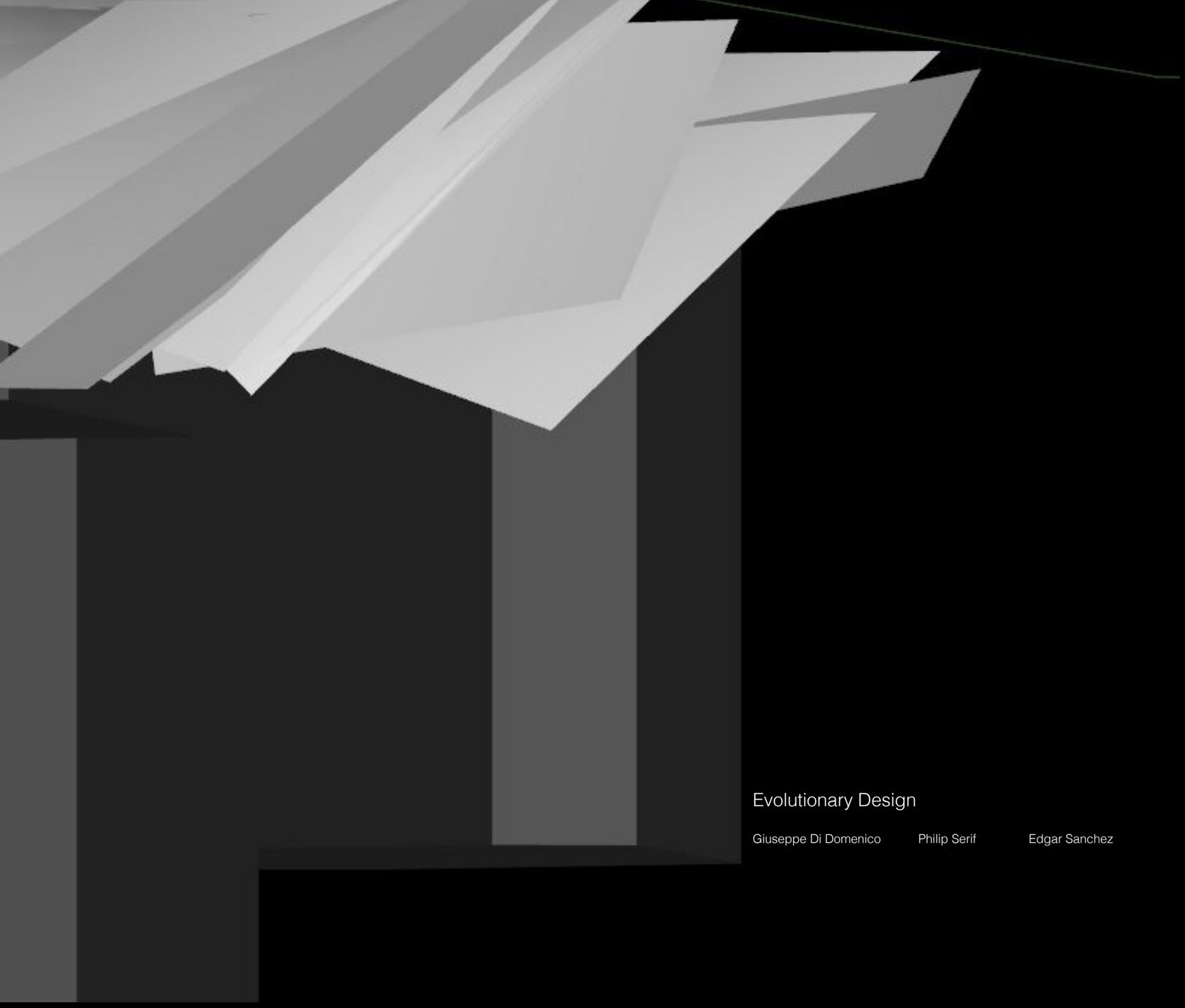
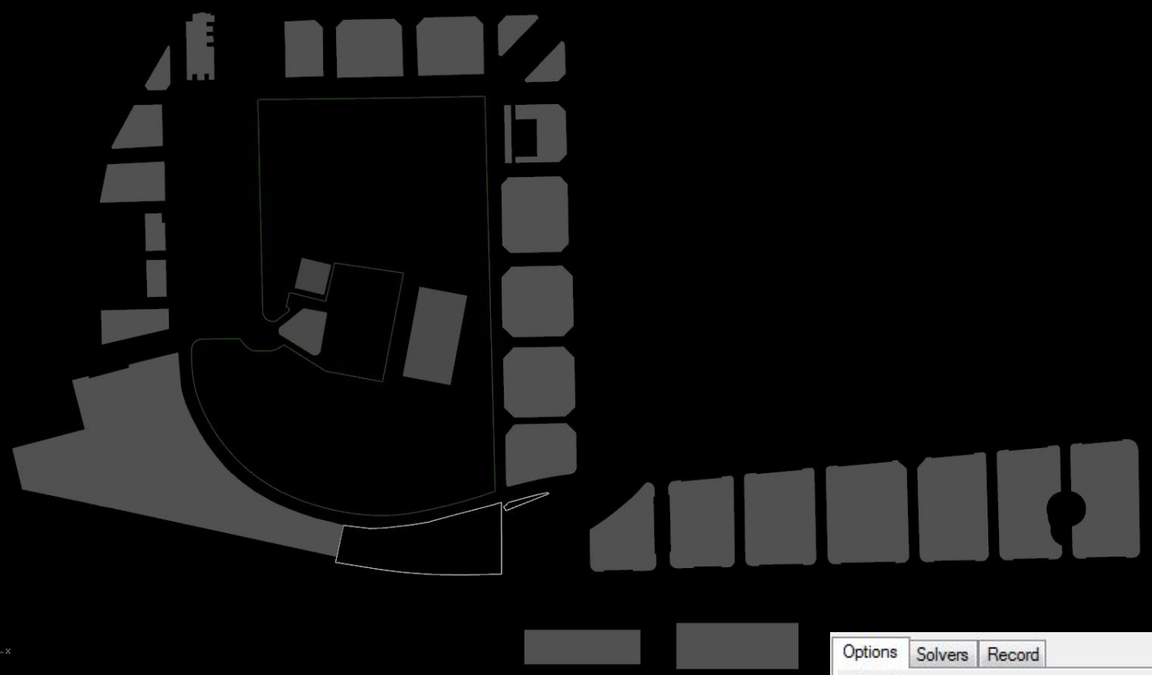
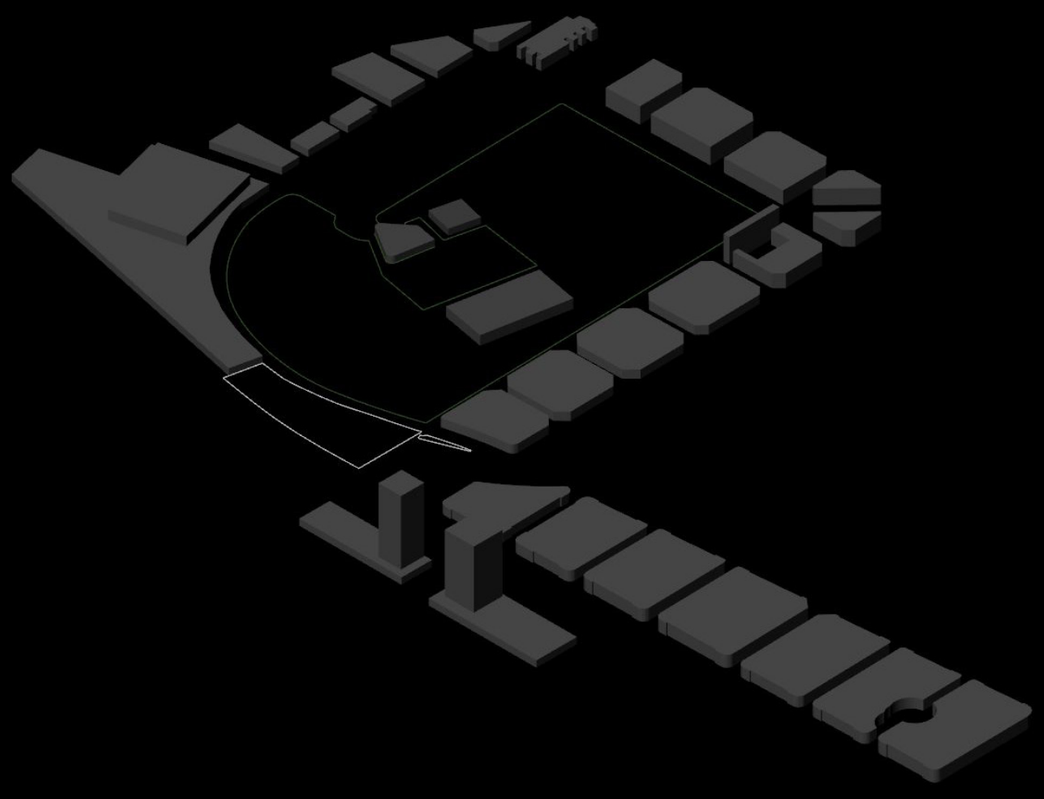


Evolutionary Design

Giuseppe Di Domenico Philip Serif Edgar Sanchez

Institute for advanced architecture of Catalonia





Background:

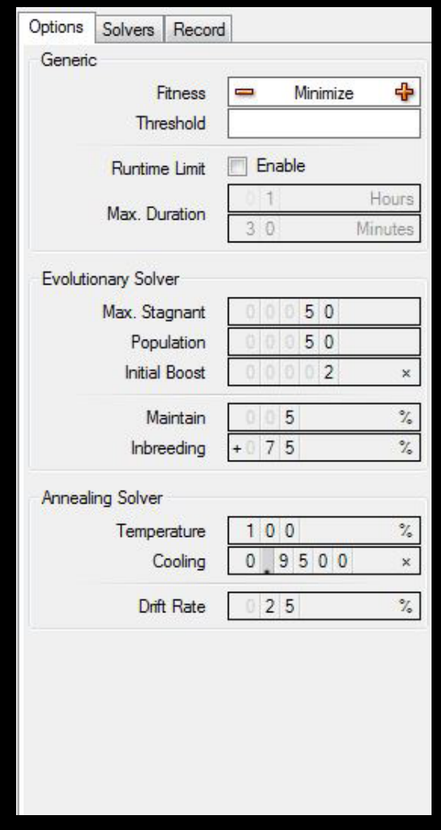
We are focusing on soil degradation/contamination as part of our studio project. Using the evolutionary approach we looked at environmental factors impacting park/greenery areas in Barcelona.

This would allow us to locate suitable areas for deployment of our prototypes.

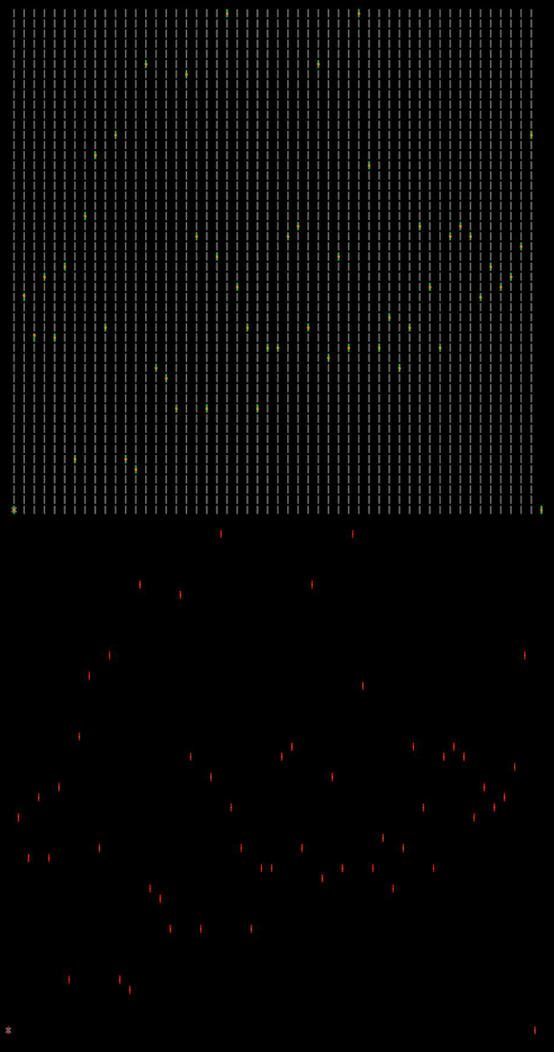
Areas around the Parc de la Ciutadella provide ideal environements for the prototype (which would ideally integrate itself as well as interact with its immediate environment).

To have some variety, locations around the park itself representing varrying urban-like environments were used as well as areas adjacent ot eh sea and hence a little more exposed.

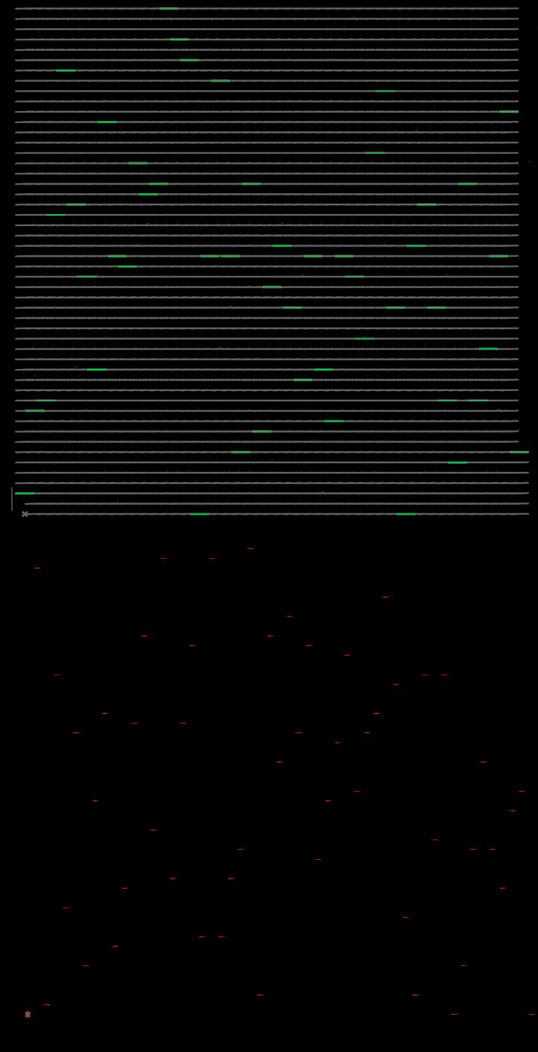
(right, settings used in the galapagos evolutionary component)



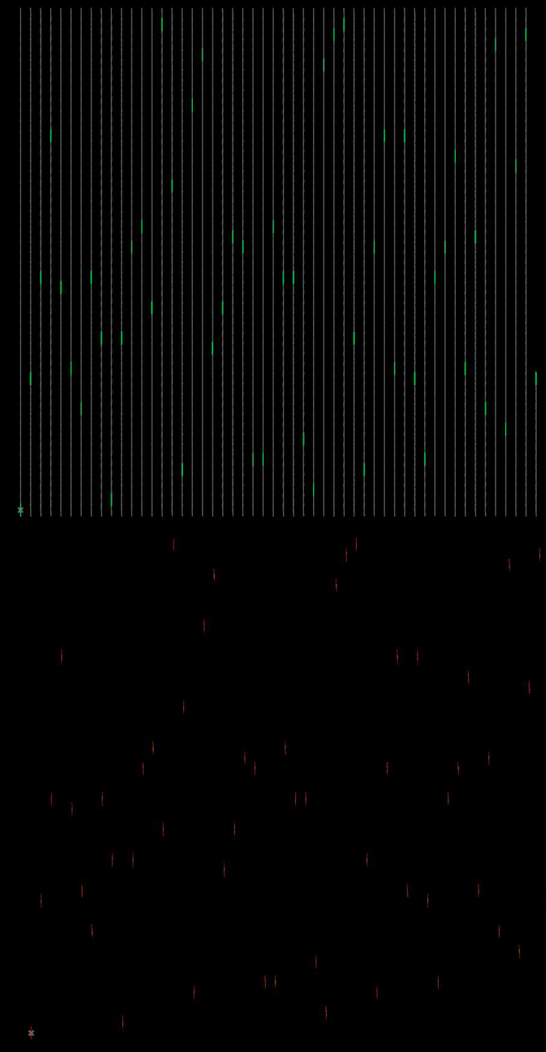
Evolution of Shading



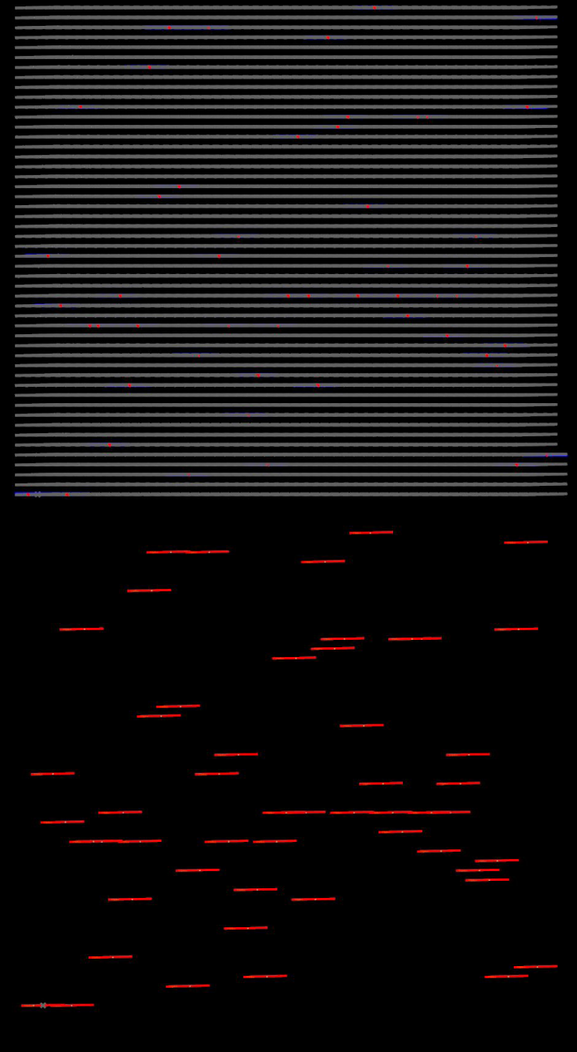
Generation of evolutions + selection of best solutions in area 1



Generation of evolutions + selection of best solutions in area 2



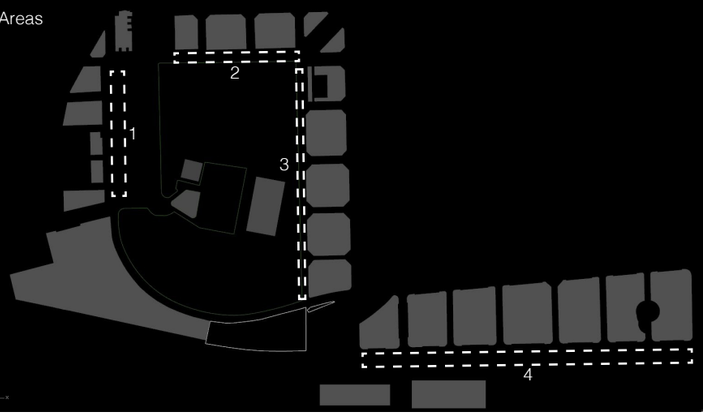
Generation of evolutions + selection of best solutions in area 3

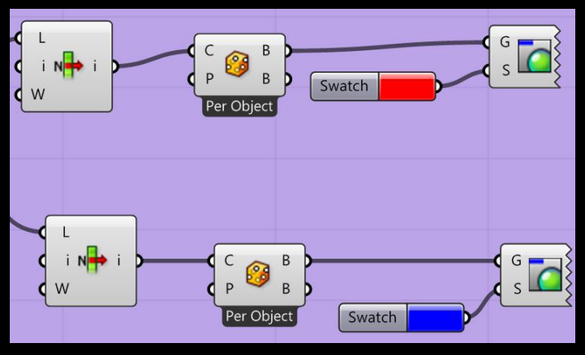


Generation of evolutions + selection of best solutions in area 4

The galapagos component was allowed to run for 50 ‘generations’.

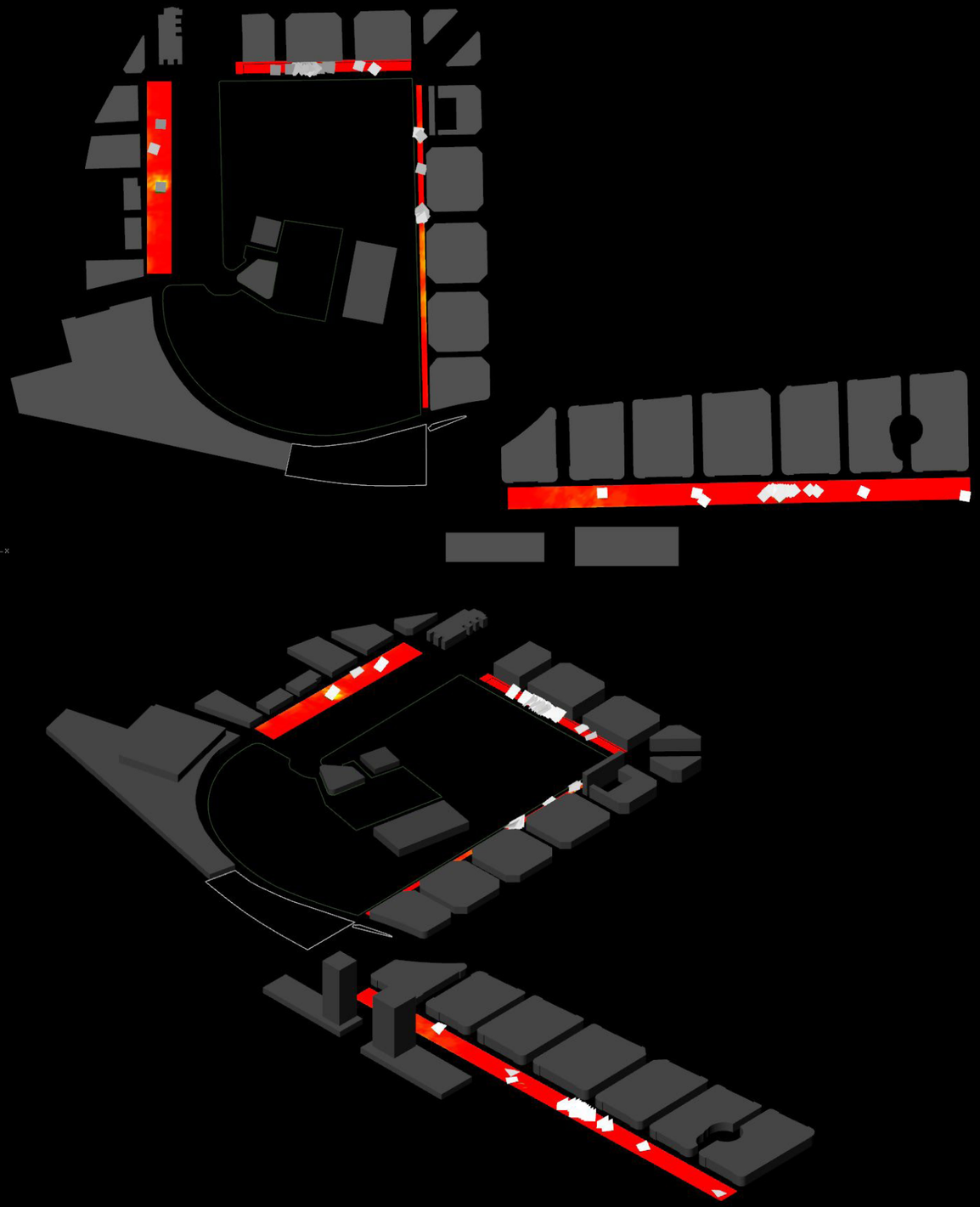
Areas





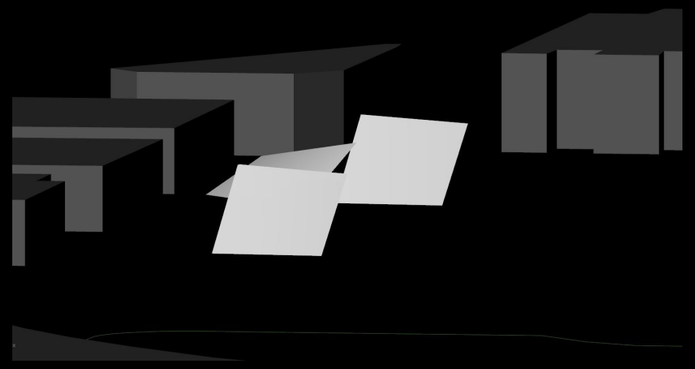
Using colours the best solutions are highlighted for baking and selection.

Evolution of Shading Visual

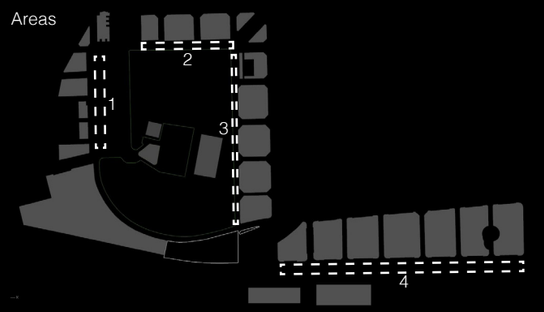


After extracting the most ideal solutions regarding shading efficiency, they were then inserted back into the landscape.

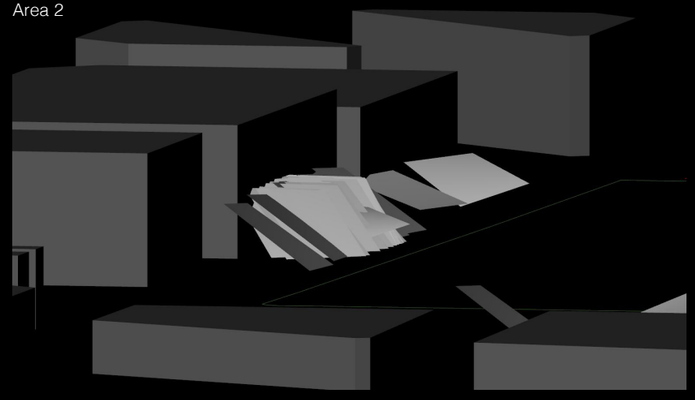
Area 1



Areas

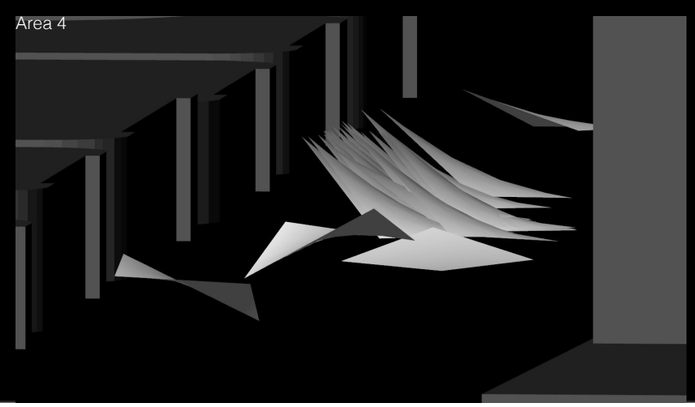


Area 2



Area 3

Area 4



Following superimposing the generated planes a general geometry can be extracted to inform varying design ideas (e.g pavillions, environmental factor exploitation, urban landscaping)

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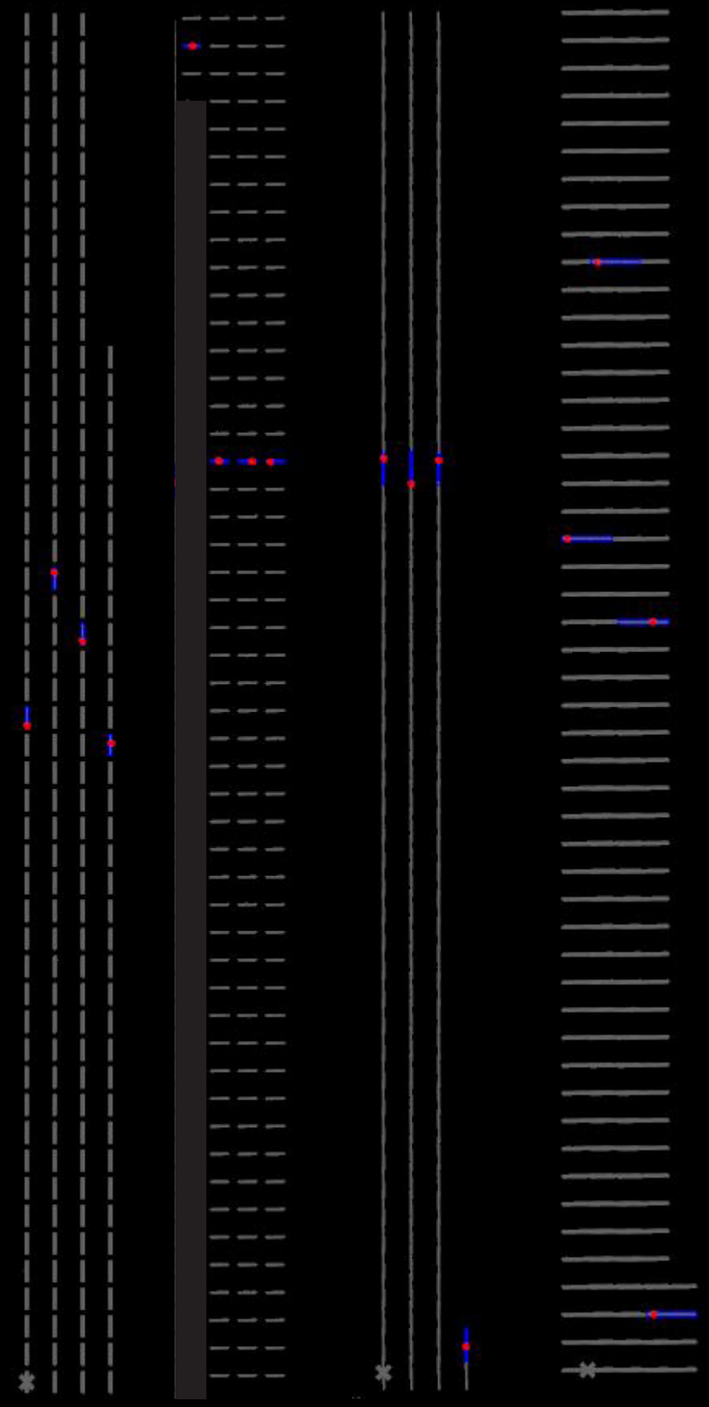
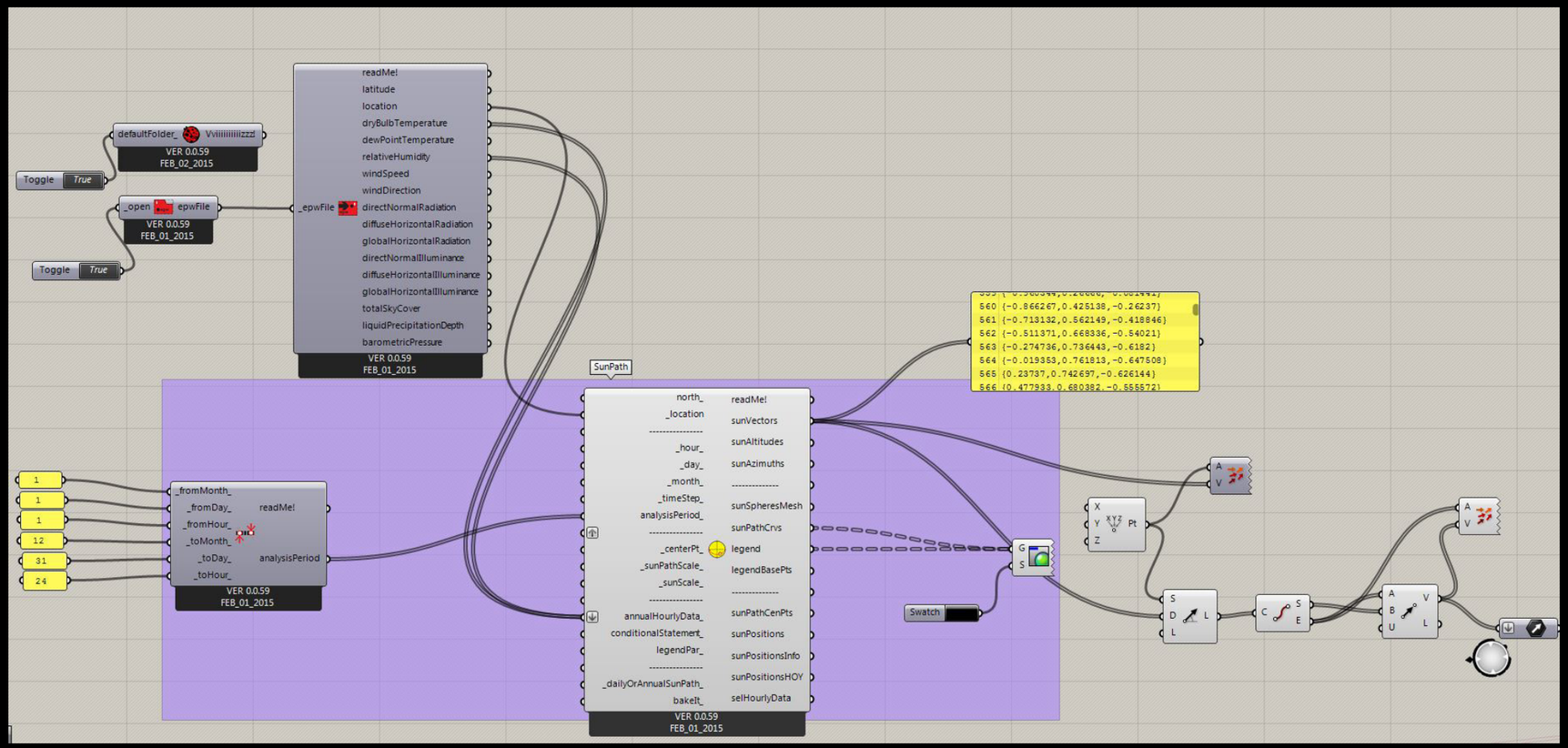


Area 1 Area 2 Area 3 Area 4

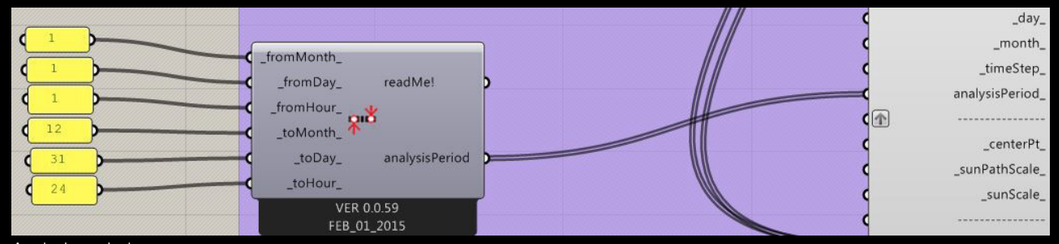


In addition to shading we found it necessary to explore solar radiation and humidity opportunities.

Using ladybug for grasshopper we plugged additional factors into the equation. This allows for greater informing of the studio project seeing as more specific locations would increase efficiency of a performant structure.

Having more influencing factors meant that the equation had become excessivley heavy, causing calculation times to rise exponentially.

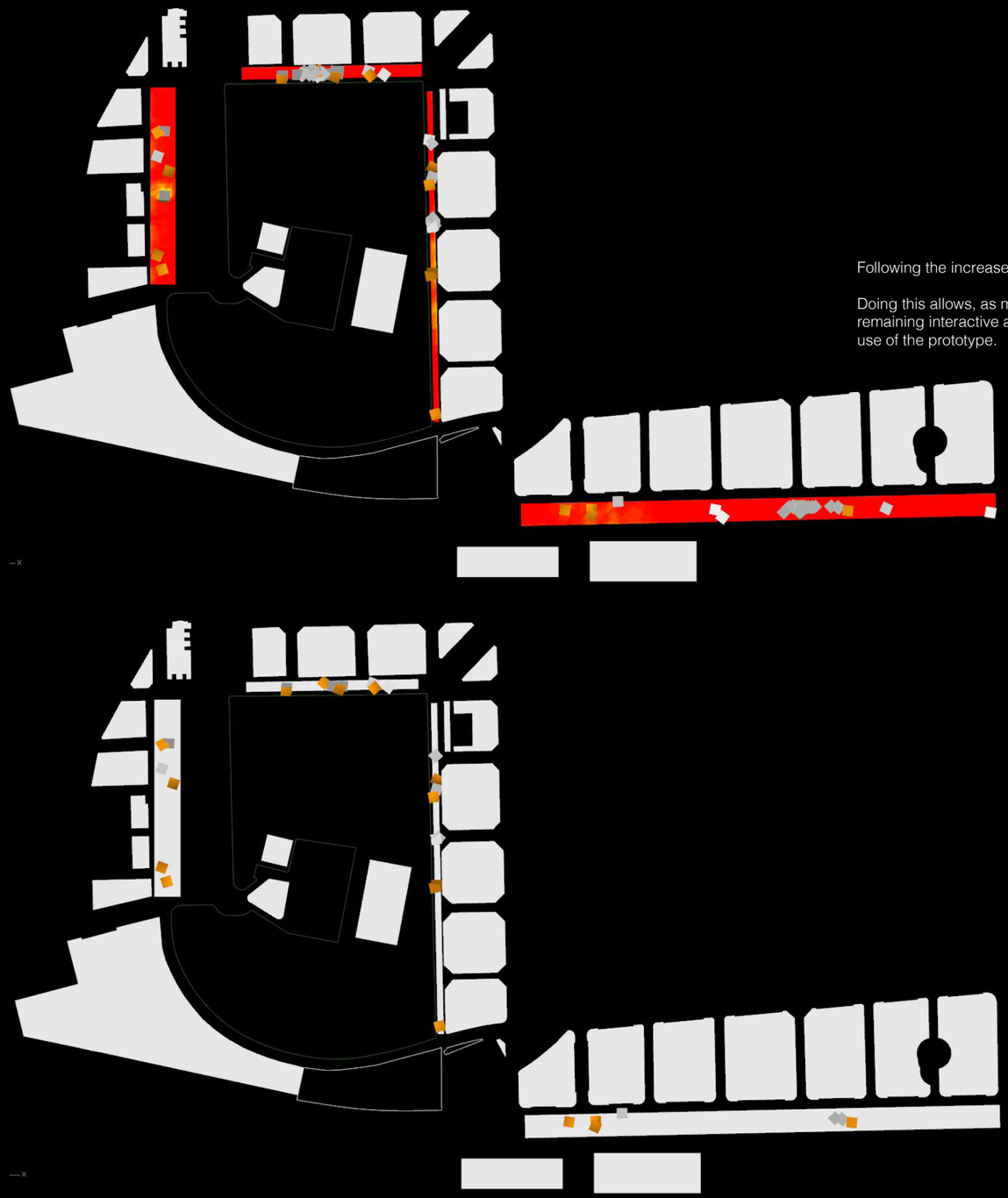
We therefore used only the first 2 ‘generations’ of iteration outputs from galapagos.



Analysis period

Additional factors, radiation and humidity

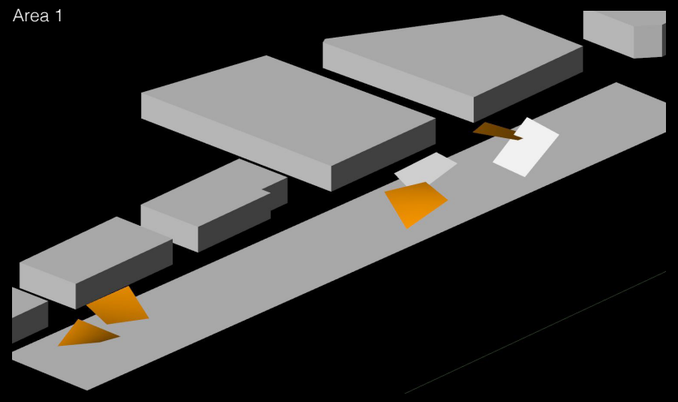
Cross-referencing Shading + Environmental Factors



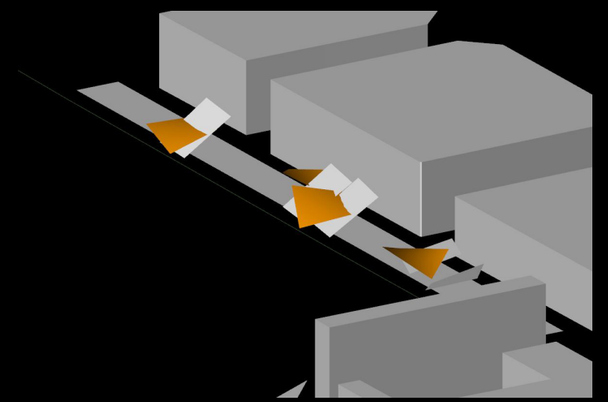
Following the increased specificity of the ladybug analysis one is able to cross reference results with the shading analysis.

Doing this allows, as mentioned earlier, for greater efficiency of the prototype as well as opportunities for further development e.g landcaping, while remaining interactive and influential on the surroundings. Specified localisation can also help avoid saturation of the environment through extensive use of the prototype.

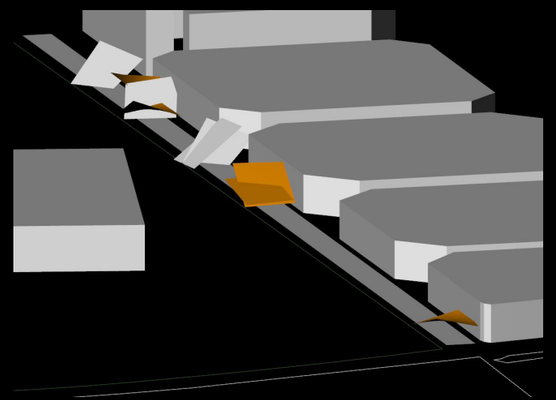
Area 1



Area 2



Area 3



Area 4