

# GREEN INDICATORS FOR ASSESSING LANDSCAPE SERVICES PROVIDED BY URBAN GREEN INFRASTRUCTURE.

## CASE STUDY: DISTRICT OF BENICALAP (VALENCIA)

### 1. OBJECTIVES

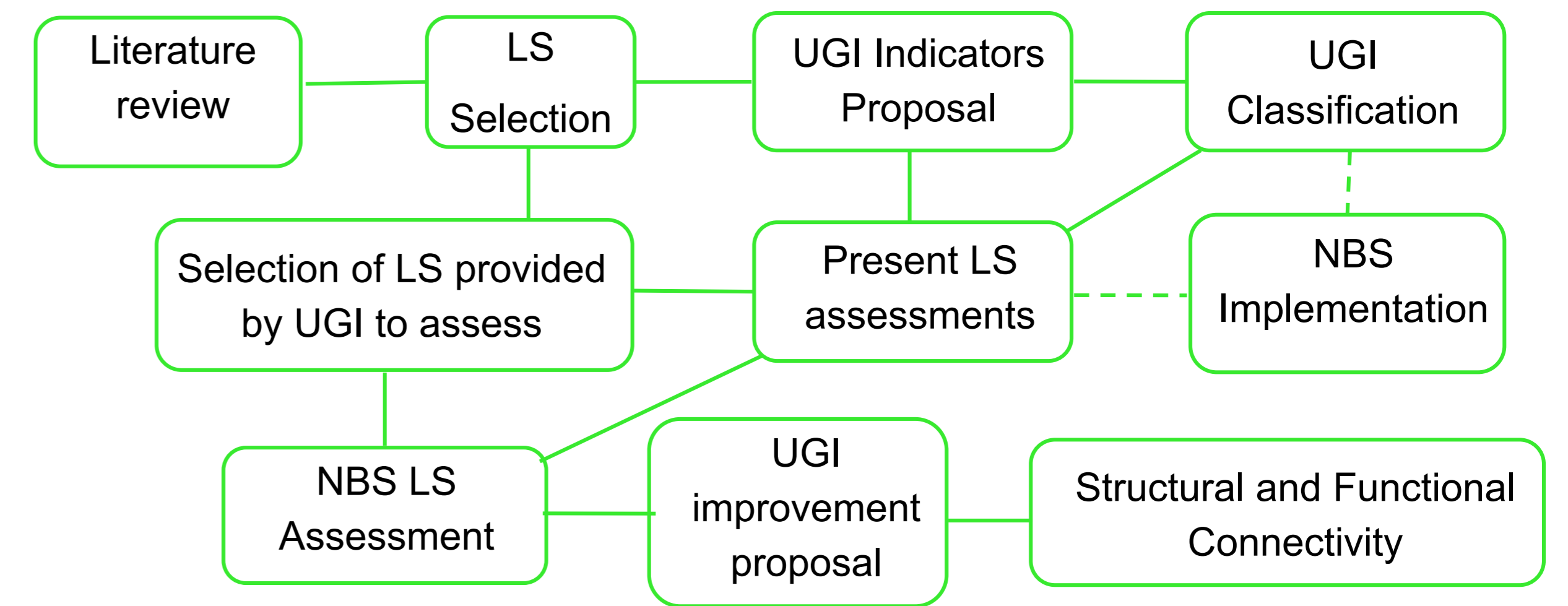
#### General objectives

- Green infrastructure benefits
- Quality life impact of nature-based solutions through green indicators
- Synergies between the effects of nature base solutions
- Strategies to improve the ecosystem services provided by urban green infrastructure

#### Specific objectives

- System of indicators to assess UGI elements at lo scale
- Measure GI indicators in public open spaces located in Benicalap District and other parts of Valencia City
- Evaluate NBS benefits developed in Benicalap district within Grow Green European project.
- Analyse synergies of nature-based solutions (NBS) developed in Benicalap District
- Recommendations to improve the urban fabric by integrating NBS in Benicalap District.

### 2. MAIN STAGES FOR THE RESEARCH



### 3. PRELIMINARY RESULTS

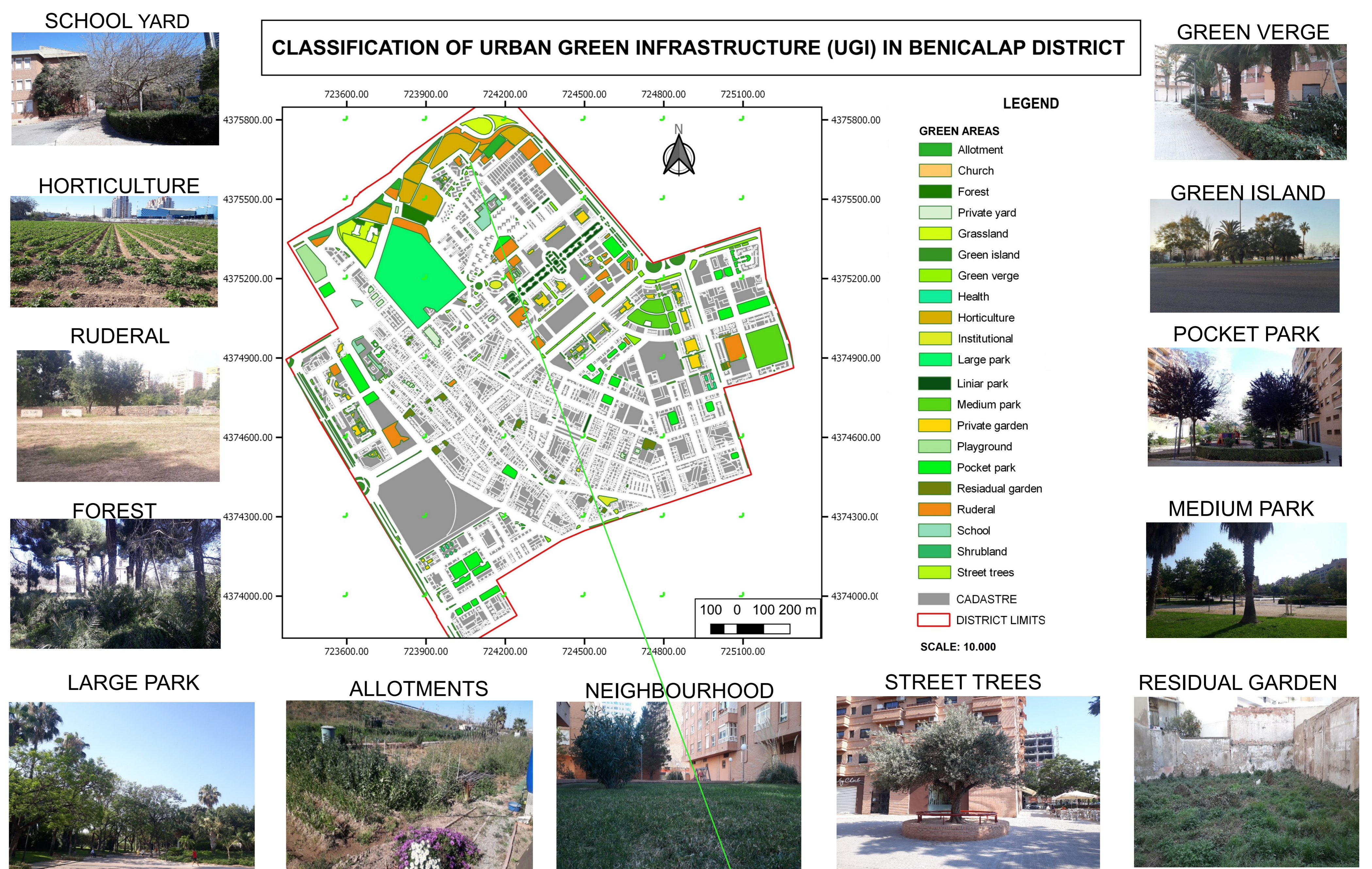
#### 3.1. DEVELOP A SYSTEM OF INDICATORS TO ASSESS UGI ELEMENTS

Table 1. Collection of Landscape Services and Green Indicators

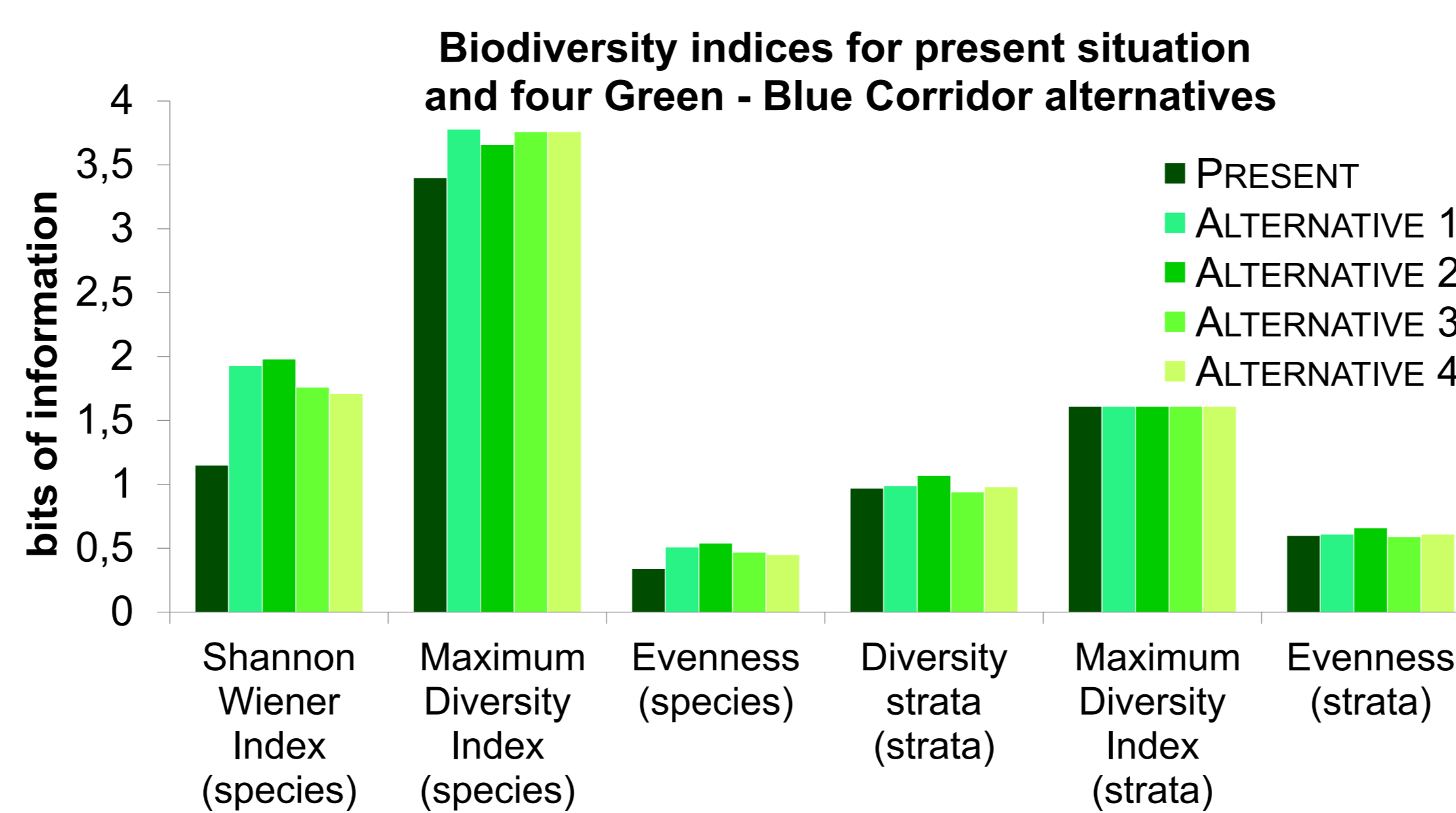
CONNECTIVITY (ACCESSIBILITY, AVAILABILITY, PROXIMITY)		STRUCTURAL INDICATORS
		*Green area/inhabitant
		Proximity to Green Spaces
		*Total area of green space
		*Accessibility of urban green
		*Euclidian Nearest Neighbor
LANDSCAPE SERVICES		UGI INDICATORS
A		
REGULATING		
1.	Water flow regulation	Reduction of Run-off: Runoff coefficient in relation to precipitation quantities *Impervious Surface
2.	Atmospheric regulation	Annual amount of pollutants (O <sub>3</sub> , NO <sub>2</sub> , SO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> ) captured by vegetation; Total amount/ yearly carbon sequestration and stored in vegetation Urban Heat Island effect mitigation; thermal comfort
3.	Lifecycle maintenance & habitat protection	*Simpson's diversity index *Shannon–Wiener diversity index *Percent of street trees of top most abundant species, genus, and family *Habitat Heterogeneity *Density of trees by street section *Network Connectivity *Species Suitability *Tree height and diameter classes *Crown coverage of the tree(large), number of trees, type of soil
B.		
CULTURAL		
1.	Symbolic: Aesthetic heritage	Enhancing attractiveness of cities Spatial perception of urban green
2.	Social relationship	Indicators of trust, attachment to neighborhood, practical help, tolerance and respect Improving social well-being (e.g. social interaction; social integration; community cohesion)
3.	Physical health: Physical activity	Sports and leisure activities including e.g. walking, cycling
4.	Mental health: Psychological	Improving mental well-being (e.g. reduced depression and anxiety; recovery from stress; attention restoration; positive emotions)
5.	Information and knowledge	Provision of outdoor sites for education and research Social values for urban ecosystems and biodiversity

\* Used green indicators for this investigation

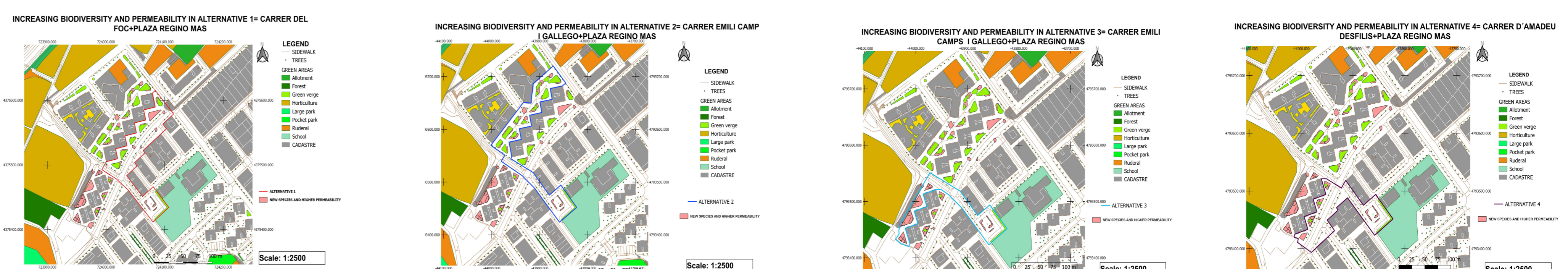
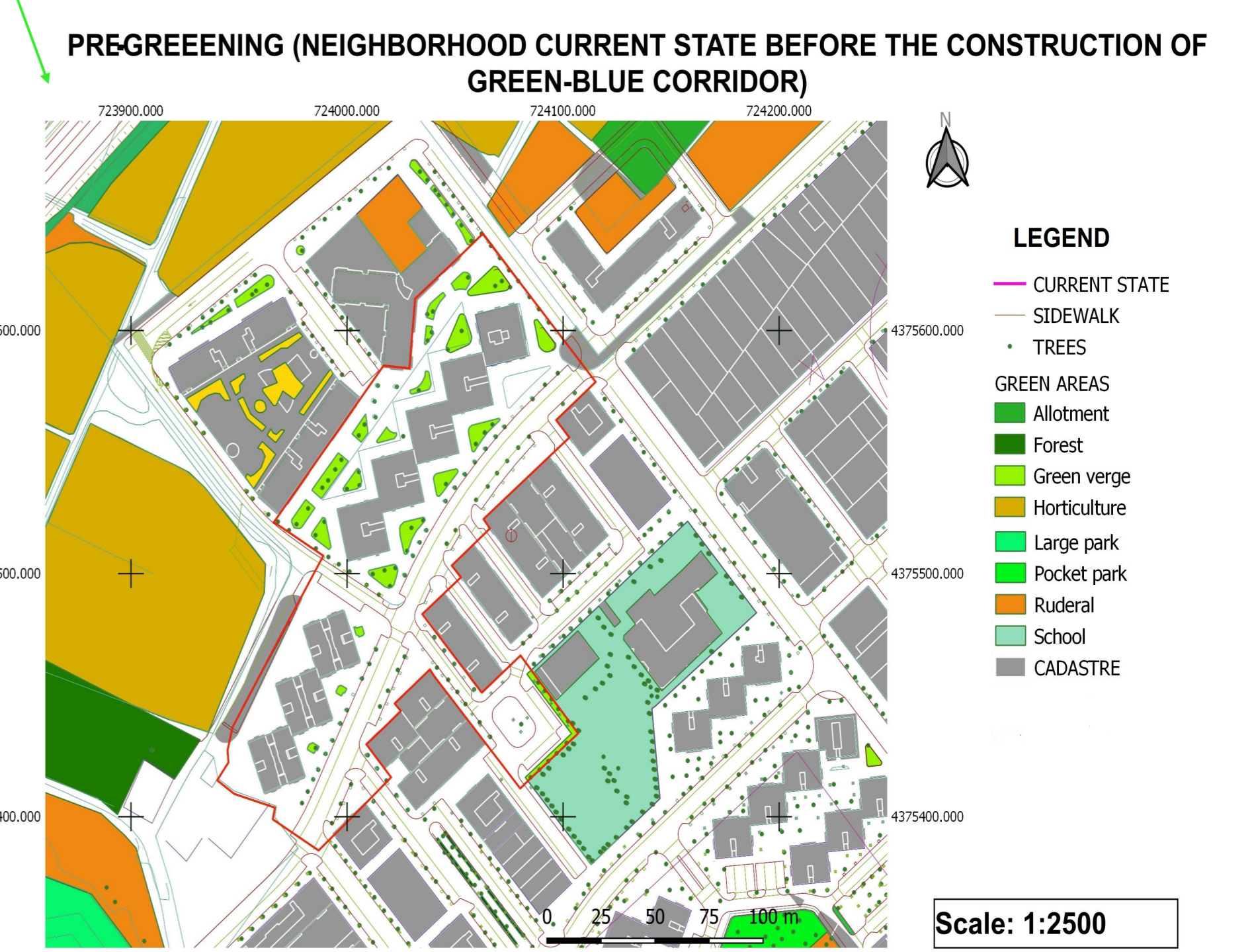
#### 3.2. MAP OF BENICALAP DISTRICT PUBLIC OPEN SPACES



#### 3.3. EVALUATE THE NBS BENEFITS OF GREEN-BLUE CORRIDOR ALTERNATIVES



#### 3.4. CONNECTIVITY RECOMMENDATIONS TO IMPROVE URBAN



### 4. EXPECTED RESULT AND POSSIBLE PROFITS

The results of this investigation could help incorporate green indicators in urban planning and management as an innovative tool for an urban sustainable design. Green indicators are suitable to provide sustainability evidence by assessing benefits provided by urban green spaces and improvements of the quality life of citizens. This study is linked to the Grow Green project, an innovative European project which aims to maintain healthy urban ecosystems and improve the quality of life of citizens, through NBS. Valencia is one of the cities involved. The development of the pilot project in the Benicalap district will provide guidelines of action that may be useful for other cities on their way towards sustainability.