



**CLEVER
Cities**

D4.3 Monitoring strategy in the FR interventions

Work Package	4
Dissemination Level	Public
Lead Partner	TECNALIA R&I
Due Date	30/06/2019
Submission Date	06/07/2020

Deliverable No.	4.3
Work Package	4
Dissemination Level	Public
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Date	06/07/2020
File Name	CLEVER D4.3 Monitoring Strategy in the FR interventions_vF2
Status	Draft
Revision	
Reviewed by (if applicable)	

This document has been prepared in the framework of the European project Clever Cities. This project has received funding from the European Union's Horizon 2020 innovation action programme under grant agreement no. 776604.

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1.1.1.1

This project has received funding from the European Union's Horizon 2020 innovation action programme under grant agreement no. 776604.

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List of Acronyms

ABC	Architecture, Building-engineering and built-environment Dept
AMAT	Agenzia Mobilità Ambiente e Territorio
AMB	Ambiente Italia s.r.l.
B	Building
BGB	Civil Code
BUE	Behörde für Umwelt und Energie
CAL	CLEVER Action Lab
CDM	Comune di Milano
CBA	Cost Benefit Analysis
CEA	Cost Effectiveness Analysis
CLEVER-SSQn	CLEVER Social Survey Questionnaire
DASTU	Department of Architecture and Urban Studies
DIPAS	Digital PARTICIPATION System
DOP	Digitalen OrthoPhotos
DRK	Deutsches Rotes Kreuz
ELI	Societa Cooperativa Sociale Eliante Onlus
FHH	Freie und Hansestadt Hamburg
FPM	Fundazione de Politecnico de Milan
FR	Front-Runner Cities
G4C	Green4Cities (project)
GIS	Geographic Information System
GLA	Greater London Authority

GMH	Gebäudemanagement Hamburg (Building Management Hamburg)
H2020	Horizon 2020 (EU program)
HCU	Hafencity Universität Hamburg
HH	Hamburg
HWWI	Hamburgisches Weltwirtschaftsinstitut Gemeinnützige GMBH
KPI	Key Performance Indicators
LGV	Landesbetrieb Geoinformation und Vermessung
LMP	Local Monitoring Plan
LMT	Local Monitoring Team
LSBG	Landesbetrieb Straßen, Brücken und Gewässer (Hamburg State Agency for Roads, Bridges and Waters)
N	Local area or neighbourhood
NBS	Nature Based Solutions
NCA	Natural Capital Accounting
OS	Open Spaces
PK47	Polizeikommissariat 47
PLDP	Public Life Data Protocol
POLIMI	Politecnico di Milano
PPP	Private Public Partnerships
RASCI	Responsibility, Accountability, Support, Consulted, Informed matrix
RFI	Rete Ferroviaria Italiana
SGD	Sustainable Development Goals
St	Station
STEG	STEG Stadterneuerungs- und Stadtentwicklungsgesellschaft Hamburg mbH

Sy	Schoolyard
TBC	To Be Confirmed
ToC	Theory of Change
TSIP	The Social Innovation Partnership
TUHH	Technische Universität Hamburg-Harbug
UCL	Univeristy College London
UIP	Urban Innovation Partnership
UKE	UniversitaetsKlinikum Essen
WHO	World Health Organization
WP	Work Package
WWF	World Wide Fund for Nature
YF	Young Foundation

1 Executive summary

This report falls under Work Package 4 of the CLEVER Cities project, which is focused on assessing Nature Based Solutions (NBS) impact by establishing and implementing a robust, long-term, integrated yet locally-adaptable co-monitoring framework and platform. As in D4.1, the approach for Key Performance Indicators (KPI) definition is underpinned by each city's timeframe, co-design process and co-monitoring programmes. This guidance report is a living document which will be updated and iterated throughout the life of the CLEVER Cities, culminating in a final version for wider dissemination.

The use of KPIs constitutes the back-bone of the CLEVER cities Impact Assessment Framework which will monitor and evaluate the effectiveness of the chosen NBS in the CLEVER Action Labs (CALs). The aim of having this monitoring framework is focused on three main goals: better informing decisions and planning processes; helping to track the progress of NBS interventions over time; and contributing to better reporting in cities.

It builds on previous deliverables submitted that have described the monitoring and evaluation objectives, the process of impact assessment in the CLEVER Cities and use of Theory of Change (ToC) as method for developing a shared understanding of desired outcomes and activities.

1. CLEVER Cities KPI selection process. A seven step KPI selection process (See Figure 1) has been developed and the first six initial points have been addressed between thematic experts and city partners reaching the point to identify a list of suitable KPIs. These need to be checked (last step under validation) to assure they meet the requirement to assess in an effective way the impacts of nature-based solutions (NBS).
2. Monitoring and assessment framework. A step has been taken towards the identification of those factors determining a successful impact of NBS associated to CLEVER challenges. Furthermore, a preliminary cross-analysis has been performed to determine which KPIs are common or very similar among CLEVER FR Cities in order to determine which outcomes or effects can be evaluated in a harmonious way, that is in the most comparable manner. In this respect to aid with the harmonisation of social derived KPIs, a CLEVER Social Survey Questionnaire (CLEVER-SSQn) has been created based on CLEVER FR Cities use models with a sound structure and metrics to characterise impact in terms of health and wellbeing and social cohesion and environmental justice.

3. Local Monitoring Plan (LMP). Work has been undertaken on the definition of key important aspects in the local monitoring plan such as the relevant stakeholders and their roles in the monitoring process, tools that will be applied for the KPIs evaluation and a preliminary schedule for the monitoring of the pre-greening scenario (before interventions). A synthesis of the LMPs that comprises a monitoring, data collection, evaluation and data storage plan is as well presented in Annex A. COVID-19 emergency situation has impacted the envisioned LMPs resulting mainly in the pre-greening monitoring delays and in the need to adapt the data collection methods or tools for social KPIs. As a result, on-line methods have become more relevant and necessary to overcome social distancing challenge. CLEVER Social Survey questionnaire was also adapted to the health emergency circumstances to diminish its bias.

In summary, this report describes i) the process of KPI definition from the identified specific regeneration objectives obtained through ToC to monitor and assess NBS, ii) the local monitoring plan details for each city and CAL and iii) other relevant considerations for the assessment approach such as existing information or description of factors affecting the assessment of the impact of NBS.

1. Introduction

In an increasingly urbanising world with pressures on finite resources, Nature Based Solutions (NBS) have been proposed as one of the ways that we can address and overcome some of the key challenges that cities face. These challenges have been recognised in the 2030 Sustainable Development Goals (SDG).

CLEVER Cities project will address various SDG at different level. CLEVER Cities project may specially contribute to:

- SDG 3: Ensure healthy lives and promote wellbeing for all at all ages, as one of the main CLEVER Cities challenges is to improve health and wellbeing of the population by the implementation of NBS in the regeneration projects.
- SDG 10: Reduce inequality within and among countries as environmental equality is also key in this project. CLEVER Cities will empower and promote the social and economic inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status. This will be.
- SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable. CLEVER Cities aim to provide universal access to safe, inclusive and accessible, green and public spaces for all.
- SDG 13: Take urgent action to combat climate change and its impacts by strengthening resilience and adaptive capacity to climate-related hazards such as heat-waves or pluvial flooding using NBS.
- SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. CLEVER Cities will aid integrating NBS, ecosystem and biodiversity values into local planning.

Furthermore, to a lesser extent CLEVER Cities will contribute to achieving other SDGs:

- SDG 5: Achieve gender equality and empower all women and girls.
- SDG 6: Ensure availability and sustainable management of water and sanitation for all.
- SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
- SDG 12: Ensure sustainable consumption and production patterns.

- SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
- SDG 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development.

It is recognised that the evidence-base to support the use of NBS over more traditional ‘grey’ solutions, specifically in terms of addressing social or economic problems, needs further development. Indeed, the objective of contributing to the EU reference Framework is one of our core objectives for CLEVER Cities. As such, our proposed NBS interventions need to be supported by measurable and robust data that assesses and validates the envisioned effectiveness and impact.

In the case of CLEVER Cities, the envisaged impact is to use NBS to regenerate the economic, physical, social and environmental conditions in urban neighbourhoods. The identified regeneration challenges within CLEVER Cities pursue the improvement of 1) health and wellbeing of residents, 2) sustainable economic prosperity, 3) social cohesion and environmental justice and 4) citizen security.

In order to evaluate and monitor the effectiveness of selected NBS a monitoring and evaluation plan is required. The monitoring and evaluation plan will help to assess the impact of the desired outcomes within the CALs in the Front Runner (FR) CLEVER Cities, during the life of CLEVER Cities and beyond.

The process of developing the monitoring and evaluation plan has been challenging for a number of reasons; one critical point is the limited financial and staff resources to carry out the ideal monitoring plan. It was recognised that we must be strategic in developing the plan, and only apply resources to areas where we can clearly attribute change as a result of CLEVER Cities activity, and where we can enrich the current evidence base, and avoid repeating evaluation of already known benefits. Furthermore, the broad range of potential NBS the cities will deploy require significant technical knowledge and specialist advice and support to define the most appropriate performance indicators.

CLEVER Cities is committed to tackling these issues by taking a co-creation approach to defining the KPIs; considering multiple stakeholder’s views and research partners guidance, by appointing Thematic Experts from within the project consortium. These experts have been working closely with the cities to develop a framework to better understand the impact of NBS in addressing urban

challenges. Given that this thinking is still relatively new¹, the complexity of this should not be underestimated.

Thus, the basis on where, when and most importantly what and how is still blurred. The CLEVER Cities' KPI definition process is in itself relatively innovative and new indicators and methods of monitoring will be required and implemented. CLEVER FR Cities have, through the Theory of Change² (ToC), identified the objectives and outcomes of three regeneration labs (CALs) as a first step on KPI definition. This is important as FR Cities will define and create value by establishing the most appropriate KPIs based on the desired NBS impacts.

Apart from KPI definition the integration of CLEVER KPIs into the local monitoring strategy is vital. Relevant practical matters must be considered within each city such as how to involve stakeholders and agreeing roles, tools & schedules.

¹ https://ec.europa.eu/research/environment/pdf/renaturing/eklipse_report1_nbs-02022017.pdf

² <https://undg.org/wp-content/uploads/2017/06/UNDG-UNDAF-Companion-Pieces-7-Theory-of-Change.pdf>

2. CLEVER Cities KPI definition framework

2.1. Framing the definition of monitoring criteria and indicators

In CLEVER Cities the monitoring and evaluation plays an important role to assess the effectiveness of the nature-based interventions and to provide guidance and advice for replication in the fellow cities. Furthermore, it facilitates decision making when considering on upscaling measures beyond the scope of the project.

To be able to measure relevant outcomes and characteristics of the implemented interventions, appropriate and meaningful evaluation criteria and indicators have to be selected.

Since the finding of suitable criteria and indicators is often arbitrary, their selection process has to be structured and rationalised. This helps to ensure the comparability of the NBS evaluation results. In addition, the replicability of the criteria and indicator selection process is increased. However, given the complexity of NBS it is difficult to generalise the identification and selection of suitable assessment criteria and indicators. The number of variables is huge and case-dependent.

Nevertheless, attempts of overarching NBS evaluation frameworks have already been developed as part of other EU funded Horizon 2020 projects, *e.g.* the EKLIPSE consortium, UNALAB or Connecting Nature projects have worked or are still working such frameworks. Also, on the European level efforts are being pursued via the ThinkNature Taskforce. But up to now no generally accepted monitoring framework is existing. The CLEVER Cities project has revised the previously published results and further developed them to propose an advanced framework for the definition of monitoring criteria and indicators (See Section 2.2). This framework is presented to provide a theoretical basis and structure for the practical work on the definition of indicators in the CLEVER Cities project.

In order to facilitate the understanding of the following descriptions, some important terms are defined below. First of all, it is clarified how the term “nature-based solutions” is understood in the context of CLEVER Cities project. The term nature-based solution is here defined as given in the CLEVER Cities project deliverable D1.2³:

³ Knoblauch et al. (2019). Multi-level policy framework for sustainable urban development and nature-based solutions -- Status quo, gaps and opportunities. Deliverable 1.2, CLEVER Cities, H2020 grant no. 776604

Nature-based solutions are systemic interventions that can be inspired by or support nature in addressing various societal challenges, such as climate change mitigation, water management, land-use and sustainable urban development. This entails planning and designing with natural features, such as trees, plants and green spaces, in a way that can help address the aforementioned urban challenges.

Two further important terms that are essential for the following descriptions are “criteria” and “indicators”.

We define the term “criteria” as a distinguishing feature or characteristic of a system, product or process that is considered to be important. Whereas “indicators” are measures that are specifying criteria. One criterion can have more than one indicator. An indicator shows the direction of change and can be a quantitative or a qualitative measure. The term “KPI - Key Performance Indicator” is used in the following to point out very important indicators characterising the respective evaluation criteria. In the CLEVER Cities project KPIs will be used to monitor and evaluate the project related outcomes and processes. The framework attempts to provide a guide for the definition of the KPIs and can at the same time be used to observe the project development process. The project development process is as important as the results and there is the necessity to take record of it.

2.2. Framework development: how we got here

This framework looks at the work undertaken within the project and proposes a way to structure it in a formal way. Thus, this section explains the steps of the process. This information is included here for the sake of transparency and to keep track of the work done.

Starting from what is described in Section 2.1, it was necessary for the CLEVER Cities project to develop a framework that structures the criteria and indicators definition for the evaluation of interventions. In the second half of the first year, the team started to develop a framework to support the process of key performance indicators identification.

At this point, an extensive literature review was done, building on the work undertaken in Task 1.1 (and it is still ongoing) to firstly understand the concept of NBS and its components and to gather information on related indicators. The ToC method revealed itself to be extremely useful in providing a temporal and logical structure for the KPI selection process.

CLEVER Cities KPI selection has followed a process containing seven steps as presented in Figure 1. Once the CLEVER urban regeneration challenges had been identified, a reflection process to determine desired changes in each CAL took place (step 2 to 4). ToC has been used to work towards the definition of KPIs creating an outcome-based framework or logic chain that helps identify what type of intervention or activities needs to happen to achieve the long-term goals or impacts.

The methodology behind ToC is briefly described in Deliverable D4.1 and the results of this process for KPI definitions are described within this deliverable. However, the co-creation of KPIs involves three additional steps: preparation of a list of general KPIs based on topics and outcomes by Thematic Experts (step 5) followed by bilateral meetings between the CLEVER FR Cities and Thematic Leaders to adapt them to the specific needs of each CAL (step 6). Step 7 promotes the assurance of KPIs to meet the requirements to assess, in an effective way, the impacts of NBS as well as the validation of KPIs. This dialogue shall primarily be held between the principal CLEVER FR Cities interlocutor and Local Monitoring Team (LMT) and/or other relevant key players.

For the identification of appropriate KPIs for the ToC outcomes (step 5 from Figure 1) various tasks were needed: specifically a proposal of KPIs by Thematic Experts combined with various forms of discussions (a workshop held in Bilbao as a starting dialogue followed by bilateral meetings between CLEVER FR Cities and Thematic Leaders of each challenge).

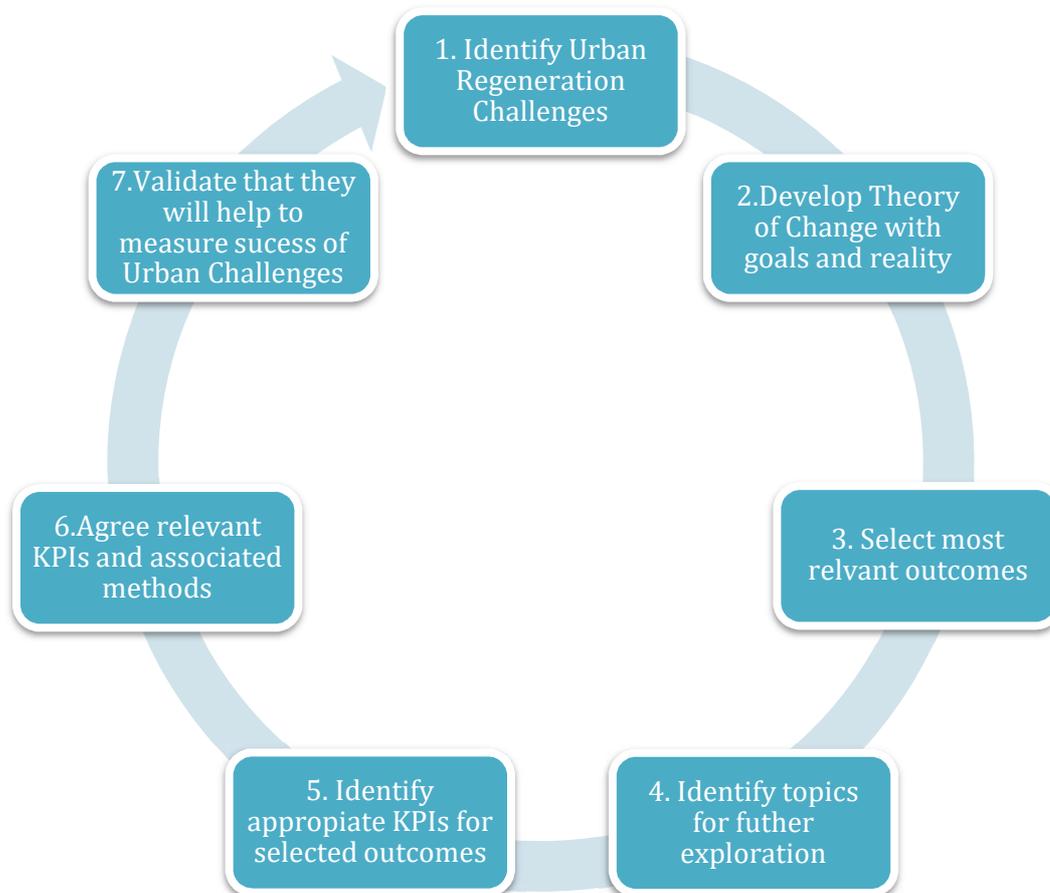


Figure 1. CLEVER Cities KPI selection process

2.2.1. Theory of Change (ToC): From long-term goals to necessary preconditions

It is important to consider the purpose of the evaluation as well as the audience for the results and potential impact of the findings. This can help guide where to prioritise resources and decide which aspects are relevant. Within CLEVER Cities the focus has been placed on the NBS outcomes, outputs and co-creation process evaluation (the latest in the context of WP2). To elucidate the KPIs related to outcomes and outputs, several ToC were developed for each city..

The Theory of Change:

- Explains the process of achieving social change by outlining casual links.
- The changes are mapped in an 'outcomes pathway' showing each outcome in relation to others and chronologically.
- Fills in 'the missing middle' between the intended goal of a project and the context it is being implemented in.

- Focuses users on choosing outcomes before designing the interventions that will achieve these outcomes.
- Is a useful tool for engaging multiple stakeholders at project outset.

To begin the process of establishing city ToCs a thematic expert, specialised in social research, facilitated a webinar on how to run local Theory of Change workshops with project teams and stakeholders based within cities. The webinar focused on:

- How the monitoring and impact measurement process would be structured in terms of roles and responsibilities.
- How WP4 and WP2 would collaborate.
- The process which would be followed to establish an impact measurement framework and set the KPIs for each CAL.
- A detailed guide to Theory of Change and how to conduct workshops in each city.
- A summary of the outputs which were required and by when.

During the webinar, each city was provided with a workshop guide to then implement with in-person groups. The guide focused on steps needed to create a ToC – first by establishing the impact (or goal) for each CAL and then working backwards to detail the ‘reality’ of each CAL including existing challenges or assets that could be leveraged to implement NBS. After discussing the reality, groups were encouraged to identify short, medium- and long-term outcomes that would be necessary to achieve intended impact. They then worked back through outputs and inputs.

Each city was able to decide who was involved in ToC workshops and how many to implement. Thematic experts provided feedback on draft ToCs created at local workshops to Milan, London and Hamburg as well as additional support to Malmö to design their own local ToC stakeholder workshop.

For example, in the case of London, Young Foundation were able to facilitate the ToC workshop with the project team and stakeholders from Peabody, GLA and Groundwork in-person (See Figure 2). The session allowed time for the articulation of the impact, reality and outcomes for each CAL and the draft ToCs were then finalised with the core project team following the workshop.

ToCs continued to be refined as cities worked towards creating their local monitoring plans and outcomes identified in the ToCs were integrated into LMPs.

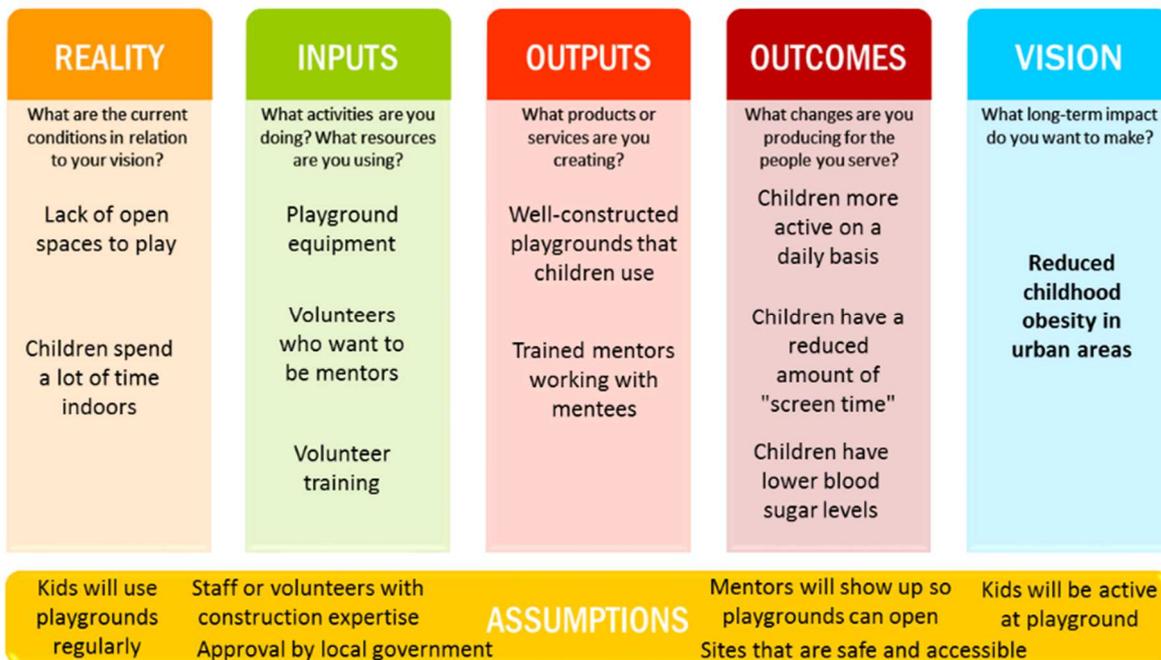


Figure 2. A scheme of the Theory of Change's methodology. It shows the kind of information that should be included by cities under each heading. Note: this scheme is incomplete and was used as a guide, rather than an example of a complete ToC. Source: Young Foundation

In the context of co-creation, some indicators to assess the co-creation process have been identified (WP2). These co-creation process indicators provide an added value to the CLEVER project as they will monitor the contribution of co-creation to:

- Create a community with sense of belonging to make decisions about NBS and to become aware about co-management.
- Obtain lesson learned to inform for future NBS interventions.
- May contribute to the overall challenge of social cohesion and environmental justice.

The ultimate goal is enhancing shared governance at the different levels of the governance structures in the projects:

- Urban Innovation Partnership (UIP): to evaluate the stakeholders' engagement in terms of form, scale and duration.
- CAL: to assess the co-creation pathway governance: co-design, co-implementation and co-development.
- Co-creation outcomes: to evaluate social impact and the process spill-overs.

These Indicators will be evaluated by the cities considering the general framework about monitoring in the project, that is showed in the Table 1.

Table 1. Indicators evaluation based on general framework about monitoring in the project.

	Quantitative	Qualitative
Process Indicators	<ul style="list-style-type: none"> • Openness, inclusivity, transparency • Operational flexibility, adaptability, efficacy • Engagement: participants, users, applicants, organizations, volunteers • Modalities: meetings, videos, links, media • Usable outputs, projects, products, time, area, unexpected choices 	Satisfaction of participants regarding all phases of the process, the outputs and the impact
NBS Impact Assessment KPIs	<ul style="list-style-type: none"> • Achieved CLEVER Cities main challenges • Achieved inclusivity in decision-making (shared govern.) 	

Regarding the methods to assess these indicators will be mainly the following:

- Feedback from surveys, questionnaire, interviews
- Collection of easy data: counting participants (registrations), stakeholder Mapping

These indicators will be finally selected and evaluated in the context of the WP2, nevertheless, they will be part of the LMP. Although co-creation process is not part of the NBS impact assessment it certainly can influence it.

2.3. Local workshop ToC outputs

This section presents the ToC outputs and includes key points discussed in the workshop held in Bilbao among CLEVER FR Cities and thematic experts regarding the expected outcomes.

2.3.1. HAMBURG

CAL 1, CLEVER Corridor, is intended to interconnect green infrastructure creating a network or corridor of NBSs. This corridor aims to be a hub for social interaction among different groups, both in the process of creating it and a legacy after the project ends. This regeneration challenge also envisions NBS as a key element in the redefinition of the connection between city and nature. Figure 3 depicts the outcomes that are sought for CAL 1. After the Bilbao workshop in April 2019 it became more evident that the use of green space, in terms of encouraging people to spend more time spent outdoors, should be reflected in the evaluation of the expected outcomes.

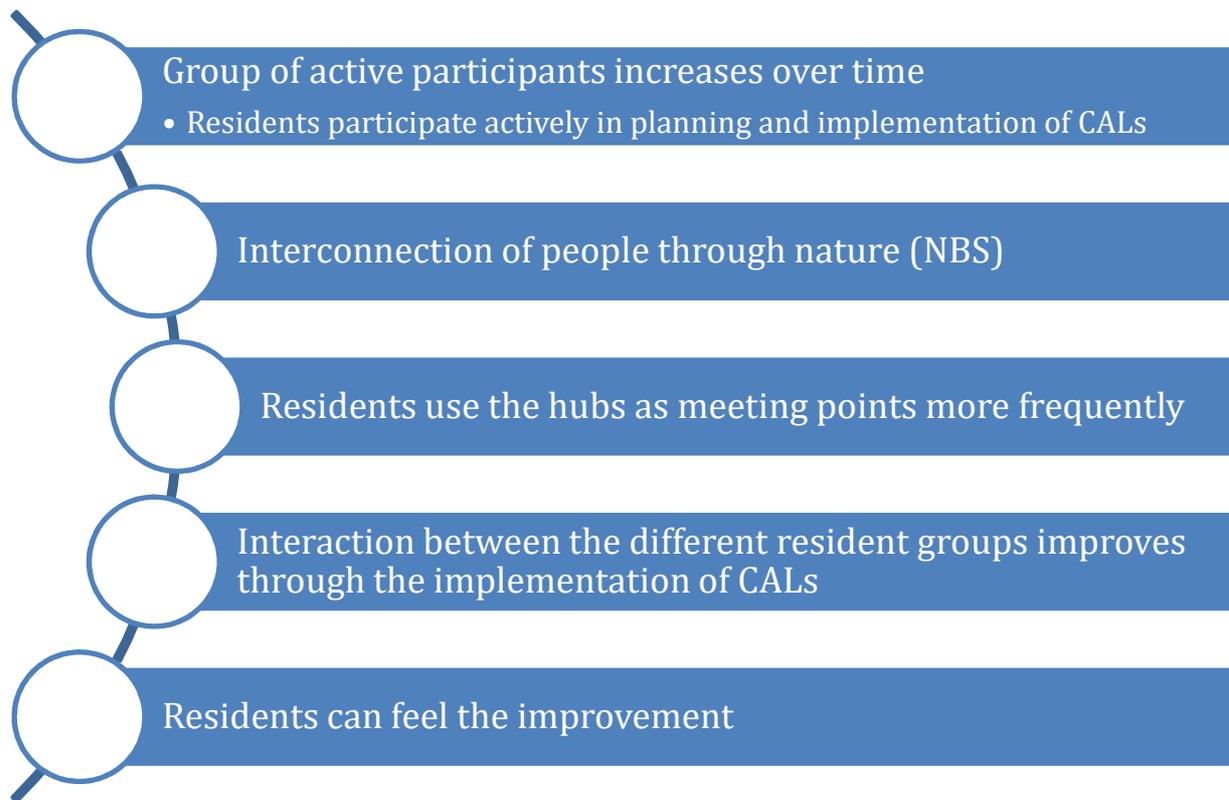


Figure 3. Desired outcomes highlighted in the ToC process for CAL1 (CLEVER Corridor) in Hamburg

CAL 2 -green roofs and façades- is intended to be a crystallization project to experience green in a new dimension, for example, re-fitting buildings to become natural spaces. Green roofs and façades can improve the liveability of the districts and contribute to restore and enhance biodiversity or new habitats. Figure 4 depicts the outcomes that are sought for CAL 2. After the Bilbao workshop in April 2019 it became more evident that the ought to create a more liveable city for everyone including plants and animals should be reflected in the evaluation of the expected outcomes.

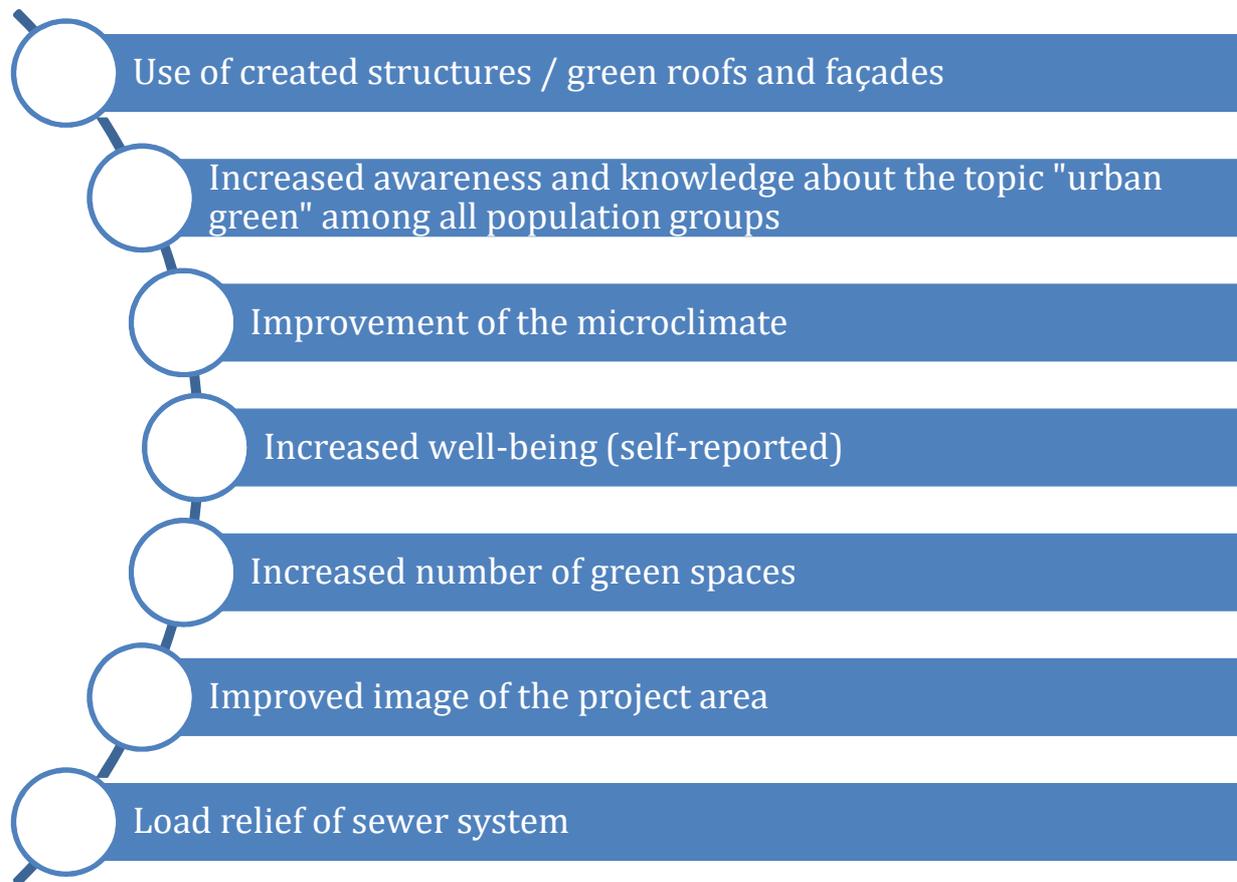


Figure 4. Desired outcomes highlighted in the ToC process for CAL2 (CLEVER Green roofs and façades) in Hamburg

CAL 3 -CLEVER School edible gardens- is intended to enhance the sustainability of the schools by increasing the cohesion and involvement of the community, raise awareness and encourage behavioural change to improve overall wellbeing. The community cohesion is sought by linking school pupils and their families with elderly residents around the school creating spaces where people like to share and exchange experiences. This project aims to support pupils in their personal growth to become responsible, independent, self-reliant and self-aware in terms of sustainability. The project aims to act as a catalyst to encourage more sustainable living. The improved quality of green spaces and higher social cohesion may increase the wellbeing among residents in the neighbourhood. Figure 5 depicts the outcomes that are sought for CAL 3. After the Bilbao workshop in April 2019 it became more evident that the city also pursues competences in healthy food and food growing among the pupils. Thus, the increase of local food growing, and number of people involved in the food growing could reflect two of the desired outcomes. However, the co-creation process led to the redefinition of some of the outcomes emerged during

the ToC. For example, biodiversity despite being a key issue was not further developed, as it was considered that the scale of the intervention may pose a great challenge to foresee significant changes.

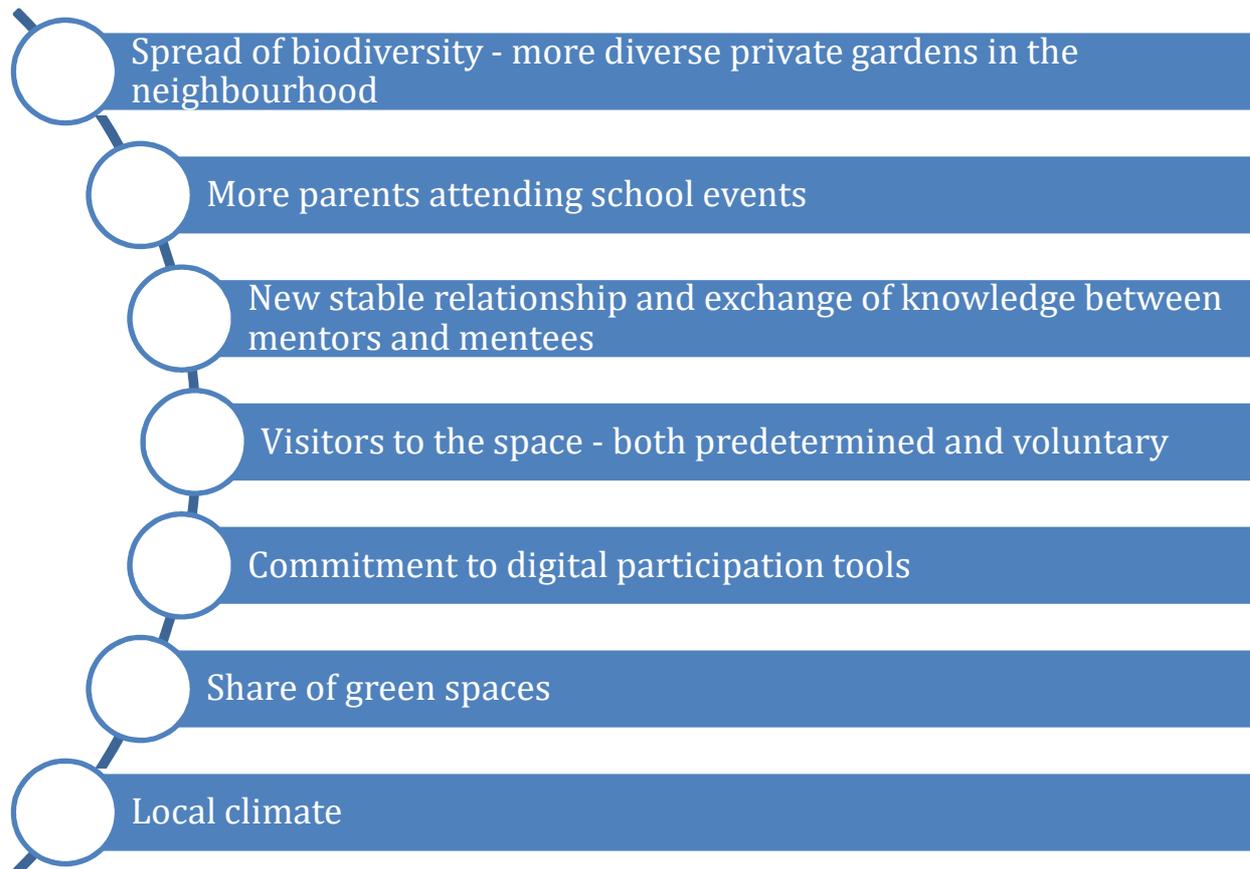


Figure 5. Desired outcomes highlighted in the ToC process for CAL3 (CLEVER school edible gardens) in Hamburg

On the other hand, the ‘commitment to digital participation tools’ and ‘local climate’ were excluded in later case definition as the focused was placed on the increase knowledge of natural cycles (new outcome being: better knowledge on natural cycles/materials cycle) and knowledge exchange about gardening between schools in the project area (new outcome being: increased knowledge transfer in terms of gardening between the schools in the project area).

Hamburg has identified several assumptions:

- There will be a green schoolyard and the discussion doesn’t get stuck in detail.
- Families and neighbours are open for cooperation.

- Whole topic of greenery and plants is attractive for pupils and they have the power of endurance to wait for blooming plants and crop.
- Critical mass of participants is reached.

2.3.2. LONDON

CAL 1, this CAL will undertake significant qualitative research to better understand how people use public spaces, the issues they face, the ideas they have to improve them and ultimately co-create solutions to common urban challenges. It will monitor how people move about the streets and the types of activities that people undertake, and how this might change as the spaces are improved.

It is hoped that the creation of greened public spaces that are improved and connect better to form a network of pedestrian and nature-friendly spaces will help Thamesmead's residents to relate better to the wider landscape, including, for example, the extensive riverside of the Thames estuary which is currently unknown to most residents. In particular, it will help young people and children to attain a better understanding of the significant and extensive areas of greenspace in their part of the city which can provide Thamesmead a unique identity. Together with the other CALs and the many improvement projects underway in Thamesmead, the CLEVER Cities programme will work to co-create and to evidence how to use the natural world to support healthier and happier residents.

Table 2 depicts the outcomes that are sought for CAL 1.

Table 2 - Desired short-term and long-term outcomes highlighted in the ToC process for CAL1 in London

Outcomes	
Short Term	Long Term
More active residents	Thamesmead has healthier Residents
Improved social networks	Thamesmead feels safer environment
More people from different background have positive experiences when using public spaces	Public spaces meet community needs
Communities are motivated to participate in civic action	More people are outside more often and for longer
Greenspaces more diverse and activated	Residents value the open space more

Outcomes	
Short Term	Long Term
Increased knowledge of Thamesmead's nature	Improved sense of belonging
Use of greenspaces embed in everyday activities	Public spaces in Thamesmead are seen as desirable
Greater awareness of existing green and blue spaces	Reduced resident transience
People have capability (knowledge and skills), opportunities and motivation to use greenspace	Evidence base to demonstrate value of regeneration
Easier to navigate and feel safer	Influence other projects to use more NBS

CAL 2 -Activating Southmere Lake- will reach out to the wider community of Thamesmead with the aim of bringing Southmere Lake to the attention of residents of Thamesmead and into their day-to-day lives. Cultural and sports activities, that have wide appeal, will act as the principal catalysts for the collaborative design process for the lake and its surrounding area. Table 3 depicts the outcomes that are sought for CAL 2. After the Bilbao workshop in April 2019 it was evident that active mobility is a key element, together with social engagement and cohesion, in the regeneration of this CAL. CAL 2 also seeks to improve the environmental quality of the lake i.e. cleaner water.

Table 3. Desired short-term and long-term outcomes highlighted in the ToC process for Cal 2 (Activating Southmere Lake) in London.

Outcomes	
Short Term	Long Term
The lake and its surrounding areas provide recreation and leisure facilities to encourage more active residents	More commercial activity in area by lake
Swimming, boating and fishing are all easily accessible activities in Southmere	Land value in areas adjacent to the lake is increased
Residents have more civic pride in their neighbourhoods	Southmere lake is destination for people outside of Thamesmead
Residents are active in community events and	The lake is seen as a shared asset bringing old and new communities together
Residents feel included in decision making	New and old communities are integrated and cohesive
NBS supports better wayfinding in Thamesmead creating a more navigable neighbourhood	Improved wellbeing by daily contact with nature
New approaches to monitoring biodiversity are developed and proved	Biodiversity is improved
Residents are more engagement and aware of Thamesmead's wildlife	Resident care for NBS spots over the long term
Local residents are active in maintaining and improving the lake and its sounding areas	Reed bed water project is a success and is replicated in other places in London
Water quality in the lake is improved	Missed connections in the catchment area are resolved

CAL 3 -greening unusual spaces- is oriented to increase the green surface of the neighbourhood by greening spots such as walls, balconies, roofs, walkways, and the incidental spaces that are often underutilised. Greening unusual spaces aims at contributing to greener, more interesting, more active and safer, contributing to healthier, more connected communities by diminishing the presence of the grey urban landscape and increasing daily contact with nature. *Table 4* depicts the outcomes that are sought for CAL 3. After the Bilbao workshop in April 2019 it was evident

that an increase in the engagement of community to improve the neighbourhood and in the sense of ownership of outdoor spaces is sought. Security issues should also be considered.

Table 4. Desired short-term and long-term outcomes highlighted in the ToC process for Cal 3 (Greening unusual spaces) in London.

Outcomes	
Short Term	Long Term
How to create green spots is better understood	Greening grey spaces is not considered onerous
Greening grey spaces is demonstrated through realistic solutions	Having green spots in neighbourhoods is valued by housing providers, businesses, residents
More NBS spots appear around Thamesmead making it feel more beautiful and cared for	NBS 'spots' can be rolled out at scale
	Residents train other community members to plant and maintain greened spots
Residents are confident to plant and maintain greened spots	Residents understand and value NBS
Residents have more civic pride in their neighbourhoods	Resident care for NBS spots over the long term
NBS supports better wayfinding in Thamesmead creating a more navigable neighbourhood	Improved wellbeing by daily contact with nature

2.3.3. MILANO

CAL 1 dedicated to increase the green surface of the city by augmenting green roof and green wall cover which aims at improving environmental quality of life and reduction of climate risks in a significant way. Figure 6 depicts the outcomes that are sought for CAL 1. After the Bilbao workshop in April 2019 it was evident that the climate risks to address correspond to urban heat island and pluvial flooding and at the same time increasing people wellbeing through the social and recreational use of the roof.

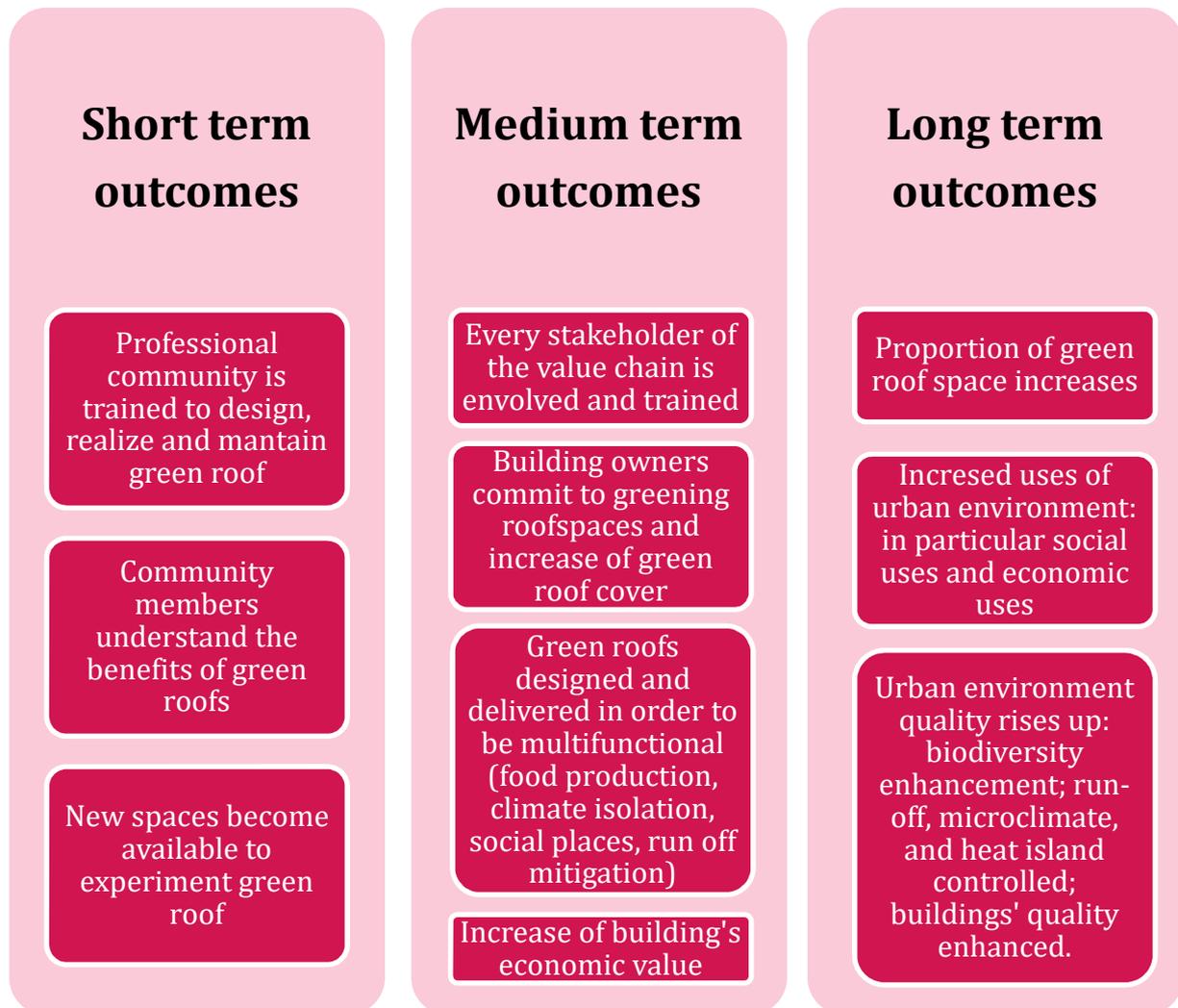


Figure 6. Desired outcomes highlighted in the ToC process for CAL 1 (Green roofs) in Milano

CAL 2, Giambellino intervention, is intended to create new multifunctional green services that improves the sense of belonging to the area where innovation and social protection are boosted. The expected outcomes are highly linked to a change of the residents' model where an increment of the attractiveness of the whole neighbourhood is pursued. Two key elements within this CAL are i) the change in perception of the area and ii) the typologies of uses in the space through new urban furniture's and NBS interventions that help visualize the change of uses, and particularly their multifunctional uses. Figure 7 depicts the outcomes that are sought for CAL 2. After the Bilbao workshop in April 2019 it became more evident that the health and wellbeing benefits are meant to be evaluated from the psychosocial perspective.

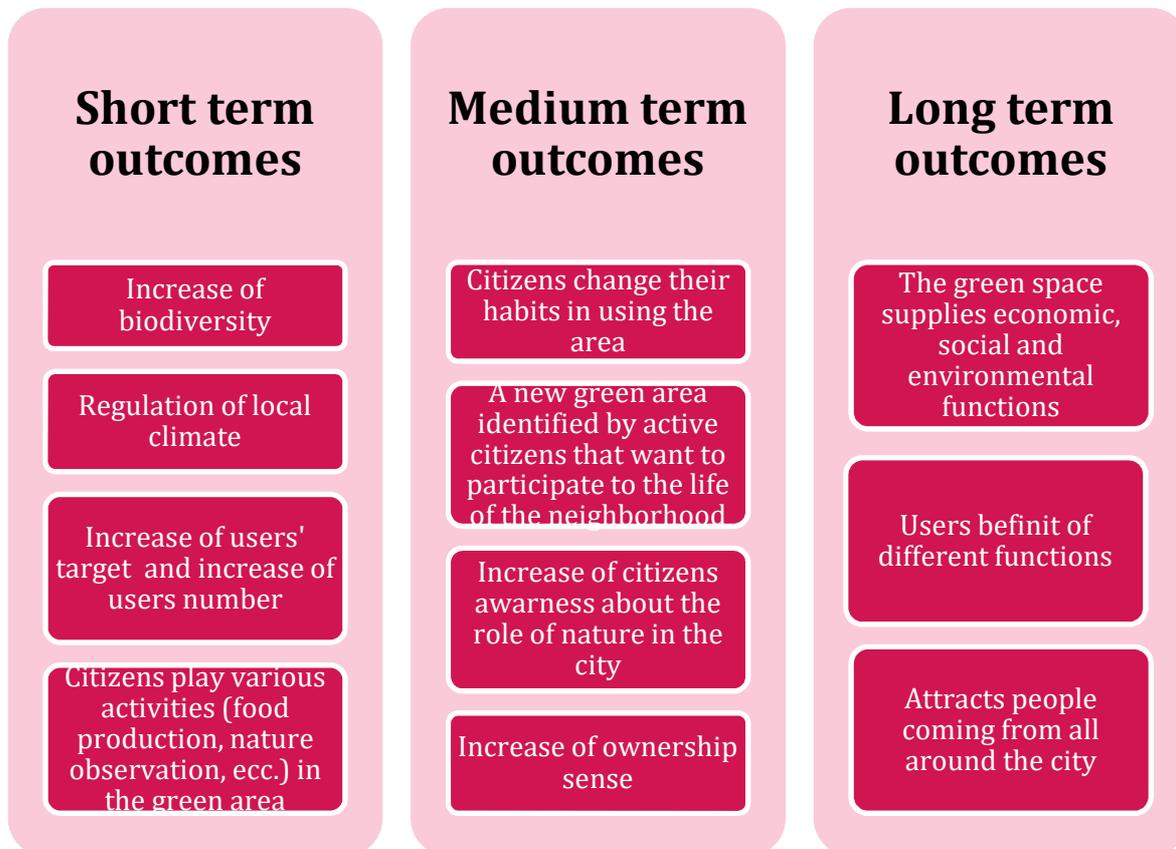


Figure 7. Desired outcomes highlighted in the ToC process for CAL 2 (Giambellino) in Milan

CAL 3, Tibaldi train stop intervention, is envisioned to help change the environmental quality and social impact in the neighbourhood through the realisation of this new public infrastructure. The expected outcomes are proposed for two target population: passengers/ commuters and the residents nearby Tibaldi Station. As for CAL 1 and 2, Tibaldi train stop (CAL 3) aims at improving the quality of life by environmental regeneration and economic indicator improvement, respectively, through NBS. Figure 8 depicts the outcomes that are sought for CAL 3. After the Bilbao workshop in April 2019 it became more evident that the vision for Tibaldi Station included the following points:

- A public space with a relaxed atmosphere comes in as “visually improved, shared, green and well-perceived micro-climate’ for both the local residents and the passengers in transit waiting for the trains with the possibility to monitor the trains flux.
- Transform the problem of the train line as barrier into an opportunity to increase a quality of life in the neighbourhood in general.
- Environmental improvement as an outcome from regeneration of the train station and placement of noise barrier.

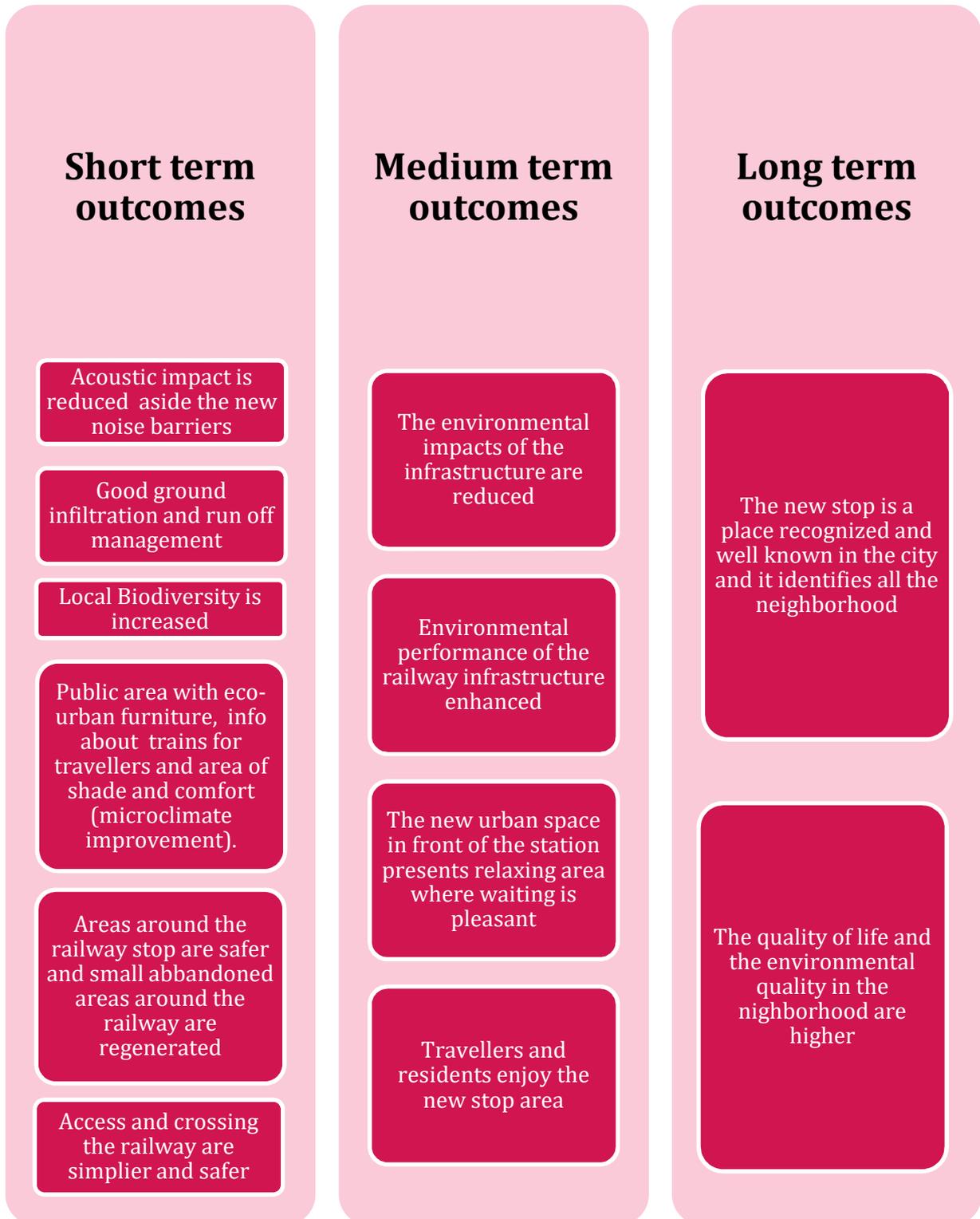


Figure 8. Desired outcomes highlighted in the ToC process for CAL 3 (Tibaldi train stop) in Milano

2.4. The process of identification of KPIs from selected outcomes and goals

The definition of the appropriate KPI to describe and assess each of the selected outcomes resulted from the ToC has not been a trivial procedure. It has been an iterative process between CLEVER Cities partners, their stakeholders and CLEVER research partners. This success of this process has been as a result of many scoping, consultation, and validation meetings. There have been over 11 meetings and 28 project development emails between the front runner cities and the research partners in the last nine months prior to this deliverable. The following subsections describe the main overall steps undertaken on this path towards the definition of KPI.

2.4.1. Developing indicators: Screening of indicators based on topic

Once the ToC workshops revealed the desired goals and outcomes for each of the CALs, the definition on how those outcomes were to be assessed started by reviewing KPIs from other projects and research studies. These were organized by topics and mapped to our CLEVER regeneration challenges. This was led, by the Thematic Experts to help the cities to identify and develop KPIs that would help to measure their desired impact. Then, CLEVER FR Cities, selected the pertinent topics for each of their CALs and mapped a number of example indicators across, to help build the picture of what we were trying to achieve. These indicators were then adapted to best meet the cities' needs and resources. However, topics and their associated KPIs needed to be "translated" to characterize the desired outcomes.

2.4.2. Developing indicators: Correlating outcomes with topics

Since all of the work that was developed during the ToC was devoted to achieving a transformation based on expected outcomes, the information was re-structured and topics were repurposed according to desired outcomes (See example of outcomes in Table 5). An extended version of Table 5 with proposed KPIs was the basis for discussions in the workshops in Bilbao and subsequent discussions to start validating what and how to monitor change. This challenging exercise needed time (several months) to fully understand the nuances related to the KPIs, especially those more linked to psychosocial aspects. Social KPIs related to NBS are less explored than environmental KPIs, thus, several reflection periods were required to evaluate which KPIs were most relevant (it mainly took place in step 2.4.4 under the questionnaire development). At this stage the identification the KPIs that fully capture the desired change in the

regeneration projects was achieved, but not the definition of the metrics associated to the social KPIs.

Table 5. Example of the re-structure of KPIs based on the linkage of topics with outcomes.

Topics	Outcome	Example of KPI
Use of function	Increase in local food growing	Gardening space per area
Mental & Physical health	Improvements in fitness/ physical health	Physical activity in CALs
	Increase in walking	Number of individuals walking and cycling in and around areas of interventions
	Improvements to mental health	Self-reported mental health status
	Reduced stress and anxiety	Self-reported stress and anxiety

The three CLEVER Cities experienced similar paths towards the KPI definition. Nevertheless, the specific description for each of the CLEVER FR Cities is presented below.

HAMBURG

Suggested and pre-selected lists of topics were matched to the desired outcomes (ToC), not only of the CALs, but to every single intervention of the 3 CALs. This resulted in a very long list of topics and related KPIs that was reduced afterwards step by step by concentrating on the most suitable ones in order to evaluate the progress towards the relevant urban challenges.

The translation of social outcomes into a set of measurable indicators required an extensive process with various stakeholders' implication in the co-creation of impact KPI. On the contrary, *e.g.* environmental KPIs development was rather immediate after the thematic experts listed several KPIs based on topics due to much mature area of knowledge. The selection process of social KPIs was guided by the CLEVER Thematic Expert, however Hamburg City partners distilled the dimensions and metrics to finally be considered. Outcomes were disaggregated to make sure that indicators were relevant across the objectives of Hamburg's multiple stakeholder groups.

LONDON

Working collaboratively with the CLEVER thematic experts, London reviewed benchmarked KPIs with other research and proposed several KPIs associated to topics. This work was progressed by commissioning some support from The Social Innovation Partnership (TSIP). This organisation is part of a wider evaluation team that Peabody have commissioned to measure the impact of their current investments, Thamesmead wide.

TSIP took all the outputs from the ToC and looked to reduce and refine the outcomes, so there was clarity to what CLEVER cities was trying to achieve, and to ensure that it also aligned with the strategic ambitions that Peabody have. After undergoing several iterations of logic chains via 1-2-1 meetings and workshops with the CLEVER Team, the following outcomes were agreed, and work as a shared vision for each of the CALs.

4. South Thamesmead open spaces are vibrant and well used
5. Nature Based Solutions interventions have positive effects on local environment
6. South Thamesmead's communities are socially resilient
7. Residents feel safe and secure in South Thamesmead
8. Residents are healthy, happy, and active
9. Project demonstrates the value of Nature Based Solutions to all stakeholders

Each of these outcomes were then reviewed and the method of how to measure if these outcomes have been achieved discussed. The final set of indicators were selected based on the principles of; measure what is possible given the resources of the project; use existing data collection where possible; benchmark indicators; only measure what will help tell the story of change. These indicators are heavily caveated by the fact direct attribution to the changes as a result of CLEVER Cities is highly difficult as other relevant on-going project within the area are taking place at in the same timeframe. To rectify this, several qualitative activities are planned, to build a richer more nuanced picture.

MILAN

In Milan, during ToC workshop emerged that a significant part of monitoring data will be qualitative and social surveys analysis. By the same time, since experimental NBS in the built environment, particularly Green Roofs and Walls in CAL1, and Green Walls in CAL3 - Tibaldi train stop, are improving performances in heat island mitigation and water runoff reduction, also quantitative

analysis and physics measurement are envisioned, particularly spot measurements, considering the small scale of these interventions. The enhancement in urban biodiversity through NBS (bird gardening, orchards, etc.) designed to maximize social impact and biodiversity will be monitored in particular in CAL2. Different studies investigated effects of biodiversity on well-being and psychological health. Designing CAL2 is focused on strategies to improve people's connection with nature in urban green spaces. The designed NBS (bird gardening, orchards, wild meadows) will promote social and educational activities, such as observation and recognition of birds and pollinators, and upskilling greenspace users to recognize elements of the natural environment (species richness). This approach could help to maximize both urban biodiversity conservation and human wellbeing.

For the definition of most relevant outcomes the CLEVER Milano team gathered scientific advice from FPM / POLIMI (both from DASTU/Urban Studies Dept., both from ABC/Architecture, Building-engineering and built-environment Dept.), and technical expertise from AMAT, ITALFERR, AMB, ELI, UKE and YF to reach a list of outcomes and related KPIs that will at the same time be scientifically sound yet easily carried out by stakeholders and public that will take part to co-monitoring. The translation of social outcomes into a set of measurable indicators required an extensive co-creation process that involve the CLEVER Milano team as well as the other project partners (AMAT, ITALFERR, AMB, ELI, UKE, TECNALIA, and YF). Unsurprisingly the environmental KPIs development was more straightforward given the larger scientific literature to draw upon.

2.4.3. Developing indicators: SMART quality check

Nowadays, SMART criteria are well established in the field of monitoring and evaluation. Thus, the SMART approach was considered in the development of the KPIs in CLEVER Cities project which is aligned with the European Monitoring Framework.

SMART indicate the following:

S - specific – effectiveness/efficiency/acceptability/equity. The indicator should respond to: Does the indicator capture the essence of the desired result?

M - measurable – The indicator has the capacity to be counted, observed, analysed, tested, or challenged. If one cannot measure an indicator, then progress cannot be determined.

A - achievable – The indicator is achievable if the performance target accurately specifies the amount or level of what is to be measured in order to meet the result/outcome.

R - relevant – The indicator is relevant when there is a relationship between what the indicator measures and the theories that help create the outcomes for the client, program, or system.

T – time – The indicator should contain the answer to: when do you want to achieve objectives by?

After the definition of a preliminary list of KPIs to assess the impact of NBS within CLEVER interventions it was considered relevant to perform a simple quality check of the KPIs, based on SMART criteria.

The aim of this quality control step was:

- to ensure that KPIs are relevant to monitor the identified outcomes provided by ToC
- to help fine-tuning the monitoring data model by identifying gaps and inconsistencies
- to start a discussion about the metrics for each KPI which would help to determine what will be measured, the frequency of measurement and the method to capture data for each KPI

SMART quality test provided a reflection period and extra insights in the definition of the KPI and the tools that may be used for acquiring the data. This step highlighted the difficulty to define common KPIs related to social outcomes as there are numerous nuances associated to them, that is, different dimensions of the same topic can be captured. Also, the cross-comparability of KPIs associated to social variables seem to be difficult without a common basic understanding on the metrics and how to characterize them. The need for a more coordinated support from CLEVER Cities project evolved in the next step: the development of a CLEVER Social Survey Questionnaire with a sound structure for the evaluation of the common social outcomes, mainly improved: (i) wellbeing and quality of life, (ii) increase physical activity and social participation, (iii) social interaction and cohesion (iv) socio-environmental justice, and (v) perception and valuation of CLEVER intervention and its benefits.

2.4.4. Developing indicators: social outcomes & CLEVER Social Survey Questionnaire

Given the complexity of social KPIs, a need to develop a standard questionnaire was highlighted by the CLEVER City partners. This questionnaire, named as CLEVER Social Survey

Questionnaire and abbreviated as CLEVER-SSQn, aims to serve as a guide and basis for the social surveys that cities will implement.

The CLEVER-SSQn aims to collect KPIs that can be used in a harmonised way to measure the social outcomes and goals selected by the cities in their CALs to meet the posed challenges.

The questionnaire is based on the KPIs proposed by the CLEVER City partners, as well as their LMPs. In the initial process of organisation, some gaps in information were revealed that had to be filled in to respond to the outcomes proposed by the cities in the ToCs, for which existing literature was used.

In order to make the questionnaire friendly and simple, the different questions were grouped by topics that responded to the outcomes and goals. The structure of the CLEVER-SSQn follows the shown topic order:

1. Use and perception of Place
2. Place satisfaction (wellbeing)
3. Psycho-Social issues related with place: social interaction and cohesion, place identity, (socio)environmental justice, social participation...
4. Health and wellbeing
5. CLEVER intervention: knowledge, valuation, expectations, participation.
6. Sociodemographic

Moreover, whenever possible the questions (items) have been grouped within the same answer format:

- Satisfaction scale: “(Overall,) How satisfied are you with _____? From 1. Completely satisfied to 5. Completely dissatisfied”.
- (Dis)Agree scale: “How much you / What extent do you agree or disagree with following statements? 1. Strongly disagree; 2. Disagree; 3. Neither agree nor disagree / Undecided; 4. Agree; 5. Strongly Agree”.

Section 2.5.2 shows the summary list of the social KPIs that make up the CLEVER-SSQn. The complete questionnaire and its format can be consulted in ANNEX B.

As a comprehensive questionnaire was developed to answer all cities needs and reflect all possible CAL realities, a two-level strategy was proposed to shorten it based on each CAL's priorities:

- **Level 1:** Highly relevant items of the questionnaire for each topic or subtopics & by type of PLACE have been marked in bold in this document:
 - The classification of the locations (PLACES) of CLEVER's interventions comprises: Open Spaces [OS]: Park, garden, square, lake, etc.; Schoolyard [Sy]; Station (outdoor) [St]; Building (green roofs and/or facades) [B]; Local area or neighbourhood [N].
- **Level 2:** Selecting only the most relevant topics for each CAL focusing on the primary objectives of each social survey.

The whole process of elaboration and validation of CLEVER-SSQn has been strongly interactive and collaborative (March-June 2020).

In order to support the cities in the application of this questionnaire, a CAL from each CLEVER FR City was chosen as a practical exercise in which it was proposed to develop a social investigation and the specific questionnaire was adapted and constructed, which also integrated particular questions for this CAL. After this guided exercise, the cities took over on the construction and adaption of the questionnaire to the other CAL specific social surveys.

Due to the confinement and social distancing that the world population has suffered due to the health emergency of COVID-19, our lifestyles and, especially, the use of space and social relations have been significantly altered. Many of these changes will continue after the period of confinement or enforced social distancing. Therefore, it has been decided that in CLEVER-SSQn most of the questions in the pre-greening phase refer to the 12 months prior to the health emergency. This question has been included as a clarification in the introduction of the questionnaire:

Please note that most of the questions refer to the period before the COVID-19 crisis. For example, when we ask you how often you have used a certain public open space in the last 12 months, we are referring to the last 12 months prior to the crisis.

To assess the incidence of health emergencies and the personal experiences of the participants, it was considered interesting to include some specific questions about the period during the COVID-19 crisis and that will be clearly specified in the questions.

More detailed information on this questionnaire, as well as some basic specifications on social research methodology: procedure, sample, etc., can be found in ANNEX B of this document.

2.5. List of KPIs

Meetings between CLEVER Cities and Thematic Experts allowed the definition of a preliminary list of KPIs after revising the relevant ToC-outcomes and visions for all three CALs in cities. These meetings also helped to move forward on agreeing monitoring approaches and identification of related baseline data.

Bilateral meetings continued during the months of March to June 2020 focusing on the definition of the KPIs corresponding to the social outcomes, which would make up the CLEVER social survey Questionnaire (See 2.5.2 Section).

2.5.1. KPIs by City & by CAL

HAMBURG

Hamburg, in the CLEVER Cities urban regeneration projects, pays special attention to the enhancement of availability & accessibility of NBS and its use and function, economic impact, participation, environmental parameters and security. This focus is translated in more KPIs related to challenge 1 (human health and wellbeing) and challenge 2 (sustainable economic prosperity). Apart from the CAL specific KPIs, several other common topics have been identified among the three CALs giving CLEVER Cities project the possibility of comparing the results within the same city (once the KPIs are established). This will help to elucidate the ability of different NBS to reach the specified goals and the suitability of specific KPI to evaluate different types of NBS.

The common topics relevant for all CALs are the following:

- Number of participants in actions, events etc.
- Area of newly established public green spaces
- Job opportunities (for volunteers)
- Economic value of green spaces

CAL 1 is planned to lead through the entire project area with the aim of linking the two surrounding nature conservation areas, closing the gap in the natural green corridor using the local species and overall NBS to develop green links, increase biodiversity and analyse the impact which CLEVER stimuli can have on the revival and cohesion of the neighbourhoods. CAL 1 will

encompass a variety of projects as steppingstones along the corridor. These projects differ in their scale and nature. Overall, this CAL aims at connecting the city to nature and puts an emphasis on the concept of nature within the city. It aims at creating a safe green corridor that promotes the awareness and knowledge of NBS and that enhance the use of outdoor spaces. This indirectly will aid to achieve a healthier and more content population. Thus, wellbeing and security are the pillars of this urban regeneration project which is translated into higher number of KPIs associated to improvement of the availability and accessibility of NBS, green skills among residents and overall increase in security perception and run off reduction (See Table 6).

Table 6. KPI selection for CAL 1 in Hamburg. [] Social KPI, which is described in more detail in section 2.5.2*

Challenge	Outcome	KPI
Human health and well-being	New area is used frequently, various physical activities are practiced	Number of people using NBS by age group and gender group at different times and for different activities (n per ...)
	Improved wellbeing	Proportion of participants in the gardening project who feel needed/ have the feeling to serve a purpose (%) [*]
Citizen security	Decreased dominance of "intimidating spaces"	("Meta-KPI"): Amount and ratio of positive/negative ratings in the entire project area [*]
	Delay/ reduction of the discharge peak	Rainwater runoff and infiltration (l)
Social cohesion and environmental justice	Improved social cohesion by volunteering in the gardening project/ activities (only considering the residents) (Co-Monitoring)	Number and type (age, gender) of residents who have actively volunteered in maintaining the garden (in the last 6 or 12 months) (n)
	Regular visits of pupils and seniors, neighbourhood picnics, care of the areas	Number of participants from each group (cooperation) / frequency of taking care of the planting (commitment) (n)
	Intergenerational exchange	Number of organized joint visits and activities / number of people from different generations (n)
Sustainable economic prosperity	Better support/involvement of local enterprises	Number of involved local enterprises
	Additional financial support for interventions (co-finance)	Amount of acquired funds for CLEVER interventions (EUR)

Challenge	Outcome	KPI
Process indicator: co-creation	Social Cohesion: participation of people in raised beds construction and management (not only parishioners)	Number of users involved in design, planning and implementation (n) (by age and gender; church member or "outsider")
Co-benefit	Awareness raising: Better information on rainwater management	Number of school hours spent on teaching about water management and in preparing the board (n)
	Biodiversity support	Number of small scale interventions in the project area, cumulated over project period, including green roofs (which also have their own KPI in CAL 2), insect hotels, the planting on barren areas close to S Fischbek, green roof on police station (PK47), green roof on access building Neugraben... (n)
	Increase of bee biodiversity	Number of bee species (n)
	More breeding and habitat options for bees	Number of realised bee / insect nests (nesting material) (n)
	More nesting sites for birds in the area of Erschließungsgebäude Neugraben	Percentage of installed bird nests which show signs of usage (%) (close to Erschließungsgebäude Neugraben)
	Improved neighbourhood by art objects; demonstration of using natural (waste) materials	Subjective perception; feeling/adherence to the neighbourhood/alter dorfkern [*]
	Improved water availability for trees because of root compound system	"Climate Trees" will be located at the square close to S-Bahnhof Neugraben or at market square Neugraben; measure the soil water content (l/m ³)
	Increased usage and awareness of the corridor and its interventions	
		Number of pictures of CLEVER HH interventions on Instagram (n)
		Number of tweets including CLEVER HH interventions on Twitter (n)
Output	New recreational area/ sports area	Total area of playgrounds in project area (Sandbek and "Alter Dorf kern") (m ² per child)
	More recreational space for refugees	Quantitative: how many recreational space (m ²) and facilities have been created before and after

CAL 2 consists of two main pillars that are interconnected: building greenery that focuses on spot interventions in the project area with the aim of creating a public green space for staying and recreation, for embedding in an existing green net structure and connecting the existing quarters in Neugraben-Fischbek with the new residential quarters. Secondly, the building greenery serves as option for decentralised rainwater management that reduces the loads of sewage systems during storm events. Similarly, to the green corridors, green roofs and façades intends to increase resident's wellbeing, but from a different perspective. In CAL 2 this is achieved by reducing the noise levels, improvement of air quality and biodiversity. On the other hand, this CAL also pretends to boost local value chain. Selected KPIs are aligned with these topics. Within this CAL it is also desired to improve water saving which will help to adapt against droughts and pluvial flooding and translate into economical savings (See Table 7).

Table 7. KPI selection for CAL 2 in Hamburg. [*] Social KPI, which is described in more detail in the section 2.5.2.

Challenge	Outcome	Preliminary selected KPI
Output	Increased green facade area and visibility in the entire project area (Neugraben-Fischbek)	Total facade area of public buildings covered green in the scope of the CLEVER Cities project (m ²)
	Increased area occupied by facade greening	Area covered by vertical green (m ²)
	Increased area occupied by facade greening	Area covered by vertical green (m ²)
Human health and well-being	Increased well-being	Perceived noise reduction and estimated wellbeing (dB) [*]
	Increased well-being	Perceived increased wellbeing [*]
	Increased well-being	Thermal comfort [*]
Co-benefit	Green roof as nesting site for birds	Percentage of installed bird nests which show signs of usage (%)
	Savings in rainwater fees	Saved rainwater fees due to green roof (€)
Citizen security	Rainwater retention on roof top	Runoff from roof top (l)
	Improved rainwater management; release the peak load when rain is forecasted	Duration of how long the water was retained (h or days)
		How many times the flow control was triggered due to weather app (n)
		Amount of retained water at different seasons? (l)

The **CAL 3** focuses primarily on the restructuring of school yards in project area in Hamburg. There are three school yards which are considered for re-design: Stadtteilschule Fischbek-Falkenberg, Grundschule Ohrnsweg and Grundschule Neugraben. The activities in the Stadtteilschule Fischbek-Falkenberg schoolyard are expected to be replicated by two other public schools in the project area. For CAL 3 Hamburg intends to increase the students' wellbeing, social cohesion, and intergenerational exchange along with education for sustainable development. KPIs that cover different themes were selected. These themes reflect the desire to increase NBS use and function, awareness, participation and education (See Table 8).

Table 8. KPI selection for CAL 3 in Hamburg.

Challenge	Outcome	Preliminary selected KPI
Social cohesion and environmental justice	More visitors to the space	Number of visitors at school events (which are also open to the public) (n [estimated])
	Increased knowledge transfer between the schools in the project area (in terms of gardening)	Number of meetings (i.e. visits between the schools to exchange knowledge) (n)
	Increased attractiveness of working group	Number of pupils choosing to participate in working group aquaponic or subject biology in general, cumulated over the project period (n)
Co-benefit	More locally grown food available for the students	Quantity of grown vegetables/fruits per season (kg [estimated])
	Food production	Amount of harvested vegetable (irrespective of where the system will be located) (kg per month)
	Better knowledge on natural cycles/ materials cycle	Pupils (participating in aquaponic project) know more about natural cycles than those who are not involved (better result in test in %)
	Increased theoretical knowledge on vegetables (plants, gardening, nature) production	Number of pupils gaining an increased knowledge due to a thematic inclusion in their curriculum, cumulated over project period (n)
	Level of acceptance: newly built place (garden) is used more frequently, differentiate by use on a planned and on a voluntary basis	Frequency of use or work in the school garden (times/hours per [week or month]) (based on usual schedule and independently from that schedule, e.g. during summer holidays)
	Evolved curriculum	Number of curriculum changes related to interventions (quality) (n)

Challenge	Outcome	Preliminary selected KPI
Output	Pupils gain new practical skills and expertise (gardening, crafting, planning, organizing etc.) or improve existing skills by actively taking part in the project	Number of pupils being in (practical) contact with the gardening project, cumulated over project period (n) (can be set into a ratio to the overall number of pupils afterwards)
	New mobile gardening units are installed	Number of installed mobile gardening units (n)

LONDON

As identified earlier, London is committing to being as efficient as possible in its approach to the monitoring and evaluation plan. Although each of our CALs has its own identity and goals, CALs 1, 2, 3 have many overlapping outcomes and approaches to measuring change. This has been a direct result of trying to: stream-line the process; work collaboratively with the wider Peabody evaluation team; wanting to work holistically with all partners and citizens; and making significant efforts to avoid duplication of efforts or repeated requests for information from an already over consulted community. Table 9 maps each of our outcomes and KPIs to each of our CALs.

Table 9. Selected KPIs from London. [*] Social KPI, which is described in more detail in the following section (2.5.2).

Challenge	Outcomes	KPI	CALs
Human health and wellbeing	Residents use green spaces more regularly	No. of resident members of newly-constituted nature-focused groups	1,2,3
		No. of residents taking part in CLEVER project activities	1,2,3
		No. and type of new recreation facilities / installations / programming	1,2
		No. of residents taking part in physical activity around Southmere lake	2
		% of South Thamesmead residents reporting use of green spaces (disaggregated by demographics) [*]	2
		No. of residents using greenspace	2
	Residents report improved health and wellbeing	% of South Thamesmead residents reporting improved wellbeing [*]	1,2,3
		% of South Thamesmead residents reporting good health [*]	1,2,3

Challenge	Outcomes	KPI	CALs
Social cohesion and environmental justice	NBS interventions have positive environmental effects	Water quality	1
		Prevalence of animal / bird /bat/ insect sounds	1
		Area (m ²) of green space/ cover in South Thamesmead (Urban Greening Factor)	1,2,3
	Residents report improved social cohesion	No. of known neighbours per resident	1
		% of residents who believe Thamesmead is a place where residents from different backgrounds get on well together [*]	1,2,3
		% of South Thamesmead residents reporting sense of belonging to local neighbourhood [*]	1,2,3
		% of residents reporting satisfaction with places to meet and come together [*]	1,2,3
% of South Thamesmead residents reporting being proud to live in Thamesmead [*]	1,2,3		
Levels of socialability of public spaces	1,2		
Citizen security	Residents feel safe and secure in South Thamesmead	% of residents who report fly tipping or vandalism as an issue in South Thamesmead [*]	1,2,3
		% of residents who perceive South Thamesmead to be a safe place [*]	1,2,3
		No. of environmental problems observed by residents	1,2,3
Economic prosperity	Project leverages in additional support and funding for NBS as a result of demonstrating value to stakeholders	No. of residents engaged in NBS-related education, employment and training	1,2,3
		No. of Peabody stakeholders who believe in the value of NBS [*]	1,2,3
		Number of and value (£) of non-CLEVER funded NBS interventions implemented locally 2020-2025	1,2,3
		Cost (£) of ongoing green space maintenance plans	2,3
		% of Peabody ground team with skills to maintain NBS	2,3
		Social return on investment - indicator TBC	1

Further to the KPIs linked to each of the challenges, more generic indicators output will also be gathered to complement the above listed KPIs:

- Number of events delivered
- Type of events delivered
- Attendance at events (incl. demographics)
- Expenditure
- NBS interventions installed/completed

MILANO

Milano, in the CLEVER Cities urban regeneration project, pays special attention to the enhancement of quality of life and environmental parameters, social cohesion and improved urban environments. This focus is translated in higher number of KPIs tackling challenge 1 (human health and wellbeing) and 3 (social cohesion and environmental justice). Several KPIs are shared among the three CALs giving CLEVER Cities project the possibility of comparing the results within the same city, due to the fact the similar types of NBS appear between CAL 1 and 3 (green walls) and between CAL 1, CAL 2 and CAL 3 (multifunctional garden or roof). This will help to elucidate the ability of similar NBS to reach the specified goals and the suitability of specific KPI to evaluate the same NBS in alternative locations (See Table 10).

For **CAL 1 – Green Roofs and Walls (GRW)** - within challenge 1 Milano intends to increase resident's wellbeing by increasing the quality of life. KPIs that cover different themes were selected. These themes reflect the desire to increase NBS use and function, the availability and accessibility of NBS, the physical environment and social wellbeing. Sustainable economic development is translated into increasing of green jobs and evaluating housing value. The increase of citizen security is mainly referred to the improvement of the rain water runoff management, in particular during heavy rainfall, through the delay/reduction of rainwater discharge in the drainage system. On the other hand, challenge 3 related KPIs intend to assess the social wellbeing, availability, accessibility and management of NBS.

CAL 2 –Community Garden- similarly, to green roofs, community gardens intends to increase resident's wellbeing by creating high quality multifunctional green services that promote physical activity and sociability. KPIs within this CAL reflect the importance of regeneration linked to challenge 1 and 3. KPIs cover themes related to use, function, availability, accessibility and management of NBS, improved physical environment and social wellbeing.

CAL 3 – The Tibaldi Train Stop aims at creating higher social and environmental quality for the neighbourhood and city in general and this is reflected in the selection of KPIs. Once more, wellbeing and social cohesion are the pillars of this urban regeneration project which is translated into higher number of KPIs associated to improvement of physical environment quality and conditions and overall increase in wellbeing.

Table 10. KPI selection for CALs in Milano. [*] KPI social, which is described in more detail in the section 2.5.2

Challenge	Outcome	KPI	CAL
Human health and well-being	Thermal Comfort	Air Temperature/ surface temperature/humidex	3
	Improved wellbeing	Perceived wellbeing [*]	1,2,3
	Improved thermal comfort	Humidex	1
	Improved thermal comfort	Surface temperature	1
	Air quality improvement	Fine particulate matter captured by leaves' surface	1,2
	Increase quality of life	Happiness and well-being related to NBS [*]	1,2,3
		Relationship with nature [*]	1,2,3
Sustainable economic prosperity	Increase of green jobs	Working hours for installations and maintenance of the NBS realized in the 3 CAL	1,2,3
	Increase of property values	Increase of the values of buildings with a green roof/wall	1
Social cohesion and environmental justice	Increase of Social cohesion and relationships	Psychosocial issues related with place satisfaction [*]	1,2,3
		Social interaction and cohesion [*]	1,2,3
		Participation in community activities related to NBS [*]	1,2,3

Challenge	Outcome	KPI	CAL
Citizen security	Increase of safety and security perception	Users perception related to NBS (accessibility, maintenance, Aesthetics, visibility) [*]	1,2,3
	Delay/reduction of rainwater discharge in the drainage system	Rainwater runoff and infiltration	1
Output	Increase quality of life	People living near a green roof, with respect to household socioeconomic profiles	1
	Increase of green roof surface	Green roof surface	1
	Increase the % of permeable surface	% of permeable surfaces	1
Co-benefit	Increase of biodiversity	presence of weeds plants	1,2,3
		Plants diversity on GR or GW (Simpson index)	1
		Pollinators (Shannon Index, autoecological parameters)	1,2,3
		Birds (Index of Point Abundance)	1,2,3
	Increase of environmental awareness	Attention on environmental issue related to NBS	1,2,3

2.5.2. Social KPIs integrated in CLEVER SSQn

As previously mentioned, the CLEVER Social Survey Questionnaire has been structured around the following topics:

1. Use and perception of Place
2. Place satisfaction (wellbeing)
3. Psycho-Social Issues related with place
4. Health and wellbeing
5. CLEVER intervention
6. Sociodemographic

Next, the considered KPIs in each of these topics are indicated.

Topic 1: Use and perception of place

This topic includes KPIs about description of place (1.1), use of space (1.2) with frequency, time of use and activities, environmental comfort (1.3), evolution from the past two years (1.4), and opinion about natural environment (1.5), please see Table 11.

Table 11. Social KPIs about use and perception of place (Topic 1).

Code	Subtopic	Social KPIs	Scale type
1.1	Description of place	[OPTIONAL, see ANNEX B]	Open
1.2.1	Use of space: Frequency	Thinking about the last 12 months before the COVID-19 crisis, how often, on average, have you spent in this PLACE?	O(5p)
1.2.2	Use of space: Time of use	[OPTIONAL, see ANNEX B]	
1.2.3	Use of space: Activities	[2 OPTIONS] A) What activities do you usually do in this/the PLACE before the COVID-19 crisis? B) Please indicate what your relationship is with this/the PLACE before the COVID-19 crisis	Multiple-choice (7+O)
1.3	Environmental Comfort	How comfortable did you feel with the following aspects in this place/building before the COVID-19 crisis? [3: Acoustic, Thermal, Overall]	O(5p)
1.4	Evolution: the past two years	[OPTIONAL, see ANNEX B]	
1.5	Opinion about natural environment	What do you think about natural environments (green spaces) in your neighbourhood?	O(5p)

The inclusion of these KPIs in the CLEVER-SSQn allows for the triangulation of information, by being able to analyse their relationships with their corresponding objective variables. In other words, on the one hand we will have the data collected through observation, and on the other hand the information collected through CLEVER-SSQn that will allow us to know how the participants perceive and value the use they make of the place being evaluated.

Topic 2: Place satisfaction (wellbeing)

This topic (Table 12) includes KPIs about general residential satisfaction (2.1), Specific Characteristics of open spaces (2.2), Building [B] (2.3), School [Sy] or Station [St] (2.4), and safety (2.5).

Table 12. Social KPIs about place satisfaction (Topic 2).

Code	Subtopic	Social KPIs	Scale type
2.1	General Residential Satisfaction: 2.1.1. Neighbourhood 2.1.2. Open spaces 2.1.3. Neighbours	Before the COVID-19 crisis, how satisfied were you with...? ...your neighbours [ALL] ...this PLACE [park, garden, school, walk, station] on the whole [OS] ...your neighbourhood on the whole [ALL]	DS(5p)
2.2-4	Specific Characteristics: 2.2. Open space [OS], 2.3. Building [B], 2.4. School [Sy]/ Station [St]	Before the COVID-19 crisis, how satisfied were you with the following characteristic of this PLACE/BUILDING...? ...environmental quality, landscape ...aesthetics [of buildings] ...accessibility ...maintenance/cleanliness ...safety [*2.5] ...green areas/elements	DS(5p)
2.5	Safety [*]	[OPTIONAL, see ANNEX B] Safety with more details: In general, before the COVID-19 crisis, how safe did you feel when walking through/stay...?	O(5p)

The satisfaction that people express in relation to the different elements of a place brings us closer to what the impact of those elements will be on people's health and well-being. That is why it is important to know this information directly from people, whether through interviews, focus groups or social surveys. The literature shows that the impact of an action on people is more associated with people's perception of the action than with the objective parameters recorded, as is the case with noise nuisance, whose association with environmental noise levels is very weak (r between 0.3 and 0.4), although significant.

Topic 3: Psycho-Social Issues related with place

This topic (Table 13) includes KPIs about social Interaction and cohesion (3.1), Sense of identity and belonging (3.2), Socio-Environmental justice (3.3.), Self-efficacy (3.4), and Civil engagement & Local community participation (3.5).

Table 13. Social KPIs about Psycho-Social Issues (Topic 3).

Code	Subtopic	Social KPIs	Scale type
		How much you / What extent did you agree or disagree with following statements before the COVID-19 crisis?	
3.1	Social Interaction and cohesion	2 People in this neighbourhood can be trusted. 3 People around here are willing to help their neighbours. 8 I have enough people I feel comfortable asking for help at any time. (loneliness)	DS(5p)
3.2	Sense of identity and belonging	Before the COVID-19 crisis, how strongly do you feel you belong to your immediate neighbourhood/local area?	O(5p)
3.3	Socio-Environmental justice	All persons, regardless of gender, age, socioeconomic level, nationality, etc: a. ...have access to the different services of this neighbourhood/building/school. b. ...can enjoy and benefit from the green areas of this neighbourhood/building/school. There are people or groups ignored in the decisions that are made in this neighbourhood/building/school where I live/work.	DS(5p)
3.4	Self-efficacy	[OPTIONAL, see ANNEX B]	
3.5	Civil engagement & Local community participation	[2 OPTIONS]	Dichotomic / Multiple-choice

In the case of psychosocial issues, it is best to ask people directly, either through interviews, focus groups or social surveys. The information collected by these procedures can be compared with the collection of indirect indicators of social cohesion (for example, number of interactions between different groups or within a certain group), environmental justice, etc.

Topic 4: CLEVER intervention

This topic (Table 14) includes KPIs about information & knowledge (4.1), General valuation (4.2), expectation related with NbS benefits (4.3), concerns (4.4), and participation (4.5).

Table 14. Social KPIs about CLEVER intervention (Topic 4).

Code	Subtopic	Social KPIs	Scale type
4.1	Information & others with different response scale	<ul style="list-style-type: none"> • Do you know something about CLEVER project/NbS? • Do you know something about CLEVER intervention/NbS? 	Dichotomic
4.2	General evaluation	<p>[2 OPTIONS]</p> <p>A) I have a positive perception of CLEVER’s intervention/NbS</p> <p>B) Could you tell us what your overall opinion is of the CLEVER intervention?</p>	DS(5p) / O(5p)
4.3	Expectation related with NbS benefits	<p>How much you / What extent do you agree or disagree with following statements?</p> <p>I think CLEVER’s intervention/NbS will improve [PRE] / has improved [POST]...</p> <p>...biodiversity (animal and plants species) of this PLACE.</p> <p>...thermal comfort of this area/place.</p> <p>...aesthetic and beauty of this PLACE..</p> <p>...wellbeing of neighbours/citizen/workers/students/users.</p> <p>...health of neighbours/citizen/workers/students/users.</p> <p>...social relationship and cohesion.</p> <p>...the lives of all people who live/work/study/use in this PLACE.</p> <p>...economic value of PLACE (apartments/houses).</p>	DS(5p)
4.4	Concerns	[OPTIONAL, see ANNEX B]	
4.5	Participation	<p>Are you taking / Did you take part in CLEVER intervention?</p> <p>o Describe what your involvement in the CLEVER intervention has been or is.</p> <p>o OR: A list of the different activities of each CAL can be made so that participants can indicate in which ones they have participated...</p>	Open / Multiple-choice

As in other previous topics, the best way to know what people's perception, assessment, etc. about the CLEVER intervention is by directly asking the people who use the places where the intervention is to be implemented. Furthermore, as previously mentioned, the effects of an action

depend on both the objectifiable characteristics of the action and, especially, on how this action is perceived, the expectations that people have about it or the concerns.

Topic 5: Health and wellbeing

This topic (Table 15) includes KPIs about perceived general health (5.1), wellbeing (5.2) COVID-related wellbeing (5.3), health conditions & illnesses (5.4), restorative capacity (5.5).

Table 15. Social KPIs about health and wellbeing (Topic 5).

Code	Subtopic	Social KPIs	Scale type
5.1	Perceived general health	How was your health in general? a) In the last 12 months, before the COVID-19 crisis, b) During the COVID-19 crisis period	O(5p)
5.2	Wellbeing	In the last 12 months, before the COVID-19 crises, Overall... ...how satisfied are you with your life nowadays? ...to what extent do you feel that the things you do in your life are worthwhile? ...how happy did you feel yesterday? ...how anxious did you feel yesterday?	O(5p)
5.3	COVID-related wellbeing	[Voluntary response] • How different has life been for you in the confinement period compared to life before the COVID-19 crisis? During the COVID-19 crisis, have you experienced any of the following? • What is your current isolation status? • What are your motivations for your current isolation status above?	different scales: multiple-choice...
5.4	Health conditions & illnesses	[Voluntary response] • Have you had COVID-19 (coronavirus)? • In the last week do you believe you have come into CLOSE CONTACT with somebody who has COVID-19 (e.g. living with, hugging, shaking hands with, or spending more than 15 minutes with)?	different scales: mainly dichotomic...
5.5	Restorative capacity	How much you / What extent do you agree or disagree with following statements? o Places like this are fascinating (FA 12) o To get away from things that usually demand my attention I like to go to places like this (B-A 5) o In places like this everything seems to have its proper place (new item) o That place is large enough to allow exploration in many directions (FA 10)	DS(5p)

As in the case of satisfaction, people's perception of their health status is a better predictor of it than physiological parameters themselves. Furthermore, we believe that these indicators can reflect in a shorter term the impact of NBS on health and well-being, considered in a holistic and integral way, as proposed by WHO (psycho-physio-social) and not only referring to physiological health related to the disease.

Topic 6: Sociodemographic

This topic (Table 16) includes KPIs about gender, age... (6.1), housing (6.2), education level (6.3), Laboral situation (6.4), and residence (6.5). This information is relevant to better understand certain background of the target groups and its relation to NBS, for example, to be able to extract environmental justice conclusions.

Table 16. Social KPIs about sociodemographic (Topic 6).

Code	Subtopic	Social KPIs
6.1	Sociodemographic	Gender, age, place of birth
6.2	Housing	House ownership type
6.3	Education level	Education level
6.4	Laboral situation and finances	Employment status
5.5	Residence time / antiquity	Place and time of residence

The inclusion of sociodemographic KPIs allows us to characterize the people and groups participating in social research. But, in addition, they can help us in the identification and inclusion of vulnerable and underrepresented groups in the researched communities. It must be taken into account that several of these variables refer to vulnerable groups such as women, older or younger people, those with low incomes, cultural groups, etc., so having this information can help us to carry out more equitable and fair social research with resources that can be distributed among the populations with the greatest needs.

In the ANNEX B of this deliverable more details of the CLEVER SSQn questionnaire can be consulted.

3. Monitoring and assessment approach

As discussed earlier in this report, CLEVER Cities recognise that effective monitoring and evaluation are of utmost importance. The selection of the objectives and KPIs that can evaluate the project are two vital pillars in any monitoring and assessment plans.

Despite developing an ad-hoc monitoring and assessment plan for CLEVER Cities interventions existing information and knowledge is also of relevance to complement CLEVER NBS impact assessment. This section gathers existing relevant data at local level for each CLEVER City, factors to consider in the assessment of NBS impacts and a cross analysis between CALs.

3.1. Baseline and links with the ToC

Baseline monitoring is a significant component in an environmental assessment process. In CLEVER Cities, we refer to **baseline** as the data that recorded as standard in the city, while the term **pre-greening** is the data that is to be collected specifically for CLEVER Cities and will be used to measure change attributable to CLEVER Cities NBS.

The three cities gathered numerous environmental, health, social and economic information. However, although useful for context, only a fraction of these data may be of use for the for the CLEVER Cities objectives. Nevertheless, we cannot fail to consider the existing relevant data as much as possible to be the most efficient in resource management. This will enable the project to focus resources on the topics not conventionally covered by the city's management system or where evidence gaps have been identified. In the next Figures (Figure 9, Figure 10, Figure 11), a summary of each city's baseline is shown. From a first glance, air quality, access to green space (greening mapping and distance to greening), housing price, demographics of population, noise levels and to less extent biodiversity and physical health information are among the most usable data to complement the evaluation of the desired outcomes.

3.1.1. HAMBURG

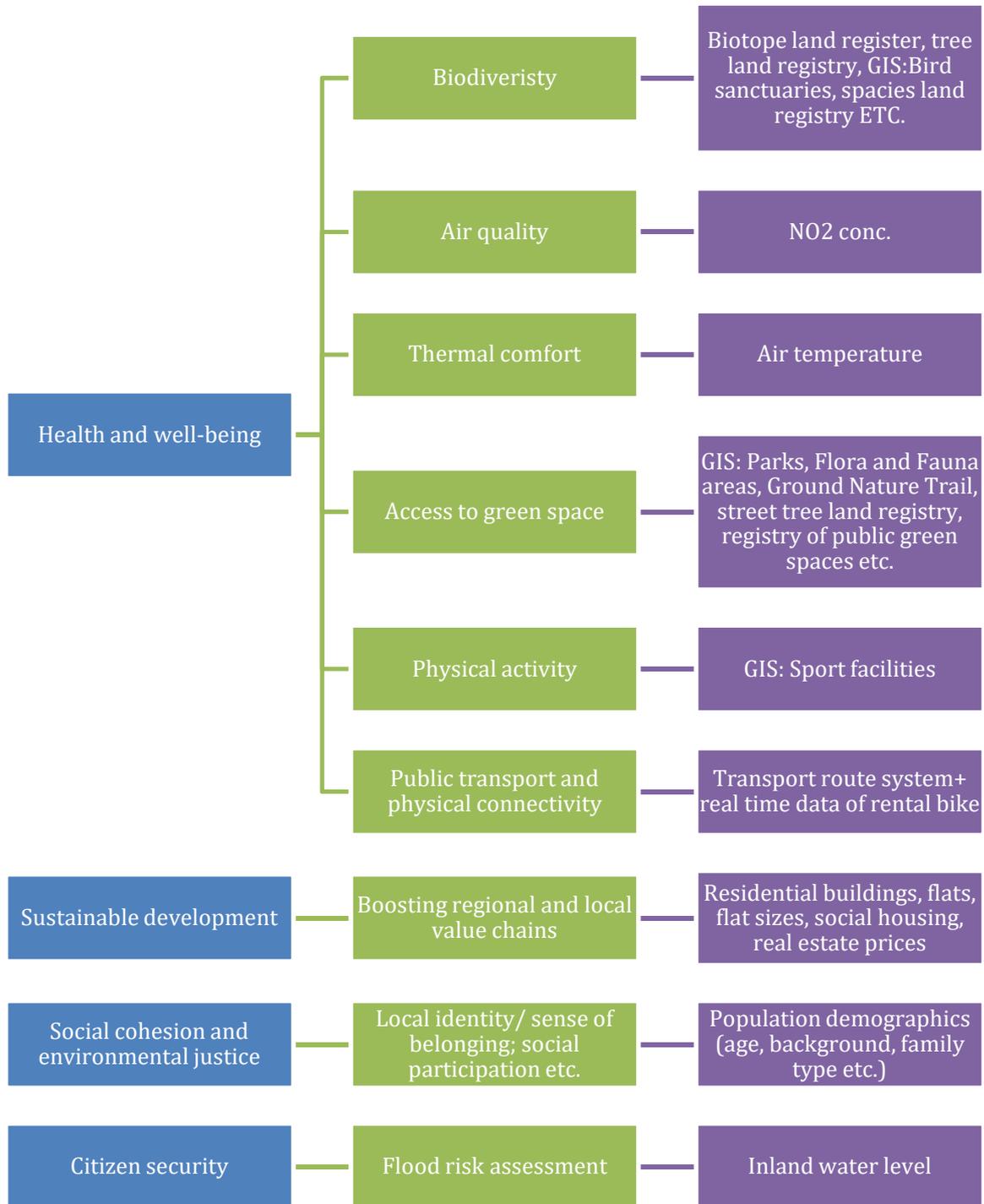


Figure 9. Hamburg's available baseline information. In blue: challenges; in green: topics; in purple: registered baseline information

3.1.2. LONDON

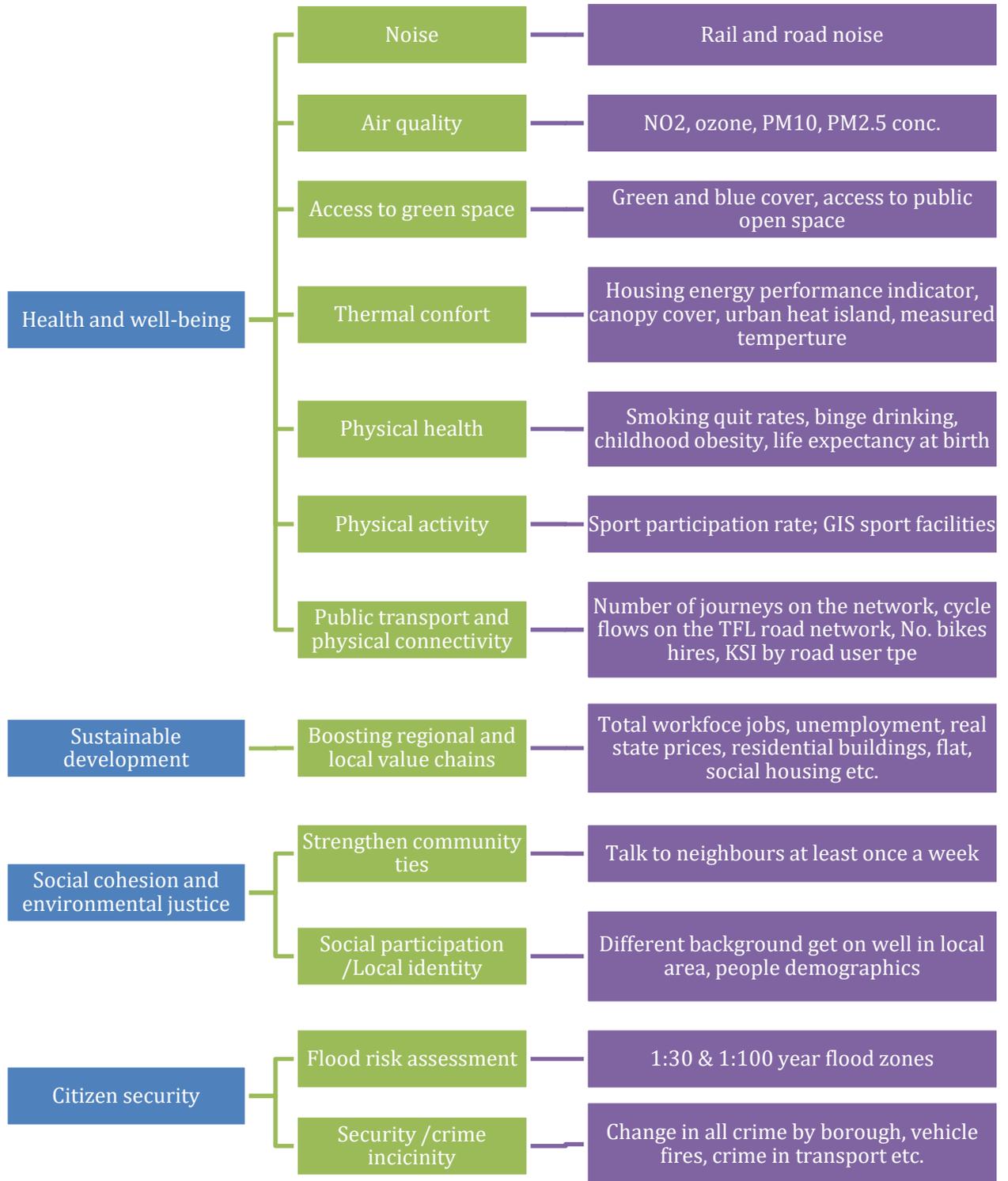


Figure 10. London’s available baselin information. In blue: challenges; in green :topics; in purple: registered baseline information

3.1.3. MILANO

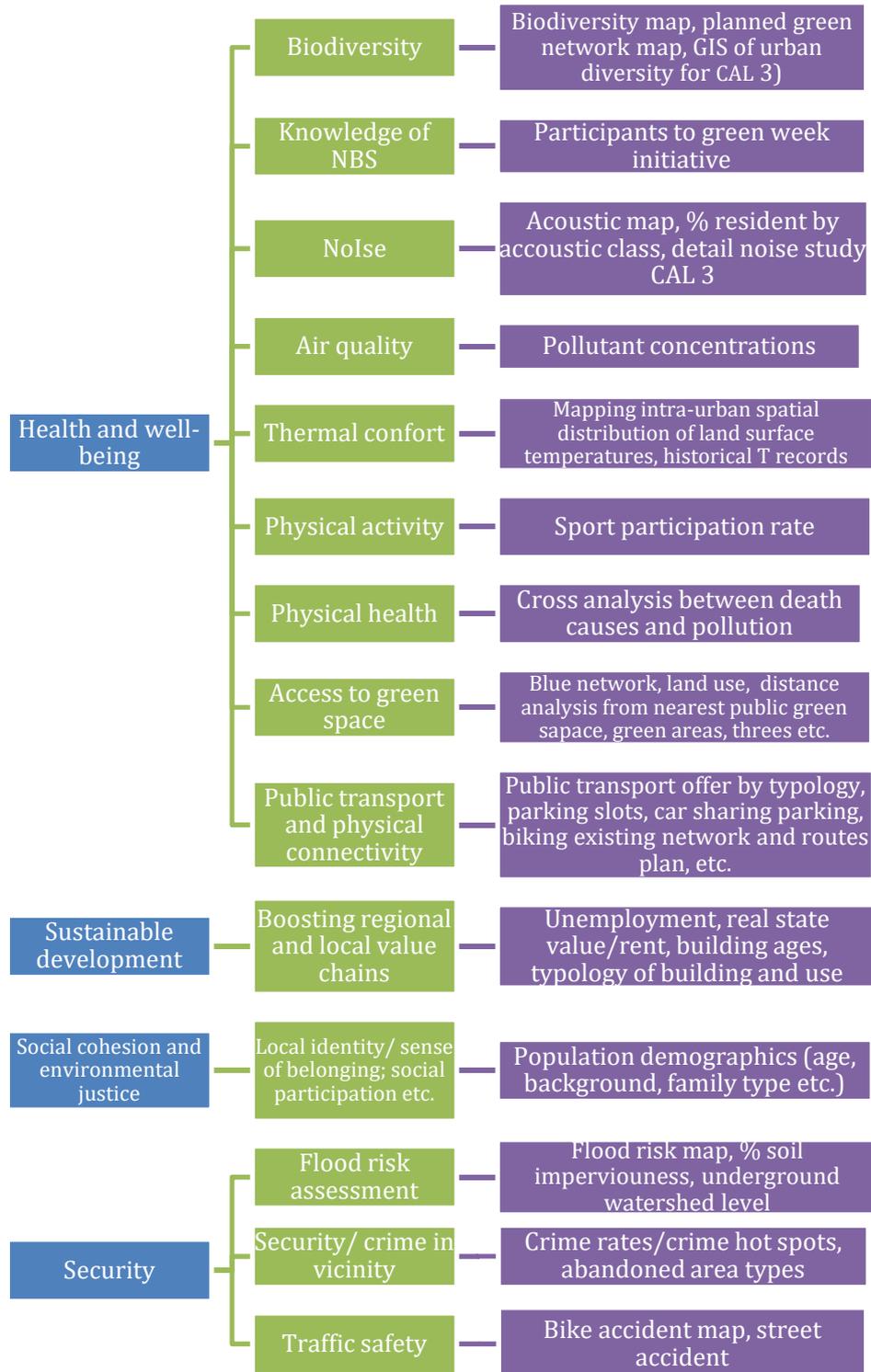


Figure 11. Milano's available baseline information. In blue: challenges; in green: topics; in purple: registered baseline information

3.2. Factors determining the assessment and monitoring of the impact of NBS

Based on the roundtable discussions, all cities plan to apply a dual approach through which physical changes (such as creating new NBS or improving existing green space) are accompanied by social activities to ensure that any new NBS interventions are embraced by the local community. Thus, the assessment and monitoring of NBS impact in the CLEVER Cities interventions require complex methods. In that sense, mixed monitoring methods were discussed and agreed to be the most suitable options:

- quantitative data collected through surveys, observations or measurements - provides valid and comparable information on use and impacts of NBS.
- qualitative data compiled through interviews and focus groups - helpful to explore the meaning of NBS to an individual/group, and to understand personal/group/community preferences and concerns.

A wide range of factors affect the impact of NBS on CLEVER Cities challenges. There is already knowledge on how specific factors impact on CLEVER challenges. There are three main determining key points for the assessment and monitoring of NBS impact in CLEVER Cities project:

- target groups
- temporal factors
- spatial factors/scale

In the beneath text, a description of how these factors affect for two of our CLEVER Cities urban challenges.

3.2.1. Challenge 1: Human health and wellbeing

Target groups

Given the range of urban green space interventions and acknowledging the different functions green space provides to different population groups, monitoring and evaluation should not only investigate population-level outcomes but also consider equity for specific groups – especially disadvantaged or underrepresented demographics or groups. Based on the CALs objectives there are different target groups including: pupils and parents, migrants and refugees, elderly, etc. The assessment will differ for each of these groups.

Considering that urban green spaces are a local resource for the whole community, it is important not to exclude some user groups through *e.g.* monofunctional green space design. Thus, in addition to monitoring the use of the green space and the satisfaction among users it is also important to collect data from people who are not using the green space and to understand what the related causes and potential barriers are.

Temporal factors

Considering the time frame for the project's outcomes to be realised it is important to emphasize that environmental impacts may occur more quickly than social or health impacts. In that sense, short-term immediately visible improvements are the initial outcome that can be assessed immediately after the intervention (urban green quality, aesthetic, amenities, etc.). Intermediate outcome is assessable after some period of time during the project (use and function, individual status and perception, social environment) while long-term health outcome (mortality rates, life expectancy, cardiovascular disease, obesity, etc.) will not be assessed during the project because it requires longer time span and it is influenced by many interweaving factors.

World Health Organization⁴ emphasizes that 'unless there is professional support from health experts, local projects should be careful to use objective health parameters (such as body mass index or cardiovascular disease) to document the impact of their interventions'. However, based on scientific literature it can be argued that improvement of urban green space (NBS) characteristics has a positive impact on setting features, use and function as well as on environmental regulation services that influence pathways to health and result in improved health status and wellbeing (please see Figure 12).

⁴ WHO, 2017. Urban green spaces: a brief for action. http://www.euro.who.int/__data/assets/pdf_file/0010/342289/Urban-Green-Spaces_EN_WHO_web3.pdf?ua=1



Figure 12. A casual model of the impacts of urban green spaces on health and well-being. Source: WHO, 2017, p.8

In that sense, although specific health outcome like decrease in obesity rates cannot be ‘visible’ during this project, it is possible to measure change in aspects that are root causes of obesity (e.g. insufficient physical activity and unhealthy food choices). Thus, the impact assessment of the NBS intervention measures a change in characteristics (e.g. quality, security) and use of urban green spaces (e.g. urban gardening, physical activity, sport) that support healthy choices and may decrease obesity on a long term.

Spatial factors/scale

Beside the temporal component, there are different geographic scales for the assessment of the performance of NBS:

a. on the NBS scale

- Green space: characteristics (availability and accessibility, quality, aesthetics, amenities/equipment, management), use and function (physical activity, active mobility/connectivity, food production, gardening, relaxation and leisure, social exchange) – observations, measurements.
- Individual status and perception: life satisfaction/quality of life, self-reported health and wellbeing, perception of green space quality and perception of social actions – surveys, interviews.
- Social environment: social cohesion, interaction, participation, safety – surveys, interviews, focus groups.

b. on the neighbourhood scale - to what extent NBS influences:

- neighbourhood quality, active mobility/connectivity/barriers, sense of belonging, living expenses.

c. on the city scale

- replication of NBS in other neighbourhoods/city districts.

3.2.2. Challenge 2: Economic development and opportunities

Temporal factors

As already known, the primary objective is to assess the change in the CAL areas before and after the implementation of the NBS interventions. Thus, the immediate change in the territories itself as well as a direct comparison with similar regions without any intervention is possible to measure.

This results in two temporal components:

- Data before the intervention
- Data after the intervention

Most of the pre-intervention status quo data can be obtained from existing databases and need to be re-evaluated only after the interventions.

Despite the tight timeframe between implementation and project end, it can be expected that some of the economic parameters related to NBS can be evaluated until the end of the project (e.g. Investment, Funding, Open Innovation).

However, there will also be factors that will be valuable as the first interim results at the end of the project but will continue to change over time (e.g. real estate price, job opportunities, number of start-ups, house market and neighbourhood stability, people knowing about NBS).

Functions such as the buffer effect of the NBS during heavy rain events reduce the load on the infrastructure and thus reduce costs. In addition, the positive impact of green spaces on health should not be ignored, which in the medium and long term also reduces the costs of the health system.

These are just a few examples of parameters that can be used to calculate cost savings caused by NBS only in the longer term and in the connection of lots of data. One study of note is London's Natural Capital Account that found that London's public parks have a gross asset value in excess of £91 billion.⁵

In general, it should be mentioned that indirectly determined costs - regarding value of green space, social and health impact - are more complex to gain than costs with regard to investment and suchlike.

Therefore, also see the graphic in Figure 13- Benefits and costs of street trees, which illustrates the positive and "negative" effects of street trees. Looking more closely at the individual factors, it can be seen that it is usually easier to measure the costs caused by trees (NBS). Whereas most of the economic benefits based on the positive impacts have to be gained over a longer period of time and indirectly in the merging of many data and factors.⁶

⁵ https://www.london.gov.uk/sites/default/files/11015viv_natural_capital_account_for_london_v7_full_vis.pdf

⁶ Swinbourne and Rosenwax (2017): Green Infrastructure, a vital step to brilliant Australian cities. <https://waterbucket.ca/gi/files/2017/04/Green-Infrastructure-vital-step-brilliant-Australian-cities.pdf>

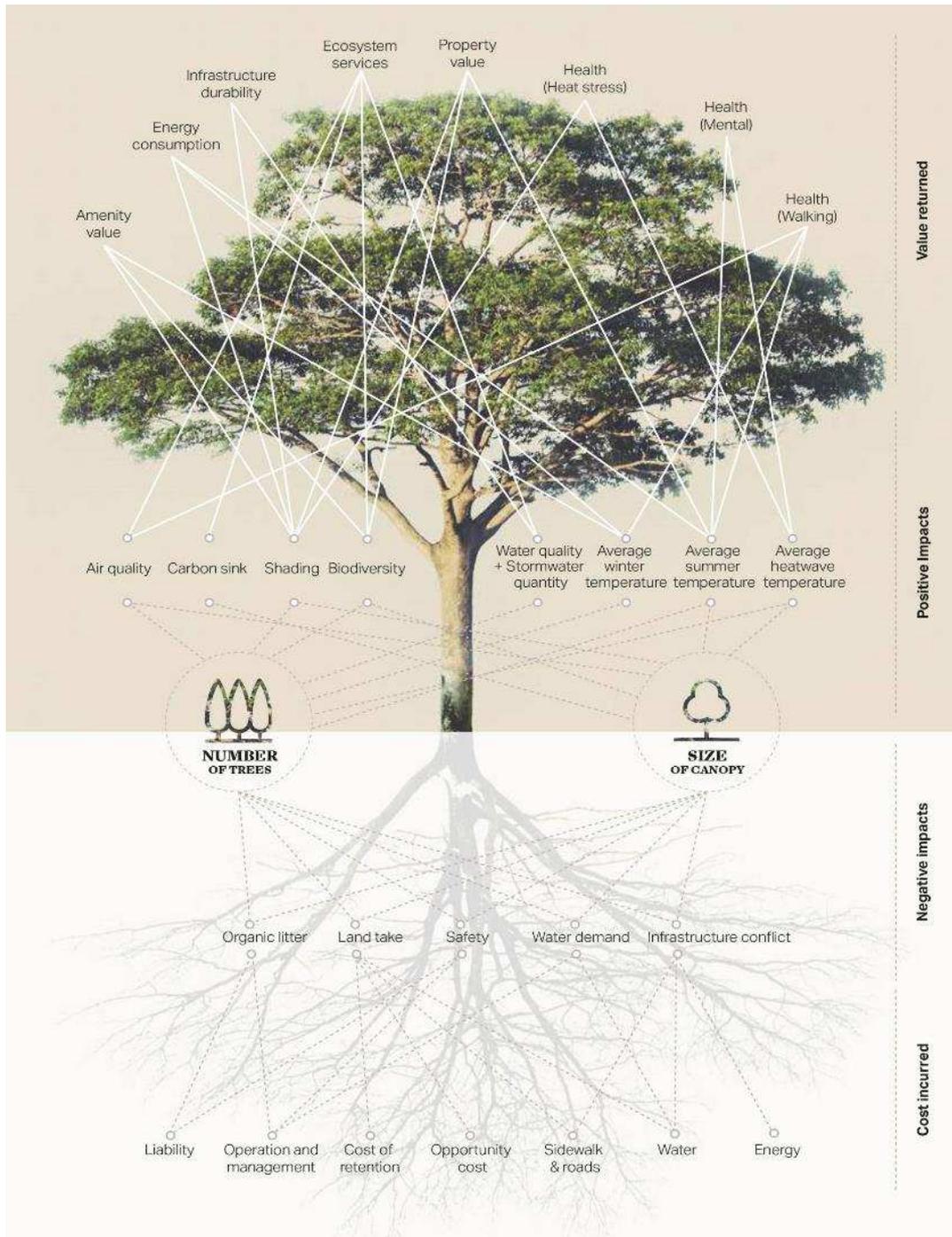


Figure 13. Benefits and cost of trees. Source: Swinbourne and Rosenwax (2017): *Green Infrastructure, a vital step to brilliant Australian cities*.

Spatial factors/scale

In addition to the temporal factors, three spatial components are influencing the assessment of the economic impact of the NBS interventions.

NBS (object-related): Investment, Funding, value of green space

CAL (region-related): new jobs in the area, Private Public Partnerships (PPPs), total investment, open innovation related to the region, crowdfunding, rental price in the region, Knowledge about NBS

City (city-related): Since the comparison with other regions in the city, in which no NBS interventions take place, is intended, it is important to consider the whole city with its comparable areas.

Target group

Of course, the people affected by NBS in the CAL regions are also a significant factor. In connection with economic development and opportunities, these are usually affected indirectly.

Based on the CALs objectives there are different target groups including: residents, children/pupils and parents, migrants and refugees, elderly, potential workers for new created jobs (professionals and volunteers and start-ups).

3.2.3. Challenge 3: Social cohesion and environmental justice

Target groups

A key aim of CLEVER Cities is to create green spaces that are inclusive and welcoming for all. In order to ensure that this is happening, it will be key to understand the perceptions different groups have of CLEVER interventions. This will be especially important for underrepresented or marginalised groups, which could include older and younger people, those from migrant communities, refugees, non-native language speakers and those from poorer households.

Methods of understanding the experiences of different groups should take into account demographic and contextual factors, for instance recognising that surveys conducted in the national language may not be understood by citizens who speak this as a second or additional language, or who are newly arrived to the country and do not yet have local language skills. Methods for collecting data on sensitive issues, such as understanding perceptions of social cohesion, should also acknowledge social desirability bias or fears of data being used to expose individuals in any way. Complementing quantitative data with qualitative methods to understand individual experience of cohesion and environmental justice will also help city teams to be responsive to citizen needs and ensure they are not inadvertently forgetting 'less heard' groups in co-creation and implementation efforts.

As with challenge 4 it is also important to collect data from people who are not using green spaces and to understand what the related causes and potential barriers are.

Temporal factors

As with human health and wellbeing, changes in social cohesion and environmental justice that result from NBS interventions are often only apparent after a significant period of time. Whilst improvements may be made to a green space in the short-term, for instance, it can take longer for residents to perceive a space as open, welcoming and 'for them' and start to use this space. Therefore, spaces being perceived as accessible to less included groups and socially cohesive for all, may only start to be seen in monitoring and evaluation efforts in the medium term. These changes are also heavily reliant on spaces being perceived as safe (challenge 4) so any efforts to measure and understand changes to social cohesion and environmental justice should be seen in context of changes to perception of safety.

Spatial factors/ scale

There are different scales at which change will be measured under challenge 3:

1. at the CAL scale
 - green space/ NBS interventions: perceptions of spaces as inclusive and welcoming to all, levels of access for different groups – surveys, interviews, focus groups, observations
 - social environment: social cohesion, interaction, participation, sense of identity and belonging, loneliness – surveys, interviews, focus groups
2. at the neighbourhood scale:
 - household level: sense of belonging to area, relationships with neighbours, pride in area, sense of ownership of area, perceptions of fairness of area for different groups – surveys, interviews, focus groups
3. at the city scale
 - replication of NBS in other neighbourhoods/city districts

3.2.4. Challenge 4 Citizen Safety and Security

The idea in monitoring safety and security with relationship to NBS implementation in CLEVER Cities CALs and urban areas is basically to look after **social** perception with relation green elements and **physical** co-benefits related to specific contexts (See Table 17).

Hence, the perception of safety and security was developed according to the criteria that showed in Table 17.

Table 17. Safety components considered in relation to NBS

Increase of safety and security perception
4.1 Lighting and clear visibility
<i>the area is lightened, visually clear paths, no sense of fear is perceived</i>
4.2 Accessibility to green area
<i>increase of accessibility means in the area (walkability, bikeability, physical activities, etc.)</i>
4.3 Maintenance of green area
<i>status of the green area (litter, green condition, furniture, etc.)</i>
4.4 Aesthetics
<i>green increase aesthetic quality of the area (green roof, walls, parks, etc.)</i>
4.5 Activities and presence of other people
<i>interaction in spaces, variety of activities, stickiness to places help you stay</i>

Target groups

As stated in the subsection 3.2.1 Health and wellbeing the evaluation on safety should not only investigate population-level outcomes but also consider specific groups as perceived safety may vary among gender, age and vulnerable or underrepresented demographics or groups. Based on the CALs objectives there are different target groups including: pupils and parents, migrants and refugees, elderly, etc. The assessment will differ for each of these groups.

W. Machielse⁷ (2015) concluded that „safety perception is a complicated topic of which the spatial and social factors have different effects on different groups of people“, despite it is known that age and gender tend to have different safety perception.

Sample of local stakeholders and residents and/or other specific groups

- **Stakeholders:** these are meant to be local stakeholders, UIP members to be involved on a specific CAL, the preferred measurement tool in this case is the qualitative interviews. The minimum of the interviewees is 10 in the pre-greening, however, collection of data could be until theoretical saturation.
- **Residents:** These are residents from same neighbourhood of the intervention in CALs and could be transversal to all UIP if it is a city scale intervention. The preferred measurement tool in this case is the quantitative analysis tools from surveys and on-site visual observations.
- **Other Specific groups:** specific groups of interest to the sample of surveys or interviews based on groups of interest. The preferred measurement tool in this case are the focus groups that give more insights on the interest of the NBS intervention.

That section is preceded by a socio-demographic analysis⁸ that gives some indication on the sample and the potential control group of specific local stakeholders to be interviewed in pre-greening and post-greening phases.

Spatial factors

The arrangement of vegetation and visibility of the area directly impact enhancement or reduction of safety feeling in urban areas. Spatial arrangement of vegetation is about means of varying and framing view distance. View distance has long been recognized as an important factor in landscape preference studies while spatial arrangement of vegetation is essentially a means of varying and framing view distance. The most significant feature of assigning sense of safety is spatial arrangement which should be in harmonized with vegetation structure in more naturalistic way not to make the parks appear unsafe. The interaction between spatial arrangement and vegetation structure are important factor in determining sense of safety but not preferences in urban park.

⁷ Machielse, Walt (2015). Perceived safety in public spaces: a quantitative investigation of the spatial and social influences on safety perception among young adults in Stockholm. Human Geography, master thesis for master exam in Human Geography. Stockholm University

⁸ Socio demographic analysis should consider sex, age range and vicinity to the area of intervention. However, it should be gender, age and race balanced and should include vulnerable population sample and consider equity effects and impacts for specific groups- especially disadvantaged or underserved target groups.

Table 18. Categorization of co-benefits and drawbacks of NBS with relationship to social perception and physical safety and security. Source: Mahrous Moustafa & Abou El Ela (2018) *Ain Shams Engineering Journal*, 9(4), 3055–3066

CATEGORY OF BENEFITS AND DRAWBACKS GAINED BY IMPLEMENTING NBS				
BENEFITS OF IMPLEMENTING NBS	Social	Safety and Security	Safety Perception	Increased perception of safety and increased resilience capacities with climate change.
			Social Cohesion	Decreased social isolation and empowerment of disadvantaged groups.
		Improved sense of community and feelings of collective activities		
		Strengthening the integration of the community and the neighbourhoods by creating opportunity to have energetic playgrounds based on imagination with the facilities in the outer space for children.		
		Generating place for social gatherings and other leisure activities.		
	Cultural	Increasing the aesthetic quality of the urban environment with their physical functions such as the regulation of the urban texture and the stabilization of density.		
		Softening the monotonous structure of the city by balancing the measurement contrast between nature and human.		
		Improving the urban landscape and the city's liveability.		
		Enhancing quality of life by bringing a depth and sense of wonder to the urban space in creating vistas.		
		Creating mental images for individuals by strengthening the spatial perception of landmarks and historical places.		
		Creating harmony and softness to space by embellishing buildings with natural elements.		
	DRAWBACKS OF IMPLEMENTING NBS	Social	Physical Perception	Creation of hiding space or “entrapment areas” by obstructing the view
				Transforming the unused and vacant land to area with illegal activities
Reducing perception of safety at night because of over-dense green vegetation				
Cultural		blocking views from buildings by giving wild-grown and unpruned vegetation give an untidy impression to by-passers”		

In a study by Hashim et al. (2016)⁹ the role of vegetation and landscape design considered as an indicator which should be investigated in regard to the spatial cognition of safe urban environment. Among essential factors that influence perceived personal safety, character of vegetation plays a prominent role in safety of parks and open spaces. Any place of parks with poor lightening, dense unmaintained vegetation or a high density of trees by providing hiding spaces and unsafe places are not utilized by park users. Additionally, in a study it has been stated that *“a quiet park, unkempt shrubs and poor lightings may cause criminal activities. Abandoned parks may also cause fear to the public especially women visitors”* (Hashim et al., 2016).

3.3. Cross analysis between CALs and in the European Monitoring Framework

The assessment of the effectiveness of any solution includes its validation under various environments or conditions. Urban environments are complex systems where many elements are interlinked. NBS have been proposed as potential urban regeneration solutions to tackle several challenges. To prove the accuracy of such claims the assessment of the expected outcomes need to be monitored and evaluated, preferably in multiple settings. Thus, the potential benefits of NBS need to be corroborated and assess the extent to which NBS are capable of reaching specific goals.

This section aims at finding common ground on the evaluation and monitoring among the CLEVER FR Cities and at framing the KPI indicator selection within the European Monitoring Framework.

⁹ Hashim, N. H. M., Thani, S. K. S. O., Jamaludin, M. A., & Yatim, N. M. (2016). A Perceptual Study on the Influence of Vegetation Design Towards Women's Safety in Public Park. *Procedia - Social and Behavioral Sciences*, 234, 280–288. <https://doi.org/10.1016/j.sbspro.2016.10.244>

Table 19. Cross analysis of possible shared KPIs among CLEVER FR Cities

Topics where KPIs may be shared	Hamburg	London	Milano
Perceived health and wellbeing	CAL (2)	CAL (1,2,3)	CAL (1,2,3)
Thermal comfort	CAL (2)	-	CAL (1,3)
Social interaction and cohesion	CAL (1, 3)	CAL (1,2,3)	CAL (1,2,3)
Perception of security	CAL (1)	CAL (1,2,3)	CAL (1,2,3)
Rainwater runoff and infiltration	CAL (1)	-	CAL (1)
Participation (e.g. number of users/ visitors/ participants)	CAL (1,3)	CAL (1,2,3)	CAL (1,2,3)
NBS use	CAL (1)	CAL (1,2,3)	CAL (1,2,3)
Knowledge/awareness related to NBS	CAL (1, 3)	-	CAL (1,2,3)
Quantification of green area	CAL (1,2)	CAL (1,2,3)	CAL (1)

After the revision of all KPIs considering the CALs, shared links have been identified. Table 19 shows the topics where it is more likely to find a common basis to establish identical or very similar KPIs. For example, in the three cities it is recurrent to find KPIs related to the number of people visiting the NBS or participating in events. However, small nuances may be present among KPIs. Another example of common selected KPI is the “perceived health and wellbeing”. Probably due to the higher difficulty to evaluate the impacts of urban green spaces on health the focused has been placed on wellbeing and/or perceived health. The same can be concluded from other topics such as thermal comfort, security, NBS use, participation. For the evaluation and cross-comparison of the social perception and assessment of these topics, as well as psychosocial topics such as social interaction and cohesion, a series of KPIs have been proposed that are gathered in the CLEVER Social Survey Questionnaire.

Below some examples are presented that explain how this cross-comparability is proposed. For example, to assess the **perceived general health** in the CLEVER-SSQn the following KPI based on Hamburg for its CAL1 has been included:

- How was your health in general? [Answers options: 1. Very good, 2. Good, 3. Normal, 4. Bad, 5. Very bad, and 9. Prefer not to answer].

Furthermore, to account for the COVID-19 health crisis issue, the question was split in two:

- In the last 12 months, before the COVID-19 crisis
- During the COVID-19 crisis period

Another example that illustrates the preparation of social KPIs for cross-comparison was the unification of response formats for the different questions included in the CLEVER-SSQn. Therefore, whenever possible, two scales were used, preferably with 5 response options:

- Satisfaction scale to evaluate the perception and assessment of the different intervention places and their different elements:
 - From “Completely satisfied” (5) to “Completely dissatisfied” (1), OR Completely satisfied (5); Satisfied (4); Neither satisfied nor dissatisfied (3); Dissatisfied (2); Completely dissatisfied (1); Prefer not to answer (9).

This scale allows us to respond to and harmonise the following set of proposed KPIs, for example for London the scale will be applied in: % of residents who feel the parks and open spaces are well maintained; % of residents who feel the waterways are well maintained; % of residents who feel the landscape has improved in the last year; % of residents who like the facilities in a particular park or open space; % of residents who think a particular park or open space is clean; % of residents who think a particular park or open space is suitable for their needs, % of residents satisfied with local services and amenities, etc.

- (Dis)Agree scale to assess social attitudes, beliefs, expectations, etc., as well as the different social issues considered in the CLEVER-SSQn (social cohesion, place identity, environmental justice...).

In other cases, two or more comparable options have been put forward from which cities can choose, as is the case with the perception of security, which has either been included as another element of those evaluated in the different types of CLEVER intervention sites (open space, building, station, school...) or raised as separate specific questions (See ANNEX B about CLEVER Social Survey Questionnaire).

- In general, before the COVID-19 crisis, how safe did you feel when walking through/stay...? [Response scale: Very safe (5); Tend to safe (4); Neutral (3); Tend to unsafe (2); Very unsafe (1); Prefer not to answer (9)]
 - ...*this PLACE*
 - ...*during the day*
 - ...*after dark*
 - *And when walking alone in their local area after dark*
 - *And in your own home*

In other cases, new issues have been included to reflect social perception, as has been the case of environmental comfort, which integrates, in addition to the global vision, the specific comforts related to thermal and acoustic conditions:

- How comfortable did you feel with the following aspects in this place/building before the COVID-19 crisis? [Response scale: Very high (1), high (2), medium (3), low (4), Very low (5)]
 - *Acoustic*
 - *Thermal*
 - *Overall*

More detailed information on the different KPIs of the CLEVER Social Survey Questionnaire can be found in ANNEX B of this document.

A first review of EU funded Horizon 2020 projects, e.g. the EKLIPSE or NATURE4CITIES, research works and ThinkNature Taskforce, indicated that the structure indicators of the CLEVER Cities is aligned with the general KPI framework. In fact, CLEVER project thematic experts are also contributing actively in the definition of indicators for the Taskforce 2 on Impact Assessment Framework (indicators). Indicators with a long history like “air quality - pollutant concentration” are well defined where there is less of a discussion not only in the definition but also in the metrics. However, for the evaluation of health, wellbeing or social impacts the debate is still opened. CLEVER Cities in the course of the project work for bringing some light to this complex issue.

4. Local monitoring plan approach

4.1 Monitoring Plans in cities

This section is devoted to the general criteria for the Local monitoring Plan in the CLEVER FR cities. On that sense the elements that are presented are the key ones that must be defined to obtain an operative and feasible monitoring process:

- **Stakeholders for monitoring:** relevant roles for monitoring are presented and can be divided in four general categories: research activities, strategy or decision-making process, development of the monitoring and assistance-support.
- **Tools for monitoring:** details about the tools that will be used for the KPIs gathering are presented in a very general approach. These tools will be linked to the specific metrics to assess KPIs that must be defined with more detail in each CAL in order to assure the impact assessment to track the outcomes achievement.
- **Schedule for monitoring:** the pre-greening and post-greening scenario has specific timeline requirements regarding the project but also for the NBS impact assessment. Also, a coordination with the procurement and public works of the interventions in CALs must be developed.

The unforeseen impact description of COVID-19 health emergency on CLEVER monitoring work has also been included in this second revision of this deliverable within this section.

Furthermore, a detailed Local Monitoring Plan (LMP) for each city is presented in the Annex A. The LMP consists on the following information:

- A **monitoring** plan: It gathers what will be monitored and assessed, where the data will be collected, who will collect the data and analyse it and when the data will be acquired.
- A **data collection** plan: It describes how the data will be collected, that is the methodology for that collection.
- An **evaluation** plan: It summarizes who and how the data will be analysed.
- A **data storage** plan: It summarize how the outputs from the previous evaluation will be stored and who will have access to them.

The latter two points, despite of being part of the evaluation plan they have been included in the LMP to have a clearer overview of the whole monitoring and assessment process.

4.1.1. Implications of COVID-19 health emergency on the LMPs

The unexpected arrival of COVID-19 has had a devastating global impact. Two of our front runner cities, London and Milan, have been badly affected, with the socio-economic impacts likely to be hard hitting and long lasting. The timing of COVID-19 has been incredibly problematic for our cities work; from being unable to undertake face to face interviews to the delay of in-depth co-design activities. This uncertainty remains: social distancing measures are still in place; there is a real threat of a second wave in the coming winter months; and the worry of an economic crisis. All of this is underpinned by anxieties citizens have on matters relating to health, social freedoms, and job security. As a result, our approach to pre-greening and getting a 'true' opinion baseline is problematic.

CLEVER Cities' aim is to demonstrate that greener cities work better for people. It proposes that if we include people in the design and maintenance of nature-based solutions, the benefits can be wide reaching and help to address some of the key urban challenges that all cities face. How and when we work with people to achieve this needs to be, in some cases, rethought for this new COVID-19 world. We will continue to work through these issues and take mitigating actions to ensure our project is still delivered to a high quality. Each city outlines some of these approaches, later in the paper.

4.1.2. Hamburg's LMP

Stakeholders for monitoring

For monitoring and evaluation of the interventions that will be implemented in the scope of the CLEVER Cities project, different institutions of the Free and Hanseatic City of Hamburg will be involved. Their contribution to monitoring will vary in type and scope. The following Table 20 gives an overview of the involved institutions along with their level of involvement. There are two possible levels of involvement: "High" and "Medium". While "High" means this organization will have the main responsibility for monitoring activities or will be involved in the monitoring activities on strategic and supervising level. "Medium" level of involvement indicates a rather contributing role to monitoring activities.

Table 20. Organisations involved in the monitoring activities (Hamburg Team 2020)

Organisation	Role	Level of Involvement
TUHH	Oversight of evaluation plan	High
TUHH, HCU, FHH-BUE	Technical and academic advice	Medium
HCU	Students research work	High
Steg	Opinion research advice and strategy	Medium
FHH-Bezirksamt Harburg	Strategic UIP Lead	High
FHH-LGV	Urban Data Management	High
Community	Monitoring on site	Medium

Tools for monitoring

The tools that will be used for the monitoring activities depend mainly on the issue that is evaluated. This requires developing a precise idea of which results, or processes should be evaluated within the framework of the project (See Chapter 3). After developing the Theory of Change workshops and the desired long-term goals of our interventions, it became very apparent that much of the data that will be gathered will be qualitative. Usually these data are based on a rather small sample but nevertheless able to provide very rich information, depicting very individual and local sensitivities. In the context of CLEVER Cities, the handling and monitoring of interventions on a small scale with a more local impact is demonstrated in Hamburg.

The monitoring activities will be supervised and planned by the project partners but will also involve local citizens to a large extent and additionally student projects. In general, the Urban Data Platform Hamburg provides the digital basis for the monitoring activities: FHH-LGV operates, provides, steers and implements the ongoing development of the Urban Data Platform and provides advice on its usage as well as on the integration, interconnection and retrieval of data.

Besides common qualitative tools, such as questionnaires and interviews, also digital devices and tools will be deployed, including apps for mobile devices. Specifically, to investigate the perceived security in the project area, the LMT is cooperating with a chair of the Technical University of Berlin, where researchers developed an app for mobile devices which is based on a citizen-centric crowdsourcing approach (Sensafety App): it enables users to report their personal perception of safety anytime and at any site as well as to explore and experience the collected data in their surroundings, depending on the current location. For CLEVER Cities, the app was adapted, such that it does not only ask for a basic assessment of the safety at the given

location, but also offers the possibility to elaborate on which measures may improve that perception. The resulting targeted data collection about the perceived safety in specified areas will reveal a comprehensive and complete picture of the perceived safety in the respective urban environment, which may support the prioritization of places in the project area for upcoming interventions and also help to identify discrepancies between actual crime rates and incidents and the subjective feeling of insecurity. Thus, deploying the app and including the resulting data in the local monitoring activities will serve as a basis for both clarification and prevention of actual crimes through environmental design, resulting in a true co-creation with residents. Table 21 below gives an overview of the deployed tools across each of the CALs.

Table 21. Tools overview (Hamburg Team 2019)

Tool	CAL 1	CAL 2	CAL 3
Focus group interviews	✓	✓	✓
Participatory sensing	✓	✓	
Questionnaires	✓	✓	✓
Annotative Image Mapping (Finding Places, DIPAS online participation tool and touch table for on-site participation)	✓	✓	
“Kiezläufer” Neighbourhood mentors	✓		
Smartphone App for measuring perceived safety	✓	✓	
Acoustic sensors (citizens science)		✓	
Digital route mapping	✓		
Incident reporting (“Melde-Michel” Portal)	✓	✓	✓
Crowd sourced photography (combined with other social media tools)	✓	✓	✓

Tool	CAL 1	CAL 2	CAL 3
Social GIS data of local administration	✓		

Schedule for monitoring

The Table 22 below shows the draft schedule for the pre-greening. This will be further implemented in the coming months once the activities in the CALs will be developed in detail. The monitoring of the CALs follows the approach of co-monitoring ensuring empowerment and participation from the local level.

Nevertheless, the procedure described here represents the current state of planning. But due to the uncertain development in the CALs and the resulting changes, the CLEVER Hamburg team will adjust the procedure according to the latest developments and needs. Also, the dynamics of the involvement processes might lead to some minor plan adjustments.

All statements in Table 22 are made on the assumption that there will be a further decline in corona pandemic. In the event of further restrictions, the schedule must be adjusted accordingly.

Table 22. Pre-greening schedule 2020/21 (Hamburg Team 2020)

Already underway	Dissemination and presentation of digital tools for safety perception (Sensafety App) Ad Hoc status quo determination (Natural playground) Pilot observational work Alignment of questionnaires Query and information letter (plantings) Starting with observational work and surveying in all CAL 1
Sep	In depth interviews (refugee camp) Questionnaires local situation CAL 2 (façades)
Oct	Opinion research in schools Crowd sourced photography
Nov	Opinion research in schools
Dec	Opinion research in schools

COVID-19 impact on the LMP

The Corona pandemic has not only postponed the implementation in some projects, but also the pre-greening phase (by 2-3 months). To buffer delays monitoring will be shifted towards digital platform (Trello) at the district school Fischbek-Falkenberg (CAL 3). This process is supported by

an external expert. Furthermore, due to the contact restrictions and the assumed change in perception of green spaces for residents, interviews and observations can only be carried out with a time delay in July / August 2020 for other CALs. For this it was necessary to adapt the questionnaires accordingly and to ask explicitly about the time before Corona, or about the effects of Corona.

This explicitly applies to the garden project at the refugee accommodation, which is managed by the German Red Cross. The risk of infections due to the narrow living conditions is particularly high here. As a result, co-implementations from spring 2020 had to be moved to late summer, as well as the corresponding monitoring steps, such as conducting interviews or distributing questionnaires at events.

4.1.3. London's LMP

Stakeholders for monitoring

There are a number of stakeholders that are involved in the monitoring and evaluation of CLEVER London. These stakeholders (See Table 23) will be involved in a variety of ways and depths in the definition of KPI and their collection and analysis.

Table 23. Stakeholders definition for London.

Organisation	Role	Level of Involvement
Peabody, GLA, Groundwork & Young Foundation	Oversight of evaluation plan	High
ARUP, TSIP	Peabody Evaluation Team	Medium
University College London	Acoustic Support	Medium
GLA Opinion Team	Opinion research advice and strategy	Medium
Social Finance	Economic Valuation of Co-production	Medium

Tools for monitoring

The first point to consider when deciding what types of tools we will use for monitoring is understanding what type of questions we want to answer. Through the process of developing the ToC and starting to identify priority outcomes, it became very apparent that much of the data we will be gathering will be qualitative. This data which is expected to have a fairly small sample will nevertheless be very rich.

We are committed to the involvement of local stakeholders and the use of citizen science as a way to engage and upskill interested local partners. We are exploring with the Economic Development team at Peabody, how we could recruit 5-10 research assistants who would provide the much needed on the ground support. They would be rewarded by both pay and training. Below is an outline of the types of tools we expect to use across each of the CALs (Table 24).

Table 24. Types of tools London expects to use in ach CAL

Tool	CAL 1	CAL 2	CAL 3
Focus Group	✓	✓	✓
Interviews	✓	✓	✓
Observational Work	✓	✓	✓
Ethnographic Study	✓		
Questionnaires	✓	✓	✓
Community walks	✓	✓	✓
Annotative Image Mapping	✓	✓	
Drone footage	✓	✓	✓
Film footage	✓	✓	✓
Acoustic sensors		✓	
Water quality testing		✓	
Activity monitors <i>e.g.</i> Health app or pedometers	✓	✓	
Digital route mapping	✓		
Urban Mind app	✓	✓	✓
Crowd sourced photography	✓	✓	✓
Time lapse photography	✓	✓	✓
Biobliz with children	✓	✓	✓

Shedule for monitoring

Below is the draft schedule for pre-greening. This will be further developed in the coming months. As the methods paper is firmed up, more detail of pre-greening and ongoing monitoring will be

available. Key to our approach is to ensure that monitoring gets built into the activities we will be running – this is to ensure that monitoring is both effective and not ponderous (See Table 25).

Table 25. Pre-greening schedule 2020

Already underway	<ul style="list-style-type: none"> Water quality testing Opinion research at community events Pilot observational work Opinion research schools Peabody Community Survey Door to door surveys Online surveys Observation work surveys
Sep	<ul style="list-style-type: none"> Telephone interviews Observational work in all CALs Water quality testing
Oct	<ul style="list-style-type: none"> Opinion research at community events Focus groups Water quality testing Crowd sourced photography
Nov	<ul style="list-style-type: none"> Drone and film footage Observational work in all CALs Annotative image mapping Drone recording Focus group In depth interview Thamesmead opinion survey Water quality testing Pilot acoustic monitoring
Jan	<ul style="list-style-type: none"> Community led guided walks Digital route mapping Water quality testing Annotative image mapping
Feb	<ul style="list-style-type: none"> Acoustic monitoring Digital route mapping Water quality testing Opinion research schools Annotative image mapping
March	<ul style="list-style-type: none"> Opinion research schools Opinion research at community events

COVID-19 impact on the LMP

This schedule has changed a lot due to the impact of COVID-19. We have delayed the formal start of our co-design work, as this was dependent on groups coming together. We are in a good position because a large proportion of our opinion baseline work, not CAL specific, has been

picked up via the Thamesmead Survey, in 2019. This will enable us to get a good understanding of social KPI baseline, pre-COVID.

In order to maintain momentum, we have been able to undertake some survey work and will use remote options like telephone surveys until social distancing rules are relaxed. We are collaborating on a Community Researcher Programme that will allow us to work with local people who can work close to home and support us with our research.

We current expect to the able to undertake group activities, outside, with social distancing in place this autumn.

4.1.4. 5.1.3 Milano's LMP

Stakeholders for monitoring

All members of Local Cluster Team will be involved in the monitoring and evaluation of CLEVER Milano, with also some additional representatives of UIP or CAL stakeholders, such as OMD cited in the following table, selection of Stakeholders for monitoring support is an ongoing process, during co-design of CAL actions (See Table 26). These stakeholders will be involved in a variety of ways and depths, even varying from one CAL to another, since actors and site location are different for each CAL in Milano. Particularly CAL1 monitoring will be supported by owners of buildings were experimental Green Roof and Walls will be located, once these buildings will be selected through public tender that is set to be published in September 2019.

Table 26. Stakeholder definition for Milano

Who	Organisation	Role
CDM, Coppi	CDM AMAT	Strategic evaluation lead
Dajelli, Morello, Bono, Vona, Coppi CDM	ITALFERR POLIMI AMB ELI AMAT CDM, OMD Osservatorio Metereologico Duomo	Technical and academic advice
Vona, CDM, FPM,	ELI - CDM FPM	Survey Strategy and Assistant
Vona Dajelli	ELI ITALFERR	Biodiversity monitoring
WWF CDM	WWF CDM	Information channels monitoring
Fiori, Coppi, Dajelli	AMAT ITALFERR POLIMI (ABC)	Sensor monitoring

Who	Organisation	Role
CDM, Bono, Forbici Prampolini, Vona	CDM AMB Assofloro WWF ELI	UIP Lead and engagement monitoring
CDM, D.Resilenza +URB, Coppi, Lorenzi	CDM AMAT FPM	Data transfer and platform, GIS Mapping

Tools for monitoring

In Milan, since almost all the interventions are aimed to answer to social challenges through NBS use, in application of H2020 SCC-2 2017 Topic as detailed in CLEVER proposal, during ToC workshop emerged that a significant part of monitoring data will be qualitative and social surveys analysis. By the same time, since experimental NBS in the built environment, particularly Green Roofs and Walls in CAL1, and Green Walls in CAL3 - Tibaldi train stop, are reviewing performances in heat island and flash floods mitigation, also quantitative analysis and physics measurement are envisioned, particularly spot measurements, considering small scale of these interventions.

Also in Milano, definition of methods for our approach to evaluation is still an ongoing process. The CLEVER Milano team is gathering scientific advice from FPM / POLIMI (both from DASTU/Urban Studies Dept., both from ABC/Architecture, Building-engineering and built-environment Dept.) and technical expertise from AMAT, ITALFERR, AMB and ELI to reach a methodology that will at the same time scientifically sound, and easily applicable also by stakeholders and public that will take part to co-monitoring in practice. Particularly social surveys will be supported by expertise both from local cluster experts (ELI, FPM/POLIMI) and also from Social Empowerment experts working on Lorenteggio/Giambellino Rehab with CDM.

List of possible tools and activities is still under construction, and scrutiny (See Table 27).

Table 27. Types of tools Milano expects to use in each CAL

Tool	CAL 1	CAL 2	CAL 3
Focus Group	✓	✓	✓
Interviews/Questionnaires	✓	✓	✓
Observational Work		✓	✓
Community walks	✓	✓	✓

Tool	CAL 1	CAL 2	CAL 3
Annotative Image Mapping	✓	✓	
Drone footage or Aerial and Satellite Mapping	✓		✓
Film footage	✓	✓	✓
Accoustic sensors		✓	✓
Activity monitors e.g. Health app or pedomitors		✓	
Digital route mapping		✓	✓
Urban Mind app		✓	
Digital co-monitoring		✓	✓
Crowd sourced photography		✓	
Time lapse photography		✓	✓

Schedule for monitoring

Below is our draft schedule for pre-greening monitoring (Table 28). This will be further developed in the coming months, so more details of pre-greening and ongoing monitoring will be provided on revision of local monitoring plan. Particularly, as defined in D.2.2, each CAL in Milano has separate timing and location, so monitoring schedule has to be adaptive to each co-creation roadmap, and pre-greening monitoring will be developed during next 18 months according to each CAL program of activities and available access to construction sites.

Table 28. Pre-greening schedule 2019/2020 for Milano

	GENERAL	CAL1	CAL2	CAL3
Summer 2019	<ul style="list-style-type: none"> Baseline finalization and check 	<ul style="list-style-type: none"> Existing green roof mapping and case study analysis 	<ul style="list-style-type: none"> Significant SH interviews 	<ul style="list-style-type: none"> Thermal data Heath island measurements if possible
Fall 2019	<ul style="list-style-type: none"> Social Network and communication monitoring 	<ul style="list-style-type: none"> Existing green roof mapping and case study analysis Accounting of training and promotional events participants 		<ul style="list-style-type: none"> Acoustics monitoring Pre-intervention perception surveys and interviews

	GENERAL	CAL1	CAL2	CAL3
Winter 2019-20		<ul style="list-style-type: none"> • Selection of GRW proposed sites • Review and update of the green roof potential surfaces map of the Milan area 		<ul style="list-style-type: none"> • Run Off measurement or modelling
Spring 2020		<ul style="list-style-type: none"> • Selection of GRW proposed sites 		
Summer 2020		<ul style="list-style-type: none"> • Selection of GRW proposed sites 	<ul style="list-style-type: none"> • Pre-intervention perception surveys • Thermal data Heath island measurements (after soil remediation) 	<ul style="list-style-type: none"> • (start) Thermal data Heath island measurements on train stop building, before NBS application
Fall 2020		<ul style="list-style-type: none"> • Pre-intervention perception surveys and interviews • Calculation of the permeability of the GRW surrounding areas 		
Spring 2021			<ul style="list-style-type: none"> • Pollinators and birds 	<ul style="list-style-type: none"> • Pollinators and birds (to be confirmed)
Summer 2021		<ul style="list-style-type: none"> • Run Off measurement or modelling (comparing green and grey surfaces) • Thermal data Heath island measurements (comparing green and grey surfaces) 		

COVID-19 impact on the LMP

The impact of COVID-19 was mostly related to the monitoring phase. The monitoring team choose the option to conduct the monitoring simultaneously among green infrastructure and comparable conventional surface instead of pre- and post- greening monitoring believing that this will also lead to significant results and possibly to verify once more the innovative qualities that green roofs offer. CAL1, the preliminary evaluation of candidate sites will be carried out without inspection due to COVID-19 related issue. The co-design will start in autumn 2020. CAL2, the decontamination activities are suspended due to COVID-19 related issues, the end of this

activities is still expected for February 2021. Pre-greening activities can be carried out remotely using phone or web questionnaire. Education cannot be carried out effectively during the COVID-19 crisis, if the situation lasts too long the monitoring activities planned for the spring 2022 will be postponed to Spring 2023.

5. Next steps

Monitoring and evaluation is an on-going part of any urban implementation strategy. CLEVER FR Cities have made good advancement towards defining a list of KPIs for the assessment of NBS impact. However, a fine-tuning of the monitoring data model for each city may be envisioned to adapt to unforeseen circumstances. There are various points that may suffer small adjustments in the monitoring plans:

- An on-going discussion about the social KPIs may promote higher cross comparability study within the CLEVER Cities. This dialogue with the cities has the intention to enrich the local surveys by challenging themselves to include innovative or new indicators/dimensions of the KPIs when relevant and to assure similar metrics are used.
- Adjustments of the methods or timing to capture data for each KPI as due to *e.g.* COVID-19 health emergency impact as it has already been described.

As the Local Monitoring Plan with its goals, methodologies and infrastructures is (or in its way) already in place the pre-greening period of monitoring is envisioned to take place shortly.

Annex A. Local Monitoring Plans

HAMBURG

CAL 1

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>CAL(s)</i>	<i>Specific Site</i>	<i>Data Collection</i>	<i>Data analysis (Institution)</i>	<i>Pre-greening Period</i>	<i>Frequency (Pre-Greening)</i>	<i>Post-Greening Period</i>	<i>Frequency (Post-Greening)</i>
New recreational area/ sports area	Area of playgrounds in project area (Sandbek and "Alter Dorfkern") (m2 per child)	CAL 1	Area "Dritte Meile" Neugraben-Fischbeck (playground - involving nature-imitating equipment, designed close to nature - natural playground; co-designed and co-complemented with local stakeholders)	DHH	LGV (DHH)	Initial area of playgrounds in the neighbourhood (FHH statistics - Digital map of green space in HH ("Digitaler Gruenplan"))	Pre-greening: December 2019 (LGV)	How the total area of playgrounds in the area develops during life time of the projects	Regularly

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
New area is used frequently, various physical activities are practiced	Number of people using NBS by age group and gender at different times and for different activities (n per ...)	CAL 1	Guiding system for the corridor	UKE; STEG	Analysis situation before: BUE/STEG; after: UKE; (HCU students?)	Expert knowledge steg; Demand assessment by BUE on requirements of playgrounds and parks in this area	Pre: Dez (2019)	Type of people using the area after implementation (until 2023)	Regularly (every year) e.g. one day at different times; different days during the year - e.g. summer, autumn, winter, spring - steg: every 3 months possible?
Decreased dominance of "intimidating spaces"	("Meta-KPI"): Amount and ratio of positive/negative ratings in the entire project area			Citizens	LGV	The Sensafety App, developed in a research project at TU Berlin, allows citizens to submit their perceived evaluation of the safety at the current location. For a baseline, we could use the amount of ratings before greening. (M1 - M15)	Once at the end of the period	Repeating evaluation of incoming ratings	Monthly

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
Increased usage and awareness of the corridor and its interventions	Number of scans of the QR code from information boards (n)	CAL 1	Innovative drainage system along cycle path	Host of Server/Web page (probably DHH or LGV or external?)	LGV	None, as long as no boards with QR-Codes are installed	Once before implementation	Quantitative development of the recognition of the corridor (until 2023)	Regularly (monthly analysis) after M40
Delay/ reduction of the discharge peak	Number of pictures of CLEVER HH interventions on Instagram (n)			LGV, steg	LGV	No corridor; nothing - or only very few pictures/tweets with a reference to the project area (consider them as baseline)	Once before implementation	Quantitative development of the recognition of the corridor (until 2023)	Regularly (monthly analysis) after M41
	Number of tweets including CLEVER HH interventions on Twitter (n)			LGV, steg	LGV	No corridor; nothing - or only very few pictures/tweets with a reference to the project area (consider them as baseline)	Once before implementation	Quantitative development of the recognition of the corridor (until 2023)	Regularly (monthly analysis) after m42
	Rainwater runoff and infiltration (l)			TUHH (WB)	TUHH (WB)	Reference path (without drainage system) is also controlled (usual path construction)	Each time together with measurements at the "innovative path"	Control of Runoff and infiltration situation at the new path (until 2023)	After implementation regularly (half a year)

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
Improved water availability for trees because of root compound system	"Climate Trees" will be located at the square close to S-Bahnhof Neugraben or at market square Neugraben; measure the soil water content (l/m ³)	CAL 1	Planting "Climate Trees" (selected species resilient against harsh environments)	Probably Uni Hamburg (contact via BUE)	Probably Uni Hamburg (contact via BUE)	Compare to normal newly planted tree (Cadastre of street trees in HH and Aerial photos (DOP))	Each time together with measurements of climate trees - "pre-greening comparison" is the normal newly planted tree	Control of tree development after planting (until 2023)	Regular control (once during vegetation period)
Improved social cohesion by volunteering in the gardening project/ activities (only considering the residents) (Co-Monitoring)	Number and type (age, gender) of residents who have actively volunteered in maintaining the garden (in the last 6 or 12 months) (n)	CAL 1	Gardening project in refugee camp (DRK-Gärten)	Steg/DRK	Steg	Nothing; nobody is gardening; in the pre-greening phase, a series of workshops about the planning of the gardening project etc. took place, of which we have participant numbers	Evaluated before implementation	Following the development of participation of the residents (until 2023)	Every 12 months (m24; m36; m48; m58) (regularly with every workshop and after implementation)
More recreational space for refugees	Recreational area and facilities have been newly designed/improved (m ²)	CAL 1	Cornelius Church (raised beds)	Steg/ DRK	Steg	Nothing, no plants or high beds	Evaluated before implementation	Following the development of the gardening area	Each year (m24; m36; m48; m58)

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
Improved wellbeing	Proportion of participants in the gardening project who feel needed/ have the feeling to serve a purpose (%)			Steg und UKE (ggf. HCU-Students?)	Steg und UKE	Status quo before implementation	Evaluated before implementation	Following the development of the well-being (feeling about the gardening project) of the residents	Each year (m24; m36; m48; m58) - yearly after development of the questionnaire
Social Cohesion: participation of people in raised beds construction and management (not only parishioners)	Number of users involved in design, planning and implementation (n) (by age and gender; church member or "outsider")			Steg, church	Steg	Additional participants by clever (in relation to rise-project)	Once before implementation	Observing the quantitative participation in the action (until 2023)	After implementation once a year (growing season)
Awareness raising: Better information on rainwater management	Number of school hours spent on teaching about water management and in preparing the board (n)	CAL 1	Rainwater retention basin information board & Retention Filter (n)	Hcu/teacher	Hcu/teacher	No consideration in curriculum up to now	Once before implementation	Observing the integration of the topic in education (school ohrnsweg) (until 2023)	During implementation and during the following year (after m30; m40)

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
Biodiversity support	Number of small scale interventions in the project area, cumulated over project period, including green roofs (which also have their own KPI in CAL 2), insect hotels, the planting on barren areas close to S Fischbek, green roof on police station (PK47), green roof on access building Neugraben... (n)	CAL 1	Further NBS interventions (green elements) on paths, bridges, squares in the project area	DHH, BUE	BUE	Site visit and counting by the end of the year	Once before implementation	Depends on respective implementation (until 2023)	Repeated counting each year after implementation
Decrease in distance between green spots (stepping stones)	Average distance between green spots (m)	CAL	Planting on barren areas close to station Fischbek	DHH	HCU/TUHH	Base on current green network	Once before implementation	Depends on respective implementation (until 2023)	Repeated counting each year after implementation
Increased awareness of professional gardeners for biodiversity supporting measures	Number of gardeners with increased sensibility about biodiversity topics (n)			Probably DHH/steg	Probably DHH/steg	By the end of the year	Once before implementation	Depends on respective implementation (until 2023)	Repeated counting each year after implementation

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
Regular visits of pupils and seniors, neighborhood picnics, care of the areas	Number of participants from each group (cooperation) / frequency of taking care of the planting (commitment) (n)			Steg/ pupils/ teachers	Steg/ HCU	No meetings	Once before implementation	Observing the participation During events (until 2023)	During events
Intergenerational exchange	Number of organized joint visits and activities / number of people from different generations (n)	CAL 1	Improvement of the former fire pond area (NBS art /sculpture made of recycled materials)	Steg/ pupils/ teachers	Steg/ HCU	No exchange existent (Einschätzung steg)	Once before implementation	Follow up of the actions at this spot (until 2023)	Repeated counting until end of the project
Improved neighbourhood by art objects; demonstration of using natural (waste) materials	Subjective perception; feeling/adherence to the neighbourhood/alter dorf kern			Steg	Steg	1 month before implementation	Once before implementation	After implementation	Once in the year after implementation
Increase of bee biodiversity	Number of bee species (n)	CAL 1	Improvement of supermarket roof (green roof)	Bue (n3)	Bue (n3)	Spring 2020	Once before implementation	Following the development of the biological status of the roof (until 2023)	In the following years same spots will be monitored again; once a year (growing season)

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>CAL(s)</i>	<i>Specific Site</i>	<i>Data Collection</i>	<i>Data analysis (Institution)</i>	<i>Pre-greening Period</i>	<i>Frequency (Pre-Greening)</i>	<i>Post-Greening Period</i>	<i>Frequency (Post-Greening)</i>
More breeding and habitat options for bees	Number of realised bee / insect nests (nisting material) (n)	CAL 1	Smart ECO FAM	BUE	BUE	Spring 2020	Once before implementation	Checking the result of the action	Once when implementing the measure
Filtration of particulate matter and other emissions	Amount of PM2,5; PM10 and NO2 reduced by the moss wall (µg/m3)			TUHH/ IT service company	TUHH/ IT service company	Sensors measure the surrounding before and after filtering	Continuously	Checking air quality improvement after installation (until 2023)	Continuously after implementation (mean values hourly, daily; montly) (company will probably send aggregated data)

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>Data collection source</i>	<i>Data Collection Methods</i>	<i>Notes on Data Collection</i>	<i>Targeted Sample</i>	<i>Target Respondent</i>	<i>Data Analysis</i>	<i>Data Analysis Method</i>	<i>Data Access</i>	<i>Outputs</i>
New recreational area/ sports area	Area of playgrounds in project area (Sandbek and "Alter Dorfkern") (m2 per child)	Administrative/local authority documents	Administrative/local authority documents-Plans	December 2021	-	-	LGV	Quantitative analysis	Urban data platform Hamburg (publicly available)	Time series
New area is used frequently, various physical activities are practiced	Number of people using NBS by age group and gender at different times and for different activities (n per ...)	Observations	Observations-Fieldwork: counting, photographing, checklist	Observations of physical activity - (SOPARC) or PUBLIC LIFE DATA PROTOCOL (PLDP) - note here that the possible physical activities highly depend on what will actually be built	-	-	BUE/STEG	Quantitative and qualitative analysis	Internal; project report	Time series
Decreased dominance of "intimidating spaces"	("Meta-KPI"): Amount and ratio of positive/negative ratings in the entire project area	Digital	Digital-Mobile apps	The data will be provided in regular intervals.	-	-	LGV	Counting and calculating an index	Probably internal	Time series of an index (graph)

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI (unit measure)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Increased usage and awareness of the corridor and its interventions	Number of scans of the QR code from information boards (n)	Digital	Digital-Mobile apps	QR-Code Monitoring (how often is it scanned?)	-	-	LGV	Quantitative analysis	Urban data platform Hamburg (publicly available) (boards and their location)	Time series
	Number of pictures of CLEVER HH interventions on Instagram (n)	Digital	Digital-Social media	Counting/Protocols; social media analysis	-	-	LGV	Quantitative analysis	Urban data platform Hamburg (publicly available)	Time series
	Number of tweets including CLEVER HH interventions on Twitter (n)	Digital	Digital-Social media	Counting/Protocols; social media analysis	-	-	LGV	Quantitative analysis	Urban data platform Hamburg (publicly available)	Time series
Delay/reduction of the discharge peak	Rainwater runoff and infiltration (l)	Experimental	Experimental-In situ scientific instruments/measurements	Rainwater control boxes along the path	-	-	TUHH (WB); nachgelagert HWWI (Impact Assessment)	Quantitative analysis	Urban data platform Hamburg (publicly available)	Time series

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI (unit measure)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Improved water availability for trees because of root compound system	"Climate Trees" will be located at the square close to S-Bahnhof Neugraben or at market square Neugraben; measure the soil water content (l/m ³)	Digital	Digital-Sensors & remote sensing	Soil sensors for measuring soil humidity (e.g. measuring by "ARBOR revival")	1 climate tree (if not too many, all climate trees); 1 normal tree	-		Quantitative analysis	Urban data platform Hamburg (publicly available)	Time series
Improved social cohesion by volunteering in the gardening project/ activities (only considering the residents) (Co-Monitoring)	Number and type (age, gender) of residents who have actively volunteered in maintaining the garden (in the last 6 or 12 months) (n)	Observations	Observations-Fieldwork: counting, photographing, checklist	Counting people who are taking part 1-3 times or 4 times or more (protocols DRK)	participating residents of the camp	-	Steg, UKE	Quantitative analysis	Internal; project report	Time series
More recreational space for refugees	Recreational area and facilities have been newly designed/improved (m ²)	Administrative/local authority documents	Administrative/local authority documents-Geographical information	Statistical data evaluation (Digital map of green space in HH ("Digitaler Gruenplan"))	1	-	HCU; TUHH	Quantitative analysis	Urban data platform Hamburg (publicly available)	Time series

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI (unit measure)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Improved wellbeing	Proportion of participants in the gardening project who feel needed/ have the feeling to serve a purpose (%)	Questionnaires/surveys	Questionnaires/surveys- Face-to-face (traditional, computer assisted interviews)	Questionnaire - note that this will take many resources and costs may increase e.g. due to translation services	Participating residents of the camp	-	UKE; HCU	Qualitative analysis	Internal; project report	Time series
Social Cohesion: participation of people in raised beds construction and management (not only parishioners)	Number of users involved in design, planning and implementation (n) (by age and gender; church member or "outsider")	Observations	Observations-Fieldwork: counting, photographing, checklist	Counting; protocols	-	-	Steg	Quantitative analysis	Internal; project report	One result
Awareness raising: Better information on rainwater management	Number of school hours spent on teaching about water management and in preparing the board (n)	Interviewing	Interviewing-Focus groups	Curriculum; questionnaire;	-	-	HCU/Teacher	Qualitative analysis	Internal; project report	Time series

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI (unit measure)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Biodiversity support	Number of small scale interventions in the project area, cumulated over project period, including green roofs (which also have their own KPI in CAL 2), insect hotels, the planting on barren areas close to S Fischbek, green roof on police station (PK47), green roof on access building Neugraben... (n)	Observations	Observations-Fieldwork: counting, photographing, checklist	Counting interventions?	-	-	BUE	Quantitative analysis	Urban data platform Hamburg (publicly available)	Time series
Decrease in distance between green spots (stepping stones)	Average distance between green spots (m)	Observations	Observations-Fieldwork: counting, photographing, checklist	Counting of plants, bushes, trees?	-	-	HCU/TUHH (LGV)	Quantitative analysis	Urban data platform Hamburg (publicly available)	Time series

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI (unit measure)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Increased awareness of professional gardeners for biodiversity supporting measures	Number of gardeners with increased sensibility about biodiversity topics (n)	Interviewing	Interviewing-Focus groups	Interviewing oder Experimental; results of survey offered by iöw (https://www.ioew.de/publikation/fragebogen_zur_dokumentation_biodiversitaetsfoerdern_der_massnahmen/)	-	(professional) gardeners involved in the implementation of the interventions (e.g. Saga etc.)		Qualitative analysis	Internal; project report	Time series
Regular visits of pupils and seniors, neighbourhood picnics, care of the areas	Number of participants from each group (cooperation) / frequency of taking care of the planting (commitment) (n)	Observations	Observations-Fieldwork: counting, photographing, checklist	Counting	-	-	Steg/ HCU	Quantitative analysis	Internal; project report	One result
Intergenerational exchange	Number of organized joint visits and activities / number of people from different generations (n)	Observations	Observations-Fieldwork: counting, photographing, checklist	Counting, protocol	-	-	Steg/ HCU	Quantitative analysis	Internal; project report	Time series

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>Data collection source</i>	<i>Data Collection Methods</i>	<i>Notes on Data Collection</i>	<i>Targeted Sample</i>	<i>Target Respondent</i>	<i>Data Analysis</i>	<i>Data Analysis Method</i>	<i>Data Access</i>	<i>Outputs</i>
Improved neighbourhood by art objects; demonstration of using natural (waste) materials	Subjective perception; feeling/adherence to the neighbourhood/alter dorfkern	Interviewing	Interviewing-Focus groups		20 with gender balance	People from the neighbourhood (residents, pedestrians)	Steg/ HCU	Qualitative analysis	Internal; project report	One result
Increase of bee biodiversity	Number of bee species (n)	Experimental	Experimental-In situ scientific instruments/measurements	Status and mapping by nature conservation authority	-	-	BUE (N3)	Quantitative analysis	Urban data platform Hamburg (publicly available)	Time series
More breeding and habitat options for bees	Number of realised bee / insect nests (nesting material) (n)	Observations	Observations-Fieldwork: counting, photographing, checklist	Counting	-	-	BUE	Quantitative analysis	Internal; project report	One result
Filtration of particulate matter and other emissions	Amount of PM2,5; PM10 and NO2 reduced by the moss wall (µg/m3)	Digital	Digital-Sensors & remote sensing	Measuring by sensors	-	-	TUHH	Quantitative analysis	Internal; project report	Time series

CAL 2

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>CAL(s)</i>	<i>Specific Site</i>	<i>Data Collection</i>	<i>Data analysis (Institution)</i>	<i>Pre-Greening Period</i>	<i>Frequency (Pre-Greening)</i>	<i>Post-Greening Period</i>	<i>Frequency (Post-Greening)</i>
Increased green facade area and visibility in the entire project area (Neugraben-Fischbek)	Total facade area of public buildings covered green in the scope of the CLEVER Cities project (m2)	CAL 2	CLEVER Interventions (public buildings)	DHH, BUE, steg	LGV	The baseline corresponds to known green facades on public buildings in the area before the CLEVER green facade interventions are installed. We do not cover green facades on private homes here. Additionally, we monitor each green facade on its own.	Once before greening -	With every CLEVER Cities green facade intervention, this amount will grow. Additionally, as the green area on each facade grows on its own, the total facade area covered in green will be updated yearly.	Constantly as well as yearly
Increased area occupied by facade greening	Area covered by vertical green (m2)		Green Wall Vogelkamp	DHH, BUE	DHH, BUE	Since the wall is not green yet, the covered area is zero; then, based on the construction documents, we will have an initial value which is valid right after installation and will then be monitored in the following years	Once before implementation (zero) and then directly after implementation (area probably given in contract)	Regular measurement of the covered area (as plants grow) (for example at the "Langer Tag der StadtNatur")	Yearly or in 6-month intervals after implementation

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-Greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
Increased area occupied by facade greening	Area covered by vertical green (m2)	CAL 2	Green Facade (SAGA)	DHH, BUE, steg (due to proximity)	BUE	Since the wall is not green yet, the covered area is zero; then, based on the construction documents, we have an initial value which will be monitored in the following years	Once before implementation (zero) and then directly after implementation (area probably given in contract)	Regular measurement of the covered area (as plants grow) (for example at the "Langer Tag der StadtNatur")	Yearly or in 6-month intervals after implementation
Increased well-being	Perceived noise reduction and estimated wellbeing (db)			HCU, TUHH (LGV) (Tecnalia)	HCU; steg	Measuring before the green facade implementation using the ComfortUp! App at different times; if possible, using the "noise maps" of FHH as baseline (if they cover that area)	Once before implementation, then directly after implementation using the ComfortUp! App	Repeating measurements	Every 6 months, starting after the implementation is done
Increased well-being	thermal comfort			TUHH, HCU, BUE (Tecnalia; Green4Cities)	HCU; steg	Measuring before the green facade implementation using the ComfortUp and/or GREENPASS	Once before implementation	Repeating measurements	Once

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>CAL(s)</i>	<i>Specific Site</i>	<i>Data Collection</i>	<i>Data analysis (Institution)</i>	<i>Pre-Greening Period</i>	<i>Frequency (Pre-Greening)</i>	<i>Post-Greening Period</i>	<i>Frequency (Post-Greening)</i>
Increased green roof area in the entire project area (Neugraben-Fischbek)	Total roof surface of buildings (Including Edeka, Kaufland...) covered green in the scope of the CLEVER Cities project or supported by IFB or investments from private households (n and m2)	CAL 2	CLEVER Interventions (all buildings)	DHH	DHH	The roofs under consideration are not green yet, so the baseline corresponds to the green roof area on public buildings before the project; some home owners already have installed green roofs and we need an estimate for the hereby greened surface	Once before CLEVER Cities greening period	With every CLEVER Cities/ RISE intervention, the amount of total covered roof surface grows, so we constantly add up to that baseline number; alternatively, for the private homes, we could use the DOPs of the LGV to identify new green roofs on private homes, estimates their surface and adds that number in m2 to the total area	Constantly during monitoring period

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>CAL(s)</i>	<i>Specific Site</i>	<i>Data Collection</i>	<i>Data analysis (Institution)</i>	<i>Pre-Greening Period</i>	<i>Frequency (Pre-Greening)</i>	<i>Post-Greening Period</i>	<i>Frequency (Post-Greening)</i>
Green roof as nesting site for birds	Percentage of installed bird nests which show signs of usage (%)			BUE	BUE	The building does not exist yet and no possibilities for nesting are provided. Right after installation, we will have the total number of offered nesting possibilities.	Directly after construction and installation of the green roof and the nests, the percentage will probably be zero.	Regular assessment of bird nests	Yearly or in 6-month intervals
Savings in rainwater fees	Saved rainwater fees due to green roof (€)			BUE (TUHH/WB?)	BUE (TUHH/WB?)	Rainwater fees for a comparable building in the same area	Once and ongoing in parallel	Compare invoices for building with green roof and building without green roof	Yearly

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-Greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
Rainwater retention on roof top	Runoff from roof top (l)			TUHH (WB), potentially LSBG (DHH)	TUHH (WB), DHH	As the building is not built yet, no value	None	As soon as the construction is done, the rainwater retention can be measured with rainwater tipping bucket rain gauges, probably needing default values because measurements are to costly and difficult to install - probably needing default values because measurements are to costly and difficult to install	Regularly via mean values during measurement period
Improved rainwater management; release the peak load when rain is forecasted	Duration of how long the water was retained (h or days)	CAL 2	Green roof smart flow control (neugraben)	Potentially Hamburg wasser (should be cleared with them by DHH)	Potentially Hamburg wasser (should be cleared with them by DHH)	Standard roof without smart flow control	Once	After implementation until the end of the project	Continuous (yearly data evaluation)

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>CAL(s)</i>	<i>Specific Site</i>	<i>Data Collection</i>	<i>Data analysis (Institution)</i>	<i>Pre-Greening Period</i>	<i>Frequency (Pre-Greening)</i>	<i>Post-Greening Period</i>	<i>Frequency (Post-Greening)</i>
Improved rainwater management; release the peak load when rain is forecasted	How many times the flow control was triggered due to weather app (n)			Potentially Hamburg wasser (should be cleared with them by DHH)	Potentially Hamburg wasser (should be cleared with them by DHH)	Standard roof without smart flow control	Once		
Improved rainwater management; release the peak load when rain is forecasted	Amount of retained water at different seasons? (l)			Potentially Hamburg wasser (should be cleared with them by DHH)	Potentially Hamburg wasser (should be cleared with them by DHH)	Standard roof without smart flow control	Once		

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI measure (unit)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Increased green facade area and visibility in the entire project area (Neugraben-Fischbek)	Total facade area of public buildings covered green in the scope of the CLEVER Cities project (m2)	Administrative/local authority documents	Administrative/local authority documents-Plans	The respective starting green facade sizes can be extracted from contracts with installation businesses, the measurements will be taken visually during the monitoring period.	-	-	DHH (+LGV)	Measuring and adding	Urban data platform Hamburg (publicly available)	Time series with irregular intervals (graph and map of green facades)
Increased area occupied by facade greening	Area covered by vertical green (m2)	Observations	Observations-Fieldwork: counting, photographing, checklist	Will be defined in the instruction for the constructor/gardener and in the following years be measured by the project team	-	-	DHH, BUE	Reading and measuring	Urban data platform Hamburg (publicly available)	Time series (graph)
Increased area occupied by facade greening	Area covered by vertical green (m2)	Observations	Observations-Fieldwork: counting, photographing, checklist	Will be defined in the instruction for the constructor/gardener and in the following years be measured by the project team	-	-	BUE	Reading and measuring	Urban data platform Hamburg (publicly available)	Time series (graph)

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI measure (unit)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Increased well-being	Perceived noise reduction and estimated wellbeing (db)	Digital	Digital-Mobile apps	Measurements will probably be taken by the project team in yearly intervals or by participants of events such as the "Langer Tag der Stadtnatur"; must be taken for 5 minutes at the respectively same times of the day Additionally interviews will be conducted	App: 20; Interviews: 5	For interviews: with inhabitants of the building	Steg; LGV; HCU	Subtracting	Internal	Time series (graph)
Increased well-being	Thermal comfort	Experimental	Experimental-Statistical methods/modeling	GREENPASS (Probably) Additionally interviews could be conducted	Interviews: 5	For interviews: with inhabitants of the building	Steg; LGV; HCU	Subtracting	Internal	Time series (graph)

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI measure (unit)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Increased green roof area in the entire project area (Neugraben-Fischbek)	Total roof surface of buildings (Including Edeka, Kaufland...) covered green in the scope of the CLEVER Cities project or supported by IFB or investments from private households (n and m2)	Administrative/local authority documents	Administrative/local authority documents-Plans	The respective roof sizes are defined in the zoning plans for e.g. PK47, the car park and contracts with green roof installation businesses	-	-	DHH (LGV)	Counting and adding; Visual inspection of digital orthophotos, counting, image recognition methods	Urban data platform Hamburg (publicly available) (private houses internal)	Time series with irregular intervals (graph)
Green roof as nesting site for birds	Percentage of installed bird nests which show signs of usage (%)	Observations	Observations-Fieldwork: counting, photographing, checklist	-	-	-	BUE	Counting	Urban data platform Hamburg (publicly available)	Time series (graph)

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI measure (unit measure)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Savings in rainwater fees	Saved rainwater fees due to green roof (€)	Administrative/local authority documents	Administrative/local authority documents-Financial	GREENPASS could also be used	-	-	DHH	Calculating	Probably internal	Time series (graph)
Rainwater retention on roof top	Runoff from roof top (l)	Experimental	Experimental-Statistical methods/modeling	GREENPASS could also be used	-	-	TUHH	Calculating	Probably internal	Time series (graph)
Improved rainwater management; release the peak load when rain is forecasted	duration of how long the water was retained (h or days)	Digital	Digital-Sensors & remote sensing		-	-	Hamburg Wasser/ (TUHH WB)	Calculating	Probably internal	Time series (graph)
Improved rainwater management; release the peak load when rain is forecasted	How many times the flow control was triggered due to weather app (n)	Digital	Digital-Sensors & remote sensing		-	-	Hamburg Wasser/ (TUHH WB)	Calculating	Probably internal	Time series (graph)

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
<i>Outcome</i>	<i>KPI measure</i> (unit)	<i>Data collection source</i>	<i>Data Collection Methods</i>	<i>Notes on Data Collection</i>	<i>Targeted Sample</i>	<i>Target Respondent</i>	<i>Data Analysis</i>	<i>Data Analysis Method</i>	<i>Data Access</i>	<i>Outputs</i>
Improved rainwater management; release the peak load when rain is forecasted	Amount of retained water at different seasons? (l)	Digital	Digital-Sensors & remote sensing		-	-	Hamburg Wasser/ (TUHH WB)	Calculating	Probably internal	Time series (graph)

CAL 3

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>CAL(s)</i>	<i>Specific Site</i>	<i>Data Collection</i>	<i>Data analysis (Institution)</i>	<i>Pre-Greening Period</i>	<i>Frequency (Pre-Greening)</i>	<i>Post-Greening Period</i>	<i>Frequency (Post-Greening)</i>
Pupils gain new practical skills and expertise (gardening, crafting, planning, organizing etc.) or improve existing skills by actively taking part in the project	Number of pupils being in (practical) contact with the gardening project, cumulated over project period (n) (can be set into a ratio to the overall number of pupils afterwards)	CAL 3	School Fischbek-Falkenberg: School garden	Pupils, teachers (supervision Steg/TUHH/HCU)	Pupils, teachers (supervision Steg/TUHH/HCU)	Before greening, no pupils were in touch with the gardening project (0)	Once	Cumulated number of pupils who are in touch with the project in any way (M30)	Add a new amount yearly
More locally grown food available for the students	Quantity of grown vegetables/fruits per season (kg [estimated])			Pupils, teachers (supervision Steg/TUHH/HCU)	Pupils, teachers (supervision Steg/TUHH/HCU)	Zero, as the garden does not grow vegetables before the rebuilding	Once	Requires regular estimates of the food quantity over a season	Yearly in summer, probably estimating each week and summing up at the end of the season

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-Greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
Increased theoretical knowledge on vegetables (plants, gardening, nature) production	Number of pupils gaining an increased knowledge due to a thematic inclusion in their curriculum, cumulated over project period (n)			Pupils, teachers (supervision Steg/TUHH/HCU)	Pupils, teachers (supervision Steg/TUHH/HCU)	Current state or curriculum before the greening project	Once	Cumulated number of pupils who learn (more) about vegetable production in their curriculum (related to the school garden project, but without considering practical activities)	Add a new amount yearly
Level of acceptance: newly built place (garden) is used more frequently, differentiate by use on a planned and on a voluntary basis	Frequency of use or work in the school garden (times/hours per [week or month]) (based on usual schedule and independently from that schedule, e.g. during summer holidays)			Pupils, teachers (supervision Steg/TUHH/HCU)	Pupils, teachers (supervision Steg/TUHH/HCU)	Area is not built yet, so the frequency of use is zero (measure first pre-greening in M22)	Once before building	In regular intervals, observations should measure how frequently the new places are used by the pupils (apart from obligatory lessons) (M25, M35, M40)	Monthly for a few hours
Evolved curriculum	Number of curriculum changes related to interventions (quality) (n)			steg / teachers	steg / teachers	Baseline is that there are no changes in the curriculum	Once	As soon as the curriculum changes, this number increases (M24-M63)	Constant

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-Greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
More visitors to the space	Number of visitors at school events (which are also open to the public) (n [estimated])			Steg	Steg	Regarding these events, as they have not yet happened, the baseline is zero	Once	As soon as the gardening project has started, the project team needs to estimate the number of guests attending school events (M24-M62)	Constant (include new measure as soon as event takes place)
New mobile gardening units are installed	Number of installed mobile gardening units (n)	CAL 3	Elementary School Neugraben / Ohrnsweg	Steg, HCU + students, teachers	Steg	Zero, no units are installed	Once	There will not be a change in the number of mobile gardening units, unless the school decides to install additional units, then we add those	Constant
Increased knowledge transfer between the schools in the project area (in terms of gardening)	Number of meetings (i.e. visits between the schools to exchange knowledge) (n)			Steg; teachers	Teachers	Zero; so far, there are no meetings to exchange knowledge regarding gardening projects	Once	The project team will constantly be informed about upcoming meetings and count those. (M35, M60)	Constant

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI (unit measure)	CAL(s)	Specific Site	Data Collection	Data analysis (Institution)	Pre-Greening Period	Frequency (Pre-Greening)	Post-Greening Period	Frequency (Post-Greening)
Food production	Amount of harvested vegetable (irrespective of where the system will be located) (kg per month)	CAL 3	School Fischbek-Falkenberg: Aquaponic	Pupils; teachers; supervision Steg/ TUHH	TUHH/HCU/(steg)	Zero, the project has not started yet	Once	As soon as the system is installed, the amount of harvested vegetable per month can be estimated based on pupils protocols	Monthly (pupils record the harvested amount - data is delivered to CLEVER team)
Better knowledge on natural cycles/ materials cycle	Pupils (participating in aquaponic project) know more about natural cycles than those who are not involved (better result in test in %)			Teachers, supervision Steg/ TUHH	Teacher	Baseline is the comparison group, which consists of those pupils who do not participate in the project	Ongoing	In regular intervals, the achievements in class tests would be compared	Yearly
Increased attractiveness of working group	Number of pupils choosing to participate in working group aquaponic or subject biology in general, cumulated over the project period (n)			Steg/ TUHH	teacher	As the project has not started yet, no pupils participate	Once	As soon as the system is installed, the teacher can count the amount of regularly participating pupils per semester	Yearly

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>Data collection source</i>	<i>Data Collection Methods</i>	<i>Notes on Data Collection</i>	<i>Targeted Sample</i>	<i>Target Respondent</i>	<i>Data Analysis</i>	<i>Data Analysis Method</i>	<i>Data Access</i>	<i>Outputs</i>
Pupils gain new practical skills and expertise (gardening, crafting, planning, organizing etc.) Or improve existing skills by actively taking part in the project	Number of pupils being in (practical) contact with the gardening project, cumulated over project period (n) (can be set into a ratio to the overall amount of pupils afterwards)	Observations	Observations-Fieldwork: counting, photographing, checklist	The amount of pupils being in touch with the project will be counted by the teacher;	-	Note here that the amount of pupils who can participate in a working group is limited	Steg	Counting	Project internal	Time series (graph)
More locally grown food available for the students	Quantity of grown vegetables/fruits per season (kg [estimated])	Observations	Observations-Fieldwork: counting, photographing, checklist	Pupils will be asked to prepare regular protocols of their school garden observations	-	-	Teacher and steg; TUHH	Counting	Probably internal, but may be published	Time series (graph)

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
Outcome	KPI (unit measure)	Data collection source	Data Collection Methods	Notes on Data Collection	Targeted Sample	Target Respondent	Data Analysis	Data Analysis Method	Data Access	Outputs
Increased theoretical knowledge on vegetables (plants, gardening, nature) production	Number of pupils gaining an increased knowledge due to a thematic inclusion in their curriculum, cumulated over project period (n)	Observations	Observations-Fieldwork: counting, photographing, checklist	Teacher has to take notes about the amount of pupils taking part in the respective classes	-	-	TUHH/Teacher and steg	Counting	Project internal	Time series (graph)
Level of acceptance: newly built place (garden) is used more frequently, differentiate by use on a planned and on a voluntary basis	Frequency of use or work in the school garden (times/hours per [week or month]) (based on usual schedule and independently from that schedule, e.g. During summer holidays)	Interviewing	Interviewing-Face-to-face interview (traditional, computer assisted interviews)	The "playground duties" could assess the frequency of use, but are not likely to use complex methods such as SOPARC or PLDP. Alternatively, pupils or teachers could be interviewed. Steg will elaborate on this (surveys - je nachdem Feld M anpassen?)	-	-	Teacher, steg, HCU (students); TUHH	Counting by observation	Probably internal	Time series (graph)

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>Data collection source</i>	<i>Data Collection Methods</i>	<i>Notes on Data Collection</i>	<i>Targeted Sample</i>	<i>Target Respondent</i>	<i>Data Analysis</i>	<i>Data Analysis Method</i>	<i>Data Access</i>	<i>Outputs</i>
Evolved curriculum	Number of curriculum changes related to interventions (quality) (n)	Interviewing	Interviewing-Telephone interview (traditional, computer assisted interviews)	Telephone call with the teacher	-	-	Teacher; steg; TUHH	Counting	Probably internal	Time series with irregular intervals (graph)
More visitors to the space	Number of visitors at school events (which are also open to the public) (n [estimated])	Observations	Observations-Fieldwork: counting, photographing, checklist	-	-	-	Steg, teachers; TUHH	Counting	Probably internal	Time series with irregular intervals (graph)
New mobile gardening units are installed	Number of installed mobile gardening units (n)	Observations	Observations-Fieldwork: counting, photographing, checklist	Counting, protocols, plans	-	-	Steg; TUHH	Counting	Probably internal	Time series with irregular intervals (graph)
Increased knowledge transfer between the schools in the project area (in terms of gardening)	Number of meetings (i.e. Visits between the schools to exchange knowledge) (n)	Observations	Observations-Fieldwork: counting, photographing, checklist	Meeting protocols	-	-	Teacher, steg; TUHH	Counting	Probably internal	Time series with irregular intervals (graph)

Monitoring Plan		Data Collection Plan					Evaluation Plan		Data Storage Plan	
What		How					Who	How	Who	How
<i>Outcome</i>	<i>KPI (unit measure)</i>	<i>Data collection source</i>	<i>Data Collection Methods</i>	<i>Notes on Data Collection</i>	<i>Targeted Sample</i>	<i>Target Respondent</i>	<i>Data Analysis</i>	<i>Data Analysis Method</i>	<i>Data Access</i>	<i>Outputs</i>
Food production	Amount of harvested vegetable (irrespective of where the system will be located) (kg per month)	Observations	Observations-Fieldwork: counting, photographing, checklist	-	-	-	TUHH/Teacher/steg	Counting	Probably internal	Time series (graph)
Better knowledge on natural cycles/ materials cycle	Pupils (participating in aquaponic project) know more about natural cycles than those who are not involved (better result in test in %)	Questionnaires/surveys	Questionnaires/ survey-. Mixed-mode surveys	Teacher needs to differentiate between students who participate and those who don't	-	-	TUHH/Teacher/steg	Counting and comparing	Probably internal	Time series (graph)
Increased attractiveness of working group	Number of pupils choosing to participate in working group aquaponic or subject biology in general, cumulated over the project period (n)	Observations	Observations-Fieldwork: counting, photographing, checklist	-	-	-	Teacher	Counting	Probably internal	Time series (graph)

LONDON

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI	CAL(s)	Specific site	Data collection	Institution responsible of data analysis	Pre-greening period	Frequency (pre-greening)	Post-greening period	Frequency (post-greening)
Residents use green spaces more regularly	No. of resident members of newly-constituted nature-focused groups	1,2,3	South Thamesmead	Groundwork	Peabody Researcher	Spring 2020	Once	2024	Quarterly
	No. of residents taking part in CLEVER project activities	1,2,3	South Thamesmead	Groundwork	Groundwork	At each event	At each event	At each event	At each event
	No. and type of new recreation facilities / installations / programming	1,2	Parkview, Southmere	Peabody Researcher	Peabody Researcher	Spring 2020	Once	2023 2025	Quarterly
	No. of residents taking part in physical activity around Southmere lake	2	Southmere	Arup baseline greenspace observations	ARUP et al	Completed - spring 2019	Once	2021, 2022, 2023, 2024, 2025	Annually
	% of South Thamesmead residents reporting use of green spaces (disaggregated by demographics)	2	South Thamesmead	Thamesmead community survey	ARUP et al	Completed - summer 2019	Once	Summer 2020, 2021, 2022, 2023	Annually
	No. of residents using greenspace	2	South Thamesmead	Arup baseline greenspace observations	ARUP et al	Completed - spring 2019	Once	2021, 2022, 2023, 2024, 2025	Annually

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI	CAL(s)	Specific site	Data collection	Institution responsible of data analysis	Pre-greening period	Frequency (pre-greening)	Post-greening period	Frequency (post-greening)
Residents report improved health and wellbeing	% of South Thamesmead residents reporting improved wellbeing	1,2,3	South Thamesmead	Thamesmead community survey; could be integrated into focus groups with South Thamesmead residents	ARUP et al	Completed - summer 2019	Once	Summer 2020, 2021, 2022, 2023	Annually
	% of South Thamesmead residents reporting good health	1,2,3	South Thamesmead	Thamesmead community survey; could be integrated into focus groups with South Thamesmead residents	ARUP et al	Completed - summer 2019	Once	Summer 2020, 2021, 2022, 2023	Annually
NBS interventions have positive environmental effects	Water quality	1	Parkview	University College London	University College London	Spring 2020	Once	Spring 2021, 2022, 2023	Annually
	Prevalence of animal / bird /bat/ insect sounds	1	Parkview	University College London	University College London	Spring 2020	Once	Spring 2021, 2022, 2023	Annually
	Area (m2) of green space/ cover in South Thamesmead (Urban Greening Factor)	1,2,3	South Thamesmead	Peabody GIS	GLA Environment	Spring 2020	Once	2023 2025	
Residents report	No. of known neighbours per resident	1	Parkview	Map of known neighbours on Maran Way	Groundwork	Completed - Spring 2020	Once	Spring 2020, 2021, 2022, 2023	Annually

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI</i>	<i>CAL(s)</i>	<i>Specific site</i>	<i>Data collection</i>	<i>Institution responsible of data analysis</i>	<i>Pre-greening period</i>	<i>Frequency (pre-greening)</i>	<i>Post-greening period</i>	<i>Frequency (post-greening)</i>
improved social cohesion	% of residents who believe Thamesmead is a place where residents from different backgrounds get on well together	1,2,3	Parkview, Southmere	Thamesmead community survey	ARUP et al	Completed - summer 2019	Once	Summer 2020, 2021, 2022, 2023	Annually
	% of South Thamesmead residents reporting sense of belonging to local neighbourhood	1,2,3	Southmere	Thamesmead community survey	ARUP et al	Completed - summer 2019	Once	Summer 2020, 2021, 2022, 2023	Annually
	% of residents reporting satisfaction with places to meet and come together	1,2,3	Parkview, Southmere	Thamesmead community survey	ARUP et al	Completed - summer 2019	Once	Summer 2020, 2021, 2022, 2023	Annually
	Levels of socialability of public spaces	1,2	Parkview, Southmere	Pro-social checklist	CLEVER PM	Spring 2020	Once	Spring 2025	Project end (once)
Residents feel safe and secure in South Thamesmead	% of residents who report fly tipping or vandalism as an issue in South Thamesmead	1,2,3	Parkview, South Thamesmead	Thamesmead community survey	ARUP et al	Completed - summer 2019	Once	Summer 2020, 2021, 2022, 2023	Annually

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI</i>	<i>CAL(s)</i>	<i>Specific site</i>	<i>Data collection</i>	<i>Institution responsible of data analysis</i>	<i>Pre-greening period</i>	<i>Frequency (pre-greening)</i>	<i>Post-greening period</i>	<i>Frequency (post-greening)</i>
	% of residents who perceive South Thamesmead to be a safe place	1,2,3	South Thamesmead	Thamesmead community survey	ARUP et al	Completed - summer 2019	Once	Summer 2020, 2021, 2022, 2023	Annually
	No. of environmental problems observed by residents	1,2,3	South Thamesmead	Groundwork and citizen scientists	Groundwork	Spring 2020	Once	Spring 2021, 2022, 2023	Annually
	% of South Thamesmead residents reporting being proud to live in Thamesmead	1,2,3	South Thamesmead	Thamesmead community survey	ARUP et al	Completed - summer 2019	Once	Summer 2020, 2021, 2022, 2023	Annually
Project leverages in additional support and funding for NBS as a result of demonstrating value to stakeholders	No. of residents engaged in NBS-related education, employment and training	1,2,3	South Thamesmead	Surveys for partners in EET including schools, employers and training schemes	Peabody Researcher	Spring 2020	As partnerships are established	Ongoing	Annually
	No. of Peabody stakeholders who believe in the value of NBS	1,2,3	South Thamesmead	GLA Opinion	Peabody Researcher	Spring Summer 2020	One off	2023 & 2025	Twice
	Number of and value (£) of non-CLEVER funded NBS interventions implemented locally 2020-2025	1,2,3	Thamesmead	Peabody Researcher	Peabody Researcher	Assessment of £££ grants for NBS - 2015 - 2020	Once	2023	Once

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI</i>	<i>CAL(s)</i>	<i>Specific site</i>	<i>Data collection</i>	<i>Institution responsible of data analysis</i>	<i>Pre-greening period</i>	<i>Frequency (pre-greening)</i>	<i>Post-greening period</i>	<i>Frequency (post-greening)</i>
+ Project leverages in additional support and funding for NBS as a result of demonstrating value to stakeholders	Cost (£) of ongoing green space maintenance plans	2,3	South Thamesmead	Peabody Researcher	Peabody Researcher (or consultant)	Spring 2020 (Phase 1)	Once	2022	
	% of Peabody ground team with skills to maintain NBS	2,3	South Thamesmead	Skills provider	Ecology Consultants	Potentially completed with skills audit work	Once	2023	Once
	Social return on investment	1	Parkview	The Natural Capital Accounting tool developed by Vivid Economics and in use by Peabody uses simple inputs data to extrapolate social outcomes and associated £ value - if Clever Cities is able to access and use this tool, they may be able to work from data that is already being collected. Alternatively, if they choose to go down the CEA/CBA route working with Social Finance, this may require dedicated primary research	Social Finance	TBC - but NCA work has already been undertaken	TBC	TBC	TBC

Monitoring Plan		Data Collection Plan				
What		How				
Outcome	KPI	Data collection source	Data collection methods	Notes on data collection	Targeted sample	Target respondent
Residents use green spaces more regularly	No. of resident members of newly-constituted nature-focused groups	Observations	Observations-Fieldwork: counting, photographing, checklist	Will comprise records of members joining groups, for example: Friends of Southmere, Nature Forum, South Thamesmead Neighbourhood Forum etc.	All residents who join groups	Residents who join groups
	No. of residents taking part in CLEVER project activities	Observations	Observations-Fieldwork: counting, photographing, checklist	Qualitative data from key informant interviews during evaluation will complement quant collected about number of people taking part	All residents attending events	Residents attending events
	No. and type of new recreation facilities / installations / programming	Observations	Observations-Fieldwork: counting, photographing, checklist	This data will be triangulated with financial records of spend on NBS interventions	Final sample depends on intervention plans	N/A
	No. of residents taking part in physical activity around Southmere lake	Thamesmead community survey	Observations-Fieldwork: counting, photographing, checklist	Arup arranged baseline observations of green spaces including the area around Southmere lake in the Spring of 2019. These observations at multiple points on different days and recorded the number, characteristics and activities being done by all those passing through or staying in the space over a 2 hour period. There is a template that can be reused for future observations.	Residents using space over 2-hour period	All residents

Monitoring Plan		Data Collection Plan				
What		How				
Outcome	KPI	Data collection source	Data collection methods	Notes on data collection	Targeted sample	Target respondent
	% of South Thamesmead residents reporting use of green spaces (disaggregated by demographics)	Thamesmead community survey	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	The Thamesmead Community Survey asks respondents: "In the last 12 months, how often have you done the following things on average?" Including "Visited your local park or greenspace (e.g. play area, playing field, allotment, canal path, lake)" This is a bespoke question but modelled on those in the Taking Part survey	1000 Thamesmead residents/ 170 South Thamesmead residents	All residents
	No. of residents using greenspace	Thamesmead community survey	Observations-Fieldwork: counting, photographing, checklist	Arup arranged baseline observations of green spaces including the area around Southmere lake in the Spring of 2019. These observations at multiple points on different days and recorded the number, characteristics and activities being done by all those passing through or staying in the space over a 2-hour period. There is a template that can be reused for future observations.	Residents using space over 2-hour period	All residents
Residents report improved health and wellbeing	% of South Thamesmead residents reporting improved wellbeing	Thamesmead community survey	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	The Thamesmead Community Survey incorporates 4 questions on wellbeing, drawn from the ONS personal wellbeing measures. All are asked on a 1-10 scale, where 1 is not at all and 10 is completely: How satisfied are you with your life nowadays?; Overall, to what extent do you feel that the things you do in your life are worthwhile?; Overall, how happy did you feel yesterday?; Overall, how anxious did you feel yesterday?	1000 Thamesmead residents/ 170 South Thamesmead residents	All residents

Monitoring Plan		Data Collection Plan				
What		How				
Outcome	KPI	Data collection source	Data collection methods	Notes on data collection	Targeted sample	Target respondent
	% of South Thamesmead residents reporting good health	Thamesmead community survey	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	The Thamesmead Community Survey includes the question 'How is your health in general' with residents responding on a Likert Scale from Very Bad to Very Good.		
NBS interventions have positive environmental effects	Water quality	Experimental	Experimental-In situ scientific instruments/measurements	UCL will collect data samples from Southmere lake, which will be shared with CLEVER team	Southmere lake	N/A
	Prevalence of animal / bird /bat/ insect sounds	Digital	Digital-Sensors & remote sensing	Focus still to be determined with UCL	Southmere lake	N/A
	Area (m ²) of green space/ cover in South Thamesmead (Urban Greening Factor)	Others	Others	Baseline desktop exercise - pre phase 1. Option for citizen science for data collection	All greenspace	N/A
Residents report improved social cohesion	No. of known neighbours per resident	Interviewing	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	Map of known neighbours on Maran Way (in aid of understanding relationships)	40% of residents - targeting 40% per building, so the sample is spread along the street (c90 people total). Will be different residents between baseline and follow-up	Residents of Maran Way

Monitoring Plan		Data Collection Plan				
What		How				
Outcome	KPI	Data collection source	Data collection methods	Notes on data collection	Targeted sample	Target respondent
	% of residents who believe Thamesmead is a place where residents from different backgrounds get on well together	Thamesmead community survey	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	The Thamesmead Community Survey asks respondents to what extent they agree or disagree that "Thamesmead is a place where people from different backgrounds get on well together". This is an adapted version (Thamesmead inserted instead of more generic 'your area') of a question asked in the Community Life Survey	1000 Thamesmead residents/ 170 South Thamesmead residents	All residents
	% of South Thamesmead residents reporting sense of belonging to local neighbourhood	Thamesmead community survey	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	See above (for Community Survey)	1000 Thamesmead residents/ 170 South Thamesmead residents	All residents
	% of residents reporting satisfaction with places to meet and come together	Thamesmead community survey	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	The Thamesmead Community Survey asks respondents to rate the extent to which they are satisfied with different aspects of Thamesmead, including places to meet and come together. This is a bespoke question but is modelled on the format of more generic questions about satisfaction with your neighbourhood asked in the Community Life Survey	1000 Thamesmead residents/ 170 South Thamesmead residents	All residents
	Levels of socialability of public spaces	Observations	Observations-Fieldwork: counting, photographing, checklist	The checklist will be completed for areas that have received CLEVER interventions, both before they have been implemented and at project end.	CAL areas	N/A

Monitoring Plan		Data Collection Plan				
What		How				
Outcome	KPI	Data collection source	Data collection methods	Notes on data collection	Targeted sample	Target respondent
Residents feel safe and secure in South Thamesmead	% of residents who report fly tipping or vandalism as an issue in South Thamesmead	Thamesmead community survey	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	The Thamesmead Community Survey asks respondents to rate the extent to which things are a problem in the area, including fly tipping and vandalism, on a 5-point scale from 'not a problem at all' to 'a very big problem'. The question is taken from the crime survey	1000 Thamesmead residents/ 170 South Thamesmead residents	All residents
	% of residents who perceive South Thamesmead to be a safe place	Thamesmead community survey	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	Will include FGDs at project end with subset of survey sample to explore perceptions of safety	1000 Thamesmead residents/ 170 South Thamesmead residents	All residents
	No. of environmental problems observed by residents	Observations	Observations-Fieldwork: counting, photographing, checklist	Citizen scientists will take part in walks to assess environmental problems - these will be carried out before and after CLEVER NBS interventions, to compare perceived change in number of environmental problems	NBS intervention areas	N/A
	% of South Thamesmead residents reporting being proud to live in Thamesmead	Thamesmead community survey	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	See above (for Community Survey)	1000 Thamesmead residents/ 170 South Thamesmead residents	All residents
Project leverages in additional support and funding for	No. of residents engaged in NBS-related education, employment and training	Questionnaires/surveys	Questionnaires/surveys-Face-to-face (traditional, computer assisted interviews)	As local partners engage with CLEVER, they will be assessed for numbers of residents engaged in NBS-related EET. For example, schools will count students	Residents engaging with partners providing NBS-related EET	All residents

Monitoring Plan		Data Collection Plan				
What		How				
Outcome	KPI	Data collection source	Data collection methods	Notes on data collection	Targeted sample	Target respondent
NBS as a result of demonstrating value to stakeholders				involved in gardening etc, which will be followed up annually		
	No. of Peabody stakeholders who believe in the value of NBS	Interviewing	Interviewing-Face-to-face interview (traditional, computer assisted interviews)	Examples of adoption of NBS in other cities / Peabody sites; Increased value of NBS among key Peabody stakeholders; Increased motivation / intent to incorporate NBS in future developments	5-7 key respondents - individuals TBC	Peabody team
	Number of and value (£) of non-CLEVER funded NBS interventions implemented locally 2020-2025	Administrative/local authority documents	Administrative/local authority documents-Financial	Gather budget records for LA and Peabody investment in NBS year on year during project lifetime	N/A	N/A
	Cost (£) of ongoing green space maintenance plans	Administrative/local authority documents	Administrative/local authority documents-Financial	To be compared in evaluation to previous costs of maintaining green spaces	N/A	N/A
	% of Peabody ground team with skills to maintain NBS	Questionnaires/surveys	Questionnaires/survey-.Mixed-mode Surveys	Peabody existing skills audit to have additional NBS questions added	Peabody grounds team	Peabody grounds team
	Social return on investment	TBC	TBC	TBC	N/A	N/A

MILAN

Monitoring Plan									
What		Where		Who		When			
Outcome	KPI	CAL(s)	Specific site	Data collection	Institution responsible of data analysis	Pre-greening period	Frequency (pre-greening)	Post-greening period	Frequency (post-greening)
Thermal Comfort	Air Temperature/ surface temperature/humidex	3	yes, place-based	Sensors on walls and remote sensing: temperature; relative humidity; solar radiation.	RFI/ITALFERR	Summer2022	continuous	summer 2023	continuous
Improved wellbeing	Perceived wellbeing	1,2,3	yes, place-based	Questionnaires + survey/interview +digital	ELI, AMBIT, RFI, POLIMI/DASTU, CDM	before construction works	one	at the end of construction works and NBS realization	one
Improved thermal comfort	Humidex	1	yes, wall to be defined	Sensors on roofs/walls: temperature; relative humidity; solar radiation.	POLIMI	June-2020-Dic-20	continuous	Jan-2021-Jan23	continuous
Improved thermal comfort	Surface temperature	1	yes, roof/wall to be defined	Sensors on roofs/walls: temperature	POLIMI	June-2020-Dic-20	continuous	Jan-2021-Jan23	continuous

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI</i>	<i>CAL(s)</i>	<i>Specific site</i>	<i>Data collection</i>	<i>Institution responsible of data analysis</i>	<i>Pre-greening period</i>	<i>Frequency (pre-greening)</i>	<i>Post-greening period</i>	<i>Frequency (post-greening)</i>
Delay/reduction of rainwater discharge in the drainage system	Rainwater runoff and infiltration	1	yes, roof/wall to be defined	rain gauge; flow sensors at each downspout	POLIMI	no	continuous	Jan-2021-Jan23	continuous
Delay/reduction of rainwater discharge in the drainage system	Rainwater runoff and infiltration	1	yes, roof/wall to be defined	rain gauge; runoff coefficient calculated for each green roof	POLIMI	no		Jan-2021-Jan23	continuous (mm rain) yearly (runoff coefficient)
Air quality improvement	Fine particulate matter captured by leaves' surface	1,2	yes, roof/wall to be defined	Environmental Scanning Electron Microscope (ESEM) leaves analysis	To be identified	no		Single measurement in the period 2021-2022	one time
Increase of green roof surface	Green roof surface	1	no	Information from "BE2" public bid documentation	AMBIT+CM	no		Jan 2021-Dec 2021	one time
Increase of green roof surface	Green roof surface	1	no	Co-mapping activities	AMBIT+CM	no		Jan-2021-Jan23	Yearly

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI</i>	<i>CAL(s)</i>	<i>Specific site</i>	<i>Data collection</i>	<i>Institution responsible of data analysis</i>	<i>Pre-greening period</i>	<i>Frequency (pre-greening)</i>	<i>Post-greening period</i>	<i>Frequency (post-greening)</i>
Increase of green roof surface	Green roof surface	1	no	Satellite/Lidar database and GIS elaboration	CM+POLIMI	2019 (2020)	one time	2023	one time
Increase the % of permeable surface	% of permeable surfaces	1	yes/partial	Satellite database and GIS elaboration	CM+POLIMI	2020	one time	2021	one time
Increase quality of life	People living near a green roof, with respect to household socioeconomic profiles	1	yes/partial	Social geodatabase and GIS elaboration	CM+POLIMI+AI	no (?)		2021-2022	one time
Increase of green jobs	working hours for installations and maintenance of the NBS realized in the 3 CAL	1,2,3	yes/partial	Information from design and administrative docs	CM+AI+RFI	no		Jan-2021-Jan23	yearly
Increase of property values	Increase of the values of buildings with a green roof/wall	1	no	survey/interview to estate agencies (owners?)	AI	no		jan22-Jan23	one time
Increase of biodiversity	presence of weeds plants	1,2,3	yes, place-based	Site observation	ELI	no		2021 CAL1, 2022 CAL2 e CAL 3	one time

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI</i>	<i>CAL(s)</i>	<i>Specific site</i>	<i>Data collection</i>	<i>Institution responsible of data analysis</i>	<i>Pre-greening period</i>	<i>Frequency (pre-greening)</i>	<i>Post-greening period</i>	<i>Frequency (post-greening)</i>
Increase of biodiversity	Plants diversity on GR or GW (Simpson index)	1	yes, roof/wall to be defined	Site observation	ELI	no		2021	one time
Increase of biodiversity	Pollinators (Shannon Index, autoecological parameters)	1,2,3	yes, place-based	Site observation	ELI	April - August 2021 all CALs	9 repetition	April - August 2021 and 2022 CAL1, 2022 CAL2 and CAL3	9 repetition
Increase of biodiversity	Birds (Index of Point Abundance)	1,2,3	yes, place-based	Site observation	ELI	March - June 2021 all CALs	4 repetition	March - June 2021 and 2022 CAL1, 2022 CAL2 and CAL4	4 repetition
Increase quality of life	Happiness and well-being related to NBS	1,2,3	yes, place-based	Questionnaires + survey/interview +digital	ELI, AMBIT, RFI, POLIMI/DASTU, CDM	2020	one time	2022	one time
Increase quality of life	relationship with nature	1,2,3	yes, place-based	Questionnaires + survey/interview +digital	ELI, AMBIT, RFI, POLIMI/DASTU, CDM	2020	one time	2022	one time

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI</i>	<i>CAL(s)</i>	<i>Specific site</i>	<i>Data collection</i>	<i>Institution responsible of data analysis</i>	<i>Pre-greening period</i>	<i>Frequency (pre-greening)</i>	<i>Post-greening period</i>	<i>Frequency (post-greening)</i>
Increase of Social cohesion and relationships	Psychosocial issues related with place Satisfaction	1,2,3	yes, place-based	Questionnaires + survey/interview +digital	ELI, AMBIT, RFI, POLIMI/DASTU, CDM	2020	one time	2022	one time
Increase of Social cohesion and relationships	social interaction and cohesion	1,2,3	yes, place-based	Questionnaires + survey/interview +digital	ELI, AMBIT, RFI, POLIMI/DASTU, CDM	2020	one time	2022	one time
Increase of Social cohesion and relationships	Participation in community activities related to NBS	1,2,3	yes, place-based	Questionnaires + survey/interview +digital	ELI, AMBIT, RFI, POLIMI/DASTU, CDM	2020	one time	2022	one time
Increase of Social cohesion and relationships	Identity and sense of belonging about NBS in the living place	1,2,3	yes, place-based	Questionnaires + survey/interview +digital	ELI, AMBIT, RFI, POLIMI/DASTU, CDM	2020	one time	2022	one time
Increase of safety and security perception	users perception related to NBS (accessibility, maintenance, Aesthetics, visibility)	1,2,3	yes, place-based	Questionnaires + survey/interview +digital	ELI, AMBIT, RFI, POLIMI/DASTU, CDM	2020	one time	2022	one time

Monitoring Plan									
What		Where		Who		When			
<i>Outcome</i>	<i>KPI</i>	<i>CAL(s)</i>	<i>Specific site</i>	<i>Data collection</i>	<i>Institution responsible of data analysis</i>	<i>Pre-greening period</i>	<i>Frequency (pre-greening)</i>	<i>Post-greening period</i>	<i>Frequency (post-greening)</i>
Increase of Environmental awareness	Attention on environmental issue related to NBS	1,2,3	yes	survey/interview	ELI, AMBIT, RFI, POLIMI, CDM	2020	one time	2022	one time

Monitoring Plan		Data Collection Plan					Evaluation Plan	
What		How					Who	How
Outcome	KPI	Data collection source	Data collection methods	Notes on Data collection	Targeted sample	Target respondent	Data analyst (or department)	Data analysis method
Thermal Comfort	Air Temperature/ surface temperature/humidex	Digital	Digital-Sensors & remote sensing		travellers		RFI/ITALFERR	Excel file analysis
Improved wellbeing	residents and travellers	Questionnaires/ surveys	Questionnaires/ surveys- Online (e-mail, web-internet, app)		significant example of people with gender balance	residents and travellers	ELI, AMBIT, RFI, POLIMI/DASTU, CDM	Excel file analysis
Improved thermal comfort	Humidex	Experimental	Experimental-In situ scientific instruments/measurments	to be evaluated the possibility to use COMFORTUP App	5 minutes sample		POLIMI	Excel file analysis
	Surface temperature	Experimental	Experimental-In situ scientific instruments/measurments		5 minutes sample		POLIMI	Excel file analysis
Delay/reduction of rainwater discharge in the drainage system	Rainwater runoff and infiltration	Experimental	Experimental-In situ scientific instruments/measurments		1 minute sample during rainfall event		POLIMI	Excel file analysis
Air quality improvement	Fine particulate matter captured by leaves' surface	Experimental	Experimental-Laboratory		Leaves from the green wall		laboratory	ESEM

Monitoring Plan		Data Collection Plan					Evaluation Plan	
What		How					Who	How
Outcome	KPI	Data collection source	Data collection methods	Notes on Data collection	Targeted sample	Target respondent	Data analyst (or department)	Data analysis method
Increase of green roof surface	Green roof surface	Administrative/local authority documents	Administrative/local authority documents-Plans	Surface of the new green roofs realised through the BE2 public bid			AMBIT	data collection
		Observations	Observations-Fieldwork: counting, photographing, checklist	Citizens will be asked to report green roofs/walls on the Clever Milan website		Residents in general	AMBIT	data collection
Increase of green roof surface	Green roof surface	Observations	Observations-Remote sensing: satellite imagery	Existing GIS elaboration mapping the greening period (based on existing geodatabase) could not be fully comparable with the GIS elaboration that will be done in 2023		Milan area	CM/POLIMI	GIS elaboration

Monitoring Plan		Data Collection Plan					Evaluation Plan	
What		How					Who	How
Outcome	KPI	Data collection source	Data collection methods	Notes on Data collection	Targeted sample	Target respondent	Data analyst (or department)	Data analysis method
Increase the % of permeable surface	% of permeable surfaces	Observations	Observations-Remote sensing: satellite imagery	Green roof capacity to increase the permeability of the surrounding area		Areas surrounding green roofs	CM/POLIMI	GIS elaboration
Increase quality of life	People living near a green roof, with respect to household socioeconomic profiles	Administrative/local authority documents	Administrative/local authority documents-Census	To be checked the availability of updated census and socio-economic geodatabase.		People living in areas surrounding green roofs	CM/POLIMI	GIS elaboration
Increase of green jobs	working hours for installations and maintenance of the NBS realized in the 3 CAL	Administrative/local authority documents	Administrative/local authority documents-Financial			People working for realizing NBS designed in the 3 CALs	CM+AI+RFI	data collection
Increase of property values	Increase of the values of buildings with a green roof/wall	Interviewing	Interviewing-Face-to-face interview (traditional, computer assisted interviews)		Estate agencies working in the CAL 1 area	Estate agencies		
Increase of biodiversity	presence of weeds plants	Observations	Observations-Fieldwork: counting, photographing, checklist				ELI	data collection

Monitoring Plan		Data Collection Plan					Evaluation Plan	
What		How					Who	How
Outcome	KPI	Data collection source	Data collection methods	Notes on Data collection	Targeted sample	Target respondent	Data analyst (or department)	Data analysis method
Increase of biodiversity	Plants diversity on GR or GW (Simpson index)	Observations	Observations-Fieldwork: counting, photographing, checklist				ELI	Excel file analysis
	Pollinators (Shannon Index, autoecological parameters)	Observations	Observations-Fieldwork: counting, photographing, checklist				ELI	Excel file analysis, Gis elaboration
	Birds (Index of Point Abundance)	Observations	Observations-Fieldwork: counting, photographing, checklist				ELI	Excel file analysis, Gis elaboration
Increase quality of life	Happiness and well-being related to NBS	Questionnaires/surveys	Questionnaires/surveys- Online (e-mail, web-internet, app)	online survey on Microsoft forms for pre-greening with COVID-19		stakeholder involved in the NBS co-design and residents or user of the areas	ELI, AMBIT, RFI, POLIMI, CDM	Excel file analysis
Increase quality of life	relationship with nature	Questionnaires/surveys	Interviewing: Mixed-mode surveys			stakeholder involved in the NBS co-design and residents or user of the areas	ELI, AMBIT, RFI, POLIMI, CDM	Excel file analysis

Monitoring Plan		Data Collection Plan					Evaluation Plan	
What		How					Who	How
Outcome	KPI	Data collection source	Data collection methods	Notes on Data collection	Targeted sample	Target respondent	Data analyst (or department)	Data analysis method
Increase of Social cohesion and relationships	Psychosocial issues related with place Satisfaction	Questionnaires/surveys	Questionnaires/surveys- Online (e-mail, web-internet, app)	online survey on Microsoft forms for pre-greening with COVID-19		stakeholder involved in the NBS co-design and residents or user of the areas	ELI, AMBIT, RFI, POLIMI, CDM	Excel file analysis
	social interaction and cohesion	Questionnaires/surveys	Questionnaires/surveys- Online (e-mail, web-internet, app)	online survey on Microsoft forms for pre-greening with COVID-19		stakeholder involved in the NBS co-design and residents or user of the areas	ELI, AMBIT, RFI, POLIMI, CDM	Excel file analysis
	Participation in community activities related to NBS	Questionnaires/surveys	Interviewing-Face-to-face interview (traditional, computer assisted interviews)	online survey on Microsoft forms for pre-greening with COVID-19		stakeholder involved in the NBS co-design and residents or user of the areas	ELI, AMBIT, RFI, POLIMI, CDM	Excel file analysis
Increase of Social cohesion and relationships	Identity and sense of belonging about NBS in the living place	Questionnaires/surveys	Questionnaires/surveys- Online (e-mail, web-internet, app)			stakeholder involved in the NBS co-design and residents or user of the areas	ELI, AMBIT, RFI, POLIMI, CDM	Excel file analysis

Monitoring Plan		Data Collection Plan					Evaluation Plan	
What		How					Who	How
<i>Outcome</i>	<i>KPI</i>	<i>Data collection source</i>	<i>Data collection methods</i>	<i>Notes on Data collection</i>	<i>Targeted sample</i>	<i>Target respondent</i>	<i>Data analyst (or department)</i>	<i>Data analysis method</i>
Increase of safety and security perception	users perception related to NBS (accessibility, maintenance, Aesthetics, visibility)	Questionnaires/surveys	Interviewing: Mixed-mode surveys			stakeholder involved in the NBS co-design and residents or user of the areas	ELI, AMBIT, RFI, POLIMI, CDM	Excel file analysis
Increase of Environmental awareness	Attention on environmental issue related to NBS	Questionnaires/surveys	Interviewing-Face-to-face interview (traditional, computer assisted interviews)			stakeholder involved in the NBS co-design	ELI, AMBIT, RFI, POLIMI, CDM	Excel file analysis

Annex B. CLEVER Social Survey Questionnaire Proposal

1.0 Methodological issues

Questionnaire construction

Scales: Whenever possible the questions (items) have been grouped:

- within the same answer format
 - Satisfaction scale: “(Overall,) How satisfied are you with _____?”
 - *Completely satisfied*
 - ...
 - *Completely dissatisfied*
 - (Dis)Agree scale: “How much you / What extent do you agree or disagree with following statements?”
 - *Strongly disagree*
 - *Disagree*
 - *Neither agree nor disagree / Undecided*
 - *Agree*
 - *Strongly Agree*
- And in sections by topics:
 - Place: description and use
 - Place Satisfaction
 - Psychosocial issues related with place
 - CLEVER intervention: information, believes, expectation, corners, participation...
 - Wellbeing and Health
 - Sociodemographic

Sense of answer options: The middle of questions is formulated in a positive and the other middle in negative sense (for control of acquiescence bias):

- **Positive sense:** the first choices reflect positive answers or higher amounts/frequency, while the last ones represent negative answers or lower amounts/frequency, etc.
Examples:
 - completely satisfied → completely dissatisfied
 - very safe (5) / tend to safe (4) / neutral (3) / tend to unsafe (2) / very unsafe (1)]
 - yes / not
 - every day / → / never

- ...
- **Negative sense:** the first choices reflect negative answers or lower amounts, while the last ones represent positive answers or higher amounts/frequency/etc. Mainly the (dis)agree scale:
 - Disagree → agree
 - ...

“**No answer**” option: it will be including in the question options.

Classification **of the locations (PLACES) of CLEVER's interventions:**

- Open Spaces **[OS]**: Park, garden, square, lake....
- Schoolyard **[Sy]**
- Station (outdoor) **[St]**
 - The interventions of schoolyard and station (outside) are very similar to they make in open spaces → NEED adapt text of questions.
- Building (green roofs and/or facades) **[B]**:
 - If the roof is accessible for people, it can be treated as an open space.
- Local area or neighbourhood **[N]**:
 - “Local area” is understood as a area within a few minutes walking distance from your home.

TEXT to replace for adapting to specificities of each CAL. In the document there are **some text highlight blue shaded** which should be replaced by the name that identifies the site or CLEVER intervention being evaluated.

- “**PLACE**” means the place where CLEVER's intervention is framed. So, when it writes “**PLACE**” in the questionnaire, this term should be replaced by the label that identifies the site to the participants. For example:
 - The garden (CLEVER intervention) in the/this **PLACE** refugee camp
 - The green facade (CLEVER intervention) in the/this **PLACE** station
- **CLEVER intervention:** in the questionnaire, this term should be replaced by the label that identifies the intervention of CLEVER project which will be make in the evaluated PLACE.

Reference to “local area” or “neighbourhood” [N]: → For questions regarding a context of the CLEVER’s intervention or valuated place.

Proposal of items to be used in ALL CALs Surveys which using questionnaires: the items of the questionnaire that are considered necessary/mandatory to be included in ALL studies using questionnaires have been **put in bold**. Some are specific to the **PLACE** or **CLEVER intervention** type.

- At the end of the document (See Section 8.1) there is a **TABLE** in which is indicate the number of de items by topic and subtopic [Nº], number of items mandatory [*], and the PLACE categoric related [N], [OS], [Sy], [St] or [B].

1 Place		Nº	[*]	N	OS	Sy	St	B
1.1	Description of place	2	1		1	1	1	2

- Into the cells for each PLACE categoric the number of mandatory items for this categoric is indicated.
- When the item/s is common for several or ALL categoric the cells are combined, as it is showing belong:

2 Place Satisfaction (unify STF) scale		Nº	[*]	N	OS	Sy	St	B
2.1 General Residential Satisfaction								
2.1.1 y 3	Neighbourhood & neighbors	2	2			2		

The resulting **questionnaire is long**. It is possible the participants spend more than 15 minutes to fill up. Because that, TECNALIA propose two strategic:

- Support by interviewers:** the questionnaires should be completed with the support of pre-trained interviewers in site.
- Shorten the questionnaire:** It might also be possible shorted the questionnaire by selecting only the most relevant topics in each CAL in function of objectives of each survey.

Other considerations:

- The several translations have to be controlled and pretested because there are several differences in meaning and interpretation between the “same” words in different languages.
- I don't know when you want to carry this out but there is a lot of work to do if you want to do this accurately. Especially with the problems mentioned above.

Procedure

TECNALIA proposes that the questionnaires be filled in at the place being evaluated (IN SITU). This can be done with paper questionnaires or questionnaires made on some computer support.

If it is not possible for them to be filled in on site, then they should only be filled in by people who know the place, so that they can evoke it, based on their previous experience in that place.

When CLEVER's interventions correspond to **green roofs & facades**, interviews or questionnaires can be carried out in the homes of the residents of the buildings where these interventions are to be implemented.

A clear procedure should be designed to carry out information gathering campaigns. This procedure should include training of interviewers (or detailed instructions when filling in through a mobile application), survey control, campaign control...

Sample

In order to be able to extrapolate the data from the questionnaires, in addition to following a careful procedure for collecting the information, the sample must be representative of the reference population.

Therefore, the first thing we must do is ask ourselves what the population under study is. For example, people between 16- and 70-years old living in a neighbourhood or building, or young people between 14 and 20 years old, or people who use a certain place (park, square...).

When it is a small population, it is recommended to involve all stakeholders. If there is an important part that does not participate, it should be analysed if these correspond to a specific group that their

But when you cannot involve the whole population, you have to select a sample from it. When the size of the reference population is known, the sample size for a given confidence level is calculated using formulas.

For the results to be generalizable, the sample must be representative of the reference population. For this purpose, the persons to be involved must be selected at random. For the results to be generalizable, the sample must be representative of the reference population. For this purpose, the persons to be involved must be selected at random. For that, it is necessary that the probability all persons has to be known before the sampling. When using a computer application, it is difficult to fulfil because the application is not available to all people or is distributed by means that do not reach all possible stakeholders. If the latter occurs, the sample will be biased, and the results will not be representative of the population of interest., that is, the probability just has to be known before the sampling.

When our population of interest is the users of a relatively small open urban space, TECNALIA usually interviews all the interested users who are on site during the busiest periods, for 1 or 2 days with pleasant weather conditions. A minimum sample of 40 users is recommended.

General aspects → to facilitate the reading of the document

WORD into items highlight in BLUE shaded

- **“PLACE”**: means the place where **CLEVER's intervention** is framed.
 - For example:
 - The garden (**CLEVER intervention**) in the refugee camp (**PLACE**)
 - The green facade (**CLEVER intervention**) in the station (**PLACE**)
 - So, when it writes **“PLACE”** in the questionnaire, this term should be replaced by the label that identifies the site to the participants.
- So, when it writes **“CLEVER intervention”** in the questionnaire, this term should be replaced by the label that identifies the intervention of CLEVER project which will be made in the evaluated **PLACE**.
- Grouped items by topics:
 - Place: description and use
 - Place Satisfaction
 - Psychosocial issues related with place
 - CLEVER intervention: information, beliefs, expectation, corners, participation...
 - Wellbeing and Health
 - Sociodemographic

Questions with Bold letter → Our proposal of common (mandatory) items for ALL CALLs (most relevant ones) or for different PLACES:

- Open Spaces [OS]
- Schoolyard [Sy]
- Station (outdoor) [St]
- Building [B]
- Local area or neighbourhood [N]

[Title of the CLEVER Survey]

Thank you for choosing to take part in the [CLEVER Survey...].

[Short introduction, e.g.

This survey is part of the CLEVER Cities Project adapted for the CLEVER Cities [Hamburg, London or Milan] local cluster.

The following questions are developed by ...]

You will need approximately 15-20 minutes to fill in the questionnaire.

[You should provide a short explanation about different response options.]

How to fill in the questionnaire?

1. Most questions can be answered by putting a cross in the box, or by writing in a number...

2. multiple choice...

3. please fill in all questions...

4. if you change your mind and want to select a different option...

Please note that most of the questions refer to the period before the COVID-19 crisis. For example, when we ask you how often you have used a certain public open space in the last 12 months, we are referring to the last 12 months prior to the crisis.

In some cases, you will be asked about the period during the COVID-19 crisis and that will be clearly specified in the questions.

[You should also add a contact person (email, phone) for more information]

Where I can get more information?

[You should provide information about data processing and storage, anonymity...]

1 Place

In this first section, we would like to find out a little about your place/neighbourhood. Please note that the following questions are about your place before the COVID-19 crisis.

1.1 Description of place

Open spaces [OS] [St] [Sy] or Building [B]

- Please can you describe how is **this PLACE** in two or three lines?
 - *[The children could draw it or write a story about it]*
- **ONLY [B]** Do You have a balcony. terrace or a garden at home?
 - Yes → could you describe it? _____ [balcony, terrace, a garden]
 - No

1.2 Use of space

Open Spaces: [OS] [Sy] [St] [B: green roof if it is accessible]

1.2.1 Frequency

- **Thinking about the last 12 months before the COVID-19 crisis, how often, on average, have you spent in **this PLACE?****
 - Every day (1 or more times)
 - Weekly
 - Monthly
 - Sporadically
 - Never, this is the first time

1.2.2 Time of use

- How long, on average, have you spent each time in **this PLACE** before the COVID-19 crisis?
 - More than 1 hours
 - Between 30-60 minutes
 - Between 15-30 minutes
 - 5-10 minutes
 - Less than 5 minutes

1.2.3 Activities

[Choose one of the two **OPTIONS**]

- **[OPTION A] What activities do you usually do in **this/the PLACE** before the COVID-19 crisis?**

[You can choose more than one answer.]

- Physical activities: sports, games, fitness...
- Care old people or child
- Social activities: picnics, talking and spending time with other...
- Gardening
- Enjoying nature, relaxing...
- Cultural activities: music events, theatre...
- Arts and crafts activities (painting)
- Other _____

- **[OPTION B] Please indicate what your relationship is with **this/the PLACE** before the COVID-19 crisis** [You can choose more than one answer.]

- I live in **this/the PLACE**
- I visit **this/the PLACE** for personal reasons (family, friends, ...)
- Work / studies in **this/the PLACE** I represent an organisation/association/group operating in the neighbourhood
- I do physical activity (sport, fitness...)
- I take care of the elderly or children
- I do socialize activities: spending time with friends, picnics
- I do gardening activities
- I relax in nature
- I carry out cultural activities: musical events, theatre
- I dedicate myself to art and craftsmanship.
- Other _____

1.3 Environmental Comfort

For open spaces [OS] [St] [Sy] or Building [B]

- **How comfortable did you feel with the following aspects in **this place/building** before the COVID-19 crisis?**

	Very high	high	medium	low	Very low
Acoustic	1	2	3	4	5
Thermal	1	2	3	4	5
Lighting	1	2	3	4	5
Visual	1	2	3	4	5
Overall	1	2	3	4	5

1.4 Evolution: the past two years

Open spaces [N] [OS] [St] [Sy] or Building [B]

- On the whole, do you think that over the past two years before the COVID-19 crisis **this PLACE** has got better or worse to **live/work** in or would you say things haven't changed **much?**
 - The **PLACE** has got better improved
 - The **PLACE** has not changed much (hasn't got better or worse)
 - The **PLACE** has got worse
 - Have not **lived/work** here long enough to say

1.5 Opinion about natural environment

- How natural environment (green/blue spaces) in **this PLACE** has changed over the past two years before the COVID-19 crisis?
 - has got better
 - has not changed much (hasn't got better or worse)
 - has got worse
 - Have not **lived/work** here long enough to say
- **What do you think about natural environments (green spaces) in your neighbourhood?**
 - Very favourable
 - Favourable
 - Indifferent
 - Against
 - Very contrary

2 Place Satisfaction (unify STF) scale

In this second section, we would like to find out a little about your opinion with local area.

[Response scale in negative SENSE: [Please, select one answer per row]

5 Completely satisfied → 1 Completely dissatisfied

OR: Completely satisfied (5); Satisfied (4); Neither satisfied nor dissatisfied (3); Dissatisfied (2); Completely dissatisfied (1); Prefer not to answer (9)]

The different issues included in this scale are:

- General Residential Satisfaction
- Open Spaces [OS] Satisfaction
(OS where the intervention of CLEVER is included)
- Residential Satisfaction: Building [B]
- Place Satisfaction: School [Sy] / Station [St]
- Safety

2.1 General Residential Satisfaction

Please note that the following questions are about your place before the COVID-19 crisis.

Issue	Question
	Before the COVID-19 crisis, how satisfied were you with...? [Response scale: Completely satisfied (5); Satisfied (4); Neither satisfied nor dissatisfied (3); Dissatisfied (2); Completely dissatisfied (1); Prefer not to answer (9)]
Neighbours	...your neighbours [ALL]
Open Space	...this PLACE [park, garden, school, walk, station] on the whole [OS]
Neighbourhood	...your neighbourhood on the whole [ALL]

2.2 Open space satisfaction (CLEVER intervention) [OS] or neighbourhood [N]

<i>Issue</i>	<i>Question</i>
Characteristic of open space	Before the COVID-19 crisis, how satisfied were you with the following characteristic of this PLACE...? <i>[Response scale: Completely satisfied (5); Satisfied (4); Neither satisfied nor dissatisfied (3); Dissatisfied (2); Completely dissatisfied (1); Prefer not to answer (9)]</i>
	environmental quality , landscape
	aesthetics [of buildings]
	air quality
	sound environment
	facilities and equipment, benches, play areas, etc.
	local services and amenities
	(public) transport
	accessibility
	suitable for their needs
	maintenance
	cleanliness
	safety [*2.5]
	affordability
green areas	

2.3 Residential satisfaction: Building [B]

<i>Issue</i>	<i>Question</i>
Building	Before the COVID-19 crisis, how satisfied were you with the following characteristic of this BUILDING...? <i>[Response scale: Completely satisfied (5); Satisfied (4); Neither satisfied nor dissatisfied (3); Dissatisfied (2); Completely dissatisfied (1); Prefer not to answer (9)]</i>
	Building you live in whole
	Aesthetics of building
	Materials
	Accessibility
	Safety [*2.5]
	Building services: water, heating...
	Orientation and views
	Green elements
	Relationship between neighbours

2.4 Place Satisfaction: School / Station

Issue	Question	Comments
School /Station	Before the COVID-19 crisis, how satisfied were you with...? <i>[Response scale: Completely satisfied (5); Satisfied (4); Neither satisfied nor dissatisfied (3); Dissatisfied (2); Completely dissatisfied (1); Prefer not to answer (9)]</i>	
	...the schoolyard / station overall	
	...its aesthetics	
	...its sound environment	
	...its facilities and equipment, benches, play areas, etc.	
	...its accessibility	
	...its building maintenance	
	...its cleanliness	
	...its safety [*2.5]	
	...green areas of the schoolyard / station	
...relationship between users of the schoolyard / station		

2.5 Safety [*2.5]

- In general, before the COVID-19 crisis, how safe did you feel when walking through/stay...? *[Response scale: Very safe (5); Tend to safe (4); Neutral (3); Tend to unsafe (2); Very unsafe (1); Prefer not to answer (9)]*
 - ...this **PLACE**
 - ... during the day
 - ...after dark
 - And when walking alone in their **local area** after dark
 - And in your own **home**

3 Psychosocial issues related with place

In this third section, we would like to find out a little about social issues

Questions: How much you / What extent did you agree or disagree with following statements before the COVID-19 crisis?

Response (Dis)Agree scale:

[Please, select one answer per row]

1. Strongly/Definitely disagree
2. Disagree
3. Neither agree nor disagree / Undecided
4. Agree
5. Strongly/definitely Agree
9. Don't know / Prefer not to answer

The different issues included here are:

- Social Interaction and cohesion
- Sense of identity and belonging
- Social justice
- Self-efficacy
- Affordability

3.1 Social Interaction and cohesion

Issue	Question
	<p>How much you / What extent did you agree or disagree with following statements before the COVID-19 crisis?</p> <p>[Response scale] [Please, select one answer per row]:</p> <ul style="list-style-type: none"> • Strongly/Definitely disagree (1) • Disagree (2) • Neither agree nor disagree / Undecided/Neutral (3) • Agree /4) • Strongly/definitely Agree (5) • Don't know / Prefer not to answer (9)
Social interaction, support, and cohesion	1 Generally, I borrow things and exchange favours with my neighbours/building when I live/people who I work/study.
	2 People in this neighbourhood can be trusted.
	3 People around here are willing to help their neighbours.
	4 People in this neighbourhood generally don't get along with each other.
	5 This local area is a place where people from different backgrounds get on well together
	6 People in this neighbourhood pull together to improve the neighbourhood
(Loneliness)	7 I am content with my friendships and relationships.
	8 I have enough people I feel comfortable asking for help at any time.
	9 My relationships are as satisfying as I would want them to be.
Affordability	10 My neighbourhood is becoming too expensive.
	11 I plan to stay in my neighbourhood for a long time.

3.2 Place identity and Sense of belonging

Issue	Question
Place identity and Sense of belonging	<p>Before the COVID-19 crisis, how strongly do you feel you belong to your immediate neighbourhood/local area? <i>Please think of the area within a few minutes walking distance from your home.</i></p> <ul style="list-style-type: none"> • Very strongly (5) • Fairly strongly (4) • Moderately strongly (3) • A little bit strongly (2) • Not at all (1) • Prefer not to answer (9)

3.3 Socio-Environmental justice

Environmental justice emerged as a concept in the United States in the early 1980s. The term has two distinct uses with the more common usage describing a social movement that focuses on the “fair” distribution of environmental benefits and burdens. The other use is an interdisciplinary body of social science literature that includes theories of the environment and justice, environmental laws and their implementations, environmental policy and planning and governance for development and sustainability, and political ecology.

The United States Environmental Protection Agency defines environmental justice as follows:

...Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation [sic]. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

Other definitions include equitable distribution of environmental risks and benefits; fair and meaningful participation in environmental decision-making; recognition of community ways of life, local knowledge, and cultural difference; and the capability of communities and individuals to function and flourish in society. An alternative meaning, used in social sciences, of the term “justice” is “the distribution of social goods”.

Issue	Question
	<p>How much you / What extent did you agree or disagree with following statements before the COVID-19 crisis?</p> <p>Response scale [Please, select one answer per row]:</p> <ul style="list-style-type: none"> • Strongly/Definitely disagree (1) • Disagree (2) • Neither agree nor disagree / Undecided/Neutral (3) • Agree /4) • Strongly/definitely Agree (5) • Don't know / Prefer not to answer (9)
Socio-Environmental Justice	City/ PLACE/School I live/work or study in is a fair City/PLACE/School.
	All persons, regardless of gender, age, socioeconomic level, nationality, etc:
	a. ...have access to the different services of this neighbourhood/building/school.
	b. ...can enjoy and benefit from the green areas of this neighbourhood/building/school.
	There are people or groups ignored in the decisions that are made in this neighbourhood/building/school where I live/work.
	This green space is open to everyone, regardless of need or background
Sense of ownership	You personally can influence decisions affecting your local area

3.4 Self-efficacy

SELF-EFFICACY (participation/co-creation): It is a component of perceived behavioural control (PBC). Self-efficacy is, according to psychologist Albert Bandura who originally proposed the concept, a personal judgment of "how well one can execute courses of action required to deal with prospective situations". Self-efficacy affects every area of human endeavour. By determining the beliefs, a person holds regarding their power to affect situations, it strongly influences both the power a person actually has to face challenges competently and the choices a person is most likely to make. These effects are particularly apparent, and compelling, with regard to behaviours affecting health.

The General Self Efficacy Scale has 10 standardised questions, translated into 33 different languages: <http://userpage.fu-berlin.de/~health/engscal.htm>

Issue	Question
	<p><i>How much you / What extent did you agree or disagree with following statements before the COVID-19 crisis?</i></p> <p>Response scale [Please, select one answer per row]:</p> <ul style="list-style-type: none"> • <i>Strongly/Definitely disagree (1)</i> • <i>Disagree (2)</i> • <i>Neither agree nor disagree / Undecided/Neutral (3)</i> • <i>Agree /4)</i> • <i>Strongly/definitely Agree (5)</i> • <i>Don't know / Prefer not to answer (9)</i>
Self- efficacy	I can always manage to solve difficult problems if I try hard enough.
	If someone opposes me, I can find the means and ways to get what I want.
	It is easy for me to stick to my aims and accomplish my goals.
	I am confident that I could deal efficiently with unexpected events.
	Thanks to my resourcefulness, I know how to handle unforeseen situations.
	I can solve most problems if I invest the necessary effort.
	I can remain calm when facing difficulties because I can rely on my coping abilities.
	When I am confronted with a problem, I can usually find several solutions.
	If I am in trouble, I can usually think of a solution.
I can usually handle whatever comes my way.	

3.5 Local community and civic participation

Issue	Question
	<p><i>How much you / What extent do you agree or disagree with following statements before the COVID-19 crisis?</i></p> <p>Response scale [Please, select one answer per row: <i>Strongly/Definitely disagree (1); Disagree (2); Neither agree nor disagree / Undecided/Neutral (3); Agree (4); Strongly/definitely Agree (5); Don't know / Prefer not to answer (9)</i></p>
Local community participation	I consider <i>that</i> myself a very active person in my community/ local area
Civic participation	I voted in the last local elections

Issue	Question
Local community participation	<p>Before the COVID-19 crisis, did you currently participate in any association or entity of any kind (cultural, neighbourhood, sports, political...)?</p> <ul style="list-style-type: none"> • Yes. [Could you indicate in which one or which ones and what is your participation? _____] • No
	<p>During the last 12 months before the COVID-19 crisis, have you done any voluntary work?</p> <p><i>A volunteer is a person who, free of charge, contributes his or her collaboration in favour of others through some organisation of general interest.</i></p> <ul style="list-style-type: none"> ○ Yes ○ No
	<p>[OR] Before the health emergency, do you happen to carry out activities in collaboration with those who live in the neighbourhood?</p> <ul style="list-style-type: none"> ○ Every day (1 or more times) ○ Weekly ○ Monthly ○ Sporadically ○ Never, this is the first time
Civic participation	<p>Have you been involved in any of the following activities, in the last 12 months before the COVID-19 crisis?</p> <p><i>Please only include those activities that were unpaid. Please don't include anything where you signed a petition but took no further action. Please select all that apply.</i></p> <ul style="list-style-type: none"> • Trying to set up a new service/amenity for local residents • Trying to stop something else happening in your local area • Running local services on a voluntary basis (e.g. childcare, youth services, parks, community centres) • Organising a community event (e.g. street party) • Campaigning on behalf of a political party • Another local issue (Please specify)

4 CLEVER intervention / NbS

In this fourth section, we would like to find out a little about CLEVER project and intervention.

Aggregated (Dis)Agree scale

How much you / What extent do you agree or disagree with following statements?

Response scale [Please, select one answer per row]:

- *Strongly disagree (1)*
- *Disagree (2)*
- *Neither agree nor disagree / Undecided (3)*
- *Agree (4)*
- *Strongly Agree (5)*
- *Don't know / Prefer not to answer (9)*

This sub- scale includes several topics:

- Information about CLEVER project, intervention...
- General evaluation
- Expectation related with NbS benefits: Environment, Wellbeing and health, (Feeling of) Social support, cohesion, interactions, Socioeconomic
- Concerns
- Participation

4.1 Information about CLEVER project, intervention...

- **Do you know something about CLEVER project/NbS?**
 - If YES → short description _____
- **Do you know something about CLEVER intervention/NbS?**
 - If YES → short description _____

4.2 General evaluation

Issue	Question
	<p><i>How much you / What extent do you agree or disagree with following statements?</i></p> <p><u>Response scale</u> [Please, select one answer per row]: <i>Strongly disagree (1); Disagree (2); Neither agree nor disagree / Undecided (3); Agree (4); Strongly Agree (5); Don't know / Prefer not to answer (9)</i></p>
The CLEVER intervention in my local area	<p>I have a positive perception of CLEVER's intervention/NbS [OR *4.2]</p> <p>I think/feel that my views and priorities are accounted for in CLEVER's intervention/NbS</p>

- **[*4.1] Could you tell us what your overall opinion is of the CLEVER intervention?**
 - Very favourable
 - Favourable
 - Indifferent
 - Against
 - Very contrary

4.3 Expectation related with NbS benefits

- Environment,
- Wellbeing and health,
- Social Interaction: (Feeling of) Social support, cohesion...
- Socioeconomic

Issue	Question
	<p><i>How much you / What extent do you agree or disagree with following statements?</i></p> <p>[Response scale] [Please, select one answer per row]: <i>Strongly disagree (1); Disagree (2); Neither agree nor disagree / Undecided (3); Agree (4); Strongly Agree (5); Don't know / Prefer not to answer (9)</i></p>
<p>[PRE intervention] Expectations about (positive) impact of CLEVER intervention</p> <p>[POST intervention] Valuation/perception about (positive) impact of CLEVER intervention</p>	<p>I think CLEVER's intervention/NbS will improve [PRE] / has improved [POST]...</p>
	<p>...biodiversity (animal and plants species) of this PLACE.</p>
	<p>...air quality of this PLACE.</p>
	<p>...noise of this PLACE.</p>
	<p>...thermal comfort of this area/place.</p>
	<p>...reduction of heat islands. [An urban heat island (UHI) is an urban area or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities" (wiki)...]</p>
	<p>...saving energy in the buildings.</p>
	<p>...aesthetic and beauty of this PLACE..</p>
	<p>...wellbeing of neighbours/citizen/workers/students/users.</p>
	<p>...health of neighbours/citizen/workers/students/users.</p>
	<p>...social relationship and cohesion.</p>
	<p>...the lives of all people who live/work/study/use in this PLACE.</p>
	<p>...economic value of PLACE (apartments/houses).</p>

4.4 Concerns

Issue	Question
	<p>How much you / What extent do you agree or disagree with following statements?</p> <p>[Response scale] [Please, select one answer per row]: <i>Strongly disagree (1); Disagree (2); Neither agree nor disagree / Undecided (3); Agree (4); Strongly Agree (5); Don't know / Prefer not to answer (9)</i></p>
PRE /POST: Concern	<p>What problems do you think can derive from the realization of CLEVER intervention/NbS?</p>
	Design errors
	Maintenance: higher costs, technical difficulties...
	Accessibility
	Bad management by condominiums
	Abandonment
	Safety
	Other

4.5 Participation

SELECT one of these options:

A) **Are you taking / Did you take part in CLEVER intervention?**

- Describe what your involvement in the CLEVER intervention has been or is.
- **OR:** A list of the different activities of each CAL can be made so that participants can indicate in which ones they have participated...

B) (Dis)Agree scale

Issue	Question
	<p>How much you / What extent do you agree or disagree with following statements?</p> <p>[Response scale] [Please, select one answer per row]: <i>Strongly disagree (1); Disagree (2); Neither agree nor disagree / Undecided (3); Agree (4); Strongly Agree (5); Don't know / Prefer not to answer (9)</i></p>
Participation in CLEVER intervention (co-design...)	<p>I have a say in the design of the CLEVER intervention in your neighbourhood/ building you live in</p>
	<p>The information made available by technicians on the characteristics of the CLEVER intervention where you live is adequate?</p>
	<p>The residents of my neighbourhood/ building were able to influence the design of the CLEVER intervention</p>

5 Wellbeing and Health

In this fifth section, we would like to find out a little about your health state and wellbeing. Please note that the following questions are about your place before the COVID-19 crisis, BUT there are some questions specific of the COVID-19 crises period [The question of this section will be OPTIONAL in the questionnaire, that is, participants may leave them unanswered.]

5.1 Perceived general health

- **How was your health in general?"**

	Very good	Good	Normal	Bad	Very bad	Prefer not to answer
In the last 12 months, before the COVID-19 crisis,	5	4	3	2	1	9
During the COVID-19 crisis period	1	2	3	4	5	9

5.2 Wellbeing

These are standardised wellbeing questions from the UK Office of National Statistics (ONS). <https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/methodologies/personalwellbeingssurveyuserguide>

In the last 12 months, before the COVID-19 crises, Overall...

- **...how satisfied are you with your life nowadays?**
 - *Completely satisfied (5); Satisfied (4); Neither satisfied nor dissatisfied (3); Dissatisfied (2); Completely dissatisfied (1); "Prefer not to answer" (9)*
- **...to what extent do you feel that the things you do in your life are worthwhile?**
 - *Where 1 is 'not at all worthwhile' → 5 is 'completely worthwhile'; "Prefer not to answer" (9)*
- **...how happy did you feel yesterday?**
 - *Where 1 is 'not at all happy' → 5 is 'completely happy'; "Prefer not to answer" (9)*
- **...how anxious did you feel yesterday?**
 - *Where 1 is 'not at all anxious' → 5 is 'completely anxious'; "Prefer not to answer" (9)*

5.3 COVID-related wellbeing

- **How different has life been for you in the confinement period compared to life before the COVID-19 crisis?**
 - Entirely the same as usual
 - Only a little different
 - Quite a few differences
 - Lots of differences
 - Completely different

- In the past 7 days, how many days have you: [1-7]
 - Not left the house or garden
 - Been outside for 15 minutes or more (including on a balcony or in the garden)
 - Had face to face contact with another person for 15 minutes or more (including someone you live with)
 - Had a phone or video call with another person for 15 minutes or more
- **During the COVID-19 crisis, have you experienced any of the following?**
[Select all that apply]
 - Lost your job/ been unable to do paid work
 - Your spouse/ partner lost their job or was unable to do paid work
 - Major cut in household income (e.g. due to you or your partner being furloughed/ put on leave/ not receiving sufficient work)
 - Unable to pay bills/ rent / mortgage
 - Evicted/ lost accommodation
 - Unable to access sufficient food
 - Unable to access required medication
 - Somebody close to you is ill in hospital (due to Covid-19 or another illness)
 - You lost somebody close to you (due you Covid-19 or another cause)
 - None of the above
- **What is your current isolation status?**
 - I am in full isolation, not leaving my home at all
 - I am staying at home, only leaving for exercise, food shopping, accessing medication, or essential activity permitted by government guidelines
 - I am staying at home only leaving for exercise, food shopping or accessing medication AND work OR other essential task (e.g. volunteering)
 - I am leaving the house for more reasons than those listed above but am adhering to social distancing in public (e.g. staying 2m away from others)
 - I am leaving the house for more reasons than those listed above and am NOT adhering to social distancing in public (e.g. staying 2m away from others)
- **What are your motivations for your current isolation status above?**
 - I am worried about catching Covid-19 and I have an existing medical condition or am categorised as high risk
 - I am worried about catching Covid-19 but am not high risk
 - I wish to protect/ shield a family member/ friend who is high risk
 - I am worried about spreading Covid-19 to others
 - It has been ordered by the government (e.g. as part of lockdown)
 - Another reason not relating to Covid-19 (e.g. maternity leave, pre-existing illness, or disability)
 - None of the above

5.4 Health conditions & illnesses

- Do you have any physical or mental health conditions or illnesses lasting or expected to last for 12 months or more, before the COVID-19 crisis? [If you have a physical condition and a mental health condition please cross both boxes]
 - Yes, a physical condition
 - Yes, a mental health condition
 - No
- Does your condition or illness/do any of your conditions or illnesses reduce your ability to carry-out day-to-day activities?
 - Yes, a lot
 - Yes, a little
 - Not at all
- Have you had Covid-19 (coronavirus?)
 - Yes, diagnosed and recovered
 - Yes, diagnosed and still ill
 - Not formally diagnosed but suspected
 - Not that I know of/ no
- In the last week do you believe you have come into CLOSE CONTACT with somebody who has Covid-19 (e.g. living with, hugging, shaking hands with, or spending more than 15 minutes with)?
 - Yes
 - No
 - Unsure

5.5 Restorative capacity

Included into Aggregated (Dis)Agree scale

This sub- scale includes items related with the main dimension of psychological restorative capacity: Fascination, Being away, Coherence and Scope

<i>Issue</i>	<i>Question</i>	<i>Comments</i>
	<p><i>How much you / What extent do you agree or disagree with following statements?</i></p> <p>[Response scale [Please, select one answer per row]: <i>Strongly disagree (1); Disagree (2); Neither agree nor disagree / Undecided (3); Agree (4); Strongly Agree (5); Don't know / Prefer not to answer (9)</i>]</p>	
Fascination	<ul style="list-style-type: none"> ○ Places like this are fascinating (FA 12) ○ In places like this my attention is drawn to many interesting things (FA 7) ○ In places like this it is hard to be bored (FA 11) 	<p><i>Scale of Restorative Quality of environments</i> Margherita Pasini et al. / Procedia - Social and Behavioral Sciences 159 (2014) 293 – 297</p> <p>Appendix A. The PRS-11 (in brackets the original number and factor in Hartig et al.'s1997a scale)</p>
Being Away	<ul style="list-style-type: none"> ○ Places like this are a refuge from nuisances (B-A 1) ○ To get away from things that usually demand my attention I like to go to places like this (B-A 5) ○ To stop thinking about the things that I must get done I like to go to places like this (B-A 4) 	
Coherence	<ul style="list-style-type: none"> ○ There is a clear order in the physical arrangement of places like this (COH 15 Rev) ○ In places like this it is easy to see how things are organised (COH 26) ○ In places like this everything seems to have its proper place (new item) 	
Scope	<ul style="list-style-type: none"> ○ That place is large enough to allow exploration in many directions (FA 10) ○ In places like that there are few boundaries to limit my possibility for moving about (new item) 	

6 Sociodemographic section

In this last section, we would like to ask you for some information about yourself. Please remember that the survey is anonymous and the information you provide will be treated with extreme confidentiality.

6.1 Demographic

- **Gender**
 - Man
 - Woman
 - Other _____
 - Don't know
 - Prefer not to answer
- **Age**
 - 16-24
 - 25-34
 - 35-49
 - 50-64
 - 65-79
 - Don't know / Prefer not to answer
- Which country were you born in? _____ [OR] **Place of birth**
- Ethnic group [**for LONDON**]: What is your ethnic group?
 - Asian/ Asian British - Indian, Pakistani, Bangladeshi, other
 - Black/ Black British - Caribbean, African, other
 - Chinese/ Chinese British
 - Middle Eastern/ Middle Eastern British - Arab, Turkish, other
 - Mixed race - White and Black/ Black British
 - Mixed race - other
 - White - British, Irish, other
 - White - European
 - Other ethnic group: _____
 - Prefer not to say

6.2 Residential characteristics

- Which of the following best describes your home?
 - Being bought on a mortgage
 - Owned outright by household
 - Rented from Local Authority
 - Rented from Housing Association / Trust
 - Rented from private landlord
 - Other (please specify) _____
 - Don't know / Prefer not to answer

- **Residence** time / antiquity

REFERENCE to neighbourhood / refugee accommodation [N] / building or home [B] / in school [Sy]

- **How long have you lived/worked or studied in this area/home/ school?**
 - Less than 1 year
 - 1 year or more, but less than 2 years
 - 2 years or more, but less than 5 years
 - 5 years or more, but less than 10 years
 - 10 years or more
 - I have always lived/work/study in this PLACE
 - Prefer not to answer
- **Place of residence** _____

6.3 Education & Laboral situation

- **Higher level of education obtained**
 - PhD
 - Degree
 - High school diploma
 - Junior high school
 - Elementary school
 - No qualifications
 - Don't know
 - Prefer not to answer
- **Occupation**
 - Unemployed
 - Employee or Self-employed/freelance without employees
 - Self-employed with employees
 - Not working – retired
 - Not working – looking after house/children
 - Not working – long term sick or disabled
 - Student (either full or part time)
 - Other _____
 - Don't know / Prefer not to answer

7 At the end

Finally, is there anything else about your experience of **living/working or studding in City or neighbourhood/school** that you would like to add? → open question

[...]

8 Complementary information

8.1 Summary table of number of items by topics and subtopics

CLEVER									comments
0 Questionnaire/s									
1	Place	Nº	[*]	N	OS	Sy	St	B	
1.1	Description of place	2	1		1	1	1	2	the 2nd only mandatory for Building
1.2	Use of space								
1.2.1	Frequency	1	1		1	1	1	(1)	(1) for roof accessible
1.2.2	Time of use	1	0		0	0	0	(1)	
1.2.3	Activities	1	1		1	1	1	(1)	
1.3	Environmental Comfort	5	3		3	3	3	3	
1.4	Evolution: the past two years	1	0		0	0	0	0	
1.5	Opinion about natural environment	2	1	+1	1	1	1	1	OPTIONAL: ask about neighbourhood
2	Place Satisfaction	Nº	[*]	N	OS	Sy	St	B	
2.1	General Residential Satisfaction								
2.1.1,3	Neighbourhood & neighbours	2	2			2			
2.1.2	Open spaces	1	1		1				
2.2	Open space satisfaction (CLEVER intervention) [N?] [OS]	14	7		7				
2.3	Residential satisfaction: Building [B]	9	5					5	
2.4	Place Satisfaction: School / Station	10	5			5	5		
2.5	Safety [*2.5]	4	0	0		0		0	
3.	Psychosocial issues	Nº	[*]	N	OS	Sy	St	B	
3.1	Social Interaction and cohesion	11	3		(1)	(2)		(3)	(1) only to residents of the neighbourhood where the OS is located (2) adapt it to people who work or study at the school (3) building neighbours
3.2	Sense of identity and belonging	1	1			1		1	City , for people who lives in this city Neighbourhood : for people which lives in the surrounding of the place School : 3rd question, specific of schools
3.3	Social-Environmental justice	6	3		3	3	3	3	
3.4	Self-efficacy	10	0			0			
3.5	Local community and civil participation	6	2	2	2	2	2	2	

4.1	CLEVER intervention	Nº	[*]	N	OS	Sy	St	B	Comments
4.1.1	Information & others with different response scale	2	2		2	2	2	2	
4.1.2	General evaluation	2	1		1	1	1	1	
4.1.3	Expectation related with NbS benefits	13	9		9	9	9	9	
4.1.4	Concerns	7	0		0	0	0	0	
4.1.5	Participation [ONLY POST]	4	1		1	1	1	1	
5	Wellbeing and Health	Nº	[*]	N	OS	Sy	St	B	
5.1	Perceived general health	2	2		2				
5.2	Wellbeing	4	4		4				
5.3	COVID-related wellbeing	5	4		4				
5.4	Health conditions & illnesses	4	0						
5.5	Restorative capacity	11	4		4	4	4	4	
5	Sociodemographic section	Nº	[*]	N	OS	Sy	St	B	
6.1	Demographic	4	3		3				
6.2	Residential characteristics	3	2		2				
6.3	Education & Laboral situation	2	2		2				
6	At the end	Nº	[*]	N	OS	Sy	St	B	
	Comments (open question)	1	1	1		1		1	
	Others questions to engagement or participation...								

Type of PLACE & CLEVER interventions by CALs

LONDON		PLACE	method
CAL1	Connecting People and Places	OS	SS
CAL2	Activating Southmere Lake	OS	SS
CAL3	Greening Unusual Places	OS, B	SS
MILLAN		PLACE	method
CAL1	Green Roofs & Facades	B	SS
CAL2	Community Garden & Self Farming "Lorentegno Giasmbellino"	OS	SS
CAL3	Tibaldi Station: Noise Barrier with NbS	St	SS
HAMBURG		PLACE	method
CAL1. Corridor	DRITTE METLE playground	OS	observation
	VILLAGE CENTRE Alter Dorfkern Fischbek (different NBS-Sides: natural based playground, Cornelius Gemeinde and fire pond).	OS	SS
	DRK: garden refugee	OS	Interviews & observation
CAL2	"Green Façade" SAGA building	B	SS
CAL3	"Schulgarten STS FF" (School)	Sy	<ul style="list-style-type: none"> o Teachers: SS o PUPILS-Children: works in class ¿?

SS: Social Survey

Two level of select common/mandatory questions

Level 1: the items of the questionnaire that are considered necessary/mandatory in social surveys by topic or subtopics & by type of PLACE have been **put in bold** in this document.

Level 2: ONLY IF THE QUESTIONNAIRE IS CONSIDERED SO LONG AND IT IS NECESSARY SHORTERED → selecting only the most relevant topics in each CAL in function of objectives of each survey and type of PLACE.

- **Mandatory topics FOR ALL CALs**
 - PLACE perception
 - CLEVER intervention
 - Health and Wellbeing
 - Sociodemographic
- **Optional subtopics in function of type of PLACE**
 - Place satisfactions **SELECT** in function of PLACE
 - Life nowadays → ALL
 - General Residential Satisfaction → ALL
 - Open space satisfaction (CLEVER intervention) → [OS]
 - Residential satisfaction: Building → [B]
 - Place Satisfaction → [Sy] [St]
- **Optional subtopics in function of OBJECTIVES**
 - Psychosocial issues related with place
 - Social Interaction and cohesion
 - Sense of identity and belonging
 - Social justice
 - Self-efficacy
 - Civil engagement

KPIs LONDON for CAL 1, 2 & 3	Topic
% of residents who believe Thamesmead is a place where residents from different backgrounds get on well together	3.1.1. Social Interaction and cohesion
% of South Thamesmead residents reporting sense of belonging to local neighbourhood	3.1.2. Sense of identity and belonging
% of residents reporting satisfaction with places to meet and come together	2. Place Satisfaction (BY type of PLACE)
% of residents who report fly tipping or vandalism as an issue in South Thamesmead	SAFETY [*2.6]
% of residents who perceive South Thamesmead to be a safe place	SAFETY [*2.5]
No. of environmental problems observed by residents	SAFETY [*2.5]
% of South Thamesmead residents reporting being proud to live in Thamesmead	SPECIFIC
% of South Thamesmead residents reporting improved wellbeing	4. Health and wellbeing
% of South Thamesmead residents reporting good health	4. Health and wellbeing
KPIs LONDON ONLY for CAL 1 & 2	Topic
Levels of sociability of public spaces (only 1 & 2)	SPECIFIC: Pro-social checklist

KPIs MILLAN ONLY for CAL3	Topic
OUTCOME: Improved wellbeing	4. Health and wellbeing
KPIs MILLAN for CAL 1, 2 & 3	Topic
Happiness and well-being related to NBS	4. Health and wellbeing
Relationship with nature	
Satisfaction and sense of belonging about NBS in the living place	2. Place Satisfaction (BY type of PLACE) 3.1.2. Sense of identity and belonging
Increase of Social cohesion and relationships: Participation in community activities related to NBS	3.1.1. Social Interaction and cohesion 3.2.5 Participation [ONLY POST]
Increase of safety and security perception: users perception related to NBS (accessibility, maintenance, Aesthetics, visibility)	2. Place Satisfaction (BY type of PLACE) SAFETY [*2.6]

KPIs HAMBURG CAL1. VILLAGE CENTRE Alter Dorfkern Fischbek (different NBS-Sides: natural based playground, Cornelius Gemeinde and fire pond).	Topic
	1.2. Use of space: Frequency, Time of use, Activities 1.3. Environmental Comfort 1.4. Evolution: the past two years 1.5. Opinion about natural environment
	2. Place Satisfaction (BY type of PLACE)
KPIs HAMBURG CAL1. "Inseln im Röhricht" Refugee CAMP	Structures Interviews
Improved social cohesion by volunteering in the gardening project/ activities (only considering the residents)	BASED ON: 3.1.1. Social Interaction and cohesion
Improved wellbeing	BASED ON: 4. Health and wellbeing
New area is used frequently, various physical activities are practiced: Number of people using NBS by age group, gender and ethnic group at different times and for different activities (n per ...)	BASED ON: 1. PLACE: Use of space (Frequency, Time of use, Activities); Environmental Comfort; Evolution: the past two years; Opinion about natural environment
KPIs HAMBURG CAL1. DRITTE MEILE: Nature based playground	OBSERVATION
<ul style="list-style-type: none"> • OUTCOMES <ul style="list-style-type: none"> • New recreational area/ sports area • New area is used frequently, various physical activities are practiced 	BASED ON: 1. PLACE: Use of space (Frequency, Time of use, Activities); Environmental Comfort; Evolution: the past two years; Opinion about natural environment
• KPIs HAMBURG CAL2	Topic
• Increased well-being: Perceived noise reduction and estimated well-being, perceived well-being	1.3. Environmental Comfort 4. Health and wellbeing
• Noise, thermal comfort	1.3. Environmental Comfort
• KPIs HAMBURG CAL3: OUTCOMES	Topic
• Pupils gain new practical skills and expertise (gardening, crafting, planning, organizing etc.) or improve existing skills by actively taking part in the project	SPECIFIC
• More locally grown food available for the pupils	SPECIFIC
• Increased theoretical knowledge on vegetable (plants, gardening, nature) production	SPECIFIC

<ul style="list-style-type: none"> • Level of acceptance: newly built place (garden) is used more frequently, differentiate by use on a planned and on a voluntary basis 	1. Place: use, comfort, evolution...
<ul style="list-style-type: none"> • Evolved curriculum 	SPECIFIC
<ul style="list-style-type: none"> • More visitors to the space 	1.2. Use of space