

ABPL90422

SI_LAB

2024_SEM2

S I _ L A B

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DOUGLAS THINWA

FISHERMAN BEND

Context and History



Expande the capacity of current Melbourne CBD

PROBLEMS

Known and future problems



Light pollution: diurnal species/nocturnal species, sensitive to night light



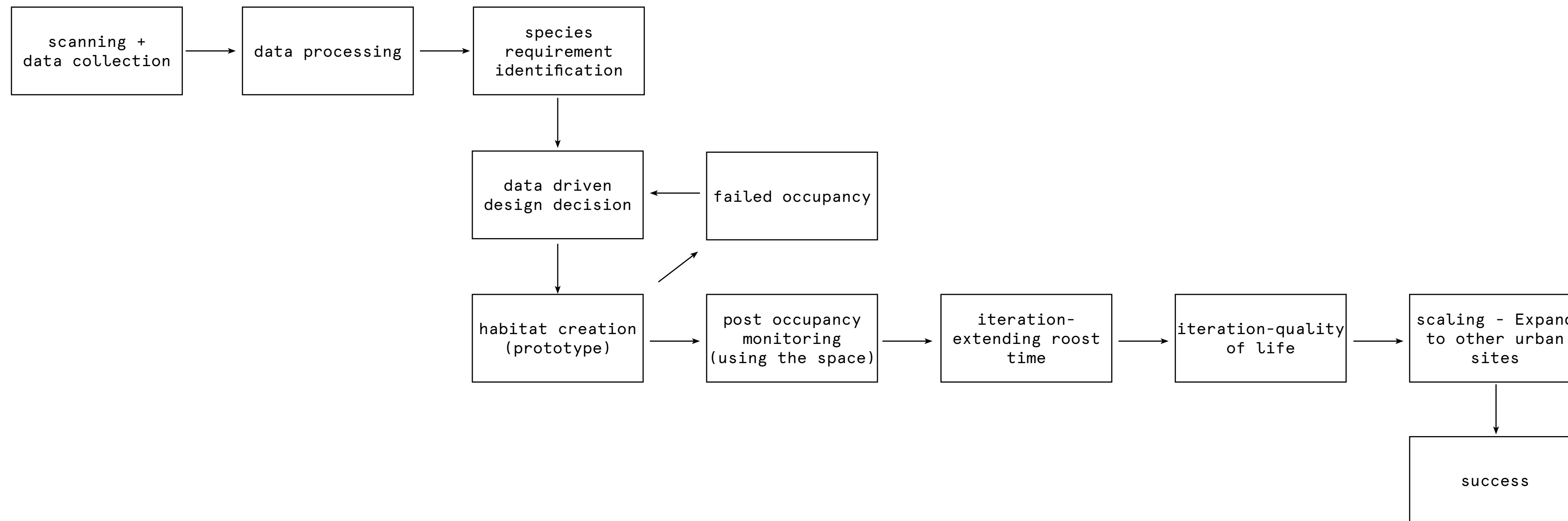
Loss of natural habitat due to urbanisation



Noise pollution: urban soundscape interference with bird's natural behaviours (e.g. disrupt bird communications- social birds' call for alarm/mating), also more sensitive to sounds than human

TOOLKIT OVERVIEW

More-Than-Human Design Approach



DATA COLLECTION

tools processes and techniques




Leica BLK360
Lidar Terrestrial Scanner




Cloudcompare
cleaning data
get point cloud set
and mesh




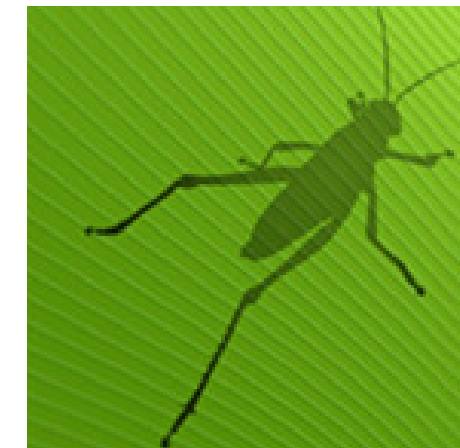

HOBO Pendant
light/temp
data logger




AudioMoth
full-spectrum
acoustic logger




Sound Level
Data Logger



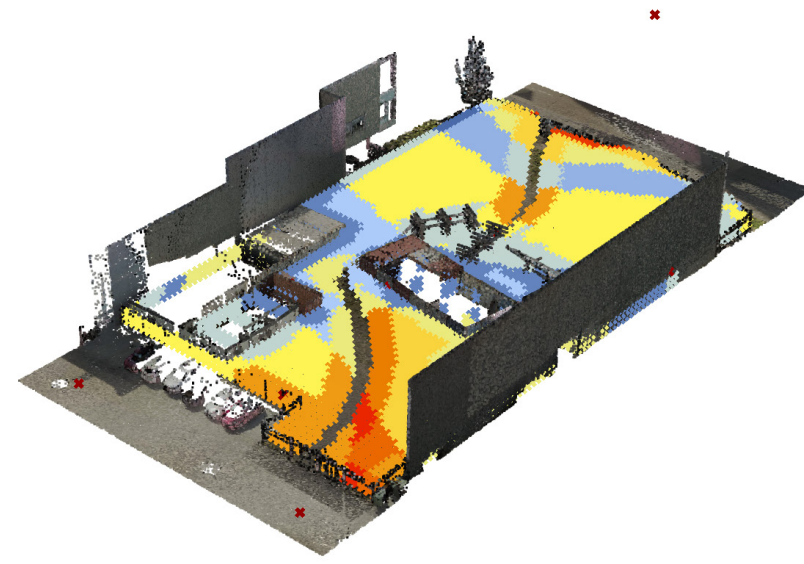
set of scripts that
read and combine data for
design solution

DATA COLLECTION

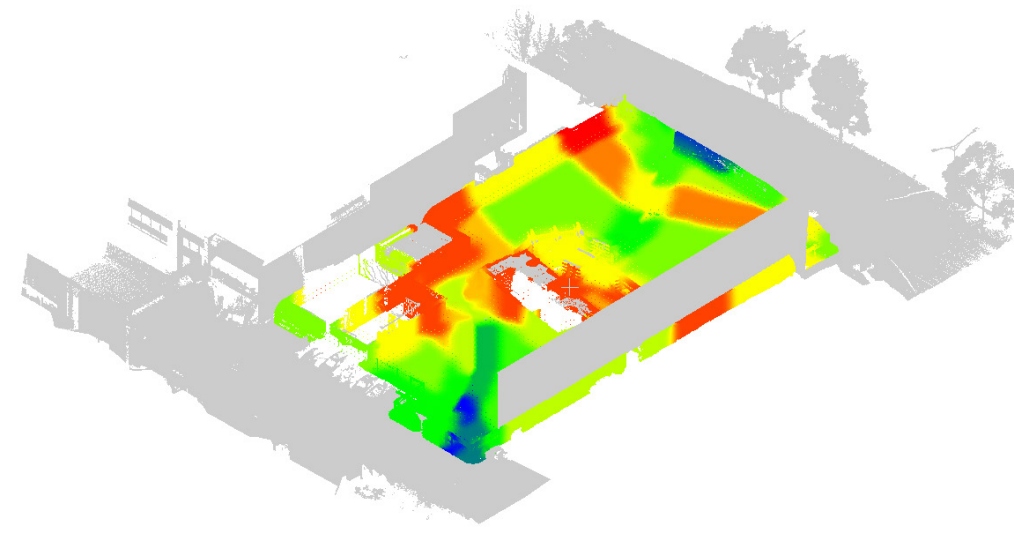
Placement of Sensors

DATA VISUALISATION

tools processes and techniques



Grasshopper Viz



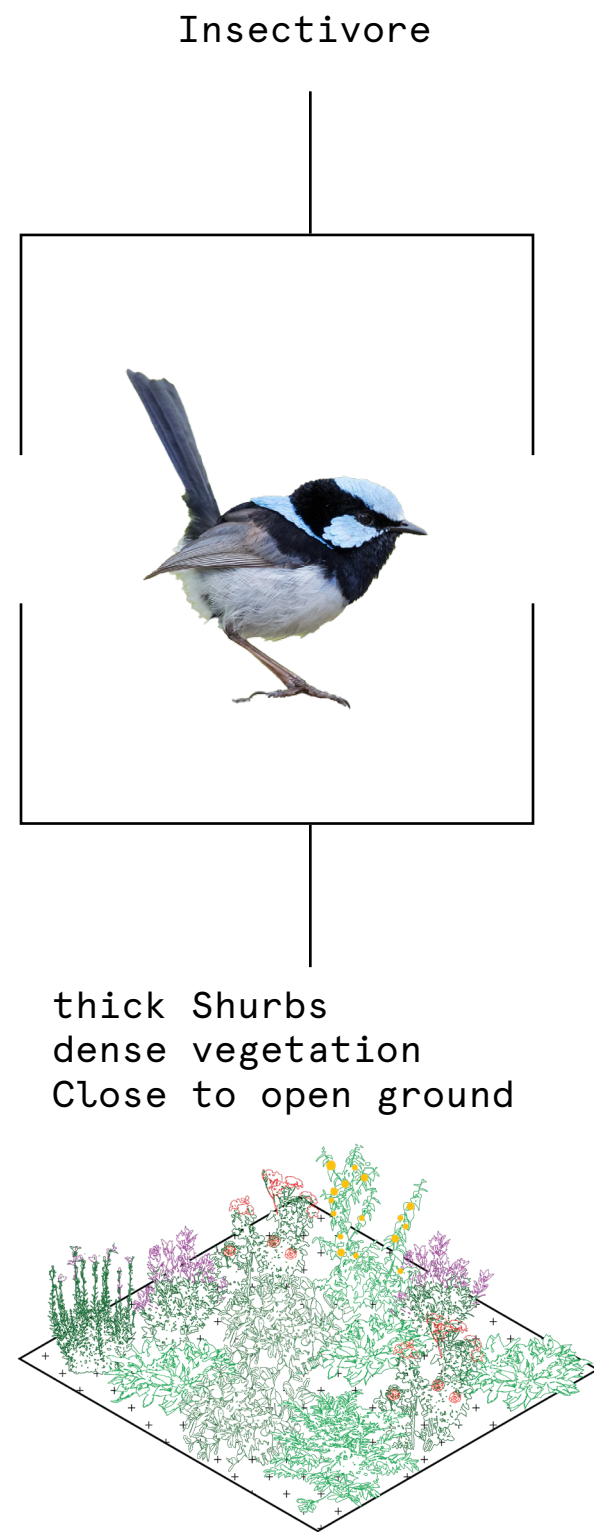
Cloudcompare Viz



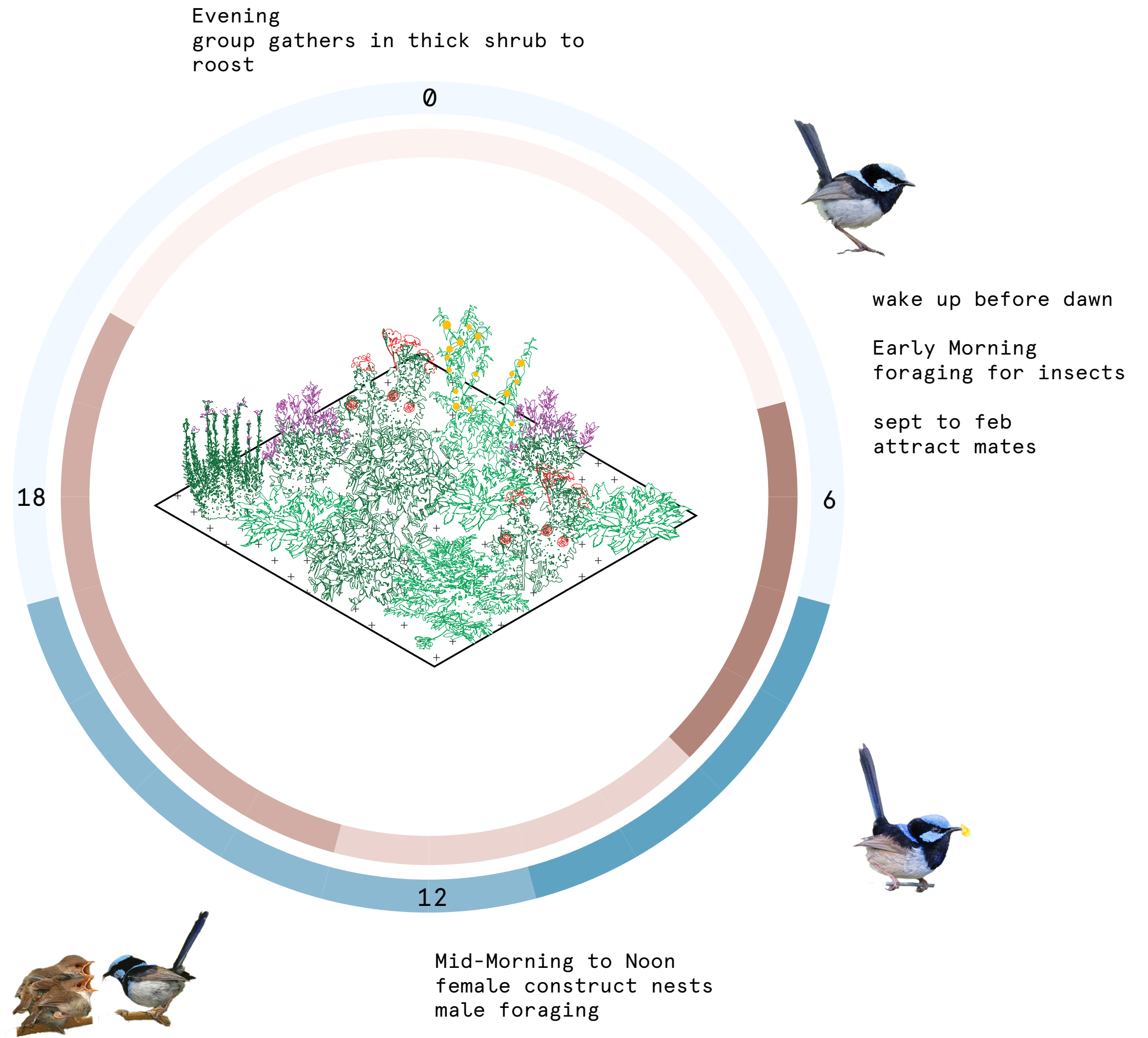
Unreal Engine Immersive Viz

SPECIES FOCUS

Superb Fairy-Wren

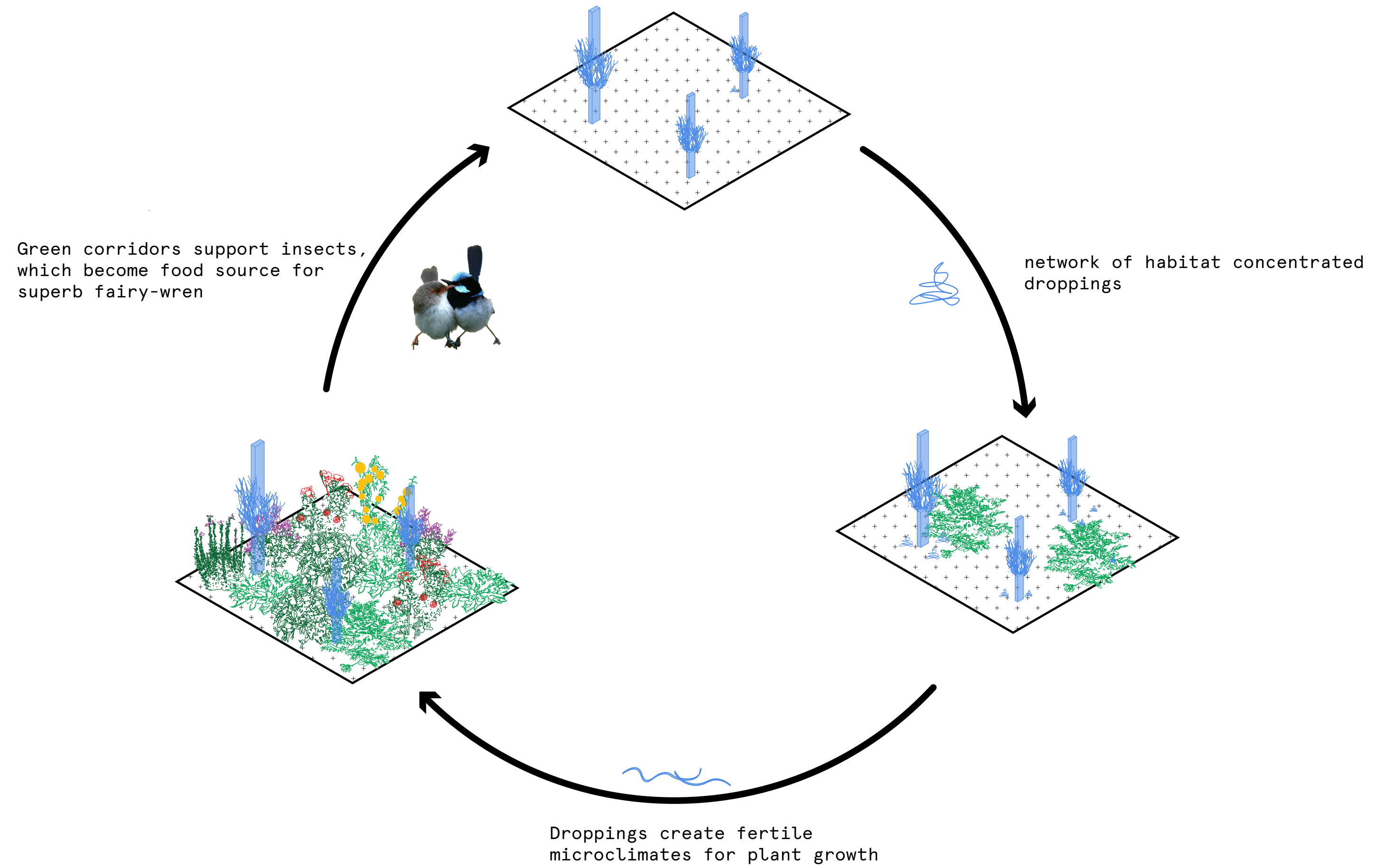


Afternoon
foraging continues



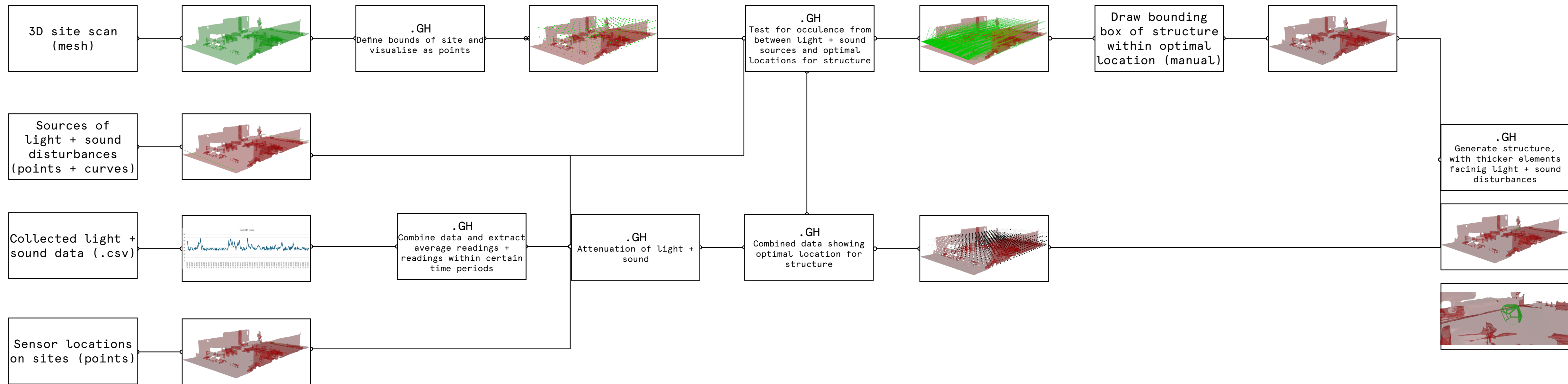
Food Chain from Network of Structures

part of a broader ecosystem

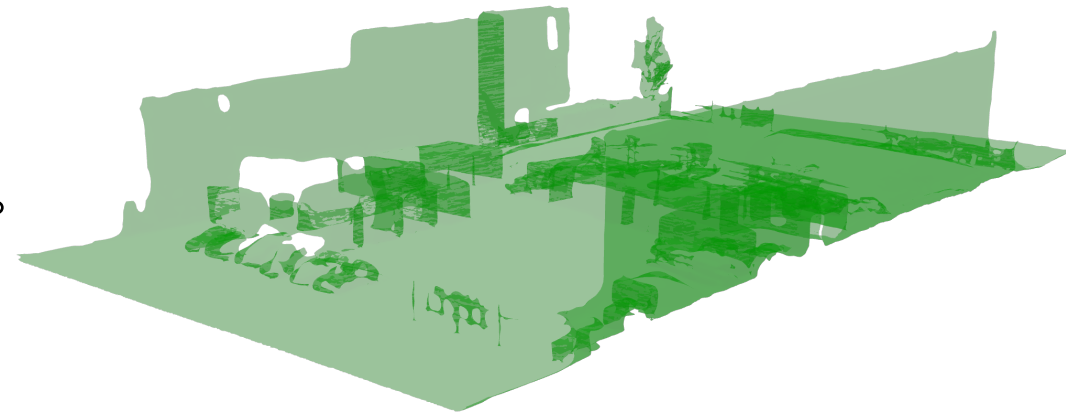


DESIGN SOLUTION

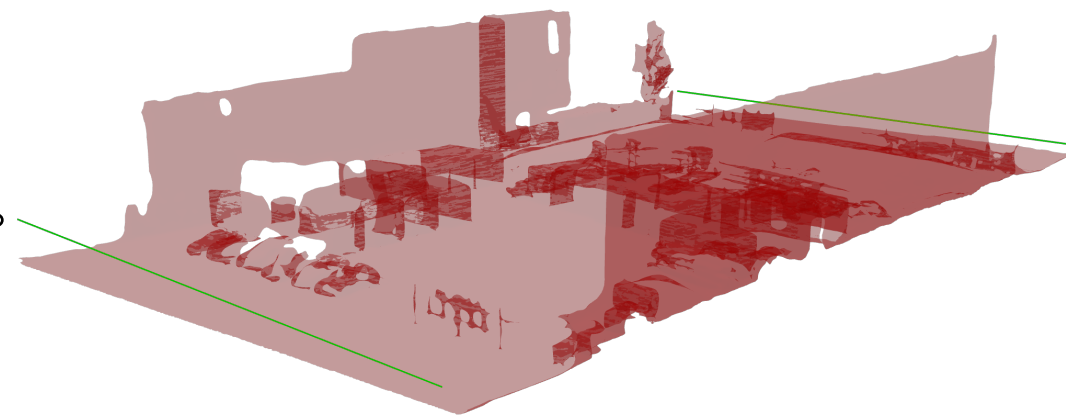
placement & optimisation



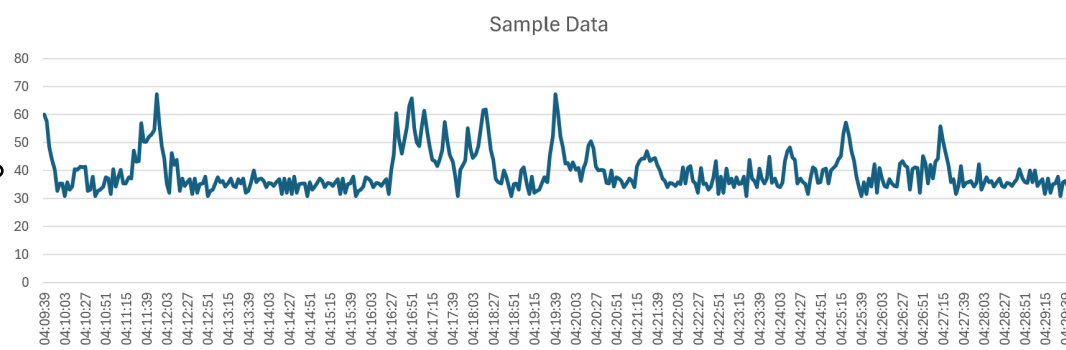
3D site scan
(mesh)



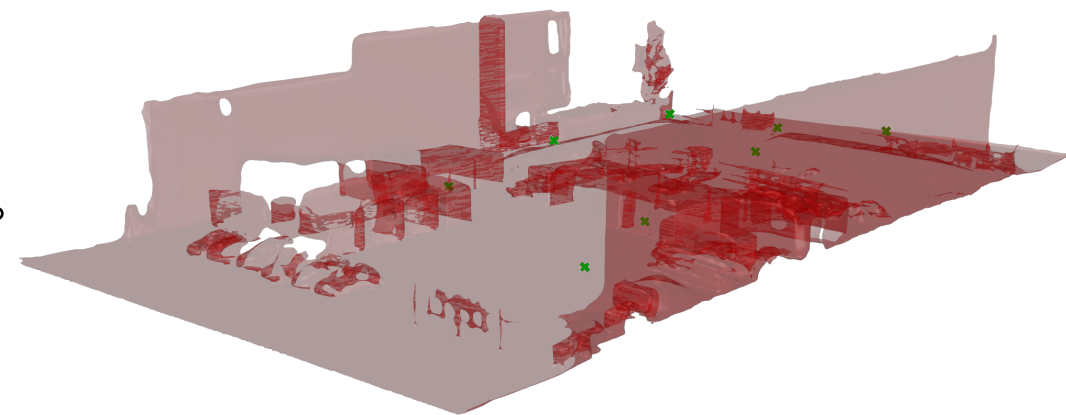
Sources of
light + sound
disturbances
(points + curves)



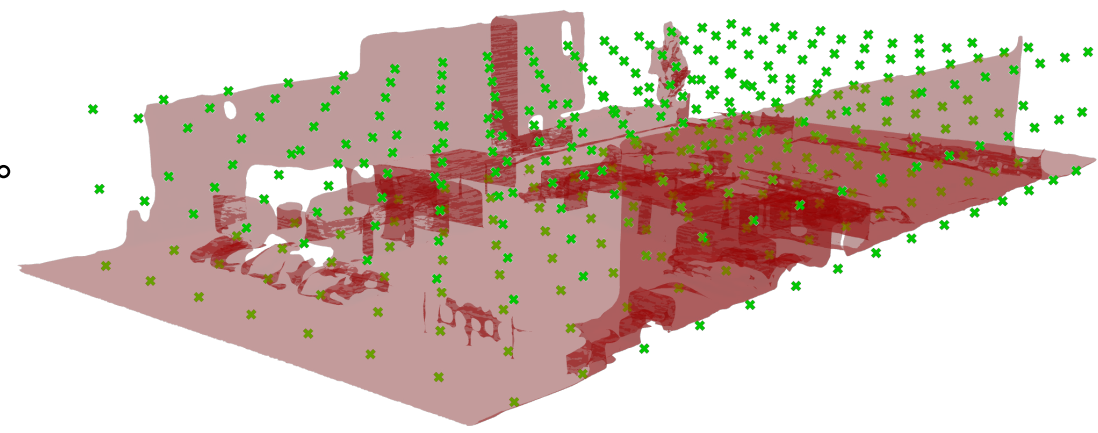
Collected light +
sound data (.csv)



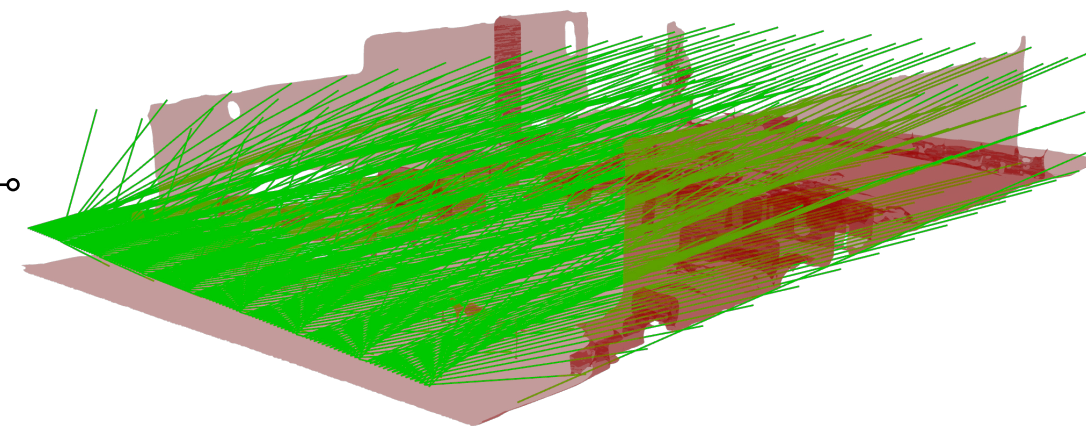
Sensor locations
on sites (points)



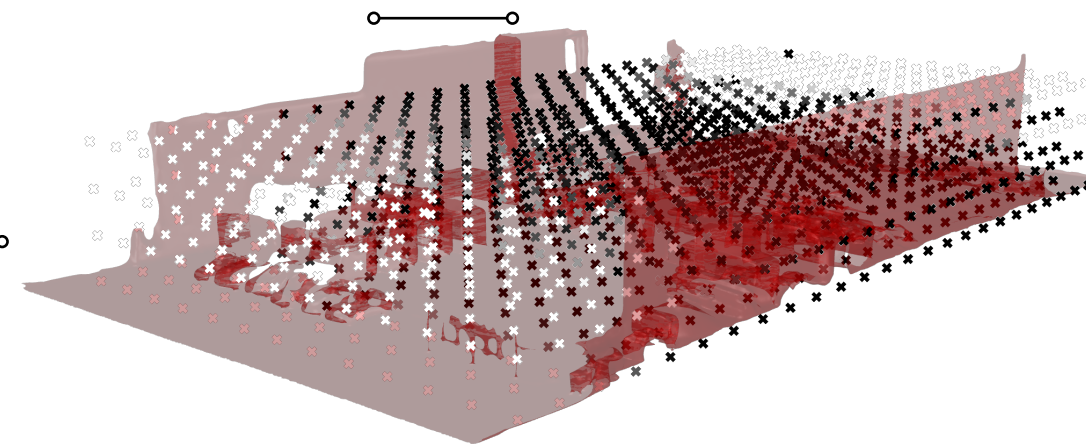
.GH
Define bounds of site and
visualise as points



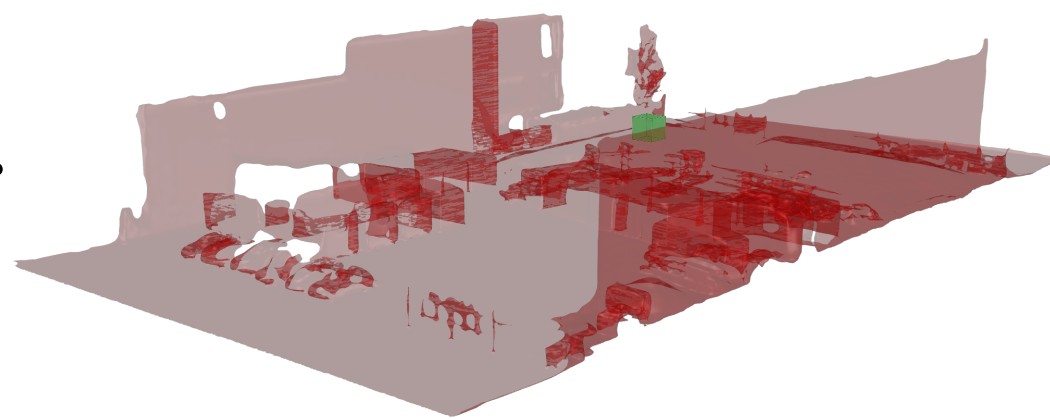
.GH
Test for occulence from
between light + sound
sources and optimal
locations for structure



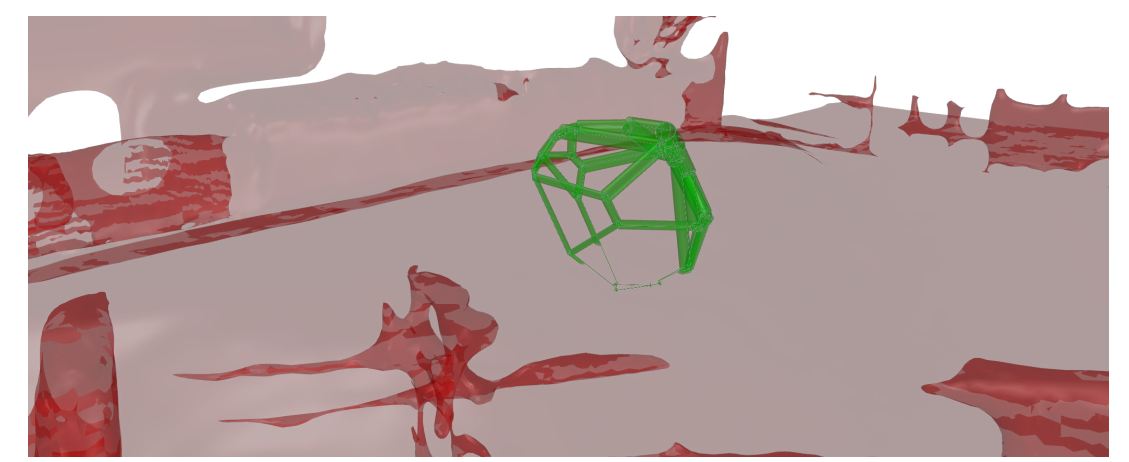
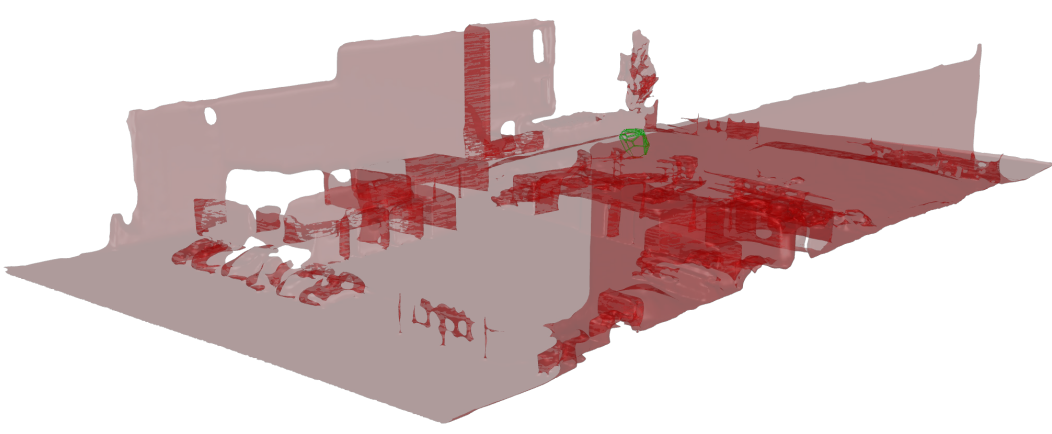
.GH
Combined data showing
optimal location for
structure



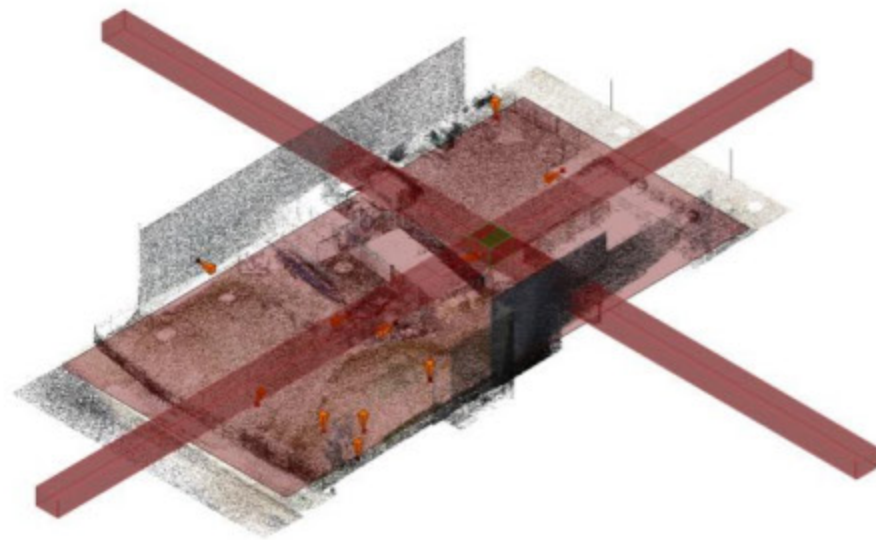
Draw bounding
box of structure
within optimal
location (manual)



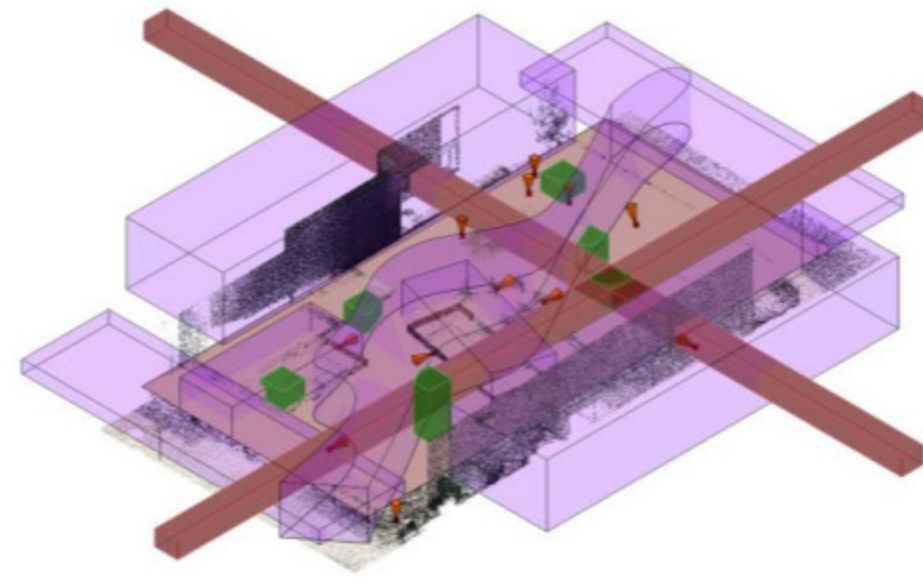
.GH
Generate structure,
with thicker elements
facing light + sound
disturbances



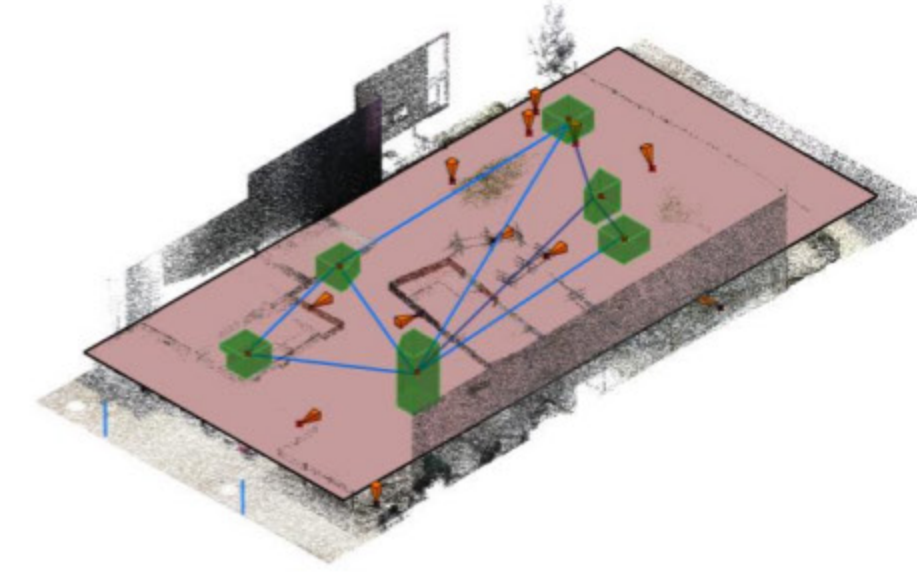
Placement script



Establish Distributed Structures: Rather than having a large, centralized structure, we aim for multiple small buildings distributed around the site. We'll start by placing several two-story buildings with varying heights around the edges.

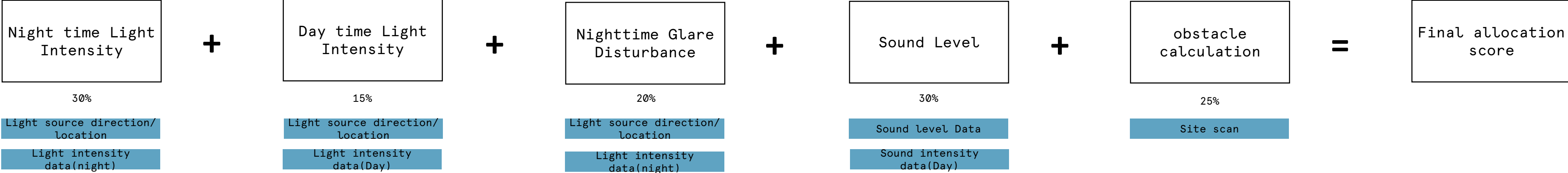


Remove Colliding Building Blocks: Instead of removing obstacles like roads and existing structures, we cut or remove any building blocks that collide with these obstacles. This process repeats until the desired volume is achieved.

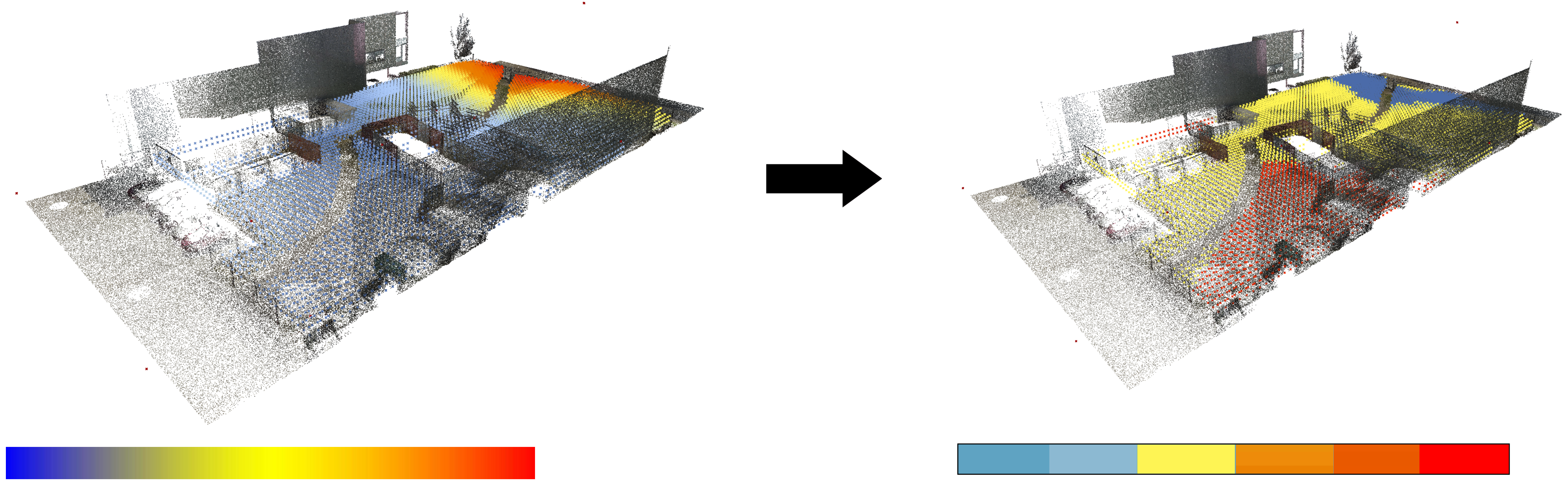


Remove Colliding Building Blocks: Instead of removing obstacles like roads and existing structures, we cut or remove any building blocks that collide with these obstacles. This process repeats until the desired volume is achieved.

PLACEMENT SCORING SYSTEM

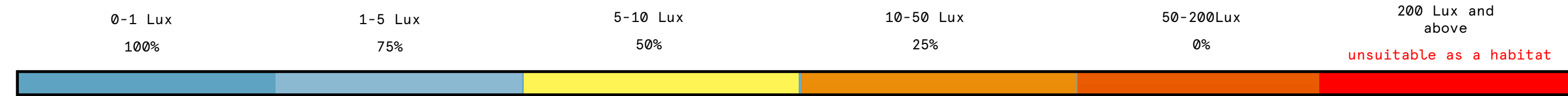
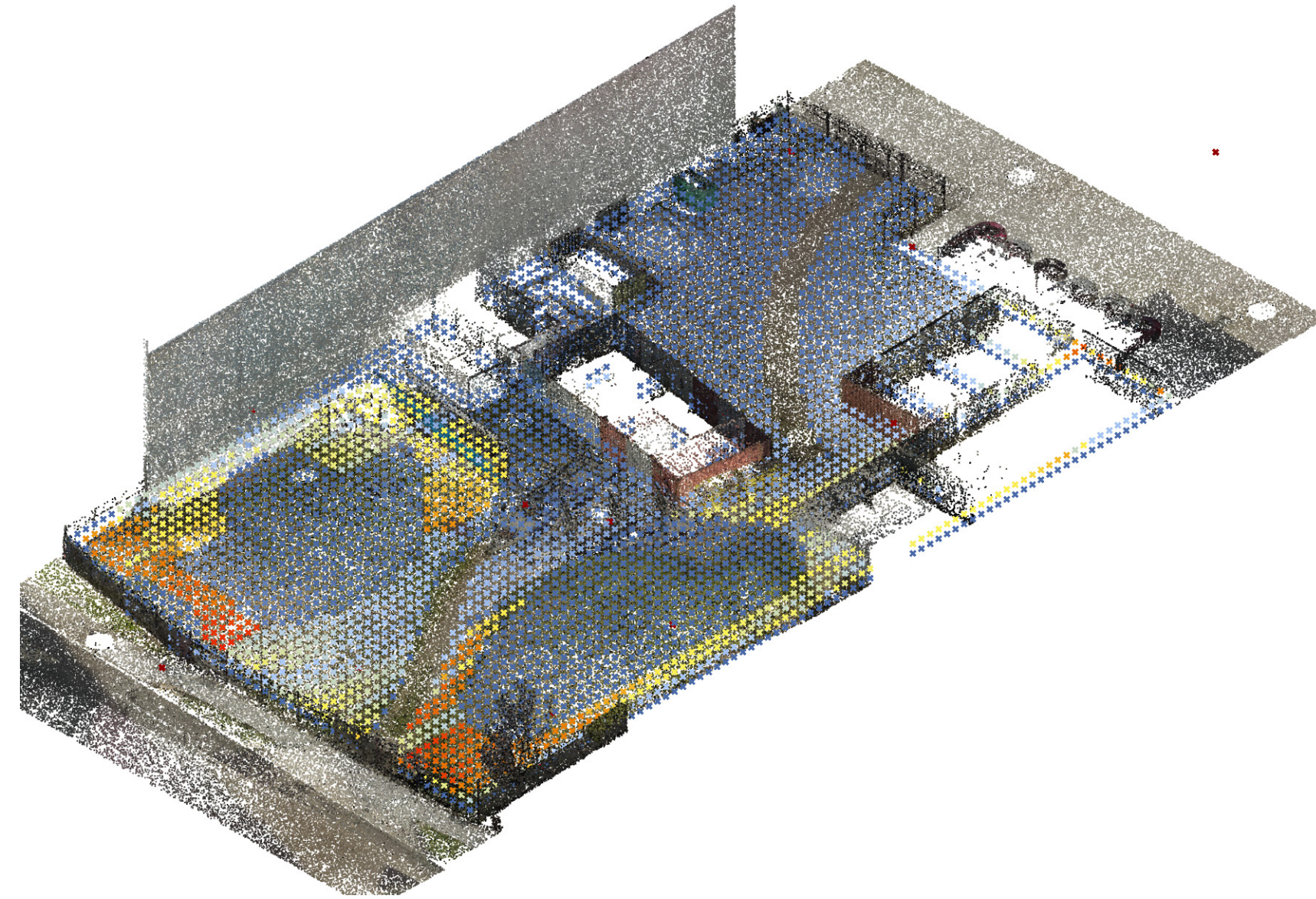


DATA EVALUATION



Night time Light Intensity

30%



Ideal for undisturbed sleep, optimal range

Low disturbance, but could slightly impact sleep quality.

Noticeable disturbance; birds may still sleep but with lower quality.

Significant disruption; sleep is possible but with high restlessness.

Very high disruption; birds likely unable to sleep properly.

Very high disruption; birds likely unable to sleep properly.



Extra shading should be considered in the design

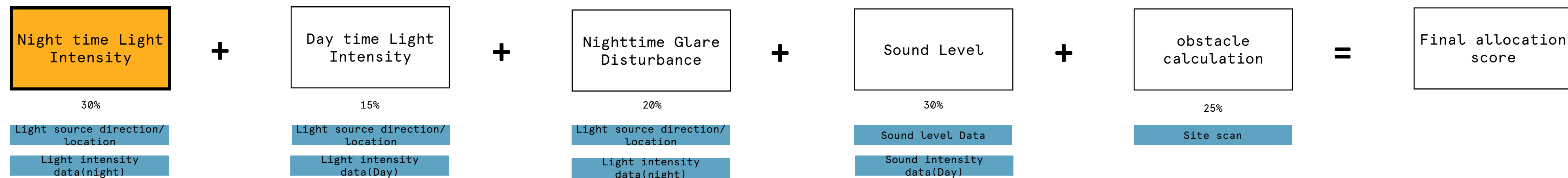
Main considered factor



Data Acquisition Sensor

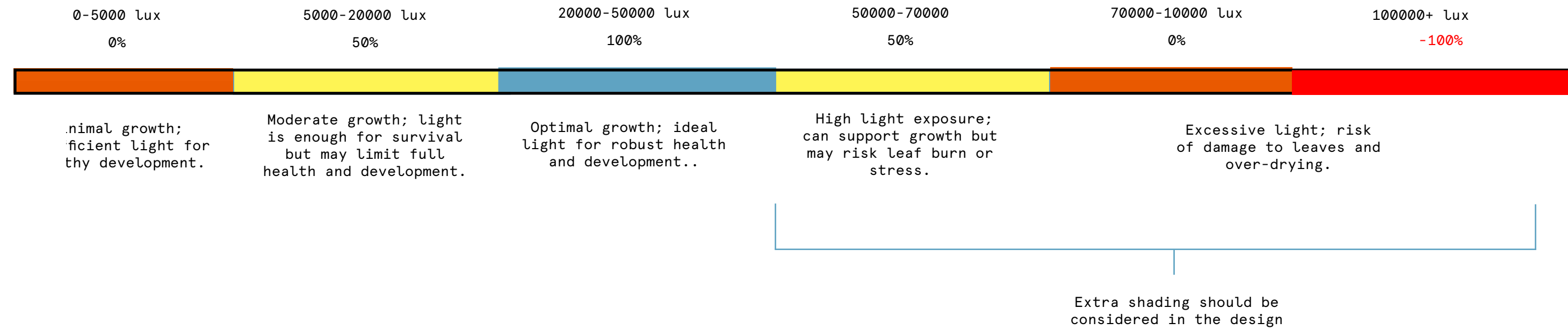
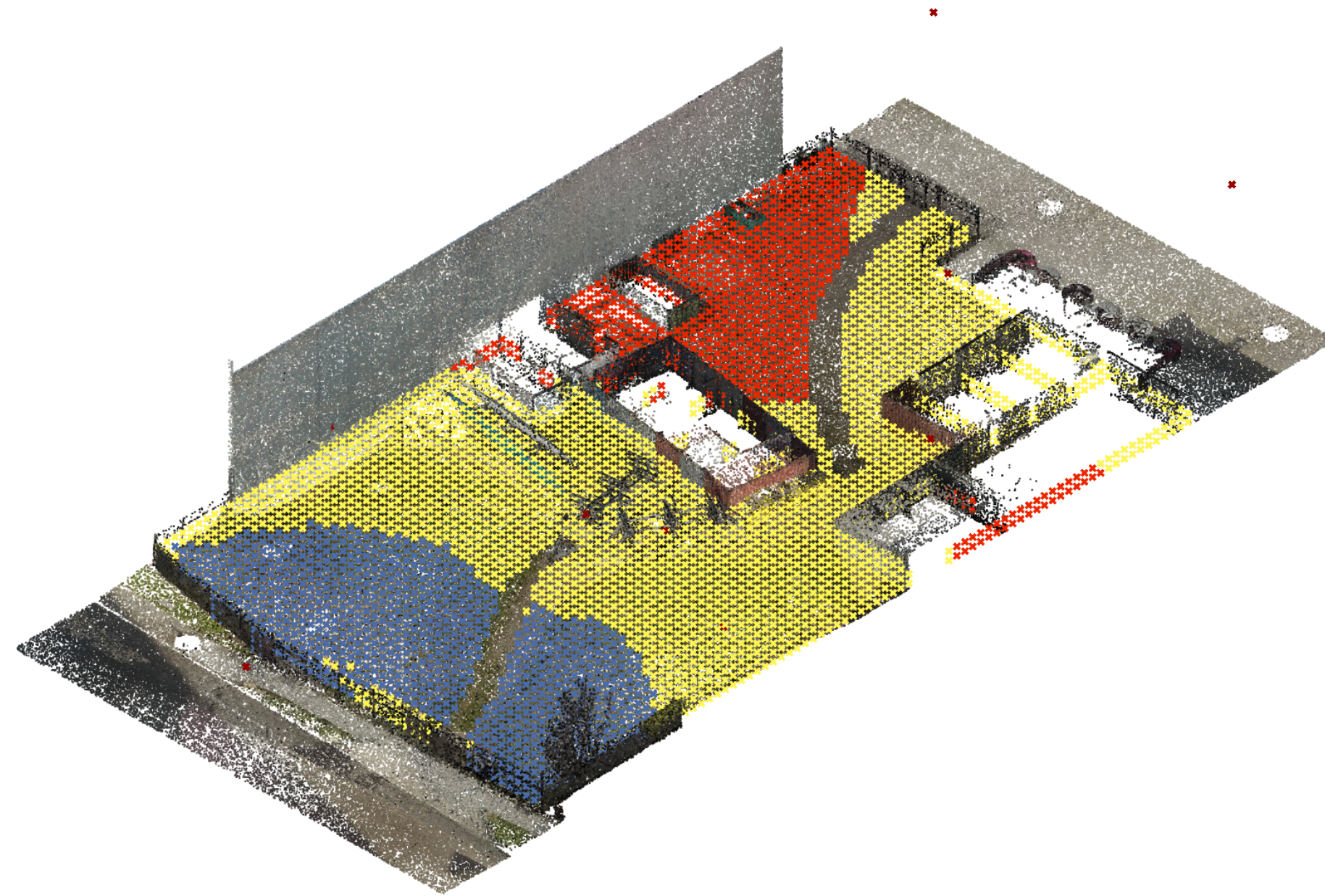


We aim for the lowest possible light intensity to ensure birds' restful sleep. If levels rise beyond a certain point, additional shading will be required in the design. For the shading, we focus primarily on fixed light sources, like existing streetlights, to evaluate light direction and minimize nighttime disturbance. If intensity is too high, extra shading will be integrated.



Day time Light Intensity

20%



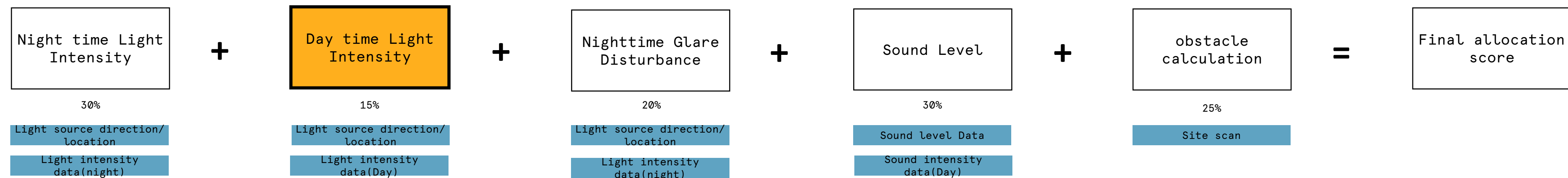
Main considered factor



Data Acquisition Sensor

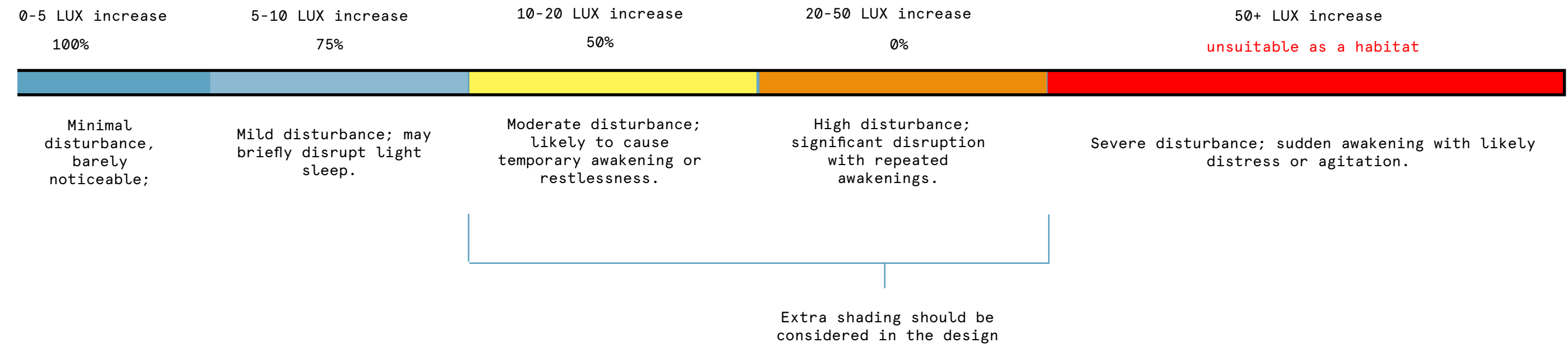


The ideal light range simulates natural outdoor light conditions for birds' daily activities. If exposure is too high, shading will help create a balanced habitat. Optimal light intensity for bush plants falls between 20,000-50,000 lux for healthy growth. If light exceeds this range, shading elements should be added to avoid stress.



Nighttime Glare Disturbance

15%



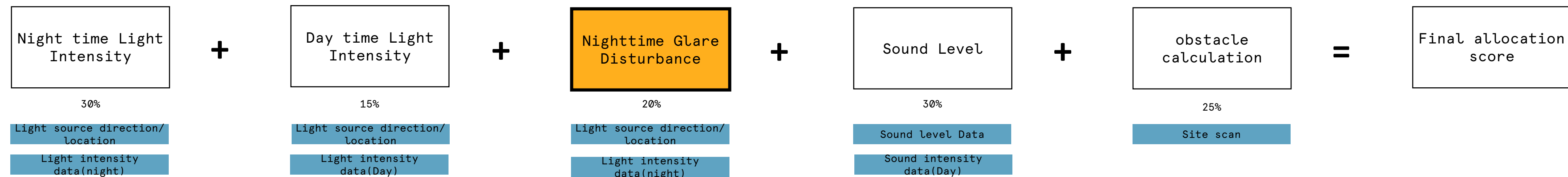
Main considered factor



Data Acquisition Sensor

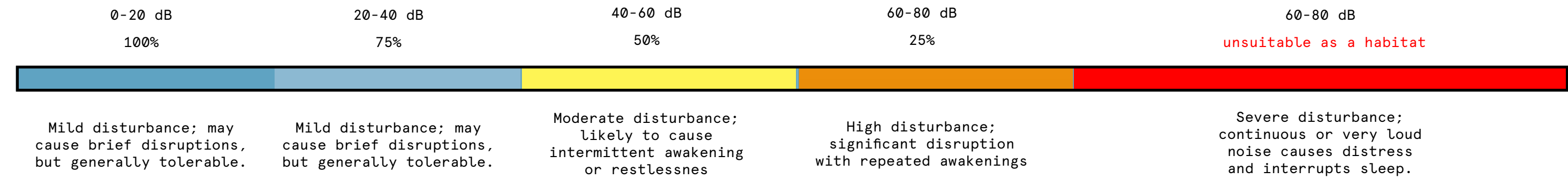
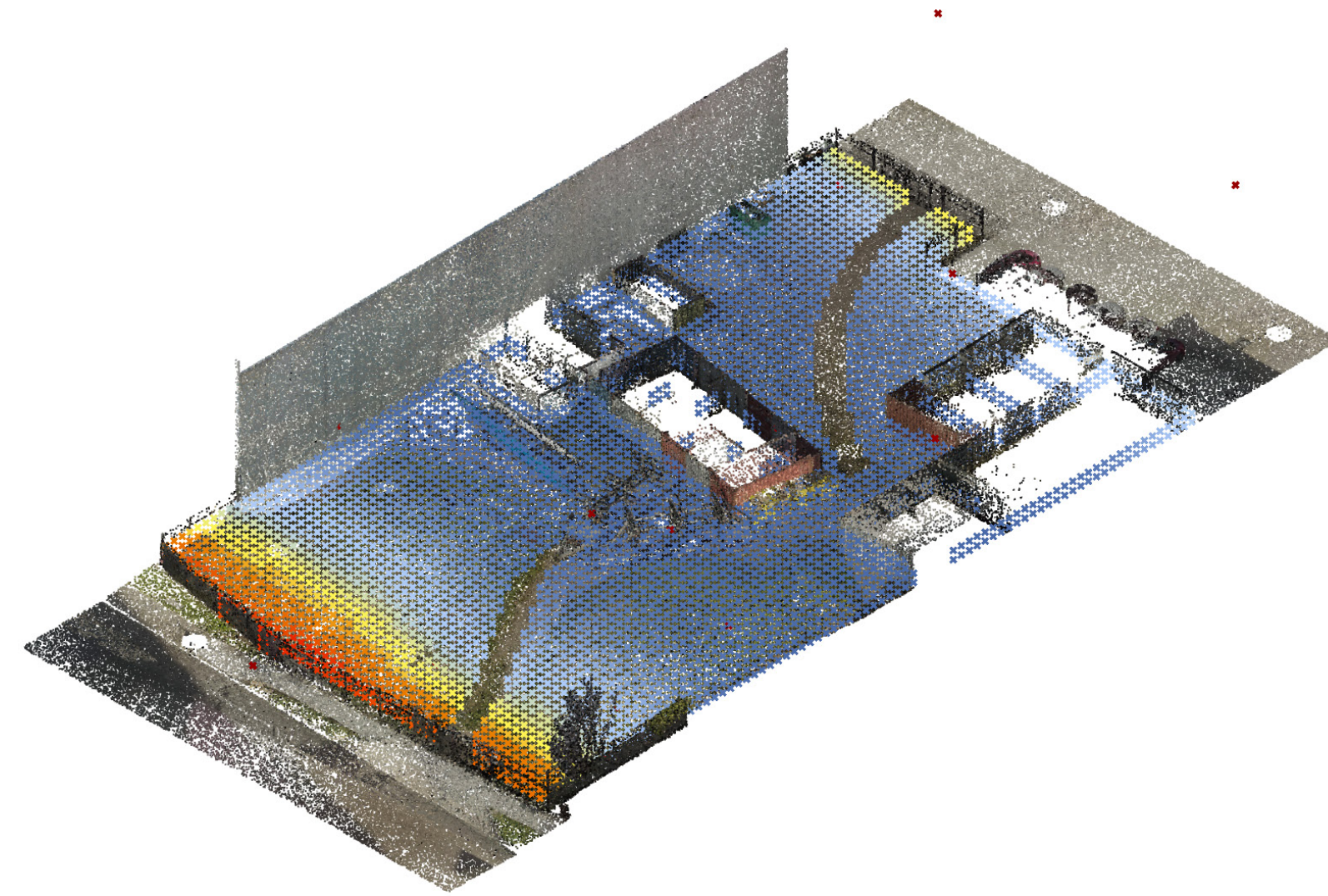


Minimal light fluctuations are essential to avoid disrupting birds' sleep. Sudden increases require extra shading measures to maintain a stable environment. For the shading, this criterion emphasizes mobile light sources, such as vehicle lights on nearby roads. When installing shades, attention will be given to reducing impact from moving lights.



Sound Disturbance

30%



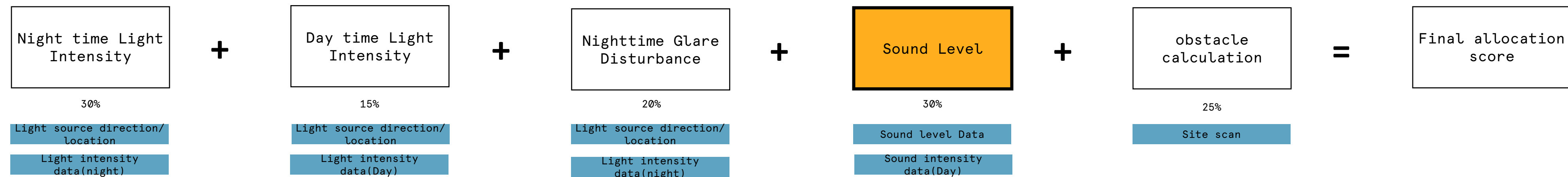
Main considered factor



Data Acquisition Sensor



We prioritize minimizing ambient noise to reduce sleep disturbance, focusing on soundproofing to control levels beyond a specific threshold.



Obstacle Disturbance

25%

Ground:

For ground-type obstacles, we set a restriction that all generated structures must be within two meters of the ground. This aligns with the target bird species, which lives within this height range, ensuring the structures suit their natural habits.



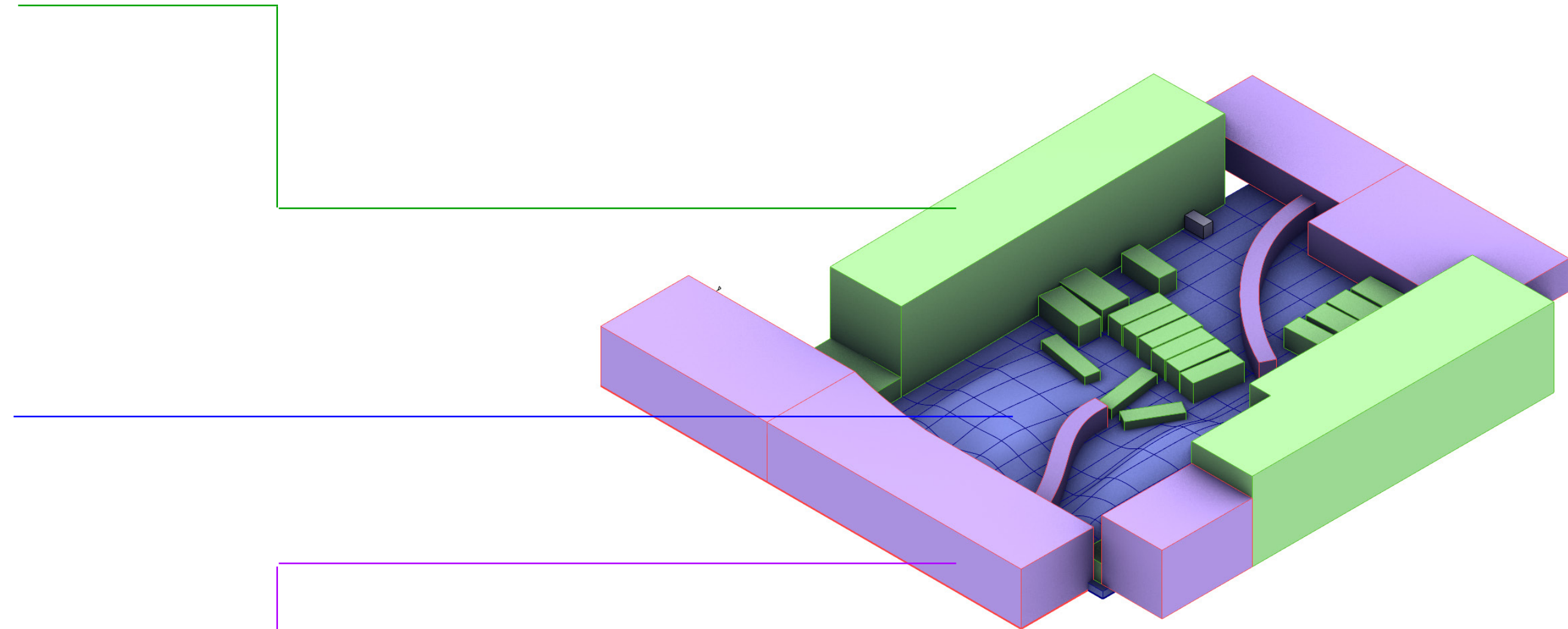
Physical Obstacles:

These include objects like columns or walls. These obstacles encourage new structures to be generated within two meters of them, as being nearby provides benefits like shade, light reduction, and noise mitigation. Additionally, these areas are often low-traffic corners, minimizing the impact on human activity. Attaching to these obstacles enhances the structural integrity of new additions and reduces construction costs.



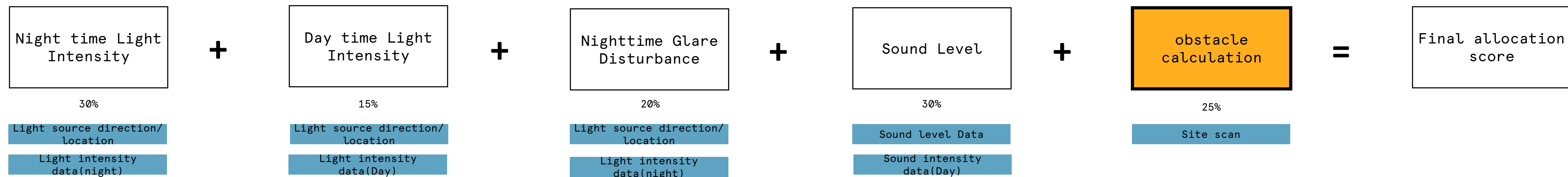
Occupied Space:

This category includes existing roads and private areas. Structures are discouraged from approaching these obstacles to avoid disrupting traffic flow or blocking light. These are typically high-traffic areas, so avoiding new structures here helps reduce interference with human activity.



Main considered factor

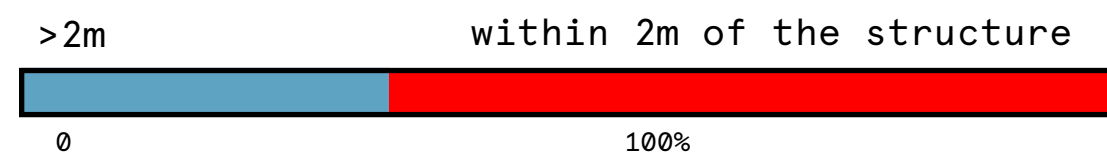
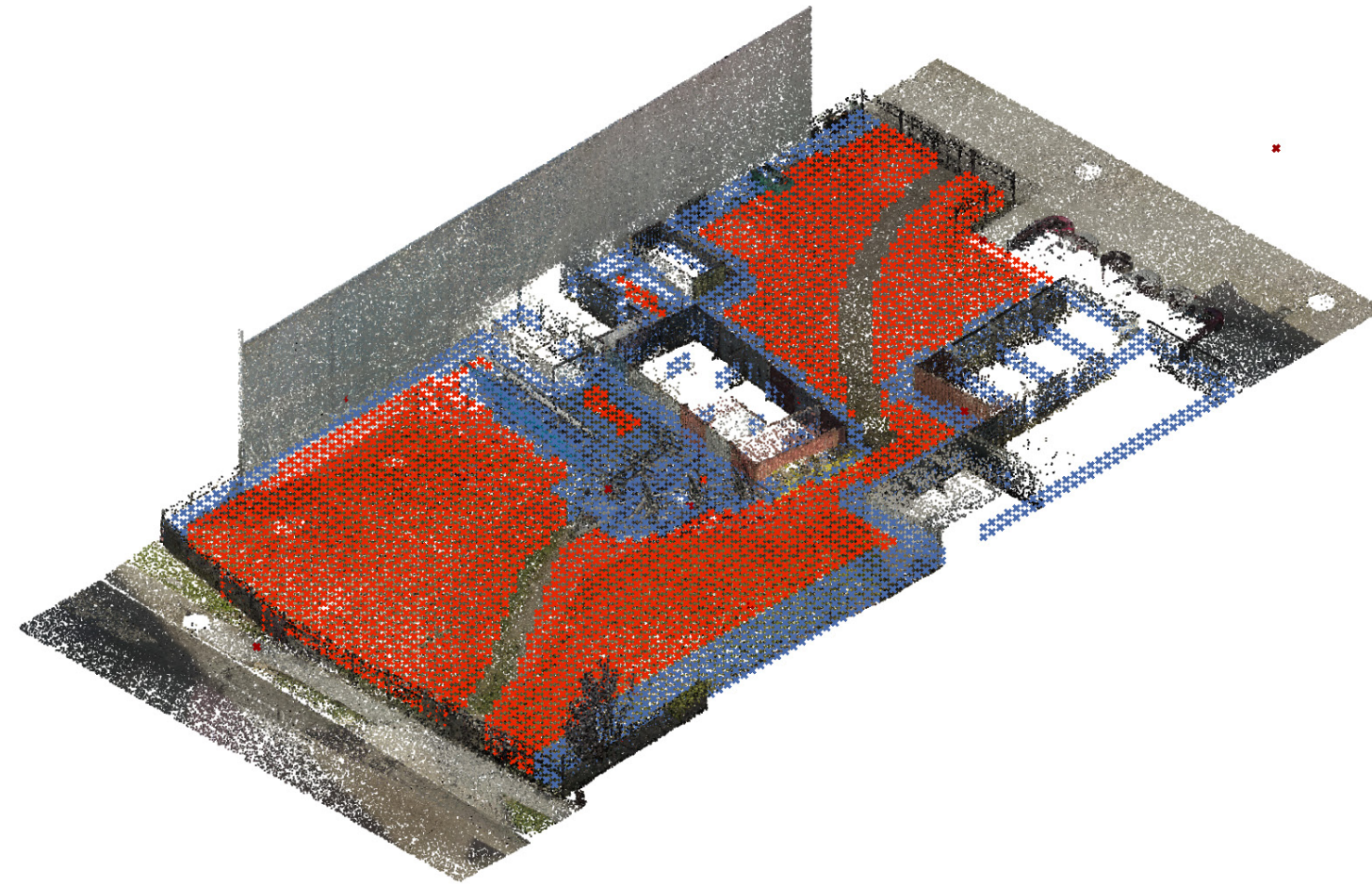
Data Acquisition Sensor



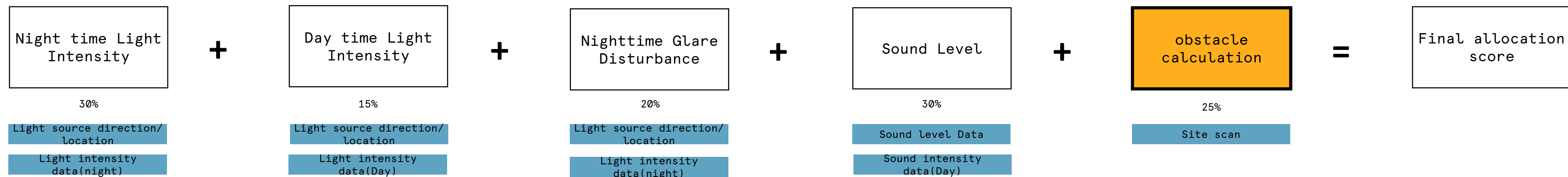
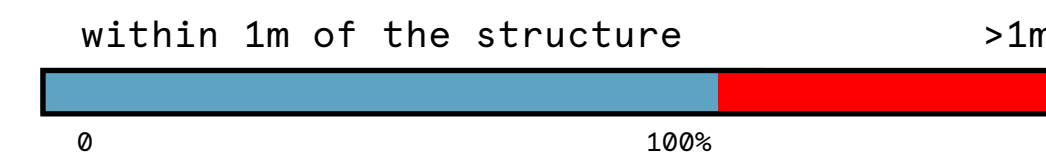
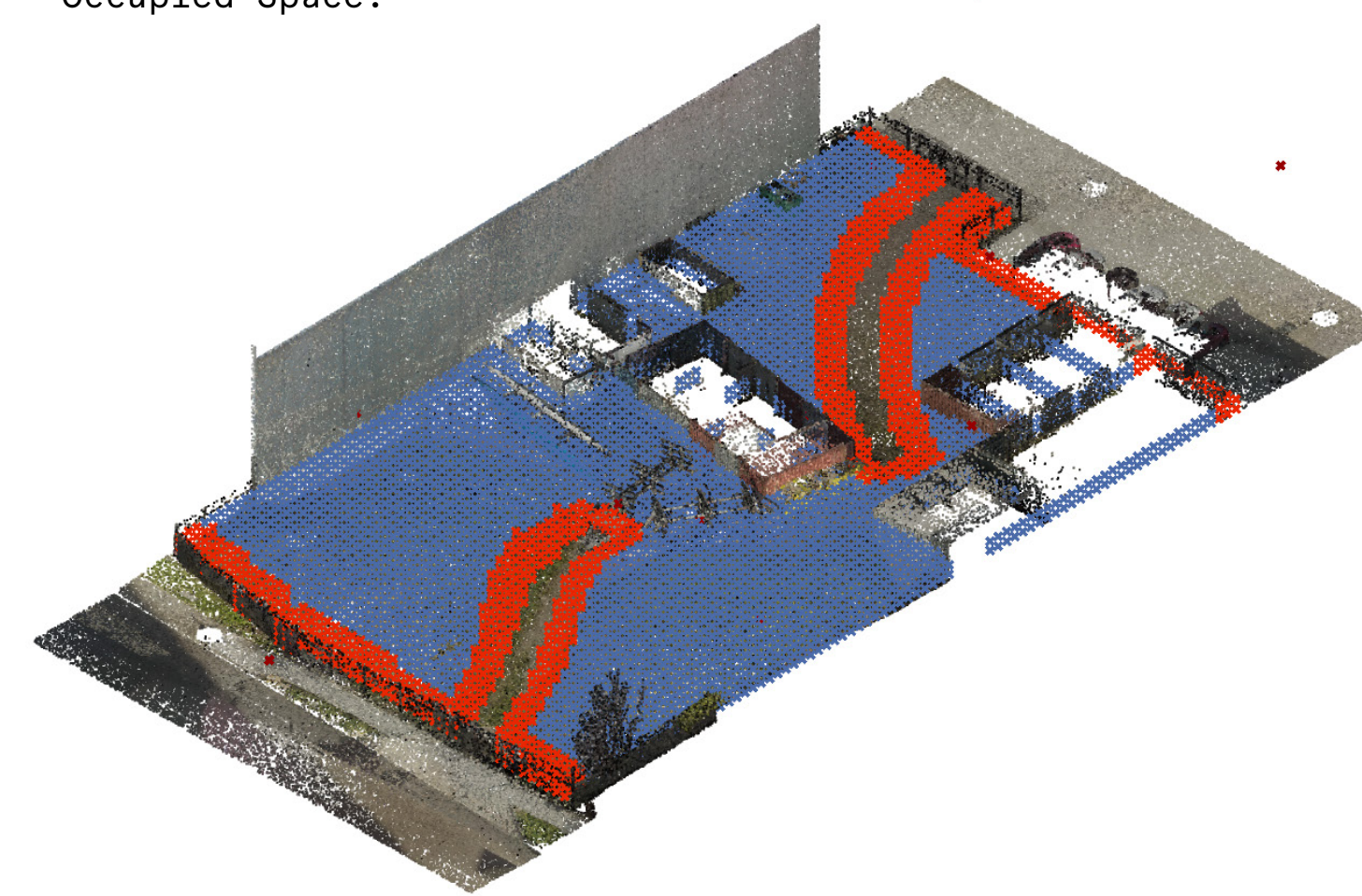
Obstacle Disturbance

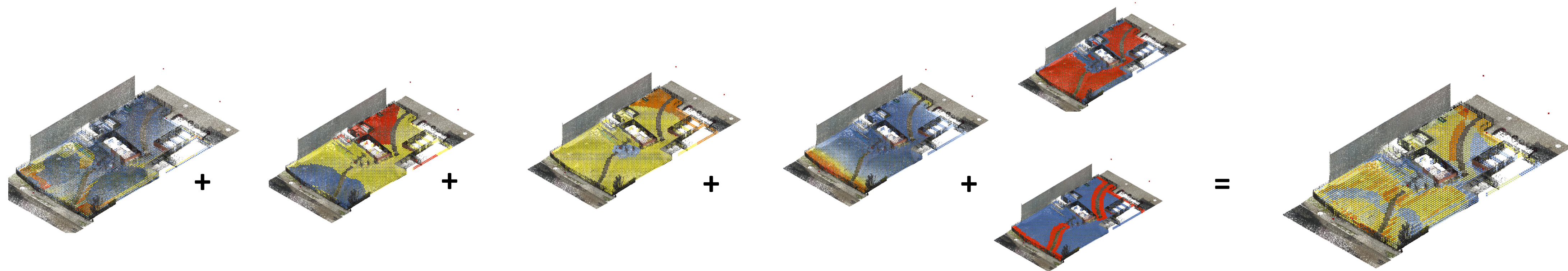
30%

Physical Obstacles:



Occupied Space:





Night time Light Intensity

+

Day time Light Intensity

+

Nighttime Glare Disturbance

+

Sound Level

+

obstacle calculation

=

Final allocation score

30%

15%

20%

30%

25%

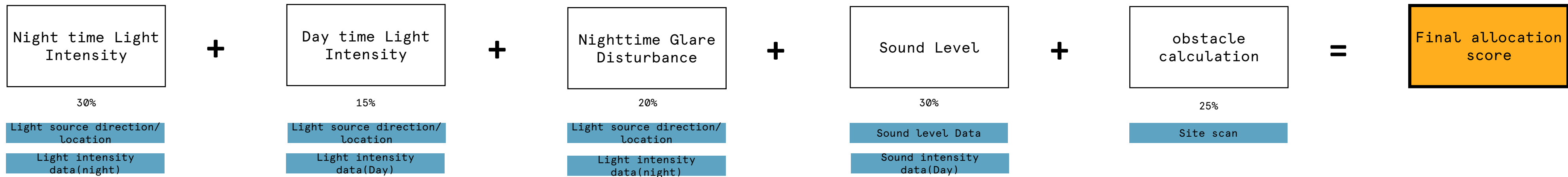
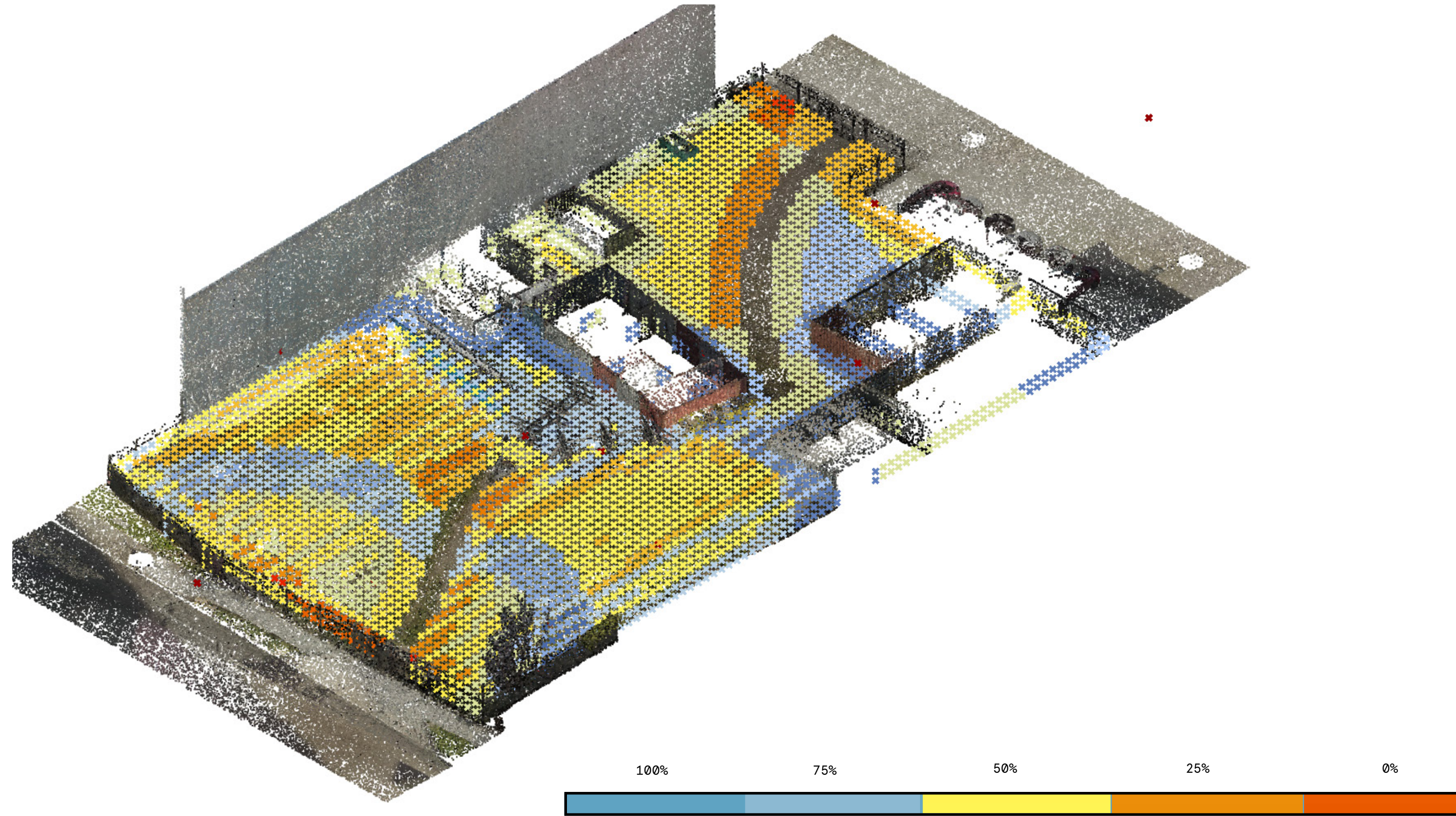
Light source direction/
location
Light intensity
data(night)

Light source direction/
location
Light intensity
data(Day)

Light source direction/
location
Light intensity
data(night)

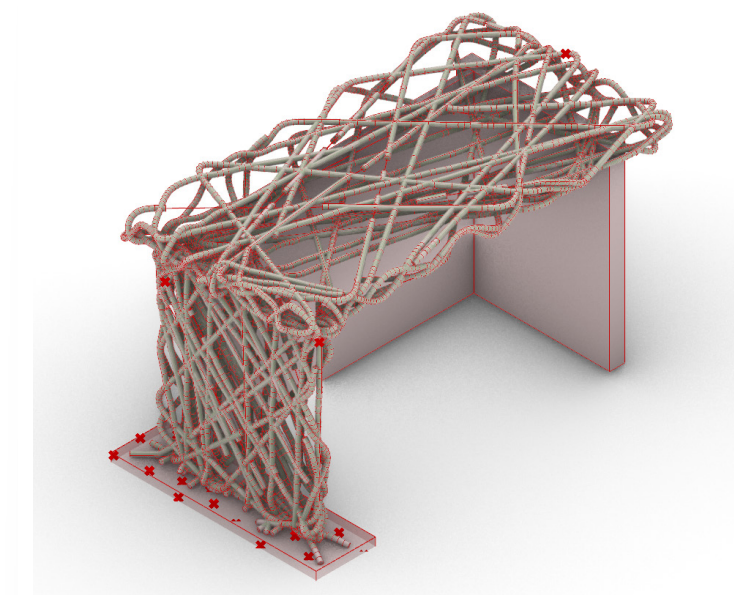
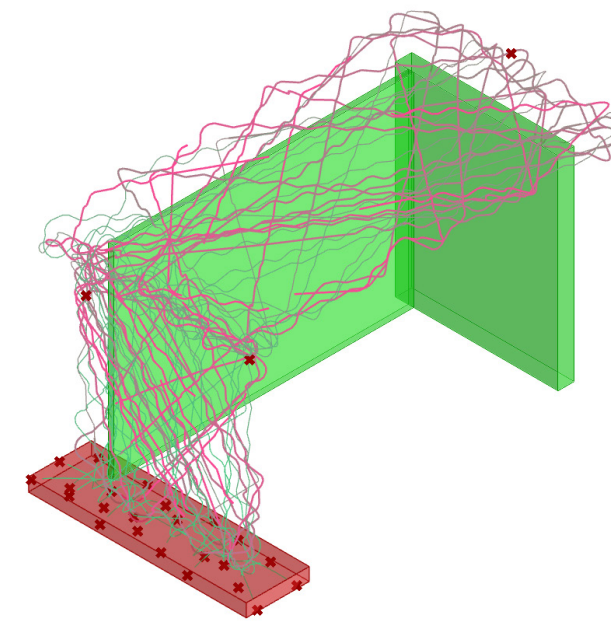
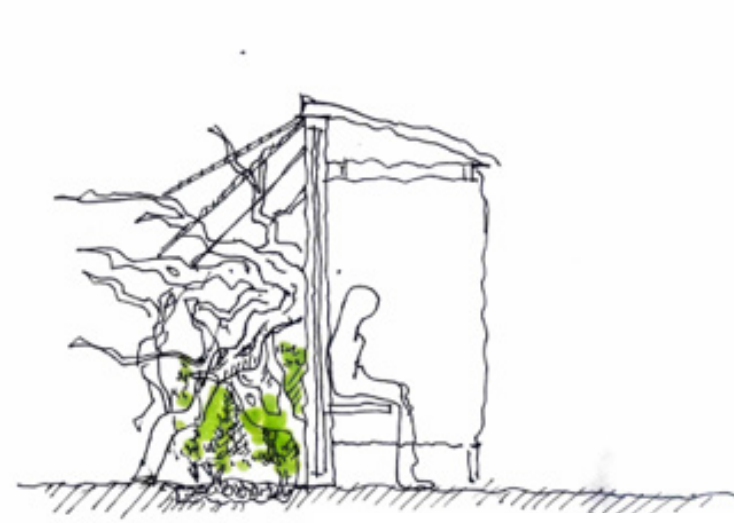
Sound level Data
Sound intensity
data(Day)

Site scan



STRUCTURE PROTOTYPES

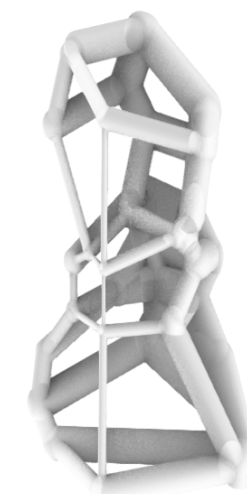
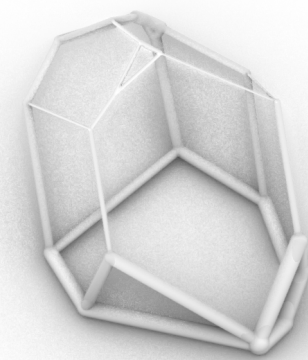
Data-Driven Design



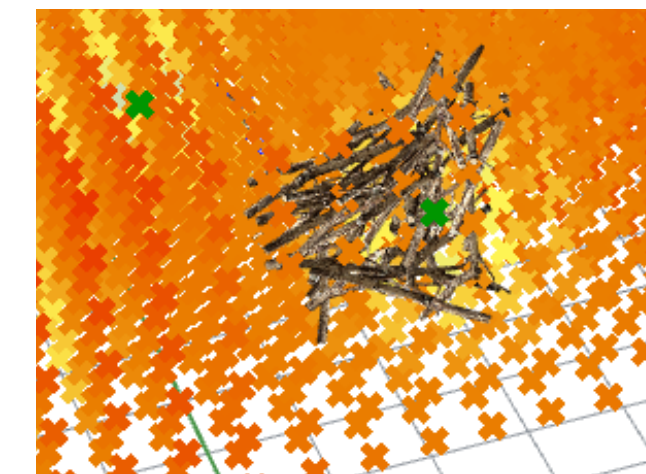
slime growth- sprawl on structure



prosthetic habitat attach to urban infrastructure/wall



data affected thickness, density



branches aggregation

VISION

MORE THAN HUMAN DESIGN



Decentralised prosthetic habitat attached to urban infrastructure

Material choice: recycled materials - branches

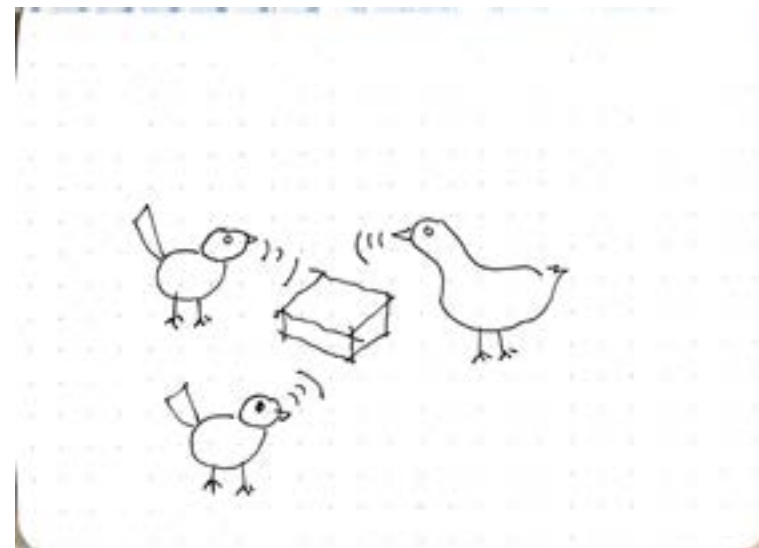
Restore macro and micro habitat that support SFW (species) life/behaviour

BIRD'S PERSPECTIVE

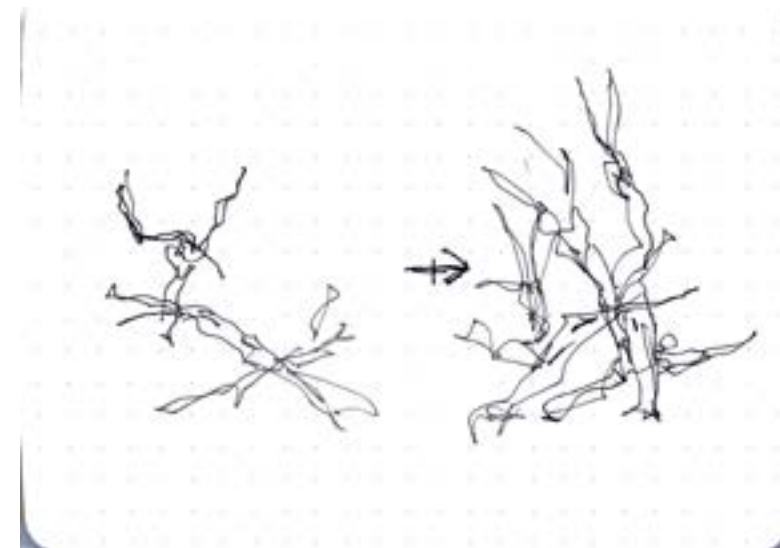
MORE THAN HUMAN DESIGN

POST OCCUPANCY

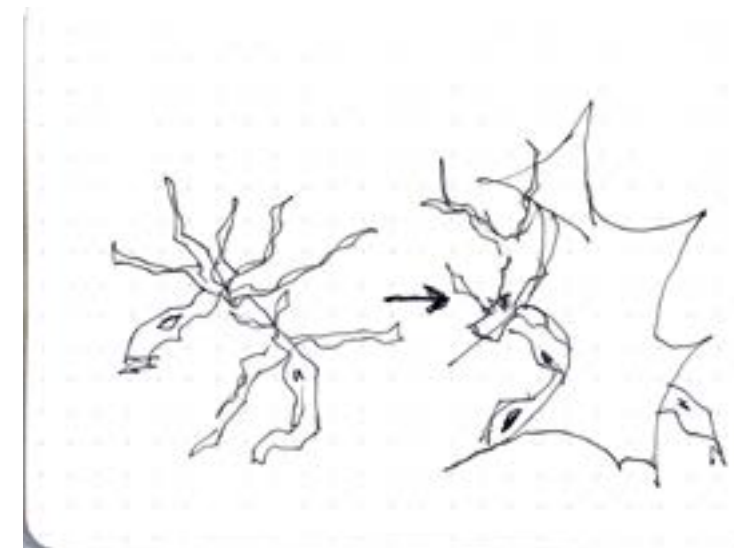
MORE THAN HUMAN DESIGN



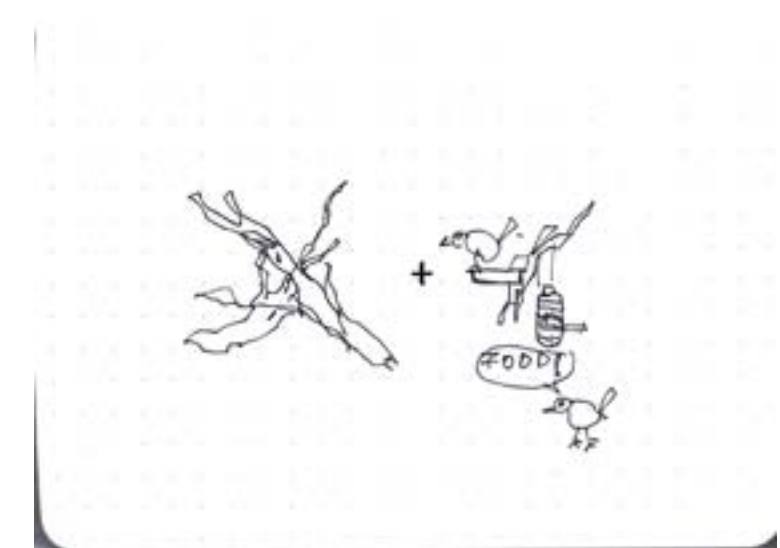
1. Using Audiomoth and species's sound frequency identifier to monitor species length of stay after placement of structure



2. Monitor and Increase length of stay by iterating structural elements, e.g. denser



3. Monitor and Increase length of stay by adding more shading/soundblocking elements according to light direction, e.g. found fabrics



3. Monitor and Increase length of stay by adding food source around structure, surface treatment like microorganism growth

POST OCCUPANCY

propagation - 1.0 on site



POST OCCUPANCY

propagation - 2.0



POST OCCUPANCY

propagation - 3.0



POST OCCUPANCY

propagation - connected

