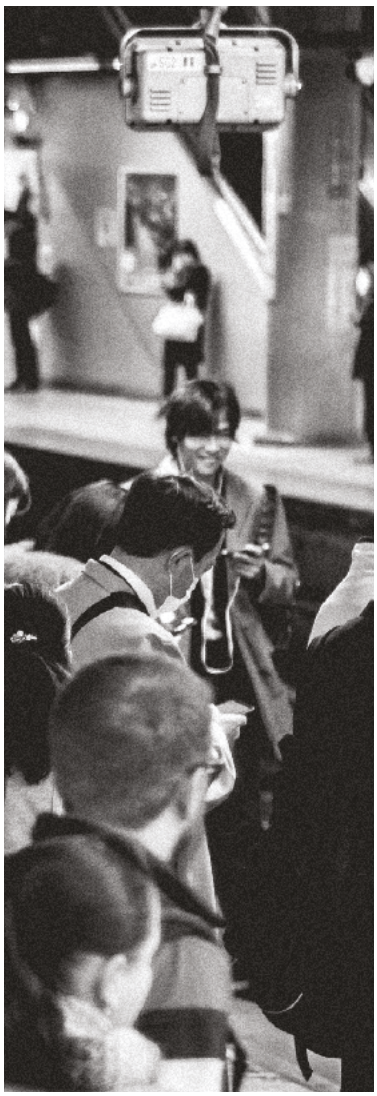
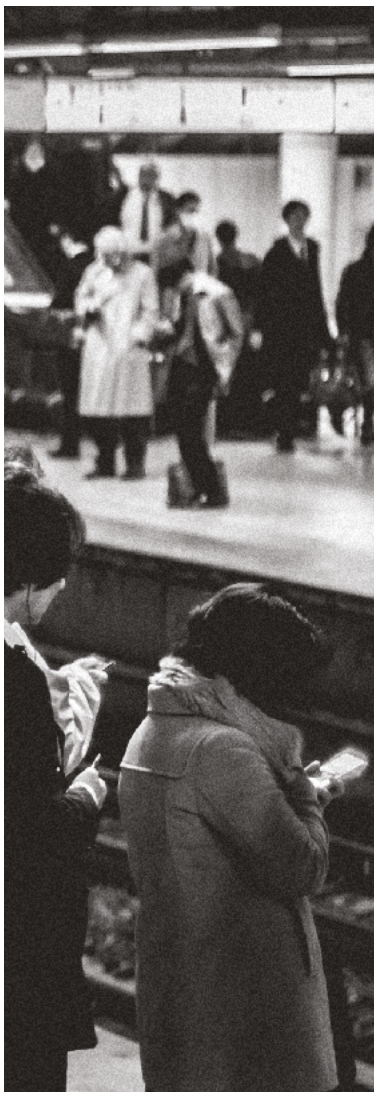
CITY
RESILIENCE
PROFILING
PROGRAMME

UN HABITAT
FOR A BETTER URBAN FUTURE

Zero draft





# Infrastructure Improvement Enhancer

Infrastructure and Development in Cities
Infrastructure and Resilience
Infrastructure and the City Resilience Profiling Tool

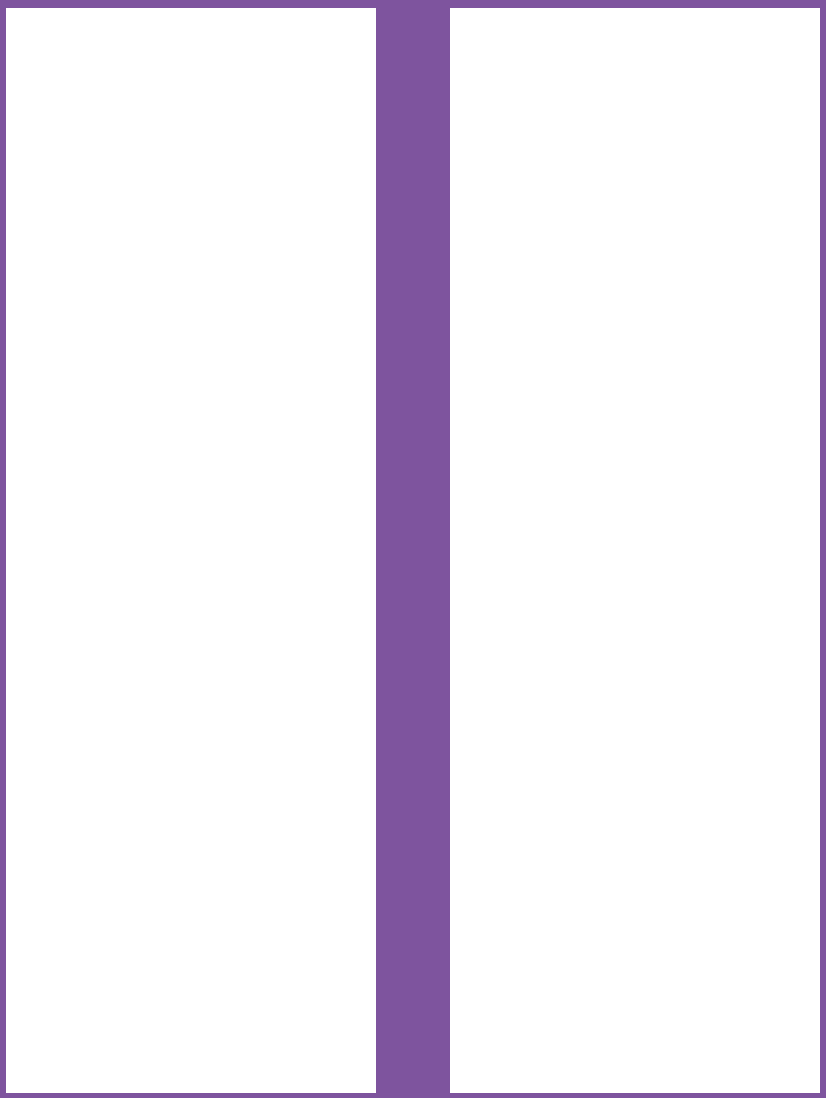
With the support of

European Commission

CITY
RESILIENCE
PROFILING
PROGRAMME

UN HABITAT
FOR A BETTER URBAN FUTURE

Zero draft



With the support of

European Commission

# Infrastructure Improvement Enhancer

Infrastructure and Development in Cities
Infrastructure and Resilience
Infrastructure and the City Resilience Profiling Tool

The Resilience Enhancers developed under the City Resilience Profiling Tool isolate the cross-cutting themes that underpin UN-Habitat's resilience building methodology into an advocacy and training tool.

The Enhancers provide both an understanding of the relationship between the topic in focus (i.e. Gender, Climate Action, Humanitarian Action, Human Rights) and development, development agendas, resilience and the CRPT. In the case of the latter, the indicators related to the topic have been extracted from the global CRPT and are included in the Enhancers. They can provide a first approach to the resilience related matter, taking into consideration the systemic, holistic and comprehensive understanding of urban resilience that moves away from assessment in silos.

The objective of the Enhancer is to help governmental actors or other partners to assess the resilience of their urban settlements but while putting a special focus on certain topics that need to be addressed, in this case Infrastructure. They can be used as a starting point to assess resilience and the matter related to urban settings, and to discuss how to take it further.

**Using the Enhancers**

The Enhancers can be used as training or advocacy tools within a city by local governments actors or partners. The Enhancers also serve to build on existing tools, approaches and methodologies that are being implemented in the city. The objective can therefore be 1. initiate discussion and thinking around the issue in focus and/or resilience building, 2. generate a snapshot of the city on the issue in focus and/ or resilience, 3. counter-check that existing tools are fully capturing the issue in focus.

**1. Initiate Discussion**
The indicators extracted from the CRPT (Indicators in the CRPT) can be used to start the discussion around resilience and the issue in focus within the city. An initiating body such as a specific department within the municipality, can initiate the collection of data for the indicators and call for a half-day workshop to validate or complete the responses. Other departments within the municipality should be invited as well as NGOs working in the city, utilities, civil society groups, among others. The Enhancer can as such become a shared project to initiate discussion on resilience. Once the exercise has been completed, contact us to find out how to take it further.

**2. Snapshot**
The outcome of the workshop is a partial snapshot of the city focussed on the issue in question. This can be shared among all stakeholders and used to inform initial decision-making and priority setting. Knowing which are the strengths and the weaknesses in relation to a certain topic within the city is going to allow local governments to think about the appropriate measures to make the city more resilient. All cities that have completed this exercise are invited to share their findings on the City Map on UN-Habitat's Urban Resilience Hub. Sharing these findings will be useful to locate other cities facing similar challenges and to start a discussion on how to tackle them.

**3. Counter-check**
Many cities are already implementing tools and methodologies to build resilience. The Questionnaire within the Enhancers serves as an approach to evaluate how well the tool is capturing the issue in question. Applying the Questionnaire to existing tools will provide a similar snapshot on the city. Therefore, it will allow cities to assess if their tools need some adjustments or if they are already capturing well the issues in questions. Having a preliminary idea on the resilience of the city is going to be helpful to take the appropriate measures and to counter-check the efficiency of the ones that have been taken.

11518
TO SEAT

## Disclaimer

The Enhancers are under continual development and should not be taken as complete or comprehensive resilience tools. They serve to increase engagement, validate approaches and lead to further engagement of resilience building through the CRPT.

Barcelona, January 2019
City Resilience Profiling Programme
UN-Habitat

# Table of contents

1 Introduction.....13
2 Infrastructure & Development.....14
3 Infrastructure & Resilience.....21
4 Infrastructure & CRPT.....22
5 Infrastructure Indicators.....24
6 Questionnaire.....42
7 References.....46

# 1.Introduction

Over the past few decades, the availability of infrastructure has increased significantly, particularly in the developing world. Rapid urbanization as well as the gradual rise in standards of living have sparked the demand for services and with it, the construction of new pipelines, electrical grids, roads, railways, schools, health facilities, et cetera.

Beyond the pressure to provide infrastructure to a growing and ever more urban population, a number of additional, compounding challenges manifest in urban areas around the globe. Rising urban informality and the sub-optimal, and often uncontrolled, sprawl of cities challenges governments to finance the extension of infrastructural networks to the urban fringes, resulting in increased per capita service provision costs due to the thinning consumer density. Exacerbating these challenges are issues related to a lack of studies on social needs, complex and cumbersome legal frameworks, decentralization and uncertain governmental competences, as well as chronic shortages in the financial resources available to local governments, all of which can lead to under-investment in the construction and replacement of built assets or in the extension of infrastructure to remote communities.

The existence of resulting fragile or inadequate infrastructure has grave consequences for local populations, especially those in vulnerable situations who depend on it to conduct their daily routines in already degraded and complex urban environments. Faulty connections to power grids, unsafe water pipes, distant hospitals, or crumbling roads endanger everyday life and result in additional time spent to procure safe(r) alternatives. These structures and their users are further threatened by climate change-induced impacts such as increasingly frequent and intense extreme weather events. Inadequate operational management and maintenance too can generate disruptions in service provision, prompting blackouts, load shedding and other service-limiting mechanisms.

When provided in a sustainable and resilient manner, however, infrastructure holds great potential to protect inhabitants from shocks and stresses and guarantee an uninterrupted delivery of basic services, including municipal, mobility and social services as well as utilities. As groups in vulnerable situations, like the urban poor, often settle in risk-prone – though more affordable – areas, properly designed and maintained infrastructure in hazard zones has the power to substantially scale down human and environmental vulnerability to disasters. Strengthening critical facilities and infrastructures, such as hospitals, power plants, dams and bridges, as well as logistical entry and distribution points in and near urban centres, significantly reinforces capacities that are vital in both normal and emergency situations, enabling the avoidance of food scarcities, electricity outages, and sewage overflows.

Additionally, in the international development field, infrastructure has proven to play a critical role in economic growth and poverty reduction. Indispensable to the fulfilment of human needs and thus the functioning of societies and economies, infrastructure investment is leveraged to spur development by improving access to basic services.

With over half of the global population now living in cities and around 3 billion more people expected to reside in urban areas by 2050, UN-Habitat – as the United Nations agency responsible to act as a focal point on sustainable urbanization – commits to improving the lives of people in urban areas around the world. Grasping the necessity of providing access to basic services as a stepping stone to raise standards of living, UN-Habitat has over the past decades been strongly invested in the sound construction and management of infrastructure in order to consolidate service delivery. The agency's Urban Basic Services Branch provides policy and technical support to countries and local authorities in the areas of water, sanitation, waste management, mobility and energy.

UN-Habitat's City Resilience Profiling Tool (CRPT), through its methodology for building resilient urban environments, highlights the need for robust, safe and available infrastructure to ensure the accessibility and continuity of services and flows for all, in the face of any type of shock or stress, from natural to social or technological. Adopting a systemic, holistic approach to cities, the CRPT recognises that damage to the infrastructure of one sector can generate a cascading effect of breakdowns in others. The CRPT therefore goes beyond a physical and sector-based understanding of infrastructure and services and seeks to analyse the relationships between spatial nodes and relevant stakeholders across the entire urban system. Identifying vulnerabilities, synergies and interlinkages between the various networks, assets and institutions, this methodology lays the groundwork to develop evidence-based, people-centred recommendations to build urban resilience at the urban scale.

The **Infrastructure Improvement Enhancer** outlines how the CRPT understands and studies the adequacy of infrastructure in an urban setting and incorporates a list of indicators that can provide a starting point for local governments to evaluate the strengths and weaknesses of their urban infrastructure systems. Officials should consider complementing their reading of this Enhancer with information coming from various CRPT Enhancers and Guides to enable a comprehensive view on the intersection of infrastructure with other transversal issues.

# 2.Infrastructure & Development

## Defining Infrastructure

Considering infrastructure constitutes the base for providing a number of diverging, though interconnected, services, academics and practitioners have over the course of the past decades come to understand infrastructure through a number of categorisations. These have helped shape and eventually broaden its conceptualisation.

While a single universal definition does not exist, infrastructure as a term has been shifting from a sole physical focus, or 'hard' infrastructure, to an understanding that complements physical aspects with what is designated as 'soft' infrastructure. 'Hard' infrastructure refers to the fixed physical structures or facilities that support mobility (e.g. ports, roads, bridges and railways), energy (electricity generation, electrical grids, gas and oil pipelines), water and sanitation, information systems (data storage facilities and telecommunication poles), and health care and education sectors (hospitals and health clinics, schools, etc.). In contrast, 'soft' infrastructure captures the **"non-tangibles supporting the development and operation of hard infrastructure, such as policy, regulatory, and institutional frameworks, governance mechanisms, systems and procedures, social networks, and transparency and accountability of financing and procurement systems"**.

The recognition of governance thinking in the conceptualisation of infrastructure is grounded in a shift towards systems-based approaches to infrastructure, a trend that has accelerated over the last decade. The systemic approach similarly integrates hard and soft elements, viewing infrastructure as a network of assets (physical structures and their internal linkages), knowledge (data management, legal and regulatory frameworks) and institutions.

## Infrastructure in the International Development Field

The introduction of 'soft' infrastructure enabled crucial insights surrounding the potential role of infrastructure in international development. Whereas in the 1990s, the linkage between infrastructure investment and poverty reduction still remained largely unrecognised and, in certain cases, corrupt practices nullified the benefits of infrastructure development. Increasingly, the international community acknowledges that complementing investment in physical assets with efforts strengthening governance and institutional frameworks can increase the potential for infrastructure services to contribute to poverty reduction.

Indeed, consolidating the proper construction and functioning of infrastructure and ensuring that services continuously and equitably reach people, strongly contributes to the fulfilment of basic human needs. Accessing safe water and an uninterrupted electricity supply can reduce time spent on household tasks, improve a family's health, and enhance household productivity. Diminished time poverty critically ameliorates standards of living for the poor, and particularly benefits women and girls, who are more often responsible for time-consuming tasks such as the collection of drinking water. Given this improved understanding of the interconnectivity of physical assets and related systems, infrastructure is increasingly viewed as a catalyst for generating economic growth and the eradication of poverty, and as an underlying driver to achieve access to basic services for all and thus fulfil associated human rights .

However, since inadequate infrastructure can exacerbate socioeconomic inequalities and reinforce existing environmental vulnerabilities, responsible development and management of infrastructure is essential to ensure positive impacts for all. Beyond compliance of physical structures with codes and regulations to guarantee the safety of the user, the adequacy of infrastructure is determined by the accessibility of networks to all communities – including those located in hazardous or remote locations, which are oftentimes (informally) inhabited by the most vulnerable of society – as well as by accessibility to people with reduced mobility. In addition, sound management of infrastructure should guarantee safe, continuous and equitably distributed delivery of services, and decision-making regarding infrastructure services should include all relevant parties, in particular those most affected by development projects, such as the poor and marginalised communities.

DON'T BLOCK
THE BOX
FINE $ 2 POINTS
LINCOL
TUNNE
3 LEF
LANES
ONE W
NO STANDING
ANYTIME
TRIUMPH

Under the right conditions, infrastructure development can promote growth and equity, and help achieve global development agendas. From the Millennium Development Goals (MDGs) onwards, the effective and responsible provision of infrastructure has constituted an essential strategy to complete set development goals and generate liveable urban habitats, improve access to safe drinking water, education and health care, and increase the sustainability of ecosystems.

## 2030 Agenda for Sustainable Development

Presented in 2015, the 17 Sustainable Development Goals (SDGs) that outline the 2030 Agenda for Sustainable Development include a number of goals and targets that intrinsically build on crucial infrastructure developments for their attainment.

Emphasising the impacts of urbanisation on current development, **SDG 11** highlights the need for access to basic services for all urban residents and implicitly urges for improved infrastructure provision, in order to reduce vulnerability in the lives of citizens – starting with those in the most precarious, and often informal, settings. Thanks to higher population densities in cities, investment in infrastructure development can allow for more cost-effective service delivery in the future. Physical assets, as well as knowledge systems and institutions, play a particularly important role in the SDG 11's call for increased access to housing, utilities, transport systems, and green and public spaces, as well as for the upgrading of slums, the downscaling of impacts on the environment, the reduction of cities' proneness to disaster risk, in addition to sound and inclusive urban policy and planning.

**SDG 9** similarly brings clarity about the role of infrastructure in the 2030 Agenda for Sustainable Development. Citing the potential of infrastructure to support economic development and human well-being, SDG 9 advocates for quality, reliable, sustainable and resilient infrastructure and reaffirms the vitality of access for all. Goal 9 also refers to the relevance of sustainable infrastructure for retrofitting industries to become clean and resource-efficient.

**Sustainable Development Goal 9**
Build resilient infrastructure, promote inclusive and sustainable urbanization and foster innovation.

**Sustainable Development Goal 11**
Make cities and human settlements inclusive, safe, resilient and sustainable.

In order to further the eradication of global poverty, which constitutes **SDG 1**, infrastructure also constitutes an indispensable means to fulfil a number of additional goals and targets. As a building block for agricultural productivity, through the expansion of irrigation systems and advancing technology, efficient and resilient infrastructure support the establishment of sustainable food production systems that protect ecosystems and their provisioning services, while increasing food availability and reducing hunger (**SDG 2**). Robust, sustainable and safely managed infrastructure can also lead populations to benefit from more equitable and accessible health care facilities and schools (**SDGs 3** and **4**) as a result of directly improving these assets or improving their connectivity by upgrading road networks and public transportation systems. Similarly, extending water and sanitation networks and expanding coverage of energy supply systems, can function as a mechanism to better satisfy basic human needs, as well as enhance gender equality by reducing time poverty experienced primarily by women and girls (**SDGs 6** and **7**).

Strengthening regulatory and institutional frameworks, as well as reinforcing accountability of stakeholders, can assist in steering investment towards infrastructure that is efficient and sustainable in the use of resources, and better equipped to protect ecosystems and the services delivered by them (**SDGs 12**, **14** and **15**). Finally, infrastructure plays a crucial role in achieving the climate action Goal (**SDG 13**), as energy-efficient buildings can curtail greenhouse gas emissions while robust and adaptive infrastructures help protect societies from climate change-induced impacts.

## New Urban Agenda

Following the announcement of the Sustainable Development Goals, the Habitat Secretariat coordinated the development of a global agenda that could specifically guide the implementation of the SDGs in urban areas. Adopted at the Habitat III Conference in Quito in October 2016, the New Urban Agenda is a vision document that guides local and national governments in the planning, management and financing of urban development over the next two decades.

Consistent with how 'infrastructure' is discussed throughout the document, the New Urban Agenda (NUA) – along with the Sustainable Development Goals – uses the term primarily as a means to provide access to basic services for all, which constitutes one of its key objectives. Throughout the Call for Action, the NUA repeatedly emphasises the need for infrastructure development that adheres to the key principles of sustainability, resilience, social inclusion and resource efficiency.

### Article 14 (a)

To achieve our vision, we resolve to adopt a New Urban Agenda guided by the following interlinked principles: a) Leave no one behind, by ending poverty in all its forms and dimensions, including the eradication of extreme poverty, by ensuring equal rights and opportunities, socioeconomic and cultural diversity, and integration in the urban space, by enhancing liveability, education, food security and nutrition, health and well-being, including by ending the epidemics of AIDS, tuberculosis and malaria, by promoting safety and eliminating discrimination and all forms of violence, by ensuring public participation providing safe and equal access for all, and by providing equal access for all to physical and social infrastructure and basic services, as well as adequate and affordable housing.

### Article 34

We commit ourselves to promoting equitable and affordable access to sustainable basic physical and social infrastructure for all, without discrimination, including affordable serviced land, housing, modern and renewable energy, safe drinking water and sanitation, safe, nutritious and adequate food, waste disposal, sustainable mobility, health care and family planning, education, culture, and information and communications technologies. We further commit ourselves to ensuring that these services are responsive to the rights and needs of women, children and youth, older persons and persons with disabilities, migrants, indigenous peoples and local communities, as appropriate, and to those of others in vulnerable situations. In this regard, we encourage the elimination of legal, institutional, socioeconomic and physical barriers.

## Paris Agreement

In 2015, Parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed during the 21st Conference of the Parties (COP21) in Paris to strengthen the global response to climate change, in line with sustainable development and efforts to eradicate poverty. The resulting Paris Agreement has to this date been ratified by 181 of the 197 Parties to the Convention and aims to restrict global temperature increase to a maximum of 2 degrees Celsius above pre-industrial levels, bolster adaptation and resilience-building efforts, and open up financing opportunities.

To accomplish these objectives, the Agreement states that significant emission reduction and actions enhancing adaptive capacity and reducing vulnerability in order to protect people, livelihoods and ecosystems, are necessary. While mechanisms and actions are not specified in the Agreement, it is clear that climate change mitigation and adaptation actions by local and national actors will indispensably hinge on the construction and management of low-carbon and adaptive infrastructure. Infrastructure constitutes both the physical environment in which we live and work, as well as the networks and systems which support effective operation and functionality for physical assets, therefore investment in infrastructure that is low in emissions and adaptive will have significant positive impacts on a society's sustainability and resilience.

ONE WAY
9 AV
W 48 ST
NOW OPEN
Leon Bakery
326
Mount Sinai
1762

# 3.Infrastructure & Resilience

Because urban areas are highly reliant on infrastructure systems for economic, societal and ecological processes, issues arising from these processes have the capability of causing significant and cascading impacts. Infrastructure that is inadequate, be it due to the physical and operational deficiencies of existing networks or the lack of coverage, increases the vulnerability of these systems, as well as inhibiting the coping and response capacities of the population. Particularly in cases of extreme events, these vulnerabilities can cause widespread disruptions and endanger lives.

This strong link between infrastructure systems and the functional continuity of a city means that improvement of inadequate infrastructure should not only concern itself with enhancing and expanding service provision in normal circumstances, but also with managing changing conditions. Critical infrastructure, or assets or network nodes intrinsic to the provision of key services (e.g. power plants, dams, telecommunication poles, etc.), requires particular attention as their failure or malfunction can spark domino effects of failures that promulgate across different sectors. Therefore, critical infrastructure requires recognition of both their particular vulnerability and their essential role in providing services, which during disaster situations can support the quick recovery of urban systems.

Because infrastructure is intrinsically tied to all aspects of urban life, improving infrastructure should ideally lead to increased individual or community resilience. In many cases, however, improvements in the name of development or resilience have indirectly generated a range of negative effects on their immediate surroundings, such as increased flooding and pollutant run-off in nearby communities due to supposed road improvements. The continuous reliance on resource-intensive and high-impact infrastructure development over more sustainable solutions has detrimental ecological effects in the long term (e.g. proposing flood protection infrastructure over nature-based solutions to address urban water cycle, or investing in road expansion rather than improving public transport to address urban mobility issues). These unforeseen negative externalities arise when infrastructure is considered in isolation and not as an integrated part of the wider urban system.

Too often, however, prevailing approaches still focus primarily on the physical aspects of singular networks. The debate on infrastructure resilience typically follows this paradigm, wherein emphasis remains on the structural integrity and physical quality of a specific infrastructure network, which must have been designed and built to withstand potential disruptive events in order to continue its attributed services. While strengthening infrastructure at this level is useful to an extent, such an insular and superficial approach often lacks the capacity to address the increasingly complex and unknown hazards and challenges that cities face.

The growing understanding of interdependencies across different networks highlights the need for a systemic approach to infrastructure resilience. Creating integrated and coordinated systems can provide flexible and adaptable pathways to mitigate risks and address impacts. Such an approach should include not only improvement of physical interfaces, but also rethinking the softer mechanisms that lie behind these assets, ranging from long-term planning and financing to day-to-day operational procedures.

Infrastructure resilience, however, should not be the end in itself, but should always be considered in relation to infrastructure's core purpose as a means to provide assets and services for people. Ensuring that infrastructure systems are able to provide continuous service delivery is essential in increasing resilience capacities, but there is little point to infrastructure that never fails if the services provided are inaccessible or exacerbate societal inequities. Infrastructure, as a semi-permanent feature of cities, must also cease to embed unsustainable practices in the urban fabric that promulgate environmental inequalities. Moving towards adaptive and sustainable infrastructure can mitigate climate change and promote responsible and efficient use of resources in order to protect ecosystems, which leads to cities gaining increased capacities for protection, response and adaptation. By considering the role it plays in the resilience of the wider system, infrastructure should aim not only to improve itself, but to improve the lives of all people it serves in a sustainable manner.

# 4.Infrastructure & CRPT

Underpinned by the understanding that urban environments function as complex, interdependent and integrated systems, the City Resilience Profiling Tool (CRPT) provides a framework that promotes the systemic thinking needed for infrastructure to effectively respond to change, both anticipated and unknown, by not only being resilient in itself but also contributing to the resilience of the urban area. Considering infrastructure as part of the urban system implies advancing from assessment of the physical aspects to a more comprehensive approach.

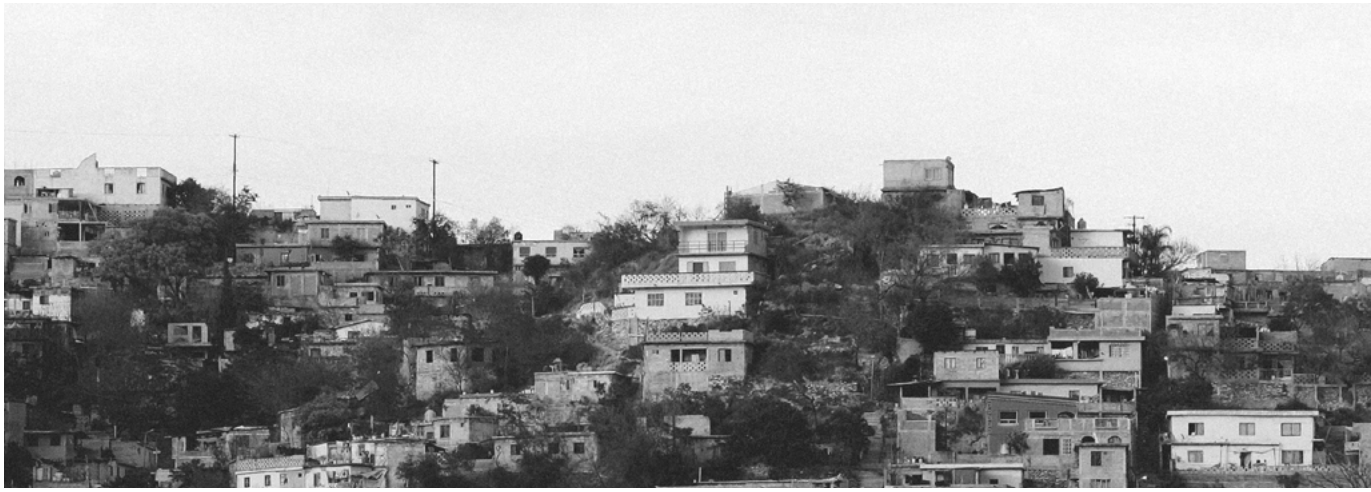
To this end, the CRPT gathers data on various aspects of what may comprise inadequate infrastructure across different types of infrastructure-based services (utilities, transport and mobility, supply chain and logistics, housing, green and public spaces, information systems, among others). It provides information on 'harder' aspects, such as inadequate construction and disruptions, while addressing 'softer' aspects such as mismanagement or lack of enforcement. As a people-centred tool, the CRPT places particular focus on the manifestations of the inadequacy of infrastructure on a city's inhabitants. Furthermore, the long-term nature of infrastructure development often means that projects are obsolete before they even commence (e.g. under/over-sized design, unsuitable location, and out-dated technologies). With this awareness of the realities of infrastructure investment, the CRPT considers in its analysis a city's existing policies, plans and initiatives to understand the trajectory of its infrastructure development. This cross-sectoral and holistic reading can improve responsiveness to changing needs through better reflecting the current state and potential trend of the city's infrastructure systems, providing evidence for actions to address attributed problems, and building knowledge on when – or in some cases when not – to act, towards a sustainable and resilient direction.

## Design and Construction

Acting as the physical interface for the urban system's interaction with essential services, the prevalence of infrastructure in the urban fabric means that the physical inadequacy of built assets, stemming from design and construction issues, can cause widespread threats to the urban area and its inhabitants, such as service breakdowns, contamination from toxic materials or leaks, or the collapse of dilapidated structures. Ensuring that the physical infrastructure itself has been located, designed and built adequately, with required redundancies and failsafe measures, can mitigate the risks within that specific system. Furthermore, integrating various systems by designing linkages among different infrastructures can also reduce breakdowns through dissipating risk and diversifying response options. Establishing risk-informed and systems-based regulatory frameworks and enforcing compliance constitutes a primary strategy in guaranteeing robust urban infrastructures.

## Operations

While the way infrastructure is built often dictates its susceptibility to damage and other issues, quality operations have the capacity to mitigate these threats or, if operations are inadequate, present new ones. Lack of proper maintenance or non-compliance with safety regulations, for example, can lead not only to inefficiencies and interruptions but, more alarmingly, to devastating effects like life-threatening accidents. Well-managed operations should include adequate planning, monitoring, enforcement and coordination within and among systems to lessen risk and strengthen capacities to respond to different situations.



## Coverage

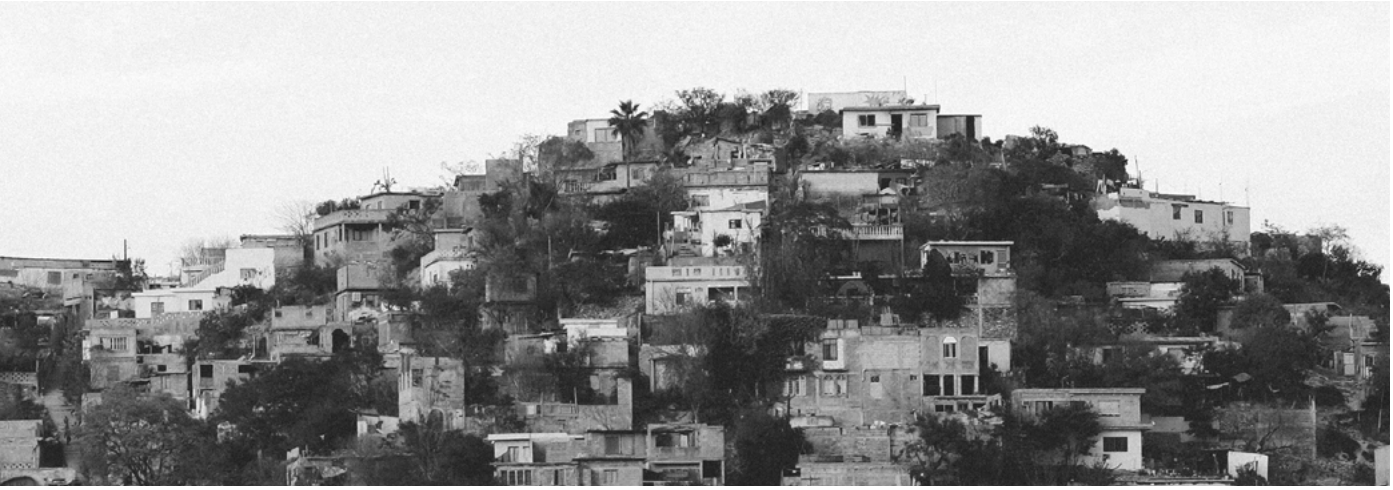
Because infrastructure provides means to deliver basic and essential services, it is important to consider who are covered by the service and who are excluded – often the poor, the marginalised, the differently-abled – and thus facing acute vulnerabilities. Reasons for this lack of coverage, which can be assessed through the unavailability, inaccessibility or uneven distribution of infrastructure, can range from a lack of understanding of social needs and financial constraints, of both provider and recipient, to a lack of support from enabling institutions. While enabling institutions have the ability to provide regulatory and financial incentives to expand coverage, such expansion can prove difficult especially in the context of informal settlements – some of the most vulnerable sectors of society – where the very nature of living conditions preclude inhabitants from being covered by infrastructure networks that could help alleviate living situations. Lack of coverage from formal means leads to relying on alternative, and often illegal and inadequate, avenues to access these essential services, further heightening exposure to risk.

## Innovation

Changing conditions require constant revisiting of what infrastructure should be and the creation of its new normal. While the existence of standards, codes, policies and plans aims to limit potential issues, problems often often arise not due to non-compliance to these, but rather from complying with obsolete plans and regulations that mandates out-dated paradigms, strategies and methods. The recently increased focus on disaster risk and climate change has prompted a wealth of innovation in infrastructure, such as promotion of adaptive infrastructures, specifically nature-based and hybrid ones, advancements in clean energy generation, integrated planning and management frameworks (e.g. water-related), integrated control centres for monitoring, and use of 'smart' information systems and 'disruptive' technologies for managing and delivering services, among many others. Innovation, however, does not merely refer to technological advances; perhaps more important are innovations in the institutional level, providing enabling environments and encouraging changes in approach and shifts in delivery methods, not only at the scale of service providers, but also at the community and individual level.

## Conclusion

By assessing these multi-dimensional aspects of infrastructure at the urban scale, important insights can emerge and be used by local actors to enhance the quality of their infrastructure in a way that ensures not only resilience of infrastructure systems but, more crucially, the urban area and its inhabitants as a whole. Because of the high-cost and long-term nature of infrastructure development, taking into account that the future of the city is written in policies, frameworks and plans that are legally agreed to many years before any infrastructure project commences, decision-makers and relevant stakeholders need to understand the interplay within the urban system and the current plans and initiatives to formulate strategies and carry out implementable actions that generate positive impacts that ripple throughout the urban system.



# 5. Infrastructure Indicators in the CRPT

To effectively use the CRPT to analyse and recommend actions for the improvement of inadequate infrastructure, this chapter presents the initial step of filtering data that can identify and promote the understanding of the current state of infrastructure in the urban area. Drawing from the four categories of infrastructure analysis – design and construction, operations, coverage and innovation – from the previous chapter, the CRPT provides information from a transversal set of indicators throughout the different sections of the City ID and Urban Elements data collection sets.

Describing the inadequacy of infrastructure based on tangible factors, the CRPT primarily captures the **category of 'HARD' aspects**. This encompasses indicators that inform on the extent to which infrastructure networks cover and are distributed across urban areas, as well as on their physical accessibility, such as through connection to transport systems and application of universal design (i.e. access for people with reduced mobility). It also incorporates indicators assessing the built quality (e.g. adequacy of construction, redundant design) and capacity of fixed assets, or identifying the location of built assets (e.g. within hazardous areas). While many indicators directly capture these physical and spatial dimensions, some tangible aspects of adequate infrastructure are inherently linked with determining the operational continuity of services delivered through infrastructure systems.

The **category of intangible or 'SOFT' aspects** provides an additional menu of possible factors that can affect the adequacy of the tangible aspects and relate to the mechanisms that support the establishment of resilient and sustainable infrastructure systems. These indicators concern existing codes and regulations, ongoing emergency response planning, monitoring and maintenance measures, enforcement of compliance with regulation, data management, as well as policies for sustainability or inclusiveness of decision-making. This category also incorporates indicators of barriers encountered in infrastructure development that may clarify reasons for the potential inadequacy of infrastructure networks, and additionally includes questions that inform about the ability of infrastructure planning to respond to challenges through time.

Apart from organising the data regarding infrastructure systems, this categorisation provides a starting point for cities to understand what and when actions should be taken as well as by which actors, when coupled by a comprehensive institutional analysis of their urban infrastructure systems.

Furthermore, taking into consideration that this Enhancer is one out of a range of resources that the CRPT provides, and the cross-cutting nature of infrastructure itself, it should be complemented by other materials, such as the Resource Efficiency Enhancer and Climate Action Enhancer, which include indicators more specific to mitigation and adaptation, as well as the Human Rights Enhancer, Upgrading from Informality Enhancer and Social Resilience Guide, which go into more detail on access to these services in multiple dimensions.

| | SET 1 - CityID | SET 4 – Urban Elements |
|---|---|---|
| Indicators relating to '**hard**' aspects of infrastructure | 19 | 222 |
| Indicators relating to '**soft**' aspects of infrastructure | 0 | 138 |
| **Total** | **19** | **360** |
| | **379** | |

# SET 1

## City ID

| | | | Features |
|---|---|---|---|
| **2 Spatial Context** | | | **Aspect** |
| 2.2 Ecosystems | | | |
| | 2.2.4 | Water supply sources | HARD |
| | 2.2.5 | Energy sources | HARD |
| | 2.2.6 | Wastewater treatment and discharge | HARD |
| | 2.2.7 | Solid waste treatment and disposal | HARD |
| 2.3 Urban Area | | | |
| | 2.3.6 | Housing typologies | HARD |
| | 2.3.7 | Construction types and materials | HARD |
| | 2.3.8 | Main public transport modes | HARD |
| | 2.3.9 | Main freight transport modes | HARD |
| 2.4 Physical Assets | | | |
| | 2.4.1 | Critical facilities | HARD |
| | 2.4.2 | Critical infrastructure | HARD |
| | 2.4.3 | Transport and Logistics Hubs | HARD |
| | 2.4.4 | Cultural sites | HARD |
| | 2.4.5 | Recreational sites | HARD |
| **4 Population and Demographics** | | | **Aspect** |
| 4.3 Households Information | | | |
| | 4.3.1 | Population living arrangement | HARD |
| **6 Hazards and Challenges** | | | **Aspect** |
| 6.1 Significant Crisis [+] | | | |
| | 6.1.1 | Crisis type(s) | HARD |
| | 6.1.2 | Time period of crisis | HARD |
| | 6.1.3 | Main Issues | HARD |
| 6.2 Challenges | | | |
| | 6.2.1 | Shocks | HARD |
| | 6.2.2 | Stresses | HARD |

# SET 4

## 1. Built Environment

| | | | Alignment | Aspect |
|---|---|---|---|---|
| **1.1 Urban Form** | | | | |
| | 1.1.1 Urban Growth Model | | | |
| Indicators | 1.1.1.2 | Percentage of urban footprint located in hazardous areas. | NUA 49, 51, 69, 88, 98, 105, 106 | HARD |
| | 1.1.1.2.1 | Are hazardous areas physically marked? | | SOFT |
| | 1.1.2 Open Areas and Street Layout | | | |
| | 1.1.2.2 | Percentage of streets within the urban footprint. | CPI-ID 5.3[C] NUA 31, 41, 72, 90, 114, 138, 155, 156 | HARD |
| | 1.1.2.3 | Street intersection density. | CPI-ID 5.1[P] | HARD |
| | 1.1.2.4 | Public open space per 100 000 population. | ESCI 46[P] ISO-37120 13.2[A] SDG 11.7.1[A] NUA 14(a), 55, 70, 99, 107 | HARD |
| | 1.1.2.4.1 | If less than 7 hectares, please identify barriers. | | HARD |
| | 1.1.2.5 | Percentage of population living within 400 meters to public open space (Please disaggregate by sex, age and groups in vulnerable situations, if possible) | CPI-QOL 4.1[C] NUA 31, 41, 72, 90, 114, 138, 155, 156 | HARD |
| | 1.1.2.5.1 | Are the public open spaces accessible to mobility-reduced people? | | HARD |
| | 1.1.2.5.2 | Please identify barriers to access public open space (with particular attention to gender and groups in vulnerable situations). | | HARD |
| **1.2 Land Tenure** | | | Alignment | Aspect |
| | 1.2.1 Legal Status of Land | | | |
| Indicators | 1.2.1.2 | Percentage of city area considered informal. | SDG 11.1.1[A] ESCI 50[A] CPI-ESI 2.1[A] | HARD |
| | 1.2.1.3 | Percentage of informal land under tenure formalisation. | | SOFT |
| | 1.2.1.3.1 | If percentage is less than 10%, please identify reasons. | | SOFT |
| | 1.2.3 Land Administration | | | |
| | 1.2.3.1 | Percentage of city area with complete land administration data. | GLII 13[P] | SOFT |
| | 1.2.3.1.1 | Is there a baseline data that proves who owns what piece of vacant land in the city? | | SOFT |
| | 1.2.3.1.2 | Is the data protected, backed-up and processable in an emergency situation? | | SOFT |
| **1.3 Housing** | | | Alignment | Aspect |
| | 1.3.1 Availability of Adequate Housing | | SDG 11.1.1[P] NUA 13(a), 13(f), 14(b), 25, 31, 32, 33, 35, 104, 105, 106, 107, 109, 111, 112, 114, 119 | |
| Indicators | 1.3.1.1 | Percentage of homes in hazardous location. | ESCI 43[A] CPI-ID 1.1[A] | HARD |
| | 1.3.1.2 | Percentage of homes with inadequate structure. | ESCI 43[A] CPI-ID 1.1[A] | HARD |
| | 1.3.1.3 | Quantitative housing shortage. | ESCI 44 NUA 13(a), 14(b), 105, 111, 121, 124 | HARD |
| | 1.3.1.3.1 | If shortage is more than 20%, please indicate reasons. | | HARD |
| **1.4 Built Assets** | | | Alignment | Aspect |
| | 1.4.1 Robustness of Critical Facilities | | ESCI 39[P] NUA 14(a), 55, 70, 99, 107 | |
| | 1.4.1.1 | Percentage of critical facilities in hazardous locations. | | HARD |
| | 1.4.1.2 | Percentage of critical facilities with inadequate structure. | | HARD |
| | 1.4.2 Robustness of Key Buildings | | ESCI 39[P] NUA 14(a), 55, 70, 99, 107 | |
| Indicators | 1.4.2.1 | Percentage of key buildings in hazardous locations. | | HARD |
| | 1.4.2.2 | Percentage of key buildings with inadequate structure. | | HARD |

# SET 4

## 2. Supply Chain & Logistics

| | | | Alignment | Aspect |
|---|---|---|---|---|
| Indicators | **2.1 Water Resources** | | | |
| | 2.1.1 Water Resource Diversity | | | |
| | 2.1.1.1 | Proportion of water supplied from each source. | | HARD |
| | 2.1.1.2 | Does the city have an operational prioritisation of water sources based on water level data? | | SOFT |
| | 2.1.1.3 | Does the city have strategies in place for alternative resources in times of unavailability of primary water sources? | | SOFT |
| | 2.1.1.3.1 | Frequency the city needs extra support from alternative sources. | | HARD |
| | 2.1.3 Water Resource Management | | | |
| | 2.1.3.1 | Existence of Integrated Water Resource Management (IWRM) toolbox components in place. | SDG 6.5.1[A] | SOFT |
| | 2.1.3.1.1 | Are advocacy groups representing women and groups in vulnerable situations involved in the IWRM process? | | SOFT |
| | 2.1.3.4 | Is the city implementing water demand management strategies? | | SOFT |
| Indicators | **2.2 Energy Resources** | | Alignment | Aspect |
| | 2.2.1 Energy Resource Diversity | | | |
| | 2.2.1.1 | Proportion of energy consumed from each source, based on shares in total final consumption. | IEA[A] CityStrength 8[A] | HARD |
| | 2.2.1.2 | Number of supply routes and suppliers for each energy source | IEA[A] CityStrength 8[A] | HARD |
| | 2.2.1.2.1 | Spare capacity available, per source. | | HARD |
| | 2.2.1.3 | Does the city have strategies in place for alternative resources and interventions during unavailability or volatility of primary energy sources? | | SOFT |
| | 2.2.1.3.1 | Frequency the city needs extra support from alternative sources. | | SOFT |
| | 2.2.3 Energy Resource Management | | | |
| | 2.2.3.1 | Existence of energy efficiency regulations in place. | ESCI 23[P] | SOFT |
| | 2.2.3.1.1 | Are advocacy groups representing women and groups in vulnerable situations involved in the energy efficiency process? | | SOFT |
| | 2.2.3.2 | Does the local government finance clean/renewable energy transition and energy efficiency initiatives? | CPI-ES 3.1 | SOFT |
| Indicators | **2.3 Food Supply Chain** | | Alignment | Aspect |
| | 2.3.1 Availability of Food Supply | | SDG 2.1.2[A] | |
| | 2.3.1.3 | Percentage of functional area with arable land (disaggregated by tenure type, if possible) | | HARD |
| | 2.3.1.3.2 | Percentage of arable land equipped for irrigation. | FAO FS I_3.2[C] | HARD |
| | 2.3.2 Food Supply Chain Efficiency | | | |
| | 2.3.2.1 | Food loss and waste in the food supply chain (disaggregate by specific food types, if possible) [+] | SDG 12.3.1[A] | HARD |
| | 2.3.2.1.1 | Trend in food loss and waste in the past 10 years. | | SOFT |
| | 2.3.2.1.2 | Are there existing initiatives applied in the local level to prevent food loss and waste? | | SOFT |
| | 2.3.2.3 | Proportion of households obtaining food through different avenues. (please disaggregate by sex of householder and groups in vulnerable situations, if possible) | | HARD |
| | 2.3.2.4 | Does the city have policies and programmes promoting sustainable food systems? | | SOFT |
| | 2.3.2.4.1 | Are advocacy groups representing women and groups in vulnerable situations involved in setting sustainable food systems policies and programmes? | | SOFT |
| | 2.3.3 Food Supply Chain Continuity | | | |
| | 2.3.3.1 | What level of disruptions does the food supply chain face? (per food supply chain stage, if possible) [+] | | HARD |
| | 2.3.3.1.1 | 19 | | HARD |
| | 2.3.3.3 | Does the city have access to food reserves and/or other strategies for food emergencies? | | SOFT |

# SET 4

## 2. Supply Chain & Logistics

| | 2.4 Urban Logistics | | Alignment | Aspect |
|---|---|---|---|---|
| | 2.4.1 Goods Transport Modal Share and Diversity | | | |
| | 2.4.1.1 | Proportion of goods (tonnes) hauled by different transport modes. | SDG 9.1.2[P] | HARD |
| | 2.4.2.1.1 | Trends in dependecy on each mode used within the functional area in the past 10 years. | | SOFT |
| | 2.4.2.1.2 | Trend in dependecy on each mode used from or to the functional area in the past 10 years. | | SOFT |
| | 2.4.2 Capacity of Logistics Infrastructures | | | |
| | 2.4.2.1 | Entry point significance in overall movement of goods, per critical entry point. | | HARD |
| | 2.4.2.1.1 | Is the critical entry point located in a hazardous area? | | HARD |
| | 2.4.2.2 | Logistics facility capacity and complexity, per key logistics facility. | ESCI 65[A] | HARD |
| | 2.4.2.2.1 | Is the key logistics facility located in a hazardous area? | | HARD |
| | 2.4.3 Logistics Network Efficiency | | | |
| | 2.4.3.1 | Average supply chain cost for physical goods as a percentage of revenue. | | SOFT |
| | 2.4.3.1 | Existence of public policies at the local level aimed at encouraging more sustainable practices in urban logistics systems? | | SOFT |
| | 2.4.3.1.1 | Are advocacy groups representing women and groups in vulnerable situations involved in setting logistics-related public policies? | | SOFT |
| | 2.4.4 Logistics Management and Continuity of Operations | | | |
| | 2.4.4.1 | What level of disruptions does the urban logistics network face? (per goods transport mode, if possible) [+] | | HARD |
| | 2.4.4.1.1 | What is the most common cause of disruption? | | HARD |
| | 2.4.4.2 | Is priority of access given to certain supply chains at critical freight nodes during a disruptive event? | CityStrength 13[A] | SOFT |
| | 2.4.4.3 | Does the local government notify private logistics operators of any changes in conditions? | CityStrength 13[A] | SOFT |
| | 2.4.4.4 | Existence of integrated coordination body/ system for managing urban logistics operation? | CityStrength 13[A] | SOFT |
| Indicators | 2.4.4.5 | Percentage of urban traffic accidents attributed to freight transport? | SDG 3.6.1[P] | HARD |

# SET 4

# 3. Basic infrastructure

| | | | Alignment | Aspect |
|---|---|---|---|---|
| **3.1.1** | **Energy - Energy Supply for Buildings** | | | |
| 3.1.1.1 | Access to Energy Supply | | | |
| | 3.1.1.1.1 | Proportion of population with access to any means of electricity supply (Please disaggregate by sex and groups in vulnerable situation, if possible) | SDG 7.1.1[C] SDG 1.4.1[P] ISO_37120 7.2[C] CPI-ID 1.4[A] | HARD |
| | 3.1.1.1.1.1 | If access is less than 100%, please indicate reasons. | | SOFT |
| | 3.1.1.1.1.2 | Proportion of population with alternative sources of electricity other than the public network (Please disaggregate by sex and groups in vulnerable situation, if possible) | EISD SOC1[A] | HARD |
| | 3.1.1.1.2 | Proportion of population with primary reliance on clean fuels and technology for heating/cooling, lighting and cooking (Please disaggregate by sex and groups in vulnerable situation, if possible) | SDG 7.1.2[C] | HARD |
| | 3.1.1.1.2.1 | If access is less than 100%, please indicate reasons. | | SOFT |
| 3.1.1.2 | Coverage of Energy Network | | | |
| | 3.1.1.2.1 | Percentage of households with an authorized connection to public network, per energy supply type [+] | ESCI 17[C] & 18[C] | HARD |
| | 3.1.1.2.1.1 | If coverage is considered inadequate, please indicate reasons | | SOFT |
| | 3.1.1.2.1.2 | Do all areas of the city have 24-hour service? | CityStrenght 8[A] | HARD |
| | 3.1.1.2.1.3 | Is the network able to cope with seasonal increase in demand? | | HARD |
| | 3.1.1.2.1.3 | Is the network able to cope with the city tendencial growth scenario? | | HARD |
| 3.1.1.3 | Efficiency in Energy Consumption | | | |
| | 3.1.1.3.2 | Percentage of non-revenue consumption in public network, per energy supply type [+] | CityStrenght 8[A] | HARD |
| | 3.1.1.3.5 | Percentage of customers with Smart Electricity Meters. | | SOFT |
| 3.1.1.4 | Continuity of Energy Supply Operations for Building Sector | | | |
| | *Per energy supply type [+]* | | | |
| | 3.1.1.4.1 | Average number of interruptions per customer per year in the public network | ESCI 19[A] ISO_37120 7.6[A] | HARD |
| | 3.1.1.4.2 | Average length of interruptions (in hours) in public network | ESCI 20[A] ISO_37120 7.7[A] | HARD |
| | 3.1.1.4.2.1 | Is the design of the distribution network compartmentalised enough to deal with faults on the line? | | HARD |
| | 3.1.1.4.3 | Are there ways to supply priority assets and/or key energy consumers in case of disruptions? | CityStrenght 8[A] | HARD |
| 3.1.1.5 | Maintenance and Monitoring of Energy Supply Networks for Buildings | | | |
| Indicators | 3.1.1.5.1 | What maintenance and monitoring measures are applied in the public network, per energy supply type? [+] | | SOFT |
| **3.1.2** | **Energy - Energy Supply for Mobility** | | **Alignment** | **Aspect** |
| 3.1.2.1 | Vehicle Supply Network Coverage | | | |
| | 3.1.2.1.1 | Percentage of vehicle fuel demand covered by supply network. | CityStrenght 8[A] | HARD |
| | 3.1.2.1.1.1 | If it is less than 100%, please indicate reasons. | | SOFT |
| | 3.1.2.1.1.2 | Spare capacity available? | | HARD |
| | 3.1.2.1.2 | Existence of alternative clean fuel vehicle network, per energy supply type [+] | | HARD |
| | 3.1.2.1.2.1 | In case of emergency/shortage, are the stations able to service multiple types of vehicle? | | HARD |
| | 3.1.2.1.2.2 | Spare capacity available? | | HARD |
| 3.1.2.3 | Continuity of Energy Supply Operations for Mobility | | | |
| | 3.1.2.3.1 | What level of disruptions does the service face, per source? [+] | | HARD |
| | 3.1.2.3.1.1 | Are majority of the disruptions internal or external? | | HARD |
| | 3.1.2.3.2 | Does the city have its own network of gas station and mobile fuelling trucks to bypass the retail liquid fuels market in case of supply chain breakdown? | CityStrenght 8[A] | HARD |
| 3.1.2.4 | Maintenance and Monitoring of Energy Supply Networks for Mobility | | | |
| Indicators | 3.1.2.4.1 | What maintenance and monitoring measures are applied, per network? [+] | | SOFT |

# SET 4

## 3. Basic infrastructure

| | | | Alignment | Aspect |
|---|---|---|---|---|
| | 3.2.1 | **Water - Water Supply** | | |
| | 3.2.1.1 | Access to Drinking Water | | |
| | 3.2.1.1.1 | Percentage of population with access to water services (Please disaggregate by sex and groups in vulnerable situation, if possible) | SDG 6.1.1 [C]<br>SDG 1.4.1 [P]<br>ISO 37120 21.2 [A]<br>CPI-ID 1.2 [P] | HARD |
| | 3.2.1.1.1.1 | Please indicate barriers to accessing improved water services. | | SOFT |
| | 3.2.1.2 | Water Supply Network Coverage | | |
| | 3.2.1.2.1 | Percentage of households covered by piped water supply network. | ESCI 1 [C]<br>ISO 21.1 [C]<br>SDG 6.1.1 [A] | HARD |
| | 3.2.1.2.1.1 | If percentage is considered inadequate (or less than 75%), please indicate reason(s). | | SOFT |
| | 3.2.1.2.2 | Percentage of water samples in a year that complies with drinking water quality standards. | ESCI 4 [C]<br>SDG 6.1.1 [P] | HARD |
| | 3.2.1.2.3 | Is the capacity of the network able to cope with seasonal increases in water demand? | | HARD |
| | 3.2.1.3 | Efficiency of Water Supply Operations | | |
| | 3.2.1.3.1 | Percentage of unaccounted for water (water loss). | ESCI 5 [C]<br>ISO 21.7 [C] | HARD |
| | 3.2.1.3.2 | Annual daily average of hours of continuous water supply service | ESCI 3 [C]<br>ISO 21.6 [C]<br>SDG 6.1.1 [A] | HARD |
| | 3.2.1.3.3 | Are there ways to supply water to priority infrastructure? | | HARD |
| | 3.2.1.3.4 | What level of unplanned disruptions does the service face? | | HARD |
| | 3.2.1.3.4.1 | Are majority of the disruption internal or external? | | HARD |
| | 3.2.1.3.4.2 | Please describe strategies used to address disruptions. | | SOFT |
| | 3.2.1.3.5 | Are there are mechanism in place to ensure a minimum average time for addressing unplanned disruptions? | | SOFT |
| | 3.2.1.3.5.1 | What is the average duration of disruptions before resumption of service? | | SOFT |
| | 3.2.1.4 | Monitoring and Maintenance of Water Supply | | |
| | 3.2.1.4.1 | Is the city conducting regular sampling of water in supply network for compliance with water quality standards? | | SOFT |
| | 3.2.1.4.1.1 | Do people have mechanisms to monitor and report water quality within their household? | | SOFT |
| Indicators | 3.2.1.4.2 | What maintenance and monitoring measures are applied? | | SOFT |
| | 3.2.2 | **Water - Wastewater and Sanitation** | **Alignment** | **Aspect** |
| | 3.2.2.1 | Access to Sanitation | SDG 6.2.1 [C] | |
| | 3.2.2.1.1 | Percentage of population with access to sanitation facilities (Please disaggregate by sex and groups in vulnerable situation, if possible) | SDG 1.4.1 [P]<br>ISO 37120 21.2 [A]<br>CPI-ID 1.3 [P] | HARD |
| | 3.2.2.1.1.1 | Please indicate barriers to access. | | SOFT |
| | 3.2.2.1.2 | Percentage of population with access to handwashing facilities (Please disaggregate by sex and groups in vulnerable situation, if possible) | | HARD |
| | 3.2.2.1.2.1 | Please indicate barriers to access. | | SOFT |
| | 3.2.2.2 | Wastewater Network Coverage | | |
| | 3.2.2.2.1 | Percentage of households connected to a wastewater network. | ESCI 10 [C]<br>ISO 20.1 [C] | HARD |
| | 3.2.2.2.1.1 | If percentage is considered inadequate (or less than 60%), please indicate reason(s). | | HARD |
| | 3.2.2.2.2 | Is the network able to cope with seasonal increase in wastewater? | | HARD |
| | 3.2.2.2.3 | Is the network able to cope with seasonal increase in rain/stormwater (if combined sewer system)? | | HARD |
| | 3.2.2.3 | Wastewater Treatment and Discharge | | |
| | 3.2.2.3.1 | Proportion of wastewater that is safely treated. | SDG 6.3.1 [C]<br>ESCI 8 [C] | HARD |
| | 3.2.2.3.1.1 | If percentage is considered inadequate (or less than 60%), please indicate reason(s). | | HARD |
| | 3.2.2.3.2 | Proportion of hazardous wastewater that is safely treated. | SDG 6.3.1 [A]<br>ESCI 8 [A] | HARD |
| | 3.2.2.3.2.1 | If percentage is considered inadequate, please indicate reason(s). | | HARD |
| | 3.2.2.3.3 | Proportion of sludge that is safely treated. | | HARD |
| | 3.2.2.3.3.1 | If percentage is considered inadequate, please indicate reason(s). | | HARD |
| | 3.2.2.3.4 | Return flow ratio - Percentage of available water that has been previously used and discharged upstream as wastewater. | WRI 3.5 [C] | HARD |

# SET 4

## 3. Basic infrastructure

| Indicators | | | Alignment | Aspect |
|---|---|---|---|---|
| | 3.2.2.4 | Efficiency of Wastewater Operation | | |
| | 3.2.2.4.1 | Total number of sewage overflows reported per 100km of sewer main per year. | | HARD |
| | 3.2.2.4.2 | Total number of sewer main breaks and/or chokes per 100 km of sewer main per year. | | HARD |
| | 3.2.2.4.3 | Average response time for sewerage incidents (including mains breaks and chokes). | | SOFT |
| | 3.2.2.4.4 | Percentage of Unscheduled Maintenance Work (Emergency) over Total Maintenance Work. | | HARD |
| | 3.2.2.5 | Maintenance and Monitoring of Wastewater System | | |
| | 3.2.2.5.1 | What monitoring and maintenance measures are applied? | | SOFT |
| | 3.2.2.5.2 | Is the city conducting regular sampling of wastewater discharge for compliance with water quality standards? | | SOFT |
| | 3.2.2.5.3 | Redundant capacity available? | | HARD |
| | 3.2.2.5.3.1 | Percentage of time Wastewater Treatment Plant (WWTP) operates with no remaining system redundancy. | | HARD |
| | **3.2.3** | **Water - Stormwater** | **Alignment** | **Aspect** |
| | 3.2.3.1 | Stormwater Collection | | |
| | 3.2.3.1.1 | Percentage of urban area covered by stormwater collection system. | | HARD |
| | 3.2.3.1.1.1 | If percentage is considered inadequate, please indicate reason(s). | | SOFT |
| | 3.2.3.1.2 | Is the city's drainage system currently able to cope with seasonal increase in rain/stormwater? | NUA 119[A] CityStrenght 17[A] | HARD |
| | 3.2.3.2 | Stormwater and Flood Management Strategies | | |
| | 3.2.3.2.1 | Is existing protective infrastructure designed and built based on flood risk information? | NUA 119[A] SDG 11.5[A] & 11.B[A] UNISDR Scorecard D4.2.1A; D4.3A & D8.1A | HARD |
| | | *Water Sensitive Urban Design* | | |
| | 3.2.3.2.2 | Does the city regularly and extensively consider the use of alternative water sensitive urban design solutions? | UNISDR Scorecard D4.2.1[A] | HARD |
| | 3.2.3.2.4.1 | If yes, what is the percentage of total urban runoff retained through water sensitive urban design solutions? | | HARD |
| | 3.2.3.2.4 | Do building codes or standards that address water sensitive urban design and/or onsite stormwater solutions exist? | UNISDR Scorecard D4.3[A] | SOFT |
| | 3.2.3.2.4.1 | Are zoning rules, building codes and standards widely applied, properly enforced and verified? | UNISDR Scorecard D4.4[A] | SOFT |
| | 3.2.3.2.4.2 | If no, please indicate reason(s). | | SOFT |
| | 3.2.3.3 | Effectiveness of Stormwater Solution | | |
| | 3.2.3.3.1 | Percentage of dwellings damaged by intense flooding (10 years). | SDG 1.1.5.2[P] ESCI 9[P] | HARD |
| | 3.2.3.3.2 | What level of disruptions on road traffic due to water logging does the service face? | | HARD |
| | 3.2.3.3.2.1 | If significant, what is the stormwater related average delay in travel time on public transportation? | | HARD |
| | 3.2.3.3.3 | What level of disruption of access to public services due to water logging does the service face? [+] | | HARD |
| | 3.2.3.3.3.1 | If significant, what is the stormwater related annual average disruption days on health and educational services? | | HARD |
| | 3.2.3.4 | Monitoring and Maintenance of Stormwater System | | |
| | 3.2.3.4.1 | What monitoring and maintenance measures are applied? | UNISDR Scorecard D8.1.2[A] | SOFT |
| | 3.2.3.4.2 | Is the city conducting regular sampling of stormwater discharge in compliance to water quality standards. | | SOFT |
| | **3.3** | **Solid Waste** | **Alignment** | **Aspect** |
| | 3.3.1 | Solid Waste Collection Coverage | CityStrength 15[A] | |
| | 3.3.1.1 | Proportion of solid waste collected out of total solid waste generated by the city, per category of waste (municipal/non-municipal; hazardous/non-hazardous; including through waste drop-off facilities for non-municipal). | SDG 11.6.1[P] & 12.4.2[P] ISO_37120 16.2[P] & 16.9[P] CPI-ES 2.1[A] | HARD |
| | 3.3.1.1.1 | If the proportion of solid waste collected is considered inadequate, please indicate reason(s), per category of waste [+] | | HARD |
| | 3.3.1.1.2 | If informal solid waste collection exists, please characterise the amount collected and, if available, specify quantity (tonnes), per category of waste [+] | | HARD |

# SET 4

## 3. Basic infrastructure

| | | | | |
|---|---|---|---|---|
| 3.3.2 | Access to Collection Service | | CityStrength 15[A] | |
| | 3.3.2.1 | Percentage of population with regular municipal solid waste collection service (at least once a week) (Please disaggregate by sex and groups in vulnerable situation, if possible) | SDG 1.4.1[P] ESCI 10[C] ISO_37120 16.1[C] | HARD |
| | 3.3.2.1.1 | If percentage of population with regular municipal solid waste collection service is less than 100%, please indicate reason(s). | | SOFT |
| 3.3.3 | Pre-treatment of Solid Waste | | | |
| | 3.3.3.1 | Main method(s) used for pre-treatment (specify percentage, if available). | SDG 12.5[A] ESCI 15[P] | HARD |
| | 3.3.3.2 | Legal obligation of pre-treatment for non-municipal solid waste generators? | | SOFT |
| 3.3.4 | Treatment: Recovery of Solid Waste | | | |
| | 3.3.4.1 | Proportion of solid waste treated out of total generated, by type of treatment. | SDG 12.5.1[P] & 12.4.2[P] ESCI 14[C], 15[C] & 16[C] ISO_37120 16.3[P] & 16.10[P] CPI-ES 2.3[C] | HARD |
| | 3.3.4.2 | Characterise the recovery trend of solid waste in the last 10 years. | | SOFT |
| 3.3.5 | Treatment: Disposal of Solid Waste | | | |
| | 3.3.5.1 | Percentage of solid waste that is disposed of out of the total solid waste generated, by types of disposal and types of waste. | SDG 11.6.1[P] & 12.4.2[P] ISO_37120 16.4[C], 16.5[C], 16.6[C], 16.7[C] & 16.8[C] ESCI 11[C] & 13[C] | HARD |
| 3.3.6 | Continuity of Operations of the Solid Waste System | | | |
| | 3.3.6.1 | What is the average number of days the solid waste systems are out of service per year? | | HARD |
| | 3.3.6.1.1 | For collection and for treatment, what is level of impact of the disruptions? [+] | | HARD |
| 3.3.7 | Maintenance and Monitoring of Solid Waste System | | | |
| | 3.3.7.1 | For collection and for treatment, what maintenance and monitoring measures are applied? [+] | | SOFT |
| | 3.3.7.2 | Remaining useful life of the site where the landfill is located (in years, based on capacity and municipal solid waste generation projections). [+] | ESCI 12[C] | HARD |
| Indicators | 3.3.7.3 | Redundant capacity available? | | HARD |

| | | | Alignment | Aspect |
|---|---|---|---|---|
| 3.4.1 | **Telecommunications - Phone and Internet** | | | |
| 3.4.1.1 | Access to Telephone and Internet Technologies | | NUA 34, 36, 50, 156 SDG 5.b[A] | |
| | 3.4.1.1.1 | Percentage of population with access to at least one telecommunication network (Please disaggregate by sex and groups in vulnerable situation, if possible) | CPI-ID 3.1[A] SDG 17.8.1[A] | HARD |
| | 3.4.1.1.1.1 | If access is less than 100%, please indicate reason(s). | | SOFT |
| | 3.4.1.1.2 | Access Opportunities - Number of subscriptions per 100 inhabitants | SDG 17.6.2[C] ISO_37120 17.1[A], 17.2[A] & 17.3[A] ESCI 69[C] & 71[C] CPI-ID 3.3[A] | HARD |
| 3.4.1.2 | Coverage of Telephone and Internet Networks | | | |
| | 3.4.1.2.1 | Percentage of households covered by communication network, per network type [+] | ITU_DOI A-7[A] | HARD |
| | 3.4.1.2.1.1 | If coverage is less than 100%, please indicate reason(s). | | SOFT |
| | 3.4.1.2.1.2 | If applicable, does the city offer a public network service? | | HARD |
| 3.4.1.3 | Diversity and Continuity of Telephone and Internet Operations | | CityStrenght 11[A] | |
| | *Per communication network type [+]* | | | |
| | 3.4.1.3.1 | What level of disruptions does the service face? | | HARD |
| | 3.4.1.3.2 | Are there ways to maintain service continuity to priority assets and/or key services in case of telecommunications blackout ? | | HARD |
| | 3.4.1.3.4 | Diversity of network infrastructure services - Number of infrastructure providers. | | HARD |
| | 3.4.1.3.5 | Are alternative modes of information management and public communication explored for emergency situations? | | SOFT |
| 3.4.1.4 | Maintenance and Monitoring of the Network | | | |
| Indicators | 3.4.1.4.1 | What maintenance and monitoring measures are applied, per network type? [+] | | SOFT |

# SET 4

## 3. Basic infrastructure

| | 3.4.2 Telecommunications - Television and Radio | | Alignment | Aspect |
|---|---|---|---|---|
| Indicators | 3.4.2.1 Access to Television and Radio | | NUA 34, 36, 50, 156 SDG 5b^ & 17.8^ | |
| | 3.4.2.1.1 | Diversity of Access Mode, by mode and device options (Please disaggregate by sex and groups in vulnerable situation, if possible) | | HARD |
| | 3.4.2.1.1.1 | If access is less than 100%, please indicate reason(s), per access mode [+] | | SOFT |
| | 3.4.2.2 Coverage of Television and Radio Network | | NUA 34, 36, 50, 156 | |
| | 3.4.2.2.1 | Percentage of households covered by broadcast system | | HARD |
| | 3.4.2.2.1.1 | If coverage is less than 100%, please indicate reason(s). | | SOFT |
| | 3.4.2.3 Diversity and Continuity of Broadcasting Operations | | CityStrenght 11^ | |
| | 3.4.2.3.2 | Number of broadcast networks | | HARD |
| | 3.4.2.3.3 | What level of disruptions does each service face? | | HARD |
| | 3.4.2.3.4 | Is the local government able to engage with broadcast operators for Emergency Broadcasting? | | SOFT |
| | 3.4.2.4 Maintenance and Monitoring of the Broadcasting System | | | |
| | 3.4.2.4.1 | What are the maintenance and monitoring measures applied, per broadcasting system: TV, Radio [+] | | SOFT |

# SET 4

# 4. Mobility

| 4.1 Urban Mobility | | Alignment | Aspect |
|---|---|---|---|
| 4.1.1 Diversity of Transport Modes and Modal Share | | | |
| 4.1.1.1 | Percentage of commuting trips using each of the following modes (Please disaggregate by sex, if possible). | SDG 9.1.2[P] ESCI 56[P] CPI-ID 4.1[P] ISO-37120 18.3[A], 18.5[A] | HARD |
| 4.1.1.2 | Percentage of population using paratransit modes of transportation (Please disaggregate by sex, if possible). | | HARD |
| 4.1.1.3 | For each mode of transport, characterise the growth rate. [+] | | SOFT |
| 4.1.1.4 | Percentage of passengers that transfer between modes more than once per journey (Please disaggregate by sex, if possible). | SUTP[A] | HARD |
| 4.1.2 Coverage of Urban Mobility Networks | | CPI-ID 4.3[A] ISO-37120 18.1[A], 18.2[A] | |
| 4.1.2.1 | Road network density (km / 100 000 population). | ESCI 52[C] | HARD |
| 4.1.2.1.1 | If road network coverage is less than 400 km / 100 000 population, please select reasons. | | SOFT |
| 4.1.2.2 | Road density dedicated for public transport only (km / 100 000 population). | ESCI 53[C] CPI-ID 4.3[A] | HARD |
| 4.1.2.2.1 | If coverage is less than 10 km / 100 000 population, please select reasons. | | SOFT |
| 4.1.2.3 | Railway density (km / 100 000 population). | CPI-ID 4.3[A] | HARD |
| 4.1.2.3.1 | If coverage is inadequate, please select reasons. | | SOFT |
| 4.1.2.4 | Navigable water network density per population (km / 100 000 population). | CPI-ID 4.3[A] | HARD |
| 4.1.2.4.1 | If coverage is inadequate, please select reasons. | | SOFT |
| 4.1.2.5 | Density of side walks and pedestrian paths (km / 100 000 population). | ESCI 55[C] | HARD |
| 4.1.2.5.1 | If coverage is less than two times the length of road network, please select reasons. | | SOFT |
| 4.1.2.6 | Bicycle lanes density (km / 100 000 population). | ESCI 54[C] ISO-37120 18.7[C] | HARD |
| 4.1.2.6.1 | If coverage is less than 15km / 100 000 population please indicate reasons. | | SOFT |
| 4.1.2.7 | Cable line density (km / 100 000 population ). | CPI-ID 4.3[A] | HARD |
| 4.1.2.7.1 | If coverage is inadequate, please select reasons. | | SOFT |
| 4.1.3 Access to Urban Mobility Systems | | SDG 1.4.1[A] SDG 11.2.1[P] UN-Habitat'[P] | |
| 4.1.3.1 | Percentage of city population within 500 m distance to nearest public transport stop. Please disaggregate by modes of transport. | SDG 11.2.1[P] IND03 UN-Habitat'[P] | HARD |
| 4.1.3.4 | Is public transport accessible to people with reduced-mobility? | SDG 11.2.1[P] | HARD |
| 4.1.3.5 | Average commuting travel time using various modes of transport. | SUTP[P] CPI-ID 4.2[P] | HARD |
| 4.1.3.6 | Identify barriers to access per public transport mode (with particular attention to gender and groups in vulnerable situations). [+] | IND09 UN-Habitat'[P] | SOFT |
| 4.1.4 Continuity of Urban Mobility Operations | | | |
| *Per transport mode [+]* | | | |
| 4.1.4.1 | What level of disruptions does the service face? | CityStrength 16[A] | HARD |
| 4.1.4.1.1 | If the mode selected is public, what are the other modes of public transport that can be used, temporarily, as alternatives in case of a disruption in operations? | | SOFT |
| 4.1.4.2 | Does the service have adequate redundant capacity? | | HARD |
| 4.1.4.3 | If the mode selected is public, what is the average passenger capacity during peak hours? | | HARD |
| 4.1.4.4 | What is the average travel speed on major thoroughfares during peak hours? | ESCI 59[C] | HARD |
| 4.1.4.5 | Does this mode have a central control system? | | SOFT |
| 4.1.4.6 | What is the average age of the transport fleet? | ESCI 57[C] | HARD |
| *All transport modes* | | | |
| | | SDG 3.6.1[C] | |

# SET 4

## 4. Mobility

| | | | | |
|---|---|---|---|---|
| | 4.2.2.2 | Number of train stations in city with regional/ international destinations. | | HARD |
| | 4.2.2.2.1 | For each train station, characterise capacity. [+] | | HARD |
| | 4.2.2.3 | Number of ports in city. | | HARD |
| | 4.2.2.3.1 | For each port, characterise capacity. [+] | | HARD |
| | 4.2.2.4 | Number of airports in city. | | HARD |
| | 4.2.2.4.1 | For each airport, characterise capacity. [+] | | HARD |
| 4.2.3 | Access to Inter-Regional Mobility Systems | | | |
| | *For each inter-regional transport facility [+]* | | | |
| | 4.2.3.1 | Is it accessible for private vehicles (cars/ motorcycles)? | | HARD |
| | 4.2.3.2 | Availability of adequate car parking? | | HARD |
| | 4.2.3.3 | Is it accessible through at least one public urban transport mode? | | HARD |
| | 4.2.3.4 | Is it accessible for people with reduced-mobility? | SDG 11.2.1[P] | HARD |
| | 4.2.3.5 | Identify barriers to access inter-regional/ international transport modes (with particular attention to gender and groups in vulnerable situations). | | SOFT |
| 4.2.4 | Continuity of Inter-Regional Mobility Operations | | | |
| | *For each mode of inter-regional or international mobility [+]* | | | |
| | 4.2.4.1 | What level of disruptions does the service face? | | HARD |
| | 4.2.4.1.1 | Please select and specify the most common cause of disturbance. | | HARD |
| | 4.2.4.2 | Does this services have adequate redundant capacity? | | HARD |
| | 4.2.4.3 | What is the average delay? | | HARD |
| | 4.2.4.4 | What is average age of the fleet? | ESCI 57[A] | HARD |
| | 4.2.4.5 | Transportation fatalities per 1000 population (Please disaggregate by sex and groups in vulnerable situations, if possible). | SDG 3.6.1[A]<br>ESCI 58[A]<br>CPI-ID 4.4[A]<br>ISO-37120 18.8[A] | HARD |
| Indicators | | | | |

# SET 4

# 5. Municipal Public Services

| 5.1 Cemeteries and Crematoriums | | Alignment | Aspect |
|---|---|---|---|
| 5.1.2 Coverage of Burial and Cremation Services | | | |
| 5.1.2.1 | Capacity of active burial sites within the city's administrative boundaries. | | HARD |
| 5.1.2.1.1 | Number of graves relocated in the past year. | | HARD |
| 5.1.2.1.1 | Is the reuse of graves legal and practiced? | | SOFT |
| 5.1.2.2 | Capacity of the crematoriums in number of ovens in use. | | HARD |
| 5.1.2.3 | Do current burial and cremation infrastructures meet the needs of the population? | | HARD |
| 5.1.2.3.1 | Average waiting period (in number of days) to bury or cremate a body. | | HARD |
| 5.1.2.3.2 | Do protocols exist regarding the long-term storage of non-cremated remains awaiting burial or cremation? | | SOFT |
| 5.1.2.4 | Does the municipality have plans for further development of the burial and crematory infrastructure? | | SOFT |
| 5.1.2.4.1 | Please indicate the main barriers the municipality encounters to extend the current infrastructure | | SOFT |
| 5.1.3 Access to Burial and Cremation Services | | | |
| 5.1.3.4 | Are there burial and cremation services not connected to the public transportation network? | | HARD |
| 5.1.4 Quality and Safety Monitoring of Burial Sites and Crematoriums | | | |
| 5.1.4.1 | Does the municipal government require burial site and crematorium operators to keep records on burials and cremations? | | SOFT |
| 5.1.4.2 | Existence of regulations and protocols. | | SOFT |
| 5.1.4.3 | Is compliance with the existing regulations or protocols monitored and enforced? | | SOFT |
| 5.1.4.4 | Do any public or private burial sites or crematoriums pose a contamination risk? | | HARD |
| **5.2 Civil Registration Services** | | **Alignment** | **Aspect** |
| 5.2.2 Coverage of Civil Registration Services | | | |
| 5.2.2.1 | Is there a unique office in charge of civil registration at city level? (per vital event type, if different) [+] | | HARD |
| 5.2.2.1.1 | If no, please inform distribution pattern and number of offices in the city | | HARD |
| 5.2.2.2 | Is the office(s) able to cover the entire population with civil registration services? | | HARD |
| 5.2.2.3.1 | If no, please indicate the main reasons contributing to this limitation | | HARD |
| 5.2.4 Civil Registration and Vital Statistics Data Management | | | |
| 5.2.4.1 | At what level are the data stored? (per vital event type) [+] | | SOFT |
| 5.2.4.1.1 | Are the records stored in an automated process with a backup system? | | SOFT |
| 5.2.4.6 | Do contingency plans exist for continuity of civil registration during emergencies and crisis? | | SOFT |
| **5.3.2 Criminal Justice and Law Enforcement - Law Enforcement** | | **Alignment** | **Aspect** |
| 5.3.2.2 Coverage with Local Law Enforcement | | | |
| 5.3.2.2.2 | Operational capabilities of each unit for designated responsibilities (in terms of coverage). | | HARD |
| 5.3.2.2.2.1 | For each unit that is found to be inadequate, please characterise this inadequacy. | | HARD |
| 5.3.2.2.2.2 | Please specify the reasons for barrier(s) for each selected reason for inadequacy | | SOFT |
| 5.3.2.3 Continuity of Law Enforcement Operations | | | |
| 5.3.2.3.3 | Response time of law enforcement entities performing at the local level. | ISO_37120 14.4[A] | HARD |
| 5.3.2.3.3.1 | For each entity where the percentage of compliance responses (all calls and/or emergency calls) is less than 100%, identify the barrier(s) in ensuring an optimal/standard response time | | SOFT |
| **5.3.3 Criminal Justice and Law Enforcement - Detention Facilities** | | **Alignment** | **Aspect** |
| 5.3.3.2 Quality of Detention Facilities | | | |
| 5.3.3.2.1 | Compliance of detention facility with international quality and human rights standards. | | HARD |
| 5.3.3.2.1.1 | For the facilities not complying with international quality and human rights standards, what are the main barriers in achieving an appropriate status? | | SOFT |

# SET 4

# 5. Municipal Public Services

| | | | Alignment | Aspect |
|---|---|---|---|---|
| **5.4** | **Cultural Heritage and Cultural Activities** | | | |
| 5.4.2 | Coverage of Cultural Activities | | | |
| | 5.4.2.1 | Cultural facilities per capita | | HARD |
| | 5.4.2.1.1 | If numbers of facilities are considered inadequate, please identify barriers. | | SOFT |
| 5.4.3 | Access to Cultural Activities | | SDG 4.7[A] | |
| | 5.4.3.3 | Are there cultural facilities and heritage sites not connected to the public transportation network? | | HARD |
| 5.4.4 | Management of Cultural Heritage and Cultural Facilities | | SDG 8.9[A], 11.4[A] | |
| | 5.4.4.1 | Public expenditure per capita spent on all cultural heritage (tangible, intangible and natural) | SDG 11.4.1[A] | SOFT |
| | 5.4.4.2 | Measures the municipality undertaken as part of its expenditure on cultural heritage | | SOFT |
| | 5.4.4.2.1 | If public subsidies are provided to religious organisations, which costs are covered? | | SOFT |
| | 5.4.4.3 | Have advocacy groups representing women and groups in vulnerable situations, in particular ethnic minorities, been involved in the development of cultural policies/plans? | | SOFT |
| **5.5** | **Emergency and Rescue Services** | | **Alignment** | **Aspect** |
| 5.5.1 | Diversity and Typology of Emergency and Rescue Services | | ISO-37120 10.1[A] | |
| | 5.5.1.1 | Fire emergency services operating in the city, with respective capacities. | | HARD |
| | 5.5.1.1.1 | If capacity is inadequate for one of the abovementioned services, please indicate barrier(s) in reaching adequacy | | SOFT |
| | 5.5.1.1.2 | For each entity, characterise the trends in terms of capacity in the past 10 years. | | SOFT |
| | 5.5.1.2 | Public works units available in the city, with respective capacities | | HARD |
| | 5.5.1.2.1 | If capacity is inadequate for one of the abovementioned services, please indicate barrier(s) in reaching adequacy | | SOFT |
| | 5.5.1.2.2 | For each entity, characterise the trends in terms of capacity in the past 10 years. | | SOFT |
| | 5.5.1.3 | Emergency services available in the city, with respective staffing and equipment capacities | | HARD |
| | 5.5.1.3.1 | If capacity is inadequate for one of the abovementioned services, please indicate barrier(s) in reaching adequacy | | SOFT |
| | 5.5.1.3.2 | For each entity, characterise the trends in terms of capacity in the past 10 years. | | SOFT |
| | 5.5.1.4 | Civil emergency services available in the city, with respective staffing and equipment capacities | | HARD |
| | 5.5.1.4.1 | If capacity is inadequate for one of the abovementioned services, please indicate barrier(s) in reaching adequacy | | SOFT |
| | 5.5.1.4.2 | For each entity, characterise the trends in terms of capacity in the past 10 years. | | SOFT |
| 5.5.2 | Continuity of Emergency and Rescue Operations | | | |
| | 5.5.2.3 | Response time of emergency and rescue services | ISO-37120 10.5-6[A] UNISDR 9.3[A] | HARD |
| Indicators | 5.5.2.3.1 | For each service where the percentage of compliant responses is less than 100%, identify barriers in ensuring an optimal response time | | SOFT |
| **5.6** | **Food Inspection and Monitoring Institutions** | | **Alignment** | **Aspect** |
| 5.6.1 | Typology of Food Inspection and Monitoring Authorities | | | |
| | 5.6.1.4 | Availability and adequacy of laboratories (staff and equipment) for local scale inspections. | | HARD |
| 5.6.2 | Food Inspections and Monitoring Mechanisms and Data Management | | CAC/RCP 1-1969[A] | |
| | 5.6.2.2 | Data storage availability and integration. | | HARD |
| Indicators | 5.6.2.3 | Are databases maintained and up to date? [+] | | SOFT |
| **5.7** | **Communicable Diseases Surveillance and Response System** | | **Alignment** | **Aspect** |
| 5.7.2 | Communicable Disease Monitoring and Mechanisms Data Management | | | |
| | 5.7.2.2 | Data storage availability and integration. | | HARD |
| **5.8** | **Municipal Taxes** | | **Alignment** | **Aspect** |
| 5.8.2 | Access to Municipal Tax Services | | | |
| | 5.8.2.1 | Tax collection accessibility measures (per municipal tax authority) [+] | | HARD |

# SET 4

## 5. Municipal Public Services

| 5.9 Public Lighting | | | Alignment | Aspect |
|---|---|---|---|---|
| 5.9.2 | Coverage of Public Lighting | | | |
| | 5.9.2.1 | Percentage of public space covered by public lighting, per type of space | | HARD |
| | 5.9.2.1.1 | If coverage of public lighting is less than 100%, please identify barriers | | SOFT |
| | 5.9.2.2 | Does the municipality use a night lighting schedule? | | SOFT |
| | 5.9.2.2.1 | Does the municipality switch off lighting for the entire city during the specified schedule? | | SOFT |
| 5.9.3 | Maintenance of Public Lighting Infrastructure | | SDG 7.3[A] | |
| | 5.9.3.1 | Proportion of different lighting types installed from the total public lighting infrastructure in the city | | HARD |
| | 5.9.3.1.1 | Do regulations or standards exist regarding the design and performance of the lighting types used? | | SOFT |
| | 5.9.3.2 | What operation and maintenance measures are applied? | | SOFT |
| | 5.9.3.2.1 | Percentage of installed public lighting infrastructure that is not functioning | | HARD |
| | 5.9.3.3 | Percentage of public lighting infrastructure equipped with electricity metering infrastructure. | | SOFT |
| 5.9.4 | Continuity of Public Lighting Operations | | | |
| | 5.9.4.1 | What level of disruption does the public lighting service face? | | HARD |
| | 5.9.4.1.1 | Average length of disruptions (in minutes per day) | | HARD |
| | 5.9.4.2 | Percentage of public lighting infrastructure that is remote-control operated. | | SOFT |
| | 5.9.4.1.2 | Does a central control system exist? | | SOFT |

# SET 4

## 6. Social Inclusion and Protection

| | | | Alignment | Aspect |
|---|---|---|---|---|
| **6.2** | **Access to Social Protection Floor for All** | | | |
| 6.2.2 | Access to Health Care (Primary, Secondary and Tertiary Healthcare) Through Appropriate Insurance | | SDG 1.3.1 [P]<br>SDG 1.4.1 [P]<br>SDG 3.8.1 [P] | |
| | *Essential health care for groups requiring particular care* | | | |
| | 6.2.2.2 | Access to family planning and reproductive healthcare services. | SDG 3.7.1 [A] | HARD |
| | 6.2.2.2.2 | Please indicate barriers in accessing family planning and reproductive healthcare services | | SOFT |
| | 6.2.2.3 | Access to vaccination and immunisation programmes. | SDG 3.b.1 [A] | HARD |
| | 6.2.2.3.2 | Please indicate barriers in accessing vaccination and immunisation programmes. | | SOFT |
| | 6.2.2.4 | Access to antiretroviral treatments and hepatitis C treatments. | | HARD |
| | 6.2.2.4.2 | Please indicate barriers in benefiting from universal health care insurance | | SOFT |
| **6.3.1** | **Access to Basic Social Services - Education** | | **Alignment** | **Aspect** |
| 6.3.1.1 | Coverage of Public Education Services | | SDG 4.2 [A]<br>SDG 1.4.1 [P] | |
| | 6.3.1.1.1 | Physical capacity of Public Education Facilities. | ESCI 75-78 [A] | HARD |
| | 6.3.1.1.1.1 | If capacity (# of places) is below the number of school-age children, what factor(s) most contribute(s) to this limitation? | | SOFT |
| 6.3.1.2 | Access to Public Education | | SDG 4.1.1 [P]<br>SDG 4.2.2 [P]<br>SDG 4.5.1 [P]<br>SDG 5.3 [A] | |
| | *Access to public transportation* | | | |
| | 6.3.1.2.4 | Do students have access to public transportation to get to schools not within walking distance? | | HARD |
| | 6.3.1.2.4.1 | If 'Partially covered' or 'No', what factor(s) contribute(s) to this limitation? | | SOFT |
| | *Access to school for disabled students* | | | |
| | 6.3.1.2.5 | Do disabled students have access to schools? | | HARD |
| | 6.3.1.2.5.1 | If 'Partially covered' or 'No', what factor(s) contribute(s) to this limitation? | | SOFT |
| 6.3.1.3 | Continuity of Educational Operations | | | |
| | 6.3.1.3.1 | Number of teaching days lost in last academic year. | | HARD |
| | 6.3.1.3.1.1 | If days lost constitute significant disruption in educational access, please describe the cause(s) of the disruption(s). | | HARD |
| **6.3.2** | **Access to Basic Social Services - Health** | | **Alignment** | **Aspect** |
| 6.3.2.1 | Coverage of Basic Health Services | | | |
| | 6.3.2.1.1 | Physical Capacity of Health Facilities. | SDG 3.C.1 [A]<br>ESCI 92-93 [A]<br>ISO37120 12.2 [A]<br>ISO37120 12.3 [A]<br>CPI-ID 2.1 [C] | HARD |
| | 6.3.2.1.1.1 | If the coverage is considered below adequate/sustainable levels, what factor(s) most contribute(s) to this limitation? | | SOFT |
| | 6.3.2.1.2 | Capacity of Emergency Response. | SDG 3.D [A] | HARD |
| | 6.3.2.1.2.1 | What is the average response time for emergency responders? | | SOFT |
| | 6.3.2.1.2.2 | If the coverage is considered below adequate/sustainable levels, what factor(s) most contribute(s) to this limitation? | | SOFT |
| 6.3.2.2 | Access to Basic Healthcare Services | | | |
| | 6.3.2.2.2 | Are hospitals accessible for persons with reduced mobility? | | HARD |
| | 6.3.2.2.2.1 | If hospitals are either partially or not accessible for persons with reduced mobility, what are the primary factors? | | SOFT |
| 6.3.2.3 | Continuity of Operations of Basic Health Services | | SDG 3.D [A] | |
| | 6.3.2.3.1 | What level of disruption is faced in the healthcare system? | | HARD |
| | 6.3.2.3.1.1 | If disruption in provision of health service is significant, please describe the cause(s) of the disruption(s). | | HARD |
| **6.3.3.** | **Access to Basic Social Services - Social Care and Protection** | | **Alignment** | **Aspect** |
| 6.3.3.1. | Coverage of Social Care Services | | SDG 1.3.1 [A]<br>ESCI 50 [A] | |
| | 6.3.3.1.2 | Existence of protective measures per each of the following category and subcategory of people in vulnerable situations, sex disaggregated. | | HARD |
| 6.3.3.2 | Access to Social Care Services | | SDG 1.3.1 [A] | |
| | 6.3.3.2.2 | Access to protective measures per each category and subcategory of people in vulnerable situations, sex disaggregated. | | HARD |

Indicators

# SET 4

## 7. Economy

| | | | Alignment | |
|---|---|---|---|---|
| **7.1** | **Local Economic Structure** | | **Alignment** | |
| 7.1.5 | Real Estate to Income Ratio | | | |
| | 7.1.5.2 | Housing stock composition (public, private, informal) | ESCI 51[A] | HARD |
| **7.3** | **Market Connectivity** | | **Alignment** | |
| 7.3.1 | Access to Financial Products | | SDG 8.10[A] | |
| | 7.3.1.1 | Proportion of the population with a bank account (%) (Please disaggregate by sex and groups in vulnerable situations, if possible) | SDG 8.10.2[C] | SOFT |
| | 7.3.1.3 | Number of commercial banks per 100,000 people | SDG 8.10.1[P] | HARD |
| | 7.3.1.3.1 | Percent of population living within 500 meters of a commercial bank | SDG 8.10.1[A] | HARD |
| | 7.3.1.3.2 | Number of ATMs per 100,000 people | SDG 8.10.1[P] | HARD |
| | 7.3.1.4 | Proportion of population utilising mobile vending applications (Please disaggregate by sex and groups in vulnerable situations, if possible) | SDG 8.10.[A] | SOFT |

# SET 4

## 8. Ecology

Indicators

| | | | Alignment | Aspect |
|---|---|---|---|---|
| **8.1** | **Ecosystem Services** | | | |
| 8.1.2 | Ecosystem Services Maintenance | | SDG 15.1[A], 14.2[A] | |
| | 8.1.2.3 | Does the local government take the ecosystem services approach or a different environmental approach into consideration in local policy and planning? | | SOFT |
| **8.3** | **Biodiversity and Green Infrastructure** | | **Alignment** | **Aspect** |
| 8.3.1 | Native Biodiversity in the City | | | |
| | 8.3.1.3 | Proportion of natural areas and urban green spaces in the city as a percentage of the urban area. | | HARD |
| | 8.3.1.4 | Urban green space per capita (Please disaggregate by sex, age and groups in vulnerable situation, if possible) | ISO-37120 19.1[C] ESCI 45[C] CPI-QOL 4.2[C] | SOFT |
| | 8.3.1.4.1 | Select barriers that may reduce access to the urban green spaces. | | SOFT |
| | 8.3.1.5 | Proportion of urban green space cover (including vegetation canopy cover and blue areas), as percentage of the size of the functional area. | | HARD |
| 8.3.2 | Protected Natural Areas in the Region and Connectivity | | | |
| | 8.3.2.2 | Trend of expenditure (public and private) per capita spent on the preservation, protection and conservation of natural heritage. | SDG 11.4.1[P] | SOFT |
| | 8.3.2.3 | Total size of the number of areas (in ha) that connect protected natural areas and urban green spaces in the city, using the Green Infrastructure Index as measure. | | HARD |
| | 8.3.2.4 | Does the city take the biodiversity in these corridors, and in their green spaces and blue areas in general, into consideration? | SDG 15.9[P] | SOFT |
| **8.4** | **Environmental Quality** | | **Alignment** | **Aspect** |
| 8.4.3 | Water Quality | | SDG 6.3.2[A] | |
| | *Ground water quality* | | | |
| | 8.4.3.1 | Pollutants present in ground water that have transgressed the established limit. | | HARD |
| | 8.4.3.1.2 | Please describe the source of pollution, if applicable. | | HARD |
| | *Surface freshwater quality* | | | |
| | 8.4.3.2 | Pollutants present in inland surface water that have transgressed the established limit. | | HARD |
| | 8.4.3.2.2 | Please describe the source of pollution, if applicable. | | HARD |
| | *Marine water quality of Class I Water* | | | |
| | 8.4.3.3 | Pollutants present in Class I Water that have transgressed the established limit. | SDG 14.1[A], 14.3.1[P] | HARD |
| | 8.4.3.3.2 | Please describe the source of pollution, if applicable. | | HARD |
| | *Marine water quality of Class II Water* | | | |
| | 8.4.3.4 | Pollutants present in Class II Water that have transgressed the established limit. | SDG 14.1[A], 14.3.1[P] | HARD |
| | 8.4.3.4.2 | Please describe the source of pollution, if applicable. | | HARD |
| 8.4.4 | Additional Pollution | | | |
| | 8.4.4.1 | Are there areas in the city with significant land pollution (e.g. brownfield sites, riverbeds, agricultural sites etc.)? | | HARD |
| | 8.4.4.1.1 | Please describe the source/origin of pollution, if applicable. | | HARD |
| | 8.4.4.3 | Are there currently areas in the city with significant radioactive pollution (e.g. nuclear power plants, industrial sites, hospitals etc.)? | | HARD |
| | 8.4.4.3.1 | Please describe the source/origin of pollution, if applicable. | | HARD |
| | 8.4.4.4 | Are there currently areas in the city with significant noise pollution? | ISO 8.7[A] | HARD |
| | 8.4.4.4.1 | Please describe the source/origin of pollution, if applicable. | | HARD |
| | 8.4.4.5 | Are there currently areas in the city with significant light pollution? | | HARD |
| | 8.4.4.5.1 | Please describe the source/origin of pollution, if applicable. | | HARD |
| 8.4.5 | Monitoring of Environmental Quality | | | |
| | 8.4.5.1 | Existence and monitoring of greenhouse gas inventory. | ESCI 28[C] | SOFT |
| | 8.4.5.2 | Existence, monitoring and enforcement of air quality regulations. | ESCI 25[C] CPI-ES 1.1[A] | SOFT |
| | 8.4.5.3 | Existence, monitoring and enforcement of water quality regulations. | SDG 6.3[A] SDG 14.1[A] | SOFT |
| | 8.4.5.4 | Existence, monitoring and enforcement of regulations regarding the additional types of pollution identified in Indicator 8.4.4. [+] | ESCI 32[P] | SOFT |

# 6.Questionnaire

In order to make the Infrastructure Improvement Enhancer effective and easily applicable, a semi-structured questionnaire was developed to internally evaluate the CRPT. This questionnaire is expected to support the CRPT in contributing to UN-Habitat's efforts supporting local governments in better studying the state of infrastructure in cities as well as the impacts on people, and in developing strategies to improve the adequacy and physical accessibility of infrastructure. The questionnaire includes the following five sections:

**1.** Basic information for contextualisation
**2.** Infrastructure Targeting
**3.** Infrastructure Identification
**4.** Infrastructure-Informed Actions for Resilience (A4Rs)
**5.** M&E aspects for further applicability of recommendations

The questionnaire was designed as a complementary tool to support each team member in applying critical thinking when addressing the adequacy of infrastructure. The process of studying inadequate infrastructure in a city should remain an iterative one, and it is expected that CRPT piloting in cities will bring new insights and enrich the current approach. At a later stage, the Enhancer is envisioned to lead to further research on the root causes and impacts of inadequate and inaccessible infrastructure, and to contribute to broader policy-making and strategy development in cities, thus fulfilling a new role, and shifting from tool strengthening to capacity building in cities to address challenges.

| 1. Basic Information about CRPT | |
|---|---|
| Analytical set | Select: SET 1 to 4, or A4Rs |
| Urban Element | Select: Element 1 to 8 |
| (Supra) Component | Full name |
| Expert in charge of the component | Name and role in the project |
| Infrastructure expert (countercheck) | Name and role in the project |
| Date of assessment | |

| 2.Infrastructure Targeting [component level] | |
|---|---|
| **Questions** | **Answers** |
| 2.1 Is the component relevant for identifying (inadequate) infrastructure? | Yes [ ]<br>No [ ]<br>Not determined yet [ ] |
| 2.2 Select the aspects for which the component, or a part of its indicators, may be relevant | 1. Design and Construction [ ]<br>2. Operations [ ]<br>3. Coverage [ ]<br>4. Innovation [ ] |
| 2.3 Is the component relevant for infrastructure improvement policies? | Yes [ ]<br>No [ ]<br>Not determined yet [ ] |

| 3. Infrastructure Identification [name the indicator or the supporting indicator] | |
|---|---|
| **Questions** | **Answers** |
| 3.1 Does the indicator relate to a service delivered through a physical infrastructure interface? | Yes [ ]<br>No [ ] |
| 3.2 Does the indicator refer to 'hard' (tangible) aspects of infrastructure systems? | Yes [ ]<br>No [ ]<br>If no, go to 3.3 |
| 3.2.1 Does the indicator refer to physical coverage of infrastructure? | Yes [ ]<br>No [ ] |
| 3.2.2 Does the indicator refer to the spatial distribution of infrastructure? | Yes [ ]<br>No [ ] |
| 3.2.3 Does the indicator refer to the physical accessibility of infrastructure, e.g. for people with reduced mobility or through the connection to various transport modes? | Yes [ ]<br>No [ ] |
| 3.2.4 Does the indicator refer to the built quality of infrastructure (materials, construction techniques, redundant design, spare capacity etc.)? | Yes [ ]<br>No [ ] |
| 3.2.5 Does the indicator refer to the operational continuity (disruptions, damages, fatalities etc.) of infrastructure services? | Yes [ ]<br>No [ ] |
| 3.2.6 Does the indicator identify the location of infrastructure, e.g. in hazardous areas? | Yes [ ]<br>No [ ] |
| 3.2.7 Does the indicator refer to other 'hard' aspects of infrastructure systems? | Yes, please describe [ ]<br>No [ ] |

| 3. Infrastructure Identification [name the indicator or the supporting indicator] | | |
|---|---|---|
| 3.3 Does the indicator refer to 'soft' (intangible) aspects of infrastructure systems? | Yes<br>No | [ ]<br>[ ] |
| 3.3.1 Does the indicator refer to reasons for the inadequacy of infrastructure (development), e.g. geospatial settings, financial barriers? | Yes<br>No | [ ]<br>[ ] |
| 3.3.2 Does the indicator refer to temporal changes in the inadequacy of infrastructure, e.g. trend in food loss or water leakage? | Yes<br>No | [ ]<br>[ ] |
| 3.3.3 Does the indicator refer to the regulatory framework regarding infrastructure, e.g. building codes and standards compliance, enforcement and updating? | Yes<br>No | [ ]<br>[ ] |
| 3.3.4 Does the indicator refer to the maintenance and monitoring of infrastructural quality? | Yes<br>No | [ ]<br>[ ] |
| 3.3.5 Does the indicator refer to the storage and management of data? | Yes<br>No | [ ]<br>[ ] |
| 3.3.6 Does the indicator refer to policy and planning regarding infrastructure? | Yes<br>No | [ ]<br>[ ] |
| 3.3.7 Does the indicator refer to the inclusion of women and groups in vulnerable situations in decision-making? | Yes<br>No<br>If no, please explain why not: | [ ]<br>[ ] |
| 3.3.8 Does the indicator refer to other 'soft' aspects of infrastructure systems? | Yes, please describe<br>No | [ ]<br>[ ] |

| 2.Infrastructure Targeting [component level] | |
|---|---|
| **Level of analysis**<br><br>The articulation with the New Urban Agenda implies work at the following five levels. Specify whether the recommendation for action for resilience is supported by infrastructure at each of these levels. | **UN-Habitat thematic area of interest**<br><br>Areas of interest for addressing inadequate infrastructure, according to UN-Habitat's branch structure. Select every relevant one. |
| 4.1 Local implementable actions<br><br>Yes [ ]<br>No [ ]<br>If not, explain why: | 1. Urban legislation, land, governance [ ]<br>2. Urban planning and design branch [ ]<br>3. Urban economy [ ]<br>4. Urban basic services [ ]<br>5. Housing and slum upgrading [ ]<br>6. Research & capacity development [ ]<br>7. Risk reduction and rehabilitation [ ] |
| 4.2 Financing the urbanisation<br><br>Yes [ ]<br>No [ ]<br>If not, explain why: | 1. Urban legislation, land, governance [ ]<br>2. Urban planning and design branch [ ]<br>3. Urban economy [ ]<br>4. Urban basic services [ ]<br>5. Housing and slum upgrading [ ]<br>6. Research & capacity development [ ]<br>7. Risk reduction and rehabilitation [ ] |
| 4.3 Strategies, planning, design<br><br>Yes [ ]<br>No [ ]<br>If not, explain why: | 1. Urban legislation, land, governance [ ]<br>2. Urban planning and design branch [ ]<br>3. Urban economy [ ]<br>4. Urban basic services [ ]<br>5. Housing and slum upgrading [ ]<br>6. Research & capacity development [ ]<br>7. Risk reduction and rehabilitation [ ] |
| 4.4 Existing rules and regulations<br><br>Yes [ ]<br>No [ ]<br>If not, explain why: | 1. Urban legislation, land, governance [ ]<br>2. Urban planning and design branch [ ]<br>3. Urban economy [ ]<br>4. Urban basic services [ ]<br>5. Housing and slum upgrading [ ]<br>6. Research & capacity development [ ]<br>7. Risk reduction and rehabilitation [ ] |
| 4.5 Harmonisation with national urban planning<br><br>Yes [ ]<br>No [ ]<br>If not, explain why: | 1. Urban legislation, land, governance [ ]<br>2. Urban planning and design branch [ ]<br>3. Urban economy [ ]<br>4. Urban basic services [ ]<br>5. Housing and slum upgrading [ ]<br>6. Research & capacity development [ ]<br>7. Risk reduction and rehabilitation [ ] |

| 5. M&E | |
|---|---|
| **Questions** | **Answers** |
| 5.1 Are any infrastructural adequacy-related baselines used in the analysis? | Yes [ ]<br>No [ ]<br>If not, explain why: |
| 5.2 Are any infrastructural adequacy-related aspects monitored when implementing the recommendations for actions for resilience? | Yes [ ]<br>No [ ]<br>If not, explain why: |
| 5.3 Is any evaluation carried out in order to assess whether the recommendations were implemented? | Yes [ ]<br>No [ ]<br>If not, explain why: |

# 7.References

**1.**Bündnis Entwicklung Hilft and United Nations University - Institute for Environment and Human Security (2016). World Risk Report 2016. Berlin: Bündnis Entwicklung Hilft.

**2.**United Nations Development Programme (2005). Making Infrastructure Work for the Poor. Synthesis Report of Four Country Studies. Bangladesh, Senegal, Thailand and Zambia. New York: United Nations Development Programme.

**3.**United Nations Human Settlements Programme (UN-Habitat) (05/10/2018). Urban Basic Services Branch. Online page: www.unhabitat.org/our-secretariat/branches/urban-basic-services-branch (accessed on 05/10/2018).

**4.**United Nations Human Settlements Programme (UN-Habitat) (2011). Infrastructure for Economic Development and Poverty Reduction in Africa. Nairobi: United Nations Human Settlements Programme (UN-Habitat). p. 5.

**5.**United Nations Human Settlements Programme (UN-Habitat) (2015). Habitat III Issue Papers 18 - Urban Infrastructure and Basic Services, including Energy. Available online at: www.habitat3.org/wp-content/uploads/Habitat-III-Issue-Paper-18_Urban-Infrastructure-and-Basic-Services-including-energy-2.0.pdf (accessed on 09/08/2018).

**6.**United Nations Development Programme (2005). Making Infrastructure Work for the Poor. Synthesis Report of Four Country Studies. Bangladesh, Senegal, Thailand and Zambia. New York: United Nations Development Programme.

**7.**United Nations Conference on Trade and Development (UNCTAD) (2001). Infrastructure as an Agent for Economic Development. Available online at: www.oecd.org/sweden/2083051.pdf (accessed on 05/10/2018).

**8.**The Habitat II Agenda refers to basic infrastructure and services as "to include the delivery of safe water, sanitation, waste management, social welfare, transport and communications facilities, energy, health and emergency services, schools, public safety, and the management of open spaces". Source: United Nations Human Settlements Programme (UN-Habitat) (2015). Habitat III Issue Papers 18 - Urban Infrastructure and Basic Services, including Energy. p. 1. Available online at: www.habitat3.org/wp-content/uploads/Habitat-III-Issue-Paper-18_Urban-Infrastructure-and-Basic-Services-including-energy-2.0.pdf (accessed on 09/08/2018).

**9.**Following UN-Habitat's definition of basic services, infrastructure constitutes an underlying driver to fulfil the human rights stated in Articles 25 and 26 of the Universal Declaration of Human Rights:

"Article 25. (1) Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control. (2) Motherhood and childhood are entitled to special care and assistance. All children, whether born in or out of wedlock, shall enjoy the same social protection.

Article 26. (1) Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit. (2) Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms. It shall promote understanding, tolerance and friendship among all nations, racial or religious groups, and shall further the activities of the United Nations for the maintenance of peace. (3) Parents have a prior right to choose the kind of education that shall be given to their children."

Source: United Nations (1948). Universal Declaration of Human Rights. Available online at: www.un.org/en/universal-declaration-human-rights/ (accessed on 23/10/2018).

**10.**United Nations Human Settlements Programme (UN-Habitat) (2011). Infrastructure for Economic Development and Poverty Reduction in Africa. Nairobi: United Nations Human Settlements Programme (UN-Habitat).

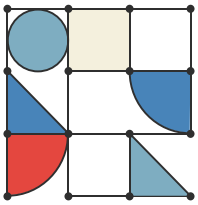
**11.**United Nations Development Programme (2005). Making Infrastructure Work for the Poor. Synthesis Report of Four Country Studies. Bangladesh, Senegal, Thailand and Zambia. New York: United Nations Development Programme.

**12.**United Nations (2017). New Urban Agenda. New York: United Nations.

**13.**United Nations Climate Change (15/10/2018). Paris Agreement - Status of Ratification. Online page: www.unfccc.int/process/the-paris-agreement/status-of-ratification (accessed on 15/10/2018).

**14.**Bündnis Entwicklung Hilft and United Nations University - Institute for Environment and Human Security (2016). World Risk Report 2016. Berlin: Bündnis Entwicklung Hilft.

**15.**United Kingdom Department for International Development (DFID) (2016). Introducing Infrastructure Resilience. Available online at: https://assets.publishing.service.gov.uk/media/57d6bc17e5274a34de000040/Introducing_Infrastructure_Resilience_25May16_rev_external.pdf (accessed on 06/08/2018).



If your organization would like to support or find out more
about UN-Habitat's Urban Resilience work, please contact us at

**info@cityresilience.org**
**www.unhabitat.org/urbanresilience**

**#UrbanResilience**

**/uresiliencehub**

# CITY RESILIENCE PROFILING PROGRAMME

UN HABITAT
FOR A BETTER URBAN FUTURE