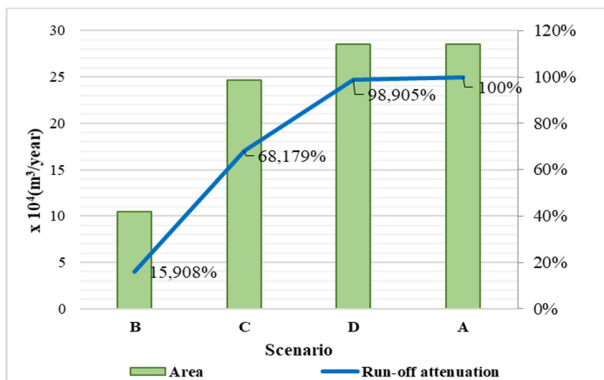
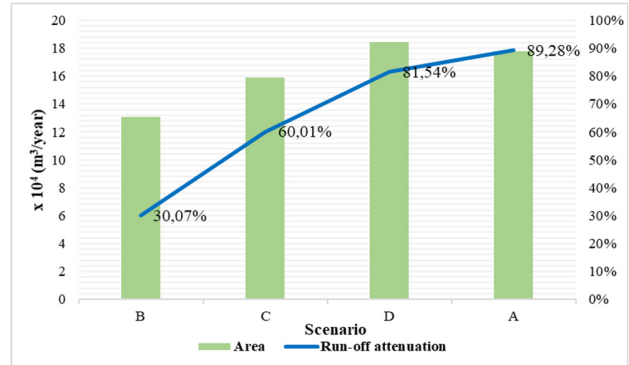


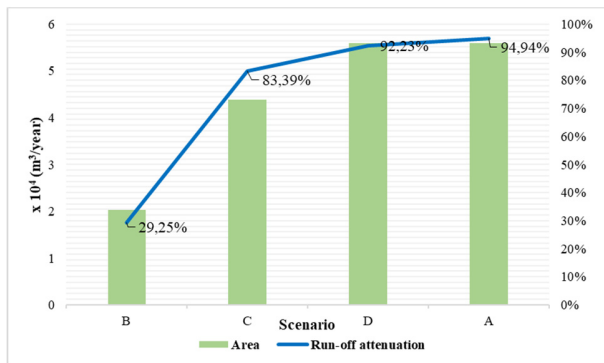
## Supplementary File S4



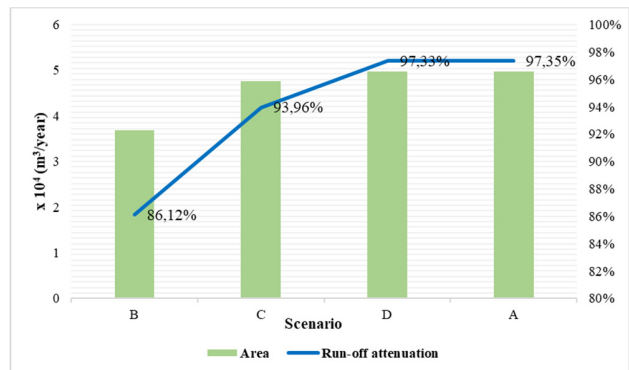
(a)



(b)



(c)



(d)

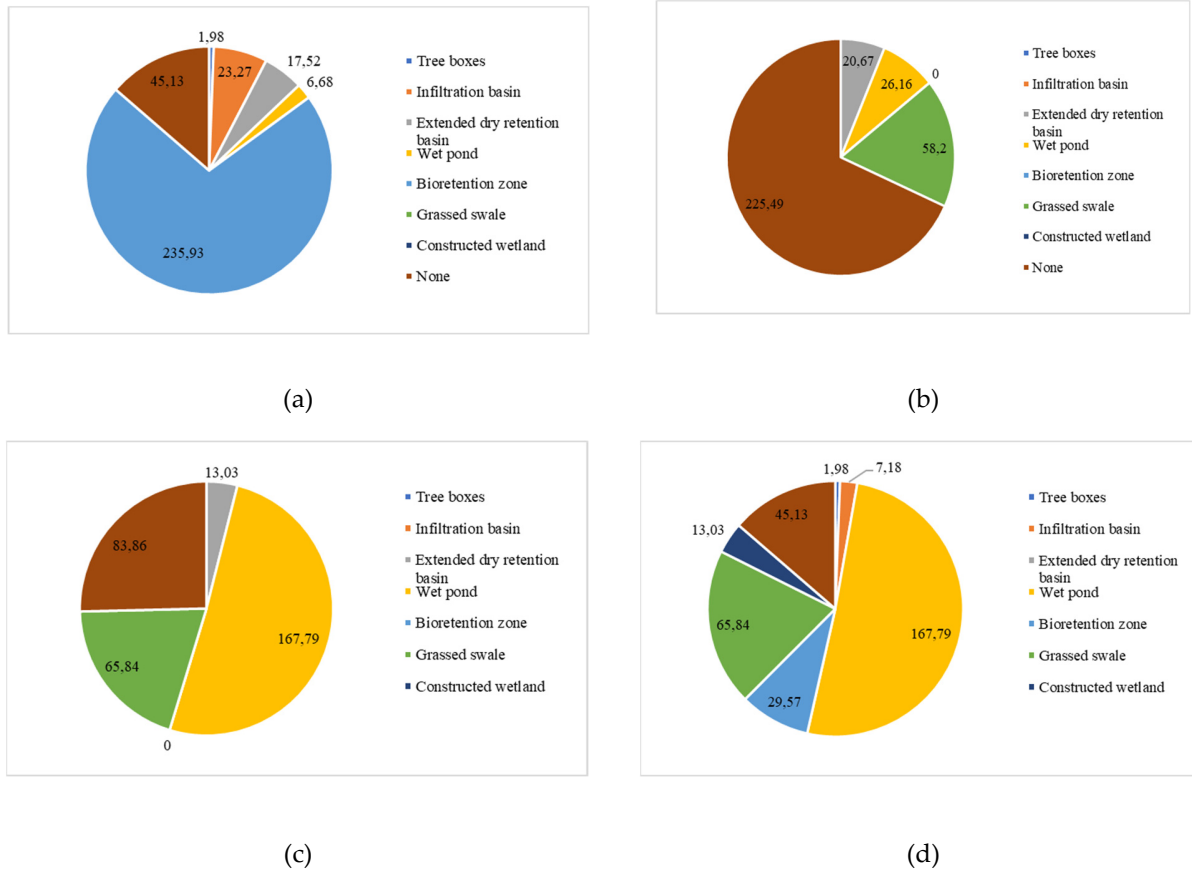
**Figure S1.** Budget scenarios (a) Ciudad Verde inflection point (C), (b) Lagos de Torca- El Bosque inflection point (D), (c) Lagos de Torca- Tibabita inflection point (C), and (d) El Reencuentro inflection point (C).

### Ciudad Verde

The feasible SUDS in this case study are mainly restricted by the slope. In the northwest zone of the project, the slope range is between 26-76% approximately and decreases in the north-center zone (2-20%). The feasible SUDS types were constructed wetlands, wet ponds, bioretention zones, grassed swales, tree boxes, infiltration basins, and extended dry retention basins. The most frequent SUDS type in each node were tree boxes (36 nodes), bioretention zones (30 nodes), wet ponds (24 nodes), and infiltration basins (17 nodes).

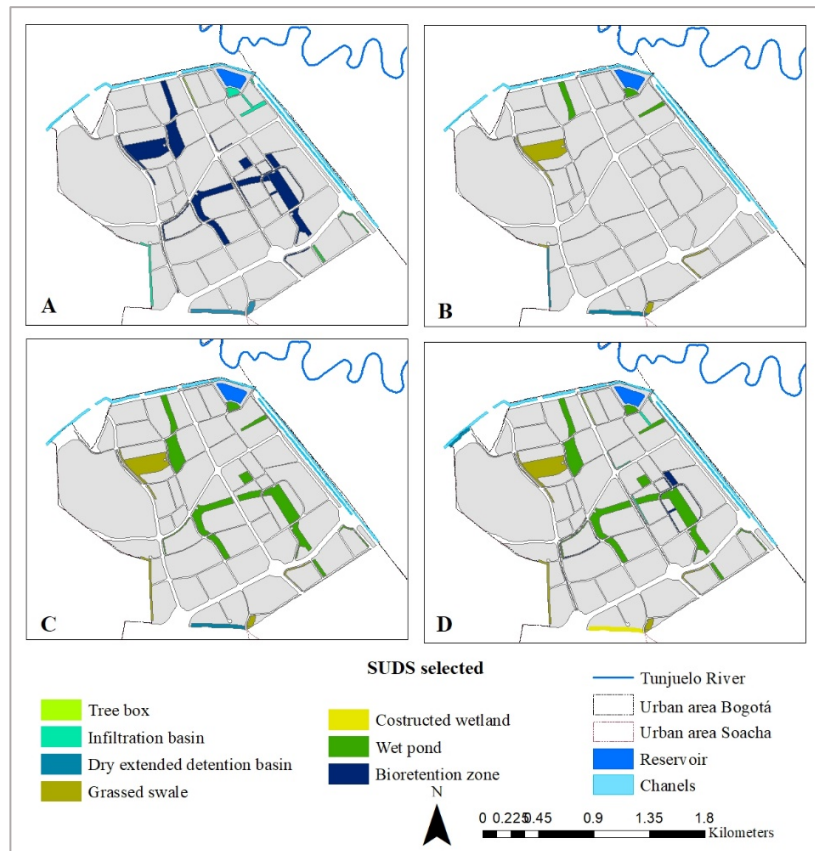
Wet ponds were selected for implementation in all optimization scenarios, as summarized in **Error! Reference source not found.** Furthermore, this SUDS type represents 68.02% and 58.79% of the total area for SUDS implementation in scenarios C and D, respectively. Extended dry detention basins and grassed swales are the second most common types. Grassed swales are present in all the scenarios

with budget restrictions (B, C, and D) and occupy 55.41% of the total area for SUDS implementation in scenario B (more restricted). Additionally, bioretention zones are only selected in scenario A, which occupies 82.67% of the total available area.



**Figure S1.** Area per type of SUDS (thousands of m²) *Ciudad Verde*: (a) scenario A, (b) scenario B, (c) scenario C, and (d) scenario D

Based on the selected SUDS in the public space, the ecosystem services requirements, and the results of the four (4) scenarios, scenario C was the best choice for run-off management. This scenario achieved a 68.22% of run-off volume reduction (10781.01 m³/ year) at a total cost of \$ 655,313.90 USD. The types of SUDS included in this scenario promote detention (grassed swales and dry extended retention basin) and retention (wet pond) of run-off (see Figure S2).

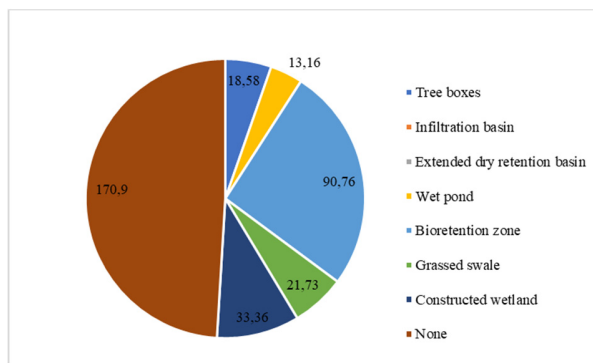


**Figure S2** SUDS selected by scenario *Ciudad Verde*

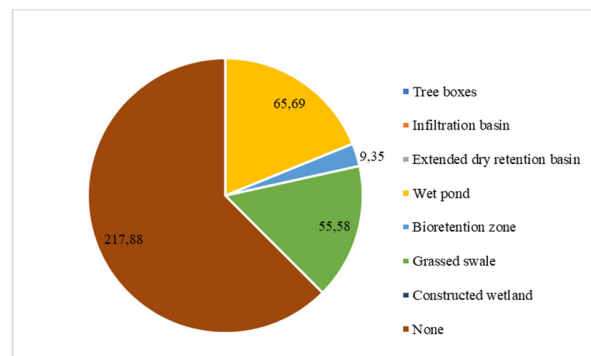
### Lagos de Torca

The preliminary selection of SUDS in *El Bosque* was mainly restricted by the infiltration rate (4-5.12 mm/h). This restriction affected the SUDS selection and implementation in the potential areas promoting the detention and retention of SUDS types. In *Tibabita*, the physical characteristics of the area did not hinder the feasibility of the analyzed SUDS types. The main types of SUDS in the preliminary selection in both cases of the study were grassed swales, wet ponds, tree boxes, bioretention zones, infiltration trenches, and constructed wetlands. Being the most frequent SUDS types in *El Bosque* tree boxes (44 nodes), grassed swales (30 nodes), and wet ponds (21 nodes) and in *Tibabita* tree boxes (19 nodes), wet ponds (14 nodes), and infiltration basins (7 nodes).

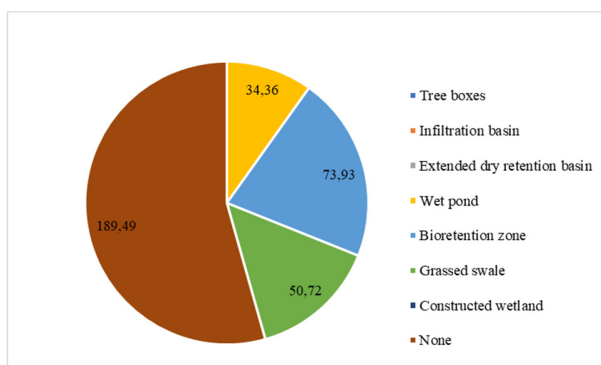
Figure S3 presents the area occupied by the optimized SUDS types in each scenario in *El Bosque*. In all the scenarios, wet ponds, bioretention zones, and grassed swales were selected. Furthermore, in scenarios A, C, and D, bioretention zones occupied 51.10%, 46.49%, and 40.05%, respectively. In scenario B the SUDS type with the higher area proportion is wet ponds (50.29%). The second most common SUDS types are tree boxes (only present in scenarios A and D) and constructed wetlands (only in scenario A).



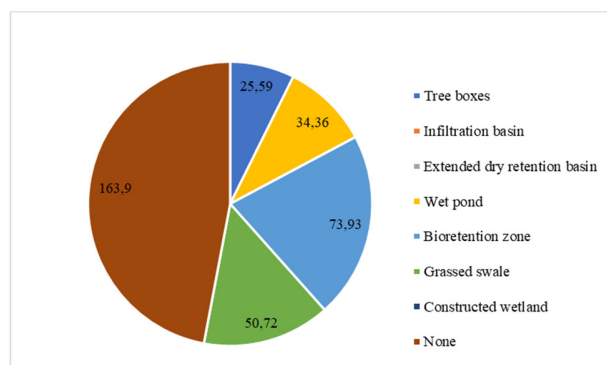
(a)



(b)



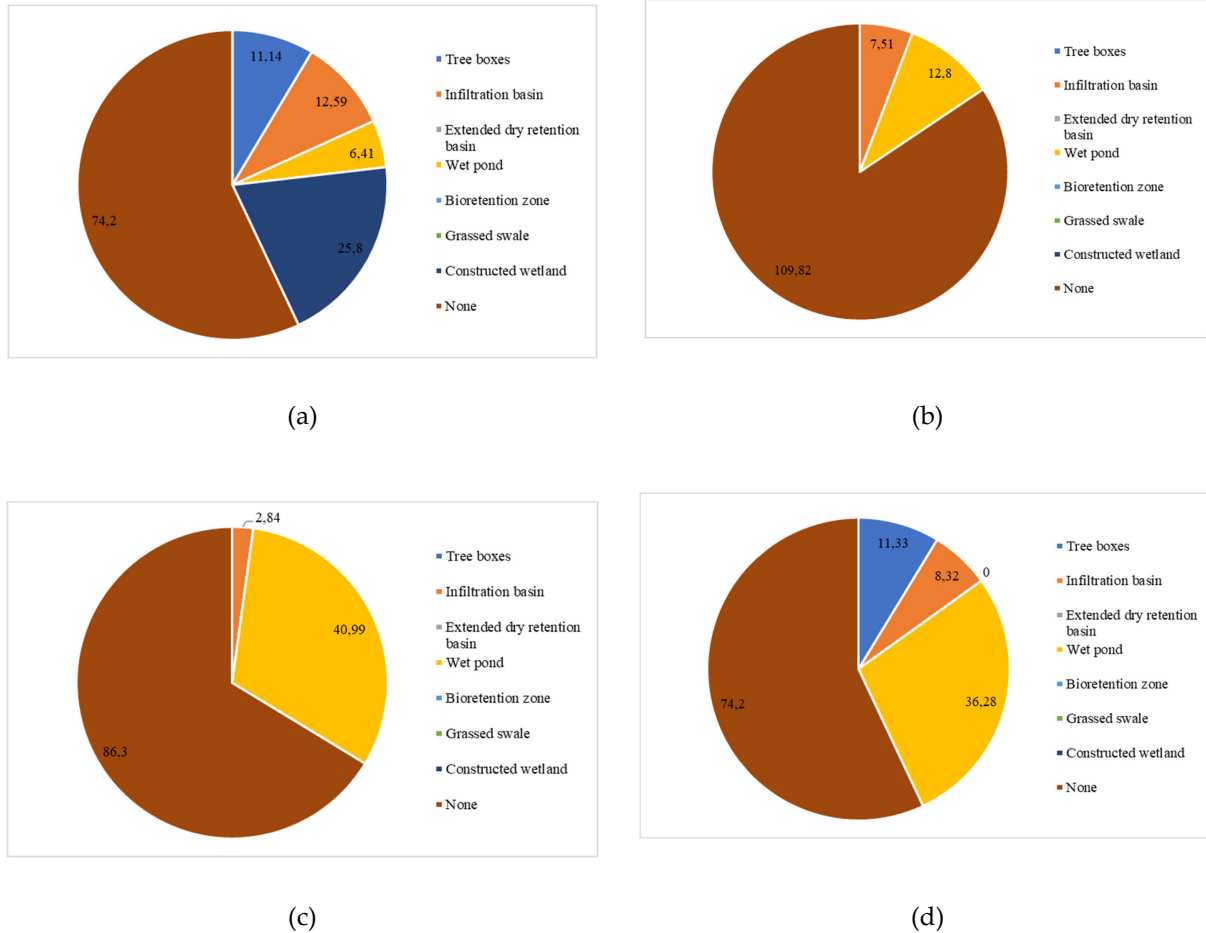
(c)



(d)

**Figure S3.** Area per type of SUDS (thousands of m<sup>2</sup>) *El Bosque*: (a) scenario A, (b) scenario B, (c) scenario C, and (d) scenario D

On the other hand, as presented in Figure S4, in all the scenarios of *Tibabita*, the most common optimized SUDS types selected were infiltration basins and wet ponds. The latter, occupies the highest area proportion in scenarios with budget restrictions (B, C, and D), 63.14%, 93.52%, and 64.86%, respectively. Followed by tree boxes and constructed wetlands, only selected in scenario A with 46.12% of the area.

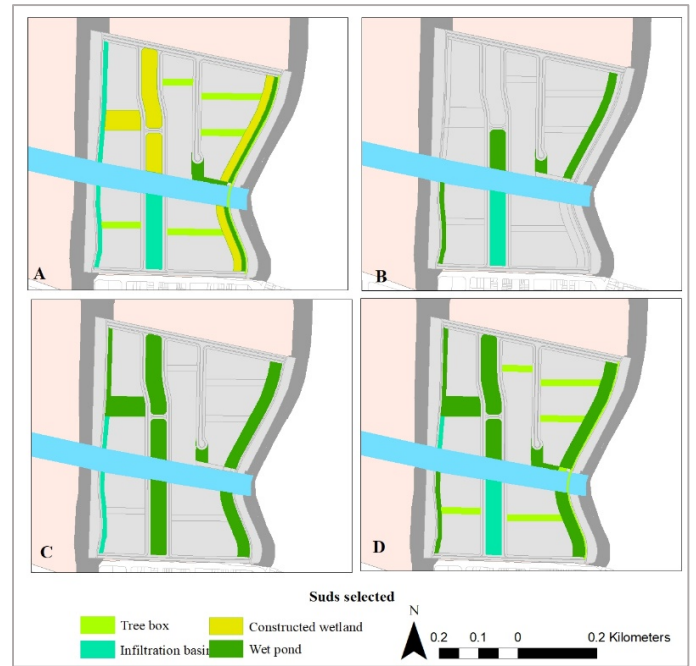


**Figure S4.** Area per type of SUDS (thousands of m<sup>2</sup>) *Tibabita*: (a) scenario A, (b) scenario B, (c) scenario C, and (d) scenario D

Figures S6 and S7 show the SUDS types selected in each scenario in the case studies cases of *Lagos de Torca*. In *El Bosque*, the optimization model indicates scenario D is the best choice for SUDS configuration with a run-off volume reduction of 12,410 m<sup>3</sup>/year (81.5%) at a total optimized cost \$775,971 USD. In *Tibabita* scenario C is the best option with 6428.47 m<sup>3</sup>/year (83.4%) at a total optimized cost of \$ 468,978 USD. In the case of *El Bosque*, this selection promotes the detention (grassed swales and bioretention zones) and retention (wet ponds) functions. While in the *Tibabita* plan, the most effective processes to manage stormwater were infiltration (infiltration basin) and retention (wet pond).



**Figure S5.** SUDS selected by scenario *El Bosque*

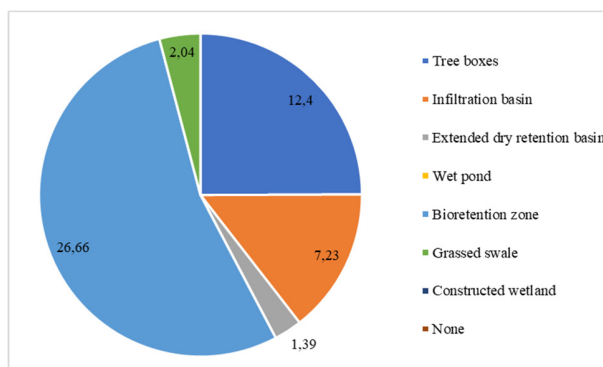


**Figure S6.** SUDS selected by scenario *Tibabita*

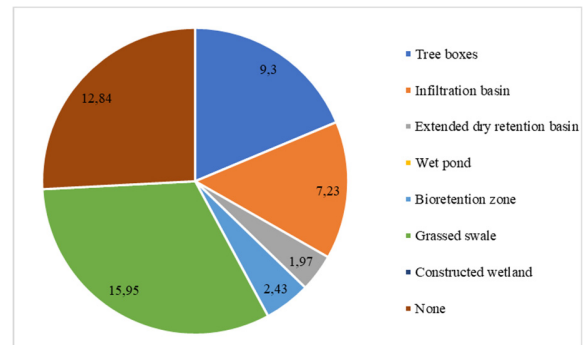
### El Reencuentro

The selection of SUDS types in *El Reencuentro* highlights the influence of the physical and environmental factors of the case study. The area of the *Calle 26* urban planning project had the lowest range of infiltration rate (0.023-2.69 mm/h), which restricts SUDS feasibility to tree boxes without infiltration process in all scenarios. As a result, the optimization process does not influence the type of SUDS selected in this area. The most frequent SUDS types in this case study are tree boxes (33 nodes), bioretention zones (16 nodes), and grassed swales (8 nodes).

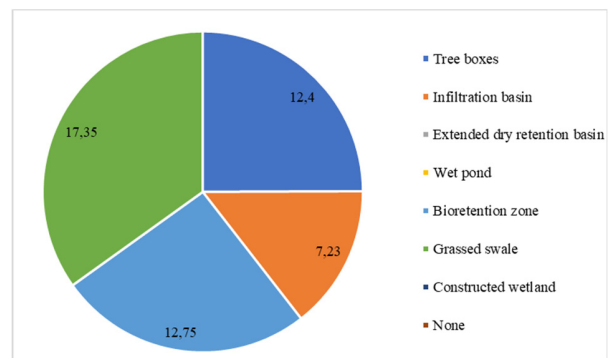
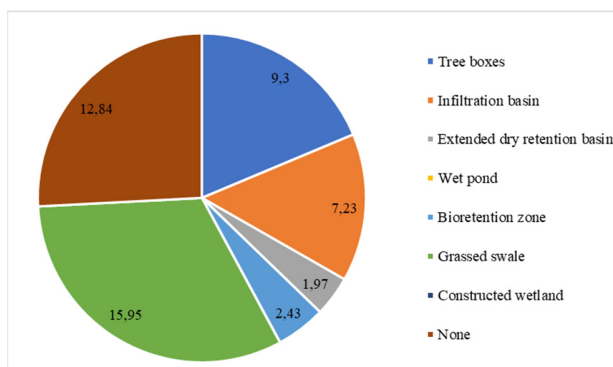
Figure S8 presents the occupied area by the optimized SUDS type in *El Reencuentro*. Tree boxes, infiltration basins, extended dry detention basins, bioretention zones, and grassed swales were selected in all the scenarios. Being the most common type of SUDS the grassed swale with 43.25% of the total area in scenario B, 33.49% of the total area of scenario C, and 34.88% of the total area of scenario D. Also, the proportion of tree boxes and infiltration basins is similar in all scenarios. Therefore, it appears that the SUDS types of the optimal solution do not depend on the budget restriction in this case.



(a)



(b)



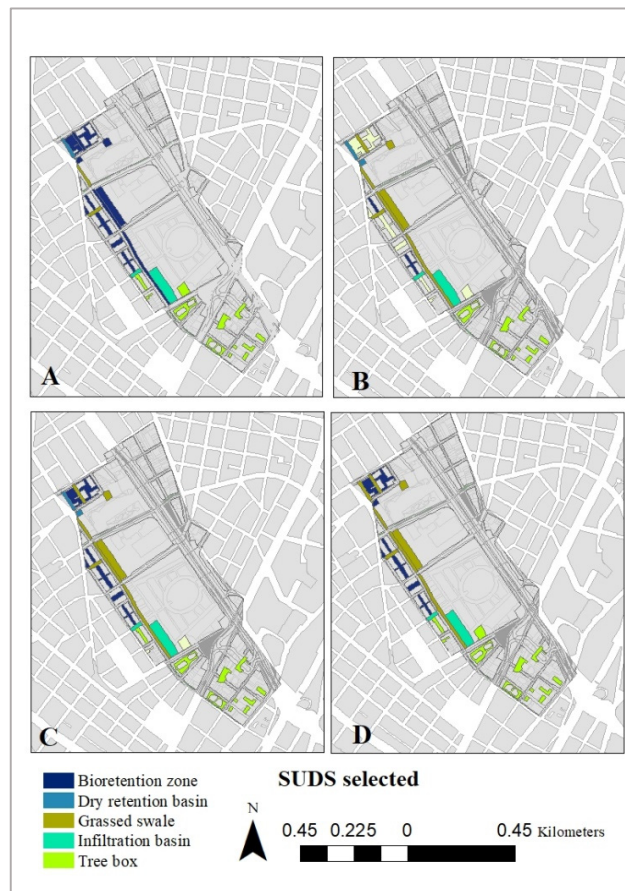


(c)

(d)

**Figure S7.** Area per type of SUDS (thousands of m<sup>2</sup>) *El Reencuentro*: (a) scenario A, (b) scenario B, (c) scenario C, and (d) scenario D

From the scenarios proposed, the C option was selected from the optimized scenarios. In that case, the run-off volume reduction was (15937.37m<sup>3</sup>/year-94.0%) with an optimized cost of 371,682.41 USD. Figure S9 illustrates the optimization process results in each scenario. In this option, the main processes promoted by the SUDS are detention (tree boxes, bioretention zones and grassed swales) and infiltration (infiltration basin) (see Figure S8).



**Figure S8.** SUDS selected by scenario *El Reencuentro*