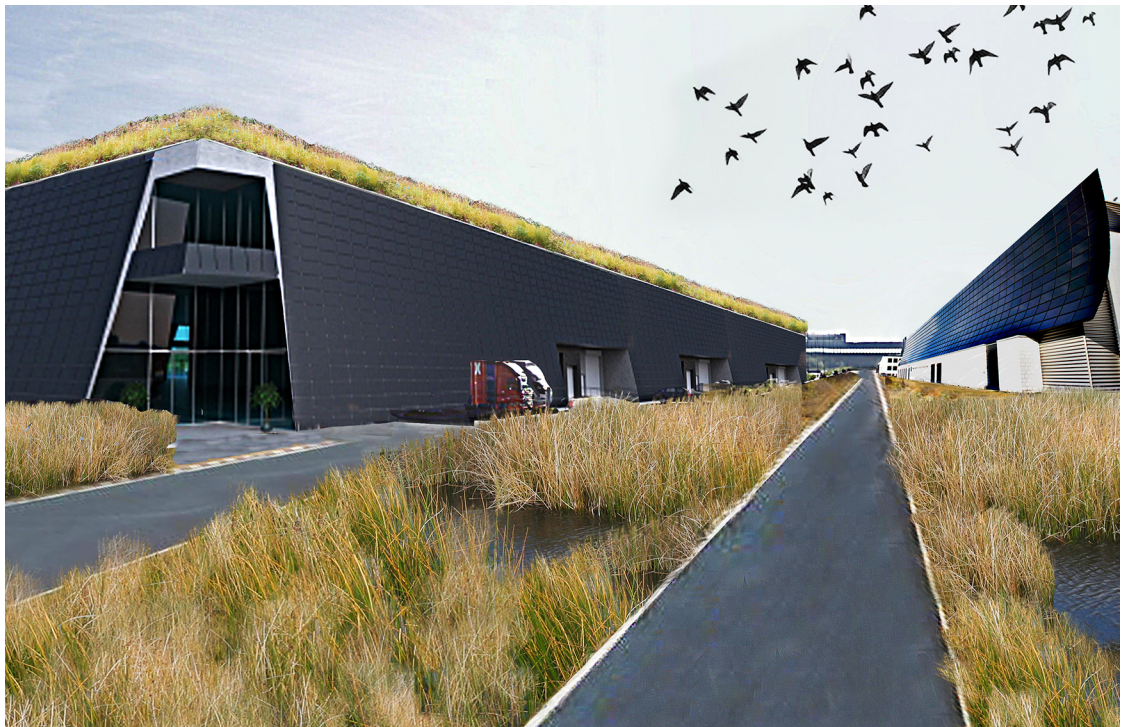


SEGRO Park Amsterdam Airport

'Bringing the Hoek Noord to life'



Sustainability concept

April 13th, 2015

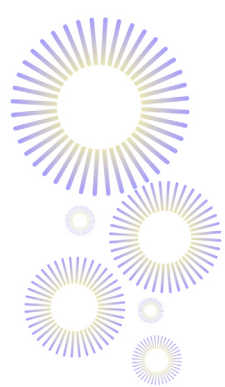
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Our future starting today

ASU Walton Sustainability
Solutions Initiatives

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Background

De Hoek Noord is uniquely positioned in the heart of the logistics hub near Amsterdam Schiphol Airport. Being in the corner between rail and the highway A5, it is both an accessible as a visible prime location for warehouses and offices. The area is projected to host about 89.548 squared meters of logistics area and distribution warehouses and 53.750 squared meters of office spaces. The developer of de Hoek Noord SEGRO has set high ambitions with respect to sustainability. Their stated ambition for 2020 is:

“To operate a well-informed, commercially focused, credible sustainability strategy that facilitates great TPR, customer satisfaction and environmental performance.”

This document proposes a very high-level philosophy and sustainability concepts that will meet the ambition of SEGRO.

Nature as inspiration

The world is changing at a fast pace. Not only are we experiencing scarcity of oil, fresh water, food, nutrients and ecosystems, but we are also facing tremendous social, cultural and economic changes. Peoples needs and desires are changing drastically and will continue to do so in the upcoming decades, as the world rapidly urbanizes. So how can we design urban environments, buildings and communities now that meet the needs of the future? How can we maintain the (economic) value of a building and the relevance of an area development? How can we be resilient over time and be adaptive in a changing climate, economy and society?

Let's take a look at nature. An ecosystem can be seen as a complex system where every organism has its role. Every flow of water, energy and nutrients is closed within the system. Whenever external events damage the system, it will restore itself to a new equilibrium. If one species no longer fits within the evolving system, it may go extinct and other better adapted species may take over its role. This diversity and flexibility of the system makes nature robust and adaptive to changes.

So why not design buildings as Living Buildings™ within a living ecosystem? Or, clusters of Living Buildings in Living Area Developments as a living ecosystem? A diverse, flexible and

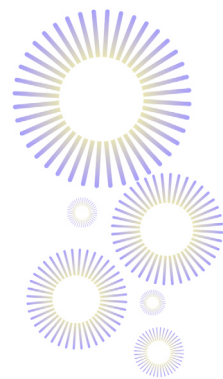
adaptive area development that embraces and promotes independence and diversity. An area with an inspiring atmosphere with a focus on a holistic approach that continuously leads to sustainable innovations.

Nature is our inspiration for SEGRO's Park Amsterdam Airport in Hoofddorp.

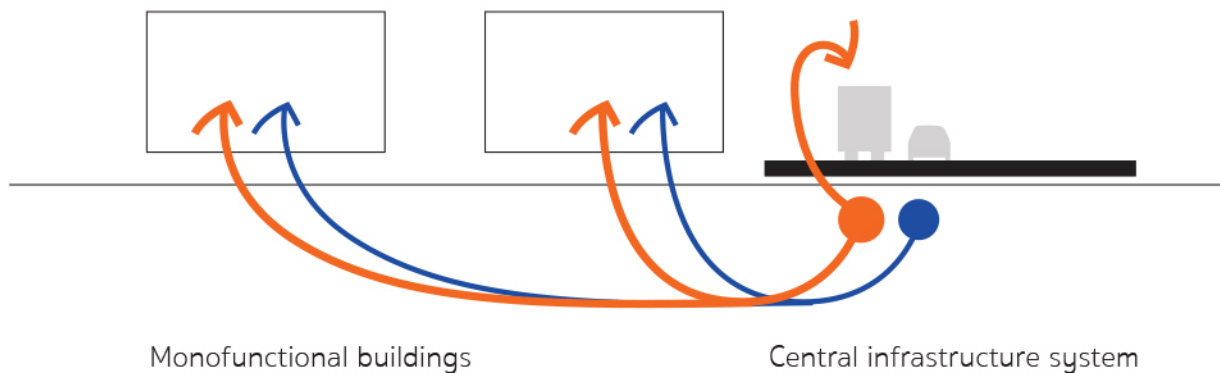
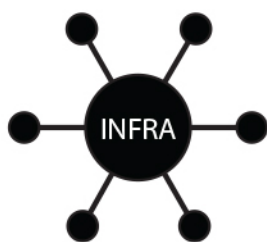
Imagine a logistics and business park that mimics a cloud forest, where the dynamic, fast-paced processes of trucks and products coming and going find their place at the forest floor, much like worker ants and other species move food and nutrients about the forest. Imagine buildings that store and transport water and energy for their needs in the ground underneath them, much like the roots of trees deep in the earth. Visualize the serenity, sounds and beauty of the forest canopy and think of people eating, walking and taking meetings among green roofs and parks, separated from the kinetic activity of the logistics processes below. Imagine solar panels generating power overhead, playing the photosynthesis role of the forest leaves. This distinction and connection between activity and serenity, between technology and nature will separate the park from other business developments where one-dimensional commerce is the only activity and the major inspiration is to get most cost-effectively and resource-efficiently to the end of the work day. A "Living de Hoek Noord" will replenish tenants and evolve and adapt as they and the broader world changes. If you see the Park from the plane, from the car on the elevated A5, from the train or in the bus on the elevated Zuidtangent lane, you will always look down to see an urban cloud forest, an ecosystem of integrated activity.

Network of living buildings

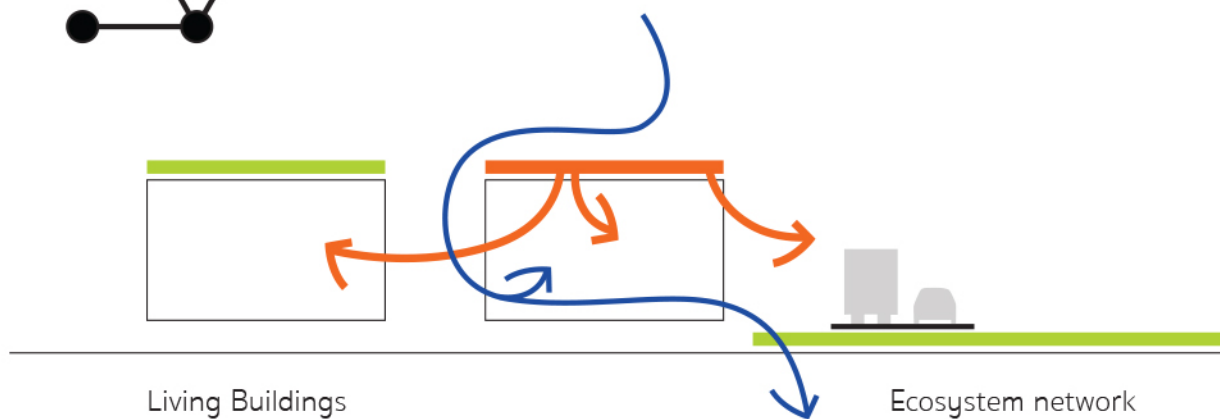
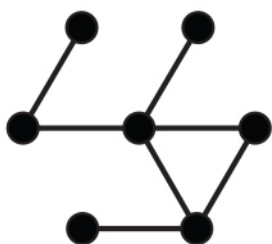
A tree in the cloudforest is the anchor from which life begins. We see the buildings as the trees, as the building blocks for life. This changes the way the infrastructure and the flows of energy, nature, water, heat and human activity flow. Just as in nature, every system is intertwined in a complex network. The network of Living Buildings each has its own role in the total concept and contributes in its own way to the sustainability of the area. See the picture on the next page for the concept of Living Building Networks instead of central infrastructure systems.

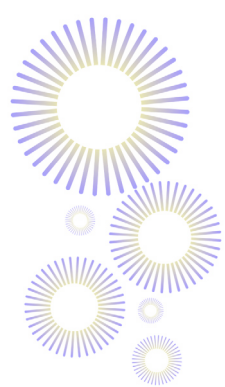


CURRENT PRACTICE **Central infrastructure system**



PROPOSED **Network of Living Buildings**





Living Building

"Imagine a building designed and constructed to function as elegantly and efficiently as a flower: a building that generates all of its own energy with renewable resources, captures and treats all of its water and that operates efficiently and for maximum beauty."

The Living Building Challenge™ is a tool that defines the most advanced measure of sustainability in the built environment possible today. While being used as a tool for already over 192 projects all over the world, and mainly in the US, there are no Living Buildings in Western Europe yet. What would be a better place to start than in Haarlemmermeer; a dynamic and ambitious municipality near Amsterdam and Schiphol Airport?

The Living Building Challenge can grant a certification based on the total development or certifications on 7 subjects called Petals: Place, Water, Energy, Health & Happiness, Materials, Equality and Beauty. Each petal has several imperatives guiding the petal. The ability to understand how parts influence one another within a whole, and the relationship of the whole to the parts, is crucial. Interdependence and synergy between the imperatives must clearly be seen in the design of the park.

The municipality of Haarlemmermeer and the Metropolitan Area of Amsterdam both have high ambitions with respect to sustainability. This is showcased in the nearby office park Park 20|20, which is inspired by the Cradle to Cradle philosophy. The Schiphol Trade Park on the other side of the Geniedijk will focus on implementing the Circular Economy. De Hoek Noord is just on the other side of the road. SEGRO could complement these activities which deriving its sustainability concepts from the Living Building Challenge. It will have its own unique selling point, while complementing the broader vision of the region. In the following paragraphs, some sustainability concepts will be discussed that tie back to the petals and imperatives from the Living Building Challenge.

Closing the water circle

A net positive water petal essentially means that the area and its occupants are a 'pass-through' of all water such that the pre-development hydrology matches the post-development hydrology of the site. This means that the surface should be as permeable as possible, minimizing concrete and asphalt and maxi-

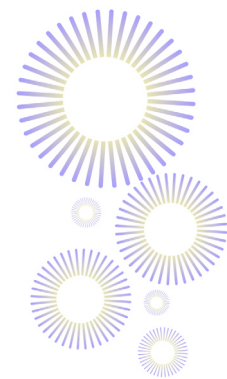
zing the usage of green roofs and green walls for water retention.

The SEGRO Park Amsterdam Airport will, without sustainability measures, consume about 200.000 cubic meters of fresh water per year. With a current rainfall intensity in the region of 0,84 cubic meters of water per square meter on average, it would be sufficient to close the loops on water in the area. The majority of the water consumption will be used for cleaning the warehouses/streets, flushing toilets and drinking water. For the latter, clear drinking (tap) water will still be needed. For the other options, a greywater recycling system with dual flush will be recommended.

Closing the energy cycle

This petal is about demonstrating that the energy production of the site exceeds its energy demand. This, on one hand, implies the reduction of energy usage as well as renewable energy generation. With an estimated usage of 75.000 GJ of energy annually without sustainability measures, the area will not be able to be net-positive. A few sustainability concepts that will help the energy petal are:

- Green roofs that improve insulation
- Solar panels (PV) could be installed on the large warehouses on the south. The surface area of these warehouses alone will be enough to provide energy for the entire park. Note that, due to the weight of the solar-pv systems, it is recommended to use thin-foil PV technologies that have a little less performance, but do not require any reinforced structure for the roofs. It is possible to integrate solar PV technologies in the facade of the structures as well, as can be seen on the front page. While this is less efficient from an energy perspective, it saves investment on regular facades or windows.
- In lieu of composting, organic waste streams can be anaerobically (no oxygen) fermented in a facility as small as a sea-container to generate biogas. The feedstock can also be augmented with local biomass from the restaurants within the park or in the area, as well as toiletwater. The cost of such a plant is approximately €18 per GJ of energy production, which can further decrease if subsidies such as SDE+ are available.
- The marine climate in the Netherlands is perfectly suitable for seasonal heat storage in underground aquifers. The Dutch outside temperature fluctuates between 21°C in



summer and 1°C in winter. The storage of the excess heat in summer for the winter times can radically reduce energy demand. This seasonal storage can take place within water-bearing formations below surface. Most of the time, a closed system is used. Although this technology might not be suitable for the warehouses itself, it is very cost-efficient for office usage.

- All over the world, the electricity grid uses an Alternating Current (AC) system while most appliances, such as laptops and LED-lighting, use Direct Current (DC) to operate. The SEGRO Park Amsterdam Airport can be the first business park in the world to run completely on Direct Current. This will save 25% on electricity costs because there is no need for conversion.
- Machinery used within the warehouses, such as forklifts, can either run on biogas from the fermentation plant or electricity generated by the solar roofs.
- Heat will be cascaded throughout the area, centralized for optimal performance.
- Lighting will be efficient with LED technology, tracking skylights and motion sensors.

While including these measures for the buildings and the site, the area will be net-positive for energy.

Re-imagining infrastructure

It is common to design the underground infrastructure (water, natural gas, sewer, electricity, etc.) under the road system. This means that the roads, which will be able to carry heavy loaded trucks, need to be thick enough to protect these pipelines. In the Living Building Network concept, this is no longer necessary. Roads can be thinner, smaller and made from recyclable material. This is already being done in Freiburg, Germany, where the underground infrastructure does no longer run under the roads, but through the foundations of the buildings. On top of that, the parking places for cars don't necessarily need to be covered with asphalt or concrete. So instead of designing the infrastructure centralized and connecting buildings to the grid, it should be the buildings that connect the infrastructure.

The concept of Living Building Networks, combined with the closed resource circles show that the "business as usual" development has a lot of unnecessary investments. Why should SEGRO invest in a natural gas pipeline while heating can be provided by heat pumps and/or radiant heaters? Why not only build roads where trucks really need roads to be? Why install street

lights in the middle of the road while this can be done with Direct Current from the buildings? By eliminating the unnecessary investments in infrastructure, there is room and budget to invest in the proposed sustainability networks.

Nature versus technology

When looking at design, the diversity between nature and technology is seen as a beauty. So the track of trucks that run through a green surrounding looks much more aesthetic than just concrete, or just grass. This combination of technology and nature could be one of the key unique selling points for the park.

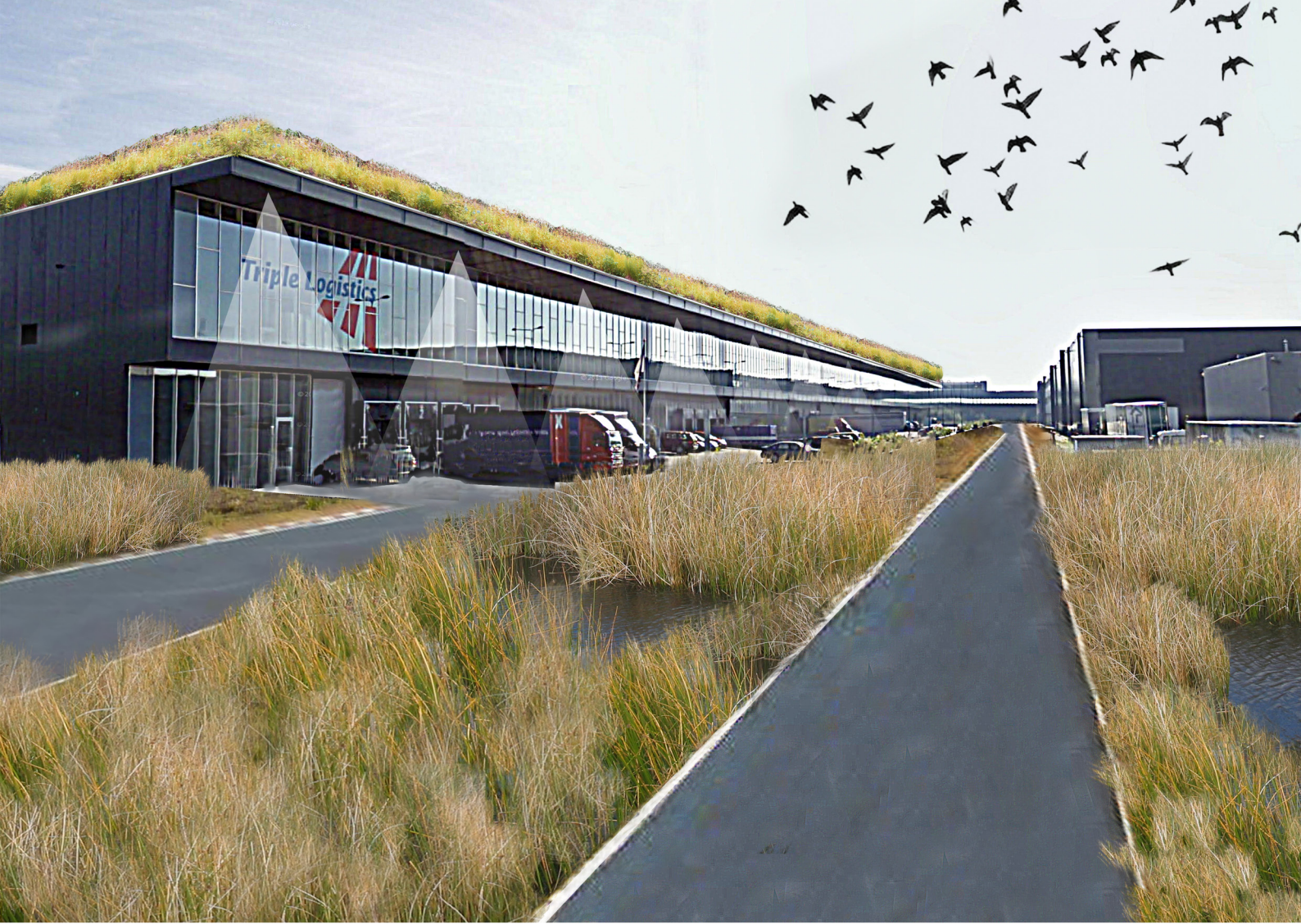
Flexibility is key

The development of the De Hoek Noord should also be practical. There will be clients who are less ambitious than others. The park will be designed in such a way, that flexibility is possible and potential clients will be able to choose their own level of sustainability, being;

- Level C – compliant to Dutch regulations
- Level B – being part of the system (zero footprint)
- Level A – being net-positive

The difference between the sustainability levels will influence the initial annual price per square meter for the client. The ambition level can be shown by labeling, such as the BREAAAM NL certification if required by the client. By giving the choice of ambition to the client, they feel included, part of the whole idea, and ultimately, more willing to choose a higher level of sustainability if they can make the park as a whole better. When looking at energy, being net positive means that the client can sell their electricity to another building next to it or across the road. Each building will have its 'base' level of sustainability, which will be enough to support the system. Like in a cloud forest, one tree is larger and more important to the system than others.

For the financial gaps there are several opportunities for implementing Total Cost of Ownership – constructions such as ESCO's (Energy Service Companies) or subsidies. The investment costs for solar technologies can either be compensated by the energy company, the local fund Meermaker or the Dutch national subsidy SDE+. So while embracing sustainability in the design without losing the economic and commercial values, the SEGRO Park Amsterdam Airport can become a new landmark in the heart of the commercial gateway.



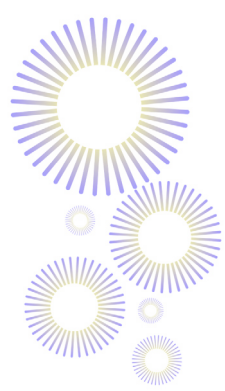
Eliminating infrastructure



Contrasting nature & technology



Quietness versus bustle



About EVOLV

EVOLV is committed to provide qualitative research and consultancy for public and private corporations. Evolve is reliable, transparent and believes in the circular economy. EVOLV can be your partner in your transition towards a more sustainable world.

One of our primary partners has been the municipality of Haarlemmermeer, where we built a unique digital database on CSR for municipalities, based on 19 different key performance indicators. This monitoring system is the first certified Dutch monitoring system for local governments (certified by Deloitte and Ernst & Young). Additionally, EVOLV has been analyzing the footprints and improvement opportunities (energy potentials, carbon efficiencies, financial possibilities and innovative solutions for sustainable development) together with Atelier 2T in The Hague (Erasmusveld), Amsterdam (Blok 6), Astana (EXPO 2017bid in Kazakhstan), Nijmegen (iLent) and Haarlemmermeer (Westflank).

We work together with the Global Sustainability Solutions Services (GS3) of the Arizona State University for objective and high-quality products. EVOLV and GS3 have partnered - amongst others - with the cradle-to-cradle inspired business Park 20|20 in Hoofddorp to assess the relation between the building design and productivity of the tenants and the regional horticulture organization of Greenport Aalsmeer for resource optimization in the region.

About the Global Sustainability Solutions Services (GS3)

The Julie Ann Wrigley Global Institute of Sustainability (the ASU Wrigley Global Institute) is the home of the first-ever comprehensive School of Sustainability, a formal network of more than 300 Sustainability Scientists and Scholars, and the Rob and Melani Walton Sustainability Solutions Initiatives (WSSI).

The School's mission is to take a transdisciplinary approach to finding solutions to the broad range of real-world sustainability challenges, by training the next generation of leaders to understand, measure, and apply sustainability solutions.

The Global Sustainability Solutions Services (GS3) of WSSI strives to deliver the best practices, the most effective tools and the most current knowledge in sustainability solutions with real-world, measureable and meaningful impact to client organizations and society, accelerated globally, through a broad collaboration of experts, stakeholders, practitioners and policy-makers.