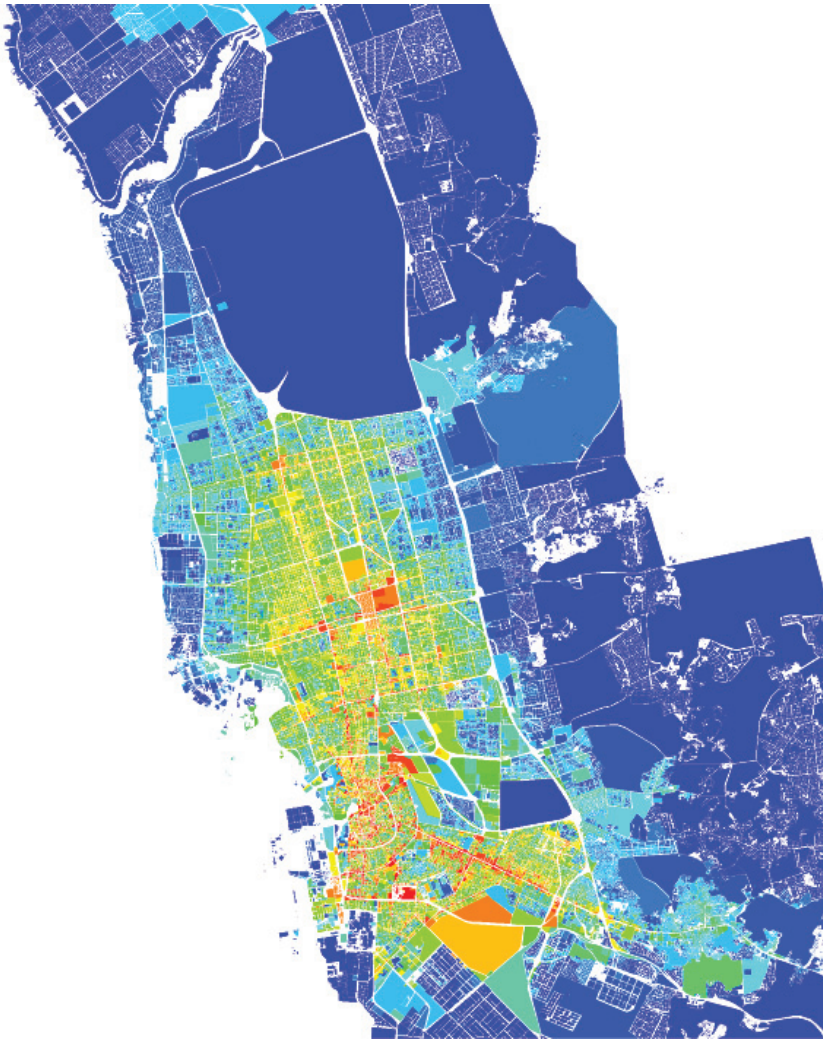
## Our solution

### Strategic spatial analysis

Through analysis of the entire city we are able to measure the inter-relationships between areas and across scales. This allows us to understand distribution of land uses, densities, and values, at both global and local scales. Armed with this understanding, we can help refine a vision and brief for settlement-specific improvement plans.

The model can also be used to help make strategic decisions, such as the best locations to accommodate urban growth, and to test the physical form this growth should take. The impact of major developments can also be tested in the same model.





**A**  
**Spatial accessibility analysis**  
 Spatial accessibility analysis revealing local-scale relationship between a city centre and informal settlements.

**B**  
**Place syntax analysis**  
 Analysis showing number of commercial plots within 5,000m. Red colours indicate plots that have more commercial uses close to them and define the city centre.

**B**

## Benefits

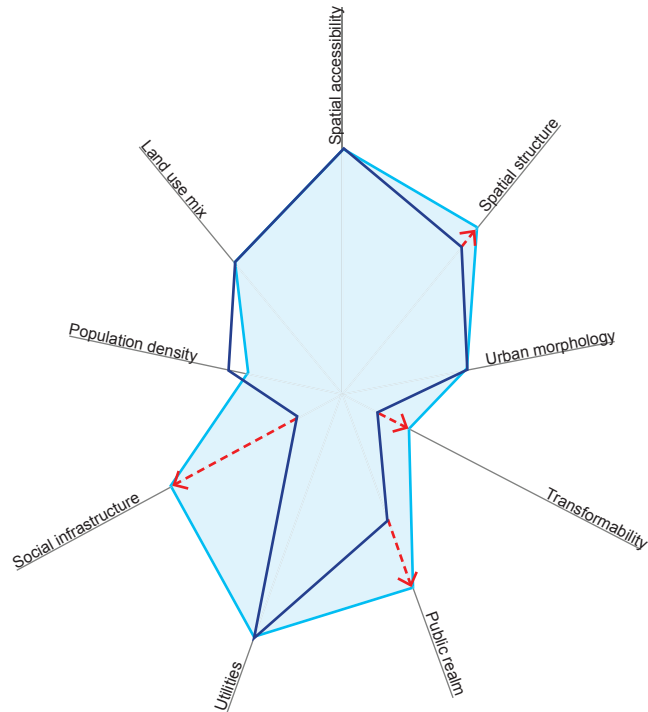
**Strategic spatial analysis provides a key tool to resolve complex, multi-scale urban problems:**

- local- and global-scale settlement conditions can be analysed using the same model, and the results can be used to identify families of settlements and a vision for redevelopment
- understanding the role of an informal settlement in relation to the wider city means that improvement can be targeted towards an achievable goal
- a spatial model of a city can be generated very quickly with minimal data input
- the spatial model provides the basis from which to develop a city-wide spatial plan and growth strategy.

# Spatial profiling

Uses detailed spatial analysis of each settlement to benchmark current conditions and compare areas. Can be applied to prioritise areas for intervention, and identify delivery processes and level of intervention required.

Typical scale  
1:100,000  
1:50,000  
1:25,000  
1:10,000  
1:5,000  
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A

## Deliverables

Spatial profile of each settlement.  
Categorisation of settlements.  
Intervention strategy for each settlement.  
Full technical report.

## Programme

Two months

## Project objective

**How can a city with multiple slums optimise public spending in the upgrading process?**

Slums and informal settlements often have a wide range of conditions and it may not be suitable to apply the same approach across all areas. Once the decision has been made to intervene spatially in a slum, it needs to be made sensitively, so as to reduce disruption and displacement.

Investment must be prioritised to the areas most in need. The areas which have the potential to attract private investment must also be identified to make the most efficient use of public funds.

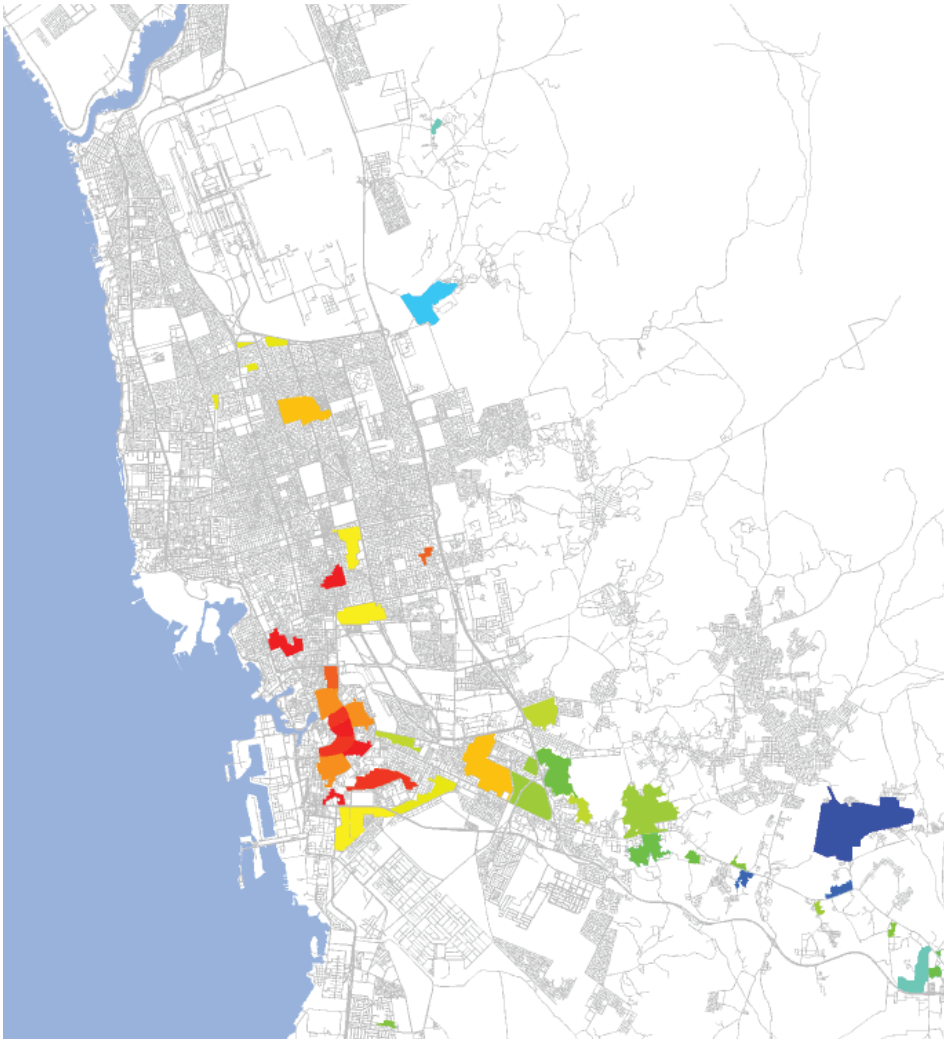
Political pressure to improve living conditions should not rush the process of upgrading at the expense of long-term sustainability.

## Our solution

### Spatial profiling

By measuring a range of conditions in each settlement we can construct a unique profile. Elements in the profile could include land use, spatial measures, quality of urban fabric, access to utilities, social infrastructure provision, or public realm condition.

Spatial profiles can be used at the wider scale to benchmark differences between settlements and prioritise delivery. At the local scale they can identify specific areas to focus intervention.



**B**

**A**  
**Spatial profiling**  
 Existing conditions recorded in dark blue, target conditions shown in light blue. Settlement-specific improvement strategy is indicated by red arrows as the work required to move from existing profile to target conditions.

**B**  
**Settlement categorisation**  
 Ranking of settlements according to attractiveness to private sector. Red indicates settlements with private sector interest, blue indicates settlements requiring public investment.

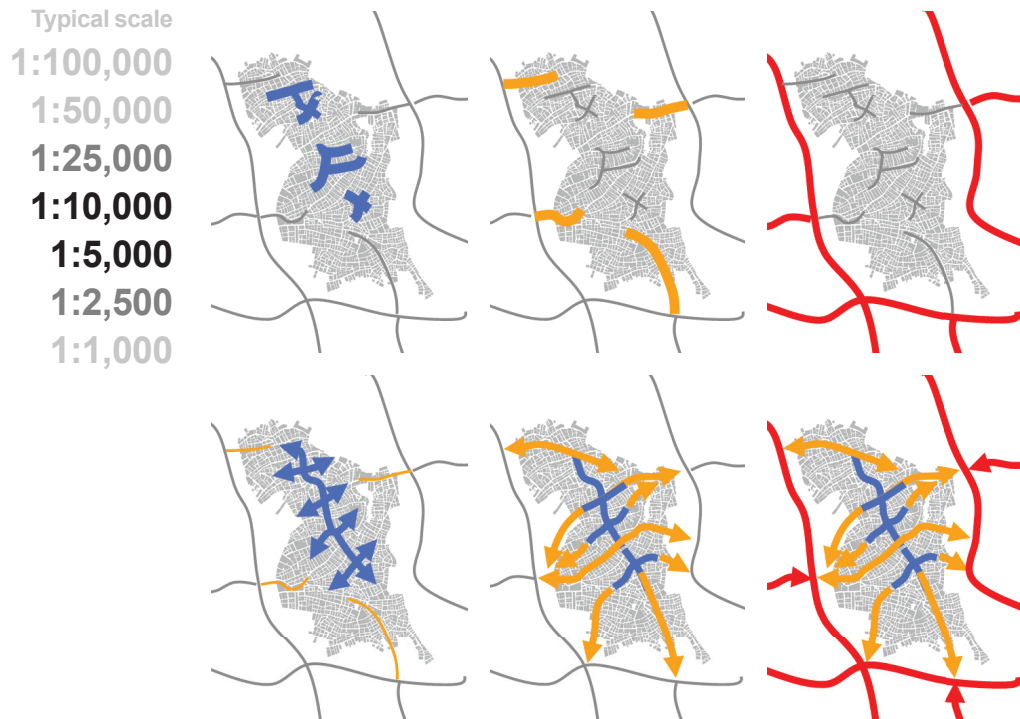
## Benefits

### Spatial profiling helps to optimise investment and minimise disruption:

- each settlement has a strategic level of intervention defined in direct response to its existing conditions
- by benchmarking the spatial profiles of each settlement, those most in need of intervention can be prioritised
- public value can be delivered by identifying areas where private investment is possible
- spatial profiling provides a strategic decision-making tool
- the analyses used in spatial profiling can be used as design tools in subsequent stages of the improvement process.

# Spatial improvement plan

Proposes large-scale spatial intervention to be implemented through longer-term planning policy.



A

## Deliverables

Spatial improvement plan for each settlement.  
Full technical report.  
Full set of spatial improvement plan drawings in hard and e formats.  
Design workshops and stakeholder presentations as required.

## Programme

Two months per settlement although multiple settlements can be programmed to overlap

## Project objective

**How can a long-term upgrading process deliver the spatial conditions to support long-term sustainability without disrupting the existing population?**

Detailed spatial analysis of informal settlements reveals a common spatial condition at the heart of the slum condition. Without addressing this spatial condition, the areas will remain isolated and the chances of sustained improvement are reduced.

By their nature slums are overcrowded. Any spatial intervention will create disruption through the acquisition of occupied land, resettlement of current residents and businesses, and the construction process.

Cities with multiple slums and informal settlements often have to balance public spending between a number of concerns.

## Our solution

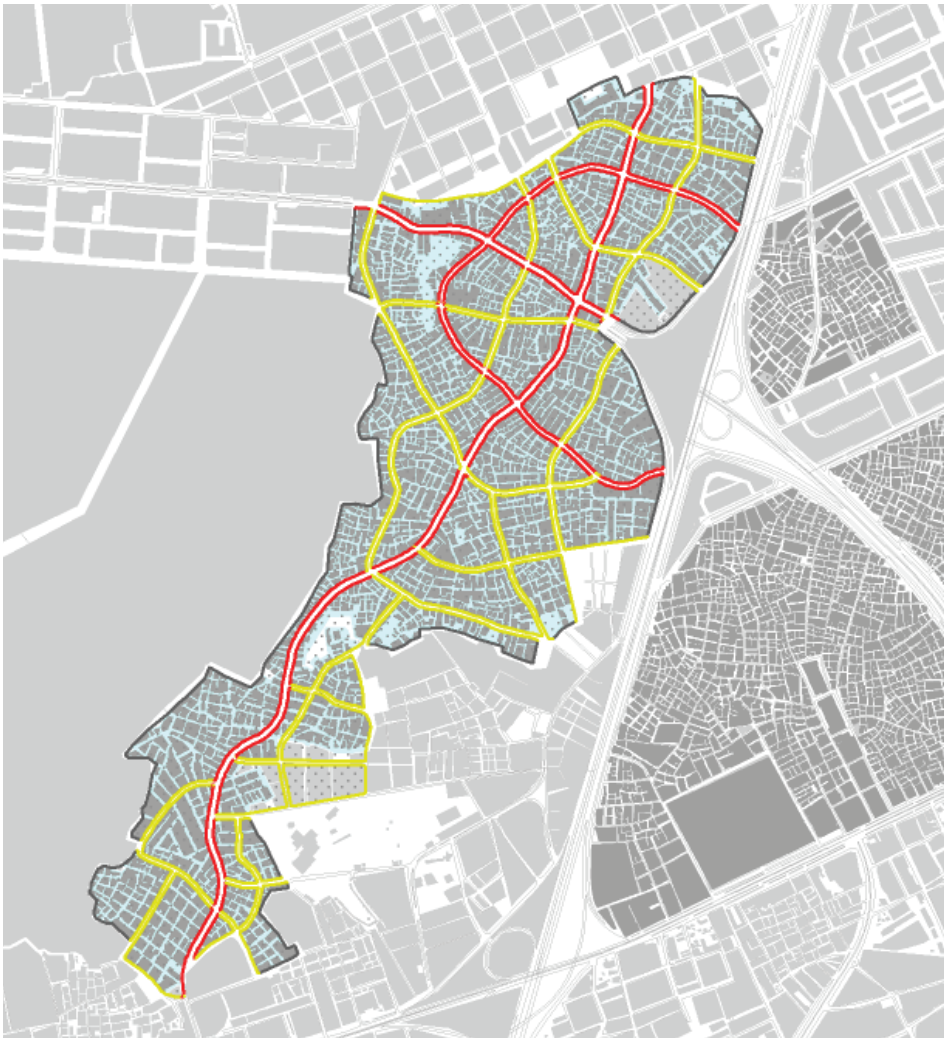
### Spatial improvement plan

Using spatial analysis we can identify the elements of the street network that under-perform at local- and city-wide scales. By realigning these streets we can develop large-scale strategies to reconnect these areas.

By using the data contained in the spatial profiles, street alignments can be fine-tuned to avoid culturally important buildings or existing social infrastructure.

Within the proposed spatial plan, areas of higher density and concentrations of commercial use are identified according to their requirement for access to movement.

Because the proposed spatial improvement plan is based on the core principles of urban development, it maximises the potential for self-organising or natural regeneration, and supports multiple delivery methods.



**B**

**A**  
**Approach to spatial intervention**  
 Spatial accessibility analysis used to identify key routes at local, intermediate and global scales. Connections made across scales while avoiding important or good quality existing buildings.

**B**  
**Spatial improvement plan**

## Benefits

**A spatial improvement plan delivers a settlement-specific, needs-based intervention, setting in place the foundations for a flexible and responsive upgrading process:**

- each settlement is provided with a unique spatial plan which can be used as planning policy or as the first step of masterplan-scale design
- providing the core spatial framework allows the potential for short-term, large-scale, privately funded development to take place alongside small-scale, long-term, publicly funded regeneration
- the spatial improvement plan provides an early focus for interaction between wider disciplines such as urban design, traffic engineering, infrastructure and utilities.

# Urban development framework

Combines a proposed spatial structure with outline development allowances to coordinate and inform mid-term private development at the scale of the urban block.

Typical scale  
1:100,000  
1:50,000  
1:25,000  
1:10,000  
**1:5,000**  
1:2,500  
1:1,000



A

## Deliverables

Urban development framework.  
Full technical report.  
Full set of urban development framework drawings in hard and e formats.  
Design workshops and stakeholder presentations as required.

## Programme

Two months per settlement although multiple settlements can be programmed to overlap

## Project objective

**How can a city make the most of private sector interest in large-scale development without compromising the delivery of social responsibilities?**

The locations of slums and informal settlements are often very attractive to developers. Allowing large-scale redevelopment of these areas reduces public investment and the requirement for project management. Development must not be biased towards financial returns at the expense of the current population.

The sale of illegally occupied land also offers potential public revenue which can be reinvested in other areas. The full value of this land must be understood to generate the maximum public benefit.

Further issues for consideration are how changes in economic, political or social conditions will affect the delivery of development.

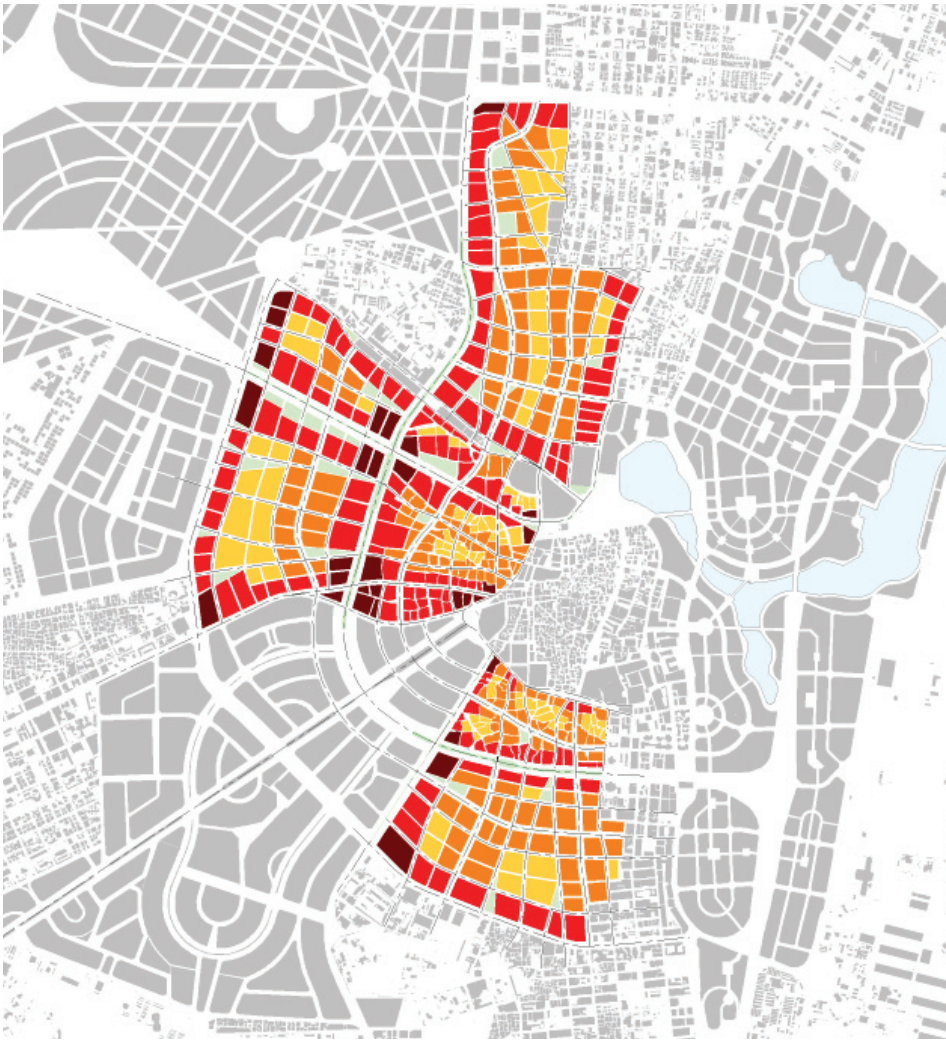
## Our solution

### Urban development framework

Building on the process of the spatial improvement plan we will refine a design to the point where individual projects can be defined and private delivery processes initiated.

Outline development allowances will be defined for land use mix and FAR. The provision of schools, clinics and further social infrastructure will be calculated based on population estimates and international standards. All land uses will be distributed in relation to their requirement for access at different scales.

The urban development framework will be developed based on a set of design scenarios that respond to potential private investment. Because scenarios share a primary and secondary street network, there is compatibility between options allowing the flexibility to adapt during the delivery process.



**A**  
**Vision for upgrading**  
 Strategic vision for the upgrading of an informal settlement located between an existing historic city centre and a major development site.

**B**  
**Urban development framework**

**B**

### Benefits

The early stages of the design process concentrate on a development vision to propose the future role of the settlement and its relationship to the wider area.

To ensure that private development fulfils the objectives of improvement, a set of design guidelines will be set in place. These provide continuity between projects, describing key components such as street treatment, open space strategy and massing principles.

During this stage of design, preliminary cost analysis can be used to develop an understanding of potential viability, and settlement value.

Through consultation and input from private developers and municipal organisations, we will refine and shape the urban development framework in response to the social and economic requirements of the project.

**The urban development framework provides an easily manageable structure to coordinate private investment at the scale of the urban block:**

- providing a set of compatible design scenarios allows the urban development framework to respond to changes in development conditions
- consultation during the early stages informs stakeholders and helps to generate support for the principles of development
- understanding the potential value of each settlement allows a delivery strategy to respond to the differences between areas
- developing a framework using the natural organising principles of cities means that land uses are distributed where they can be sustained and repeated investment in areas is not required.

# Area action plan

Develops detailed spatial plans to coordinate and inform shorter term public and private development at the scale of the individual plot.

Typical scale  
1:100,000  
1:50,000  
1:25,000  
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A

## Deliverables

Area action plan.  
Full technical report.  
Full set of area action plan drawings in hard and e formats.  
Design workshops and stakeholder presentations as required.

## Programme

Three months per settlement although multiple settlements can be programmed to overlap

## Project objective

**How can development be defined in areas which are less attractive to private investment?**

In settlements without a high level of developer interest, responsibility for design development and delivery rests with the public sector. By defining a more detailed level of resolution, improvements can be delivered as a set of urban blocks by the private sector. Alternatively, public sector seed projects can be used to stimulate resident-lead regeneration.

A detailed understanding of the implementation process shapes the design at this stage. Strategies need to be developed to mitigate resident displacement, disruption to business, cost, and the impact of construction phasing.

The design must also respond to potential changes in development conditions.

## Our solution

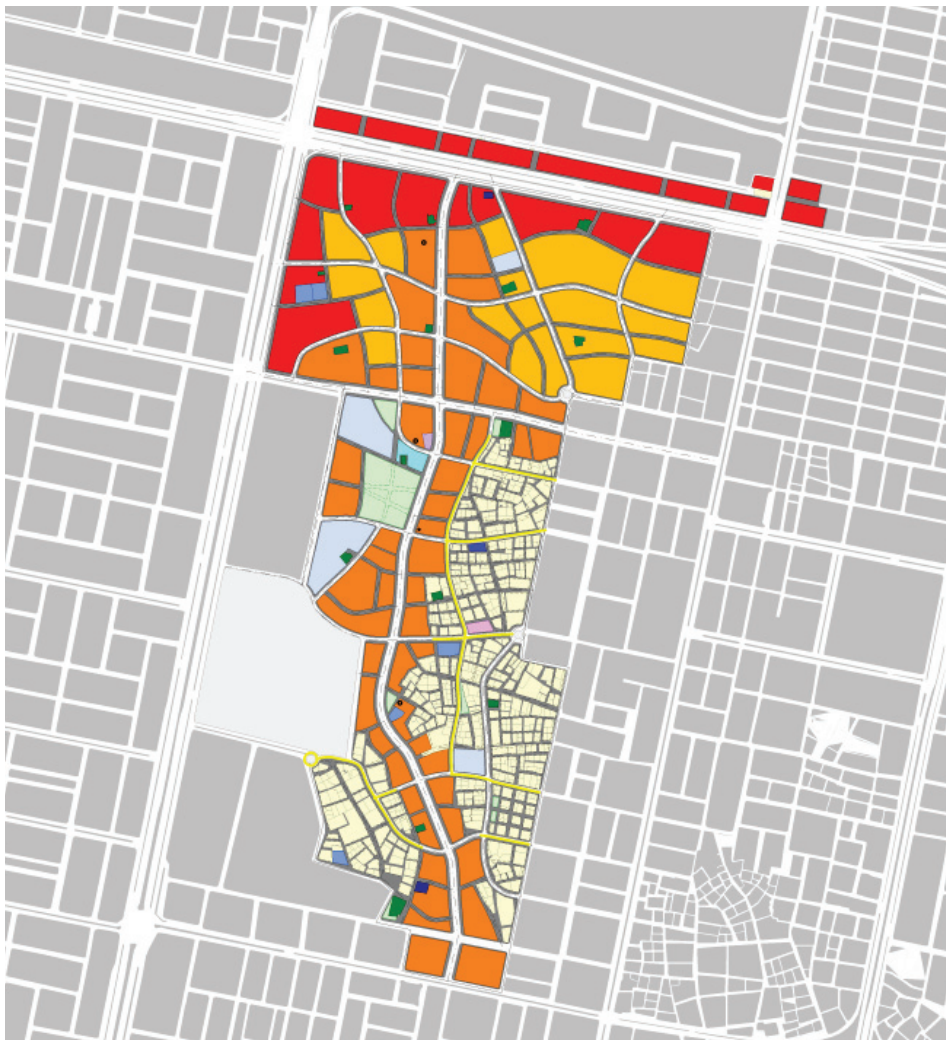
### Area action plan

This solution applies the unique methodologies of Space Syntax to resolve design output at a higher level of detail.

A detailed pedestrian and tertiary street network will be refined, along with concept designs for key public spaces and parks. Projects are described at the scale of proposed building plots, and allow the potential to retain existing buildings where suitable.

Where private investment is limited, projects can be quantitatively assessed in terms of improvement in accessibility, cost of project, or residents affected. A similar assessment process can inform phasing and implementation strategies.





**A**  
**Massing strategy**  
 Study to locate taller buildings in more accessible locations.

**B**  
**Area action plan**

**B**

### Benefits

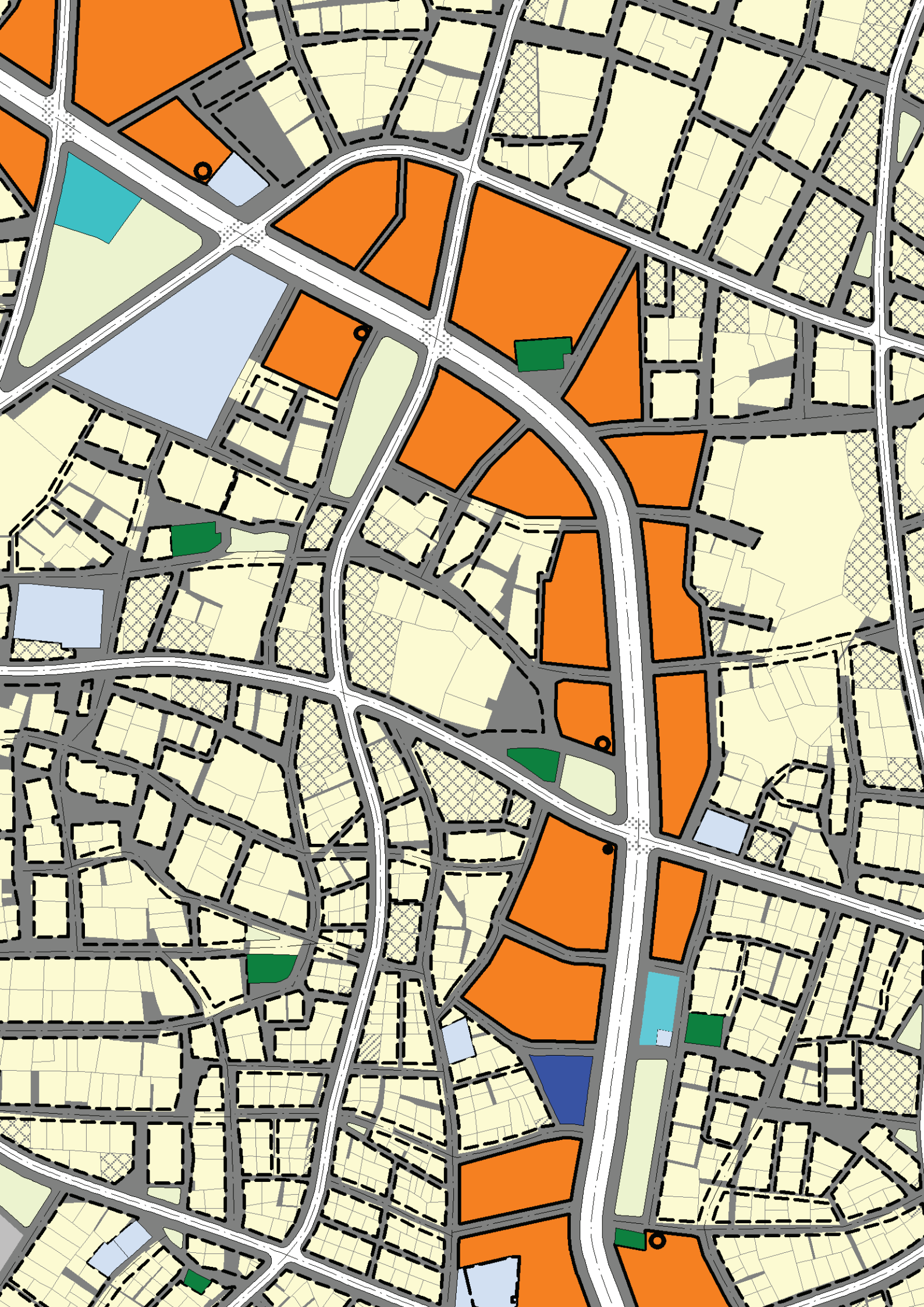
To mitigate the situation where private investment fails to materialise, we will prepare a compatible design scenario based only on road widening and street realignment. This ensures that the wider-scale connections can be implemented, and allows for a natural regeneration process.

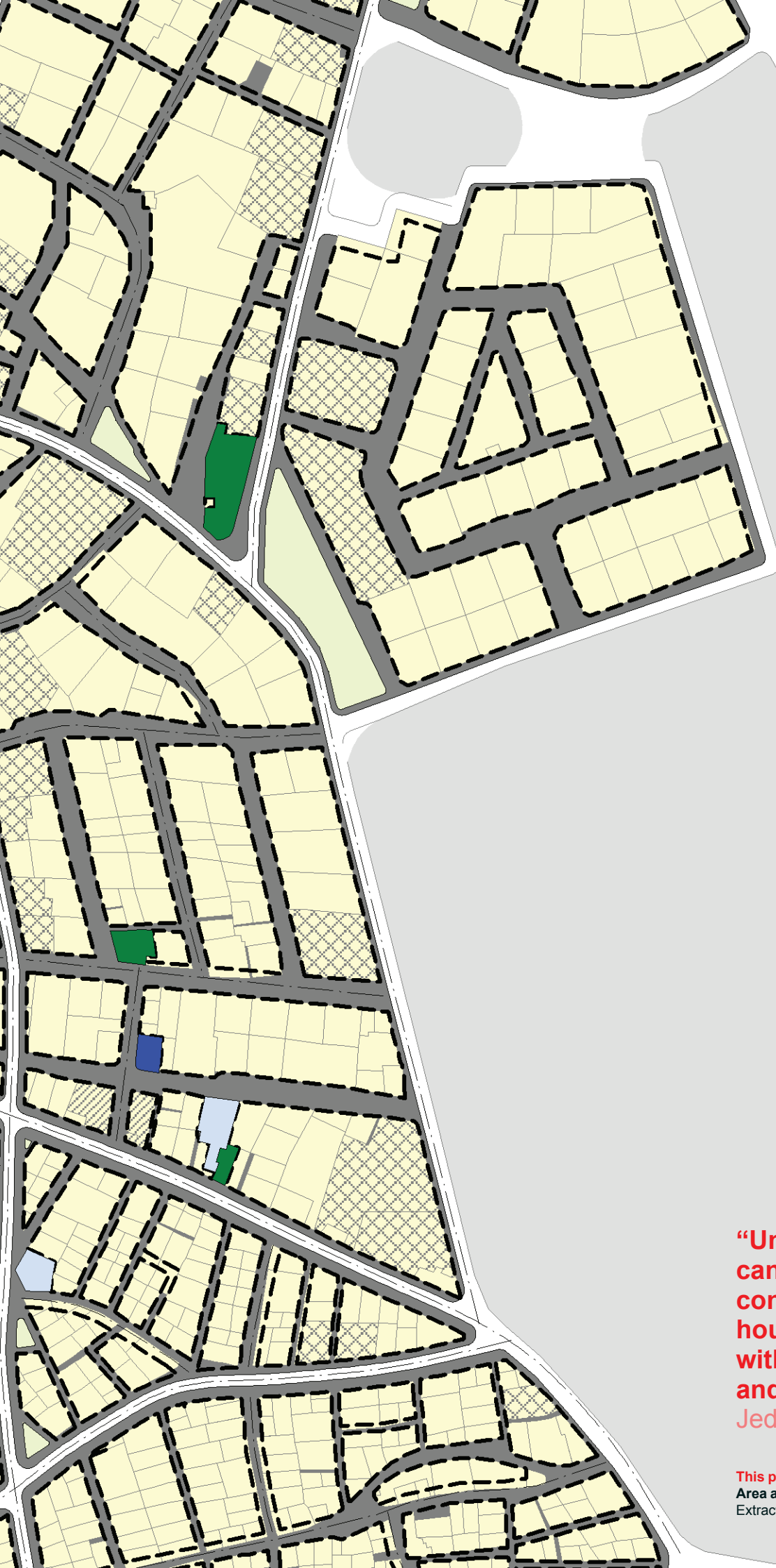
To make sure that road widening is effective, we will produce an accompanying set of guidelines explaining the processes of plot consolidation and redevelopment at the scale of the individual plot.

Throughout the process we can consult with private developers, local residents and public sector organisations.

**The area action plan delivers a fully compatible set of design scenarios to implement public and private development at the scale of the urban plot:**

- compatible design scenarios allow the improvements to be delivered incrementally according to the most feasible option at any time
- phasing projects which make the most positive impact earliest allows the resulting increases in land value to contribute to a natural process of regeneration
- consultation with residents provides the opportunity for community involvement and reassures them that their interests are being considered
- preliminary cost modelling allows value-generating projects to contribute to overall implementation





## Case study

**“Unplanned Settlements can no longer be considered an acceptable housing solution in a city with the wealth, status and ambition of Jeddah.”**  
Jeddah Strategic Plan

**This page**  
Area action plan  
Extract of area action plan proposal

# Case study

## Jeddah Unplanned Settlements



A



B

### The challenge

The city of Jeddah currently has 50 areas classified as Unplanned Settlements. These areas house approximately one million inhabitants, in total covering nearly 7,000 hectares of land.

Living conditions in the settlements vary, although most of them combine the UN slum-defining conditions of:

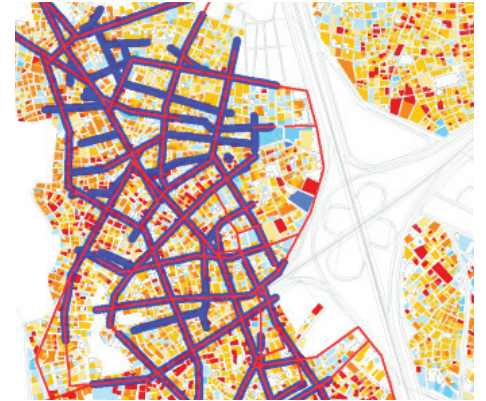
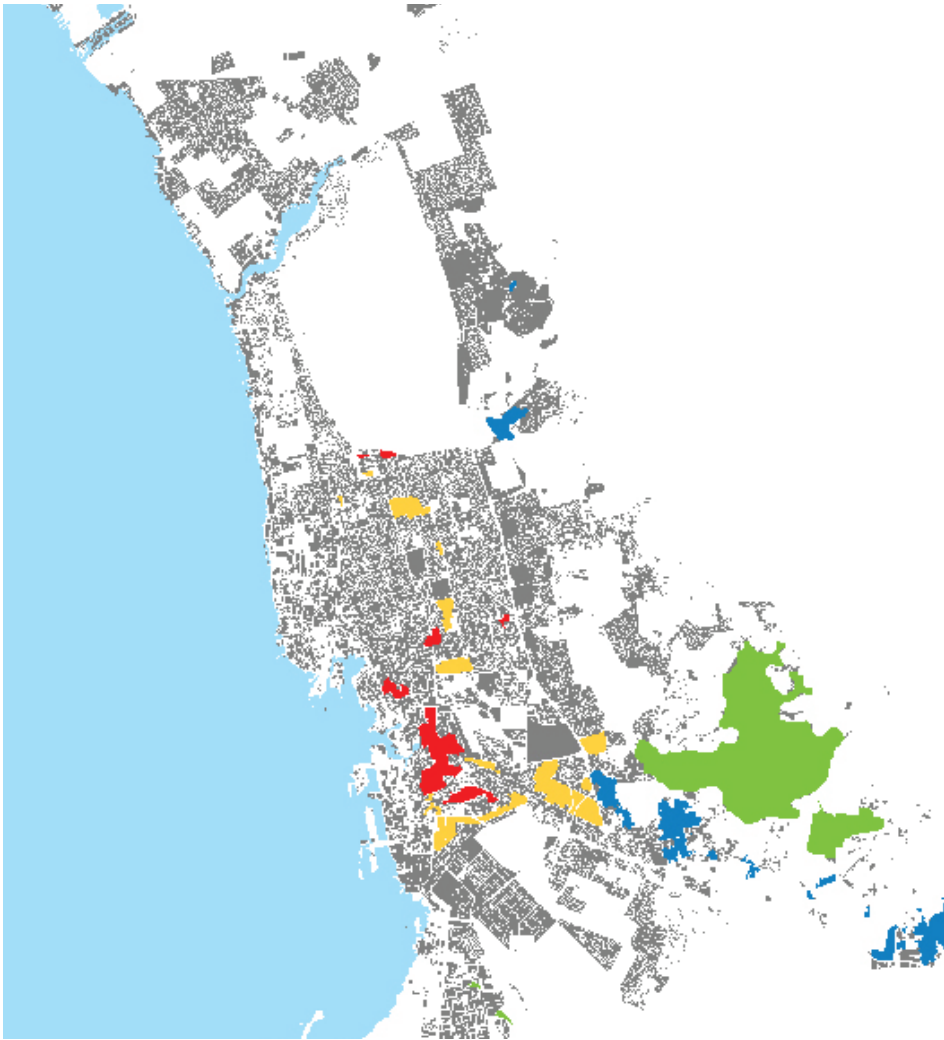
- inadequate access to safe water
- inadequate access to sanitation and other infrastructure
- poor structural quality of housing
- overcrowding
- residential status.

Further complications include (the perception of) high crime levels, security concerns, the low income of residents, private sector pressure to redevelop and political pressure to improve the areas.

While the Unplanned Settlements house a significant population, spatial intervention is necessary in many of them.

The role of the Municipality of Jeddah has been to start the “Jeddah without slums” programme, and to establish the Jeddah Development and Urban Regeneration Company (JDURC). The JDURC is a vehicle for entering into Public Private Partnerships and for implementing settlement improvement.

**The major focus of this work has been to develop spatial interventions aimed at delivering long-term sustainability with the minimum disruption to existing residents and business owners, and which are flexible enough to respond to changing economic, social and political conditions.**



- D**
- A/B**  
**Existing settlement conditions**
- C**  
**Settlement categorisation**  
Categorisation of settlements by attractiveness to the private sector
- D**  
**Spatial analysis**  
Analysis of existing building quality and spatial accessibility overlap

C

### Our contribution

Since 2006 we have been working with the Municipality of Jeddah and the JDURC to provide an understanding of Jeddah's Unplanned Settlements, and to develop design solutions.

Over this time we have contributed the full suite of Space Syntax informal settlements consultancy packages.

By analysing the whole city we were able to show the positive and negative roles these areas contribute.

Detailed profiling of each settlement has led to the categorisation of settlements according to their attractiveness to developers. This allowed the Municipality to take strategic decisions concerning the delivery process of each area. Spatial profiling also contributed to the development of a needs-based intervention strategy for each settlement.

Spatial improvement plans, urban development frameworks and area action plans have been developed using Space Syntax analysis techniques. The delivery of these consultancy packages was supplemented by design workshops and consultation with local municipalities, residents and developers.

Implementation strategies were developed using spatial impact testing, cost analysis and resident displacement mitigation. The definition and refinement of a set of project boundaries within each settlement allowed each implementation strategy to adapt to changing economic, social or political conditions.

A series of detailed studies were carried out to ensure that design proposals contributed to the environmental, social and economic success of these areas in the long term.

# Case study

## Jeddah Unplanned Settlements



A



B

### The benefits

**Our work has resolved the needs of the short and the long term through the development of a flexible, incrementally deliverable approach to development, which provides the foundation for long-term sustainability:**

- throughout all stages of the improvement programme our work has informed and shaped a constructive dialogue between residents, developers, municipal staff, experts and consultants.

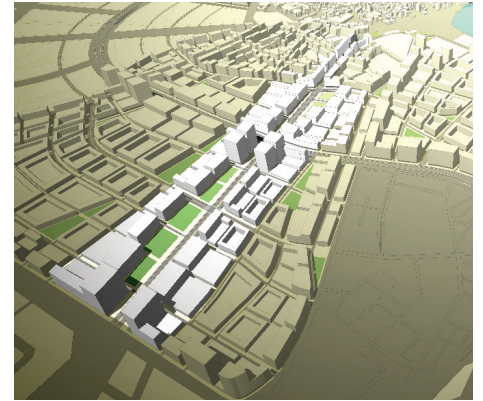
- strategic spatial analysis identified the core spatial problem of the Unplanned Settlements and allowed us to focus on reintegrating these areas with the wider city

- spatial profiling has provided evidence for strategic decision making, informing investment programmes and intervention strategies, and setting briefs for private development

- spatial interventions have been shaped by the naturally emerging principles which structure cities throughout the world, enhancing the chances of success and reducing the need for repeated investment



C



D

**A**  
**Stakeholder consultation**  
 Residents completing a questionnaire on settlement conditions and proposals

**B**  
**Area action plan**  
 Extract of proposed area action plan

**C/D**  
**Area action plan**  
 3d images of development framework proposals

## Unplanned Settlements project list

### Strategic spatial analysis

**Client:** Municipality of Jeddah

**Duration:** 2005 - 2006

**Number of settlements:** 50

#### Project Area

Entire city

Typical settlement area 130 ha

**Population:** Approximately 985,000 inhabitants

### Spatial profiling

**Client:** Municipality of Jeddah

**Duration:** 2007

**Number of settlements:** 50

#### Project Area

Total area approximately 6,600 ha

Typical settlement area 130 ha

**Population:** Approximately 985,000 inhabitants

### Spatial improvement plan

**Client:** Municipality of Jeddah

**Duration:** 2007

**Number of settlements:** 8

#### Project Area

Total area approximately 640 ha

Typical settlement area 80 ha

**Population:** Approximately 200,000 inhabitants

### Spatial improvement plan

**Client:** Jeddah Development and Urban Regeneration Company

**Duration:** 2007 - 2008

**Number of settlements:** 15

#### Project Area

Total area approximately 2,200 ha

Typical settlement area 275 ha

**Population:** Approximately 379,000 inhabitants

### Area action plan

**Client:** Jeddah Development and Urban Regeneration Company

**Duration:** 2008 - 2009

**Number of settlements:** 6

#### Project Area

Total area approximately 1,180 ha

Typical settlement area 148 ha

**Population:** Approximately 310,000 inhabitants

### Urban development framework

**Client:** Jeddah Development and Urban Regeneration Company

**Duration:** 2009

**Number of settlements:** 7

#### Project Area

Total area approximately 550 ha

Typical settlement area 70 ha

**Population:** Approximately 156,000 inhabitants

create space : create value



**Space has a real and realisable value.**

To find out how Space Syntax can help you in the analysis and regeneration of informal settlements, please contact:

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