

# A nature inclusive train station by the Alna river

Abstract

## Thesis

*“How can we build our urban structures in a way that facilitates for an improved urban biodiversity?”*

This question came from the ever more apparent reality that our biodiversity is dwindling, and that our diverse ecosystems are being replaced with new development of concrete and asphalt.

Oslo is densifying to meet the increasing housing demands. Important nature areas must in many cases give way to the demands of new development.

Many species, however, have over many generations learned to coexist with human structures. For example birds, bats, rodents, and many plants types have adapted to the urban ecosystem and urban structures.

With the energy demand of eco-friendly housing and modern design ideals, the current way of building does not provide these species the necessary facilities for their survival. Even species such as the House Sparrow, a common bird mainly found in urban environments, are now endangered species in several parts of Europe, and their numbers are falling in Norway.

If the urban development and densification of our cities are unavoidable, is it possible, then, to do it in a way that includes nature into our urban fabric and structures? Is it possible to build in a way that works with the demands of nature instead of against? How do we then build structures that can facilitate for other species than just humans? And can we create a way of building that ensures the co-existence of human needs and the needs of our biodiversity and ecosystems?

## Task

*“To propose a train station at Breivoll by the Alna river with nature inclusive design as the basis for the design decisions”*

The train station is a vessel to test the questions that arose from the initial thesis. The main focus for the diploma has been to use the program of the train station to implement designs for improving urban biodiversity. As a way of limiting the project, I focused on facilitating for areal species (birds and bats).

## Site

Breivoll is situated between Alnabru right north of the main highway, and Bryn. The Alna river with its surrounding wetland forest runs in the middle of the site from north to south, dividing the area in two. Parallel to the rivers west side are the train tracks, dividing the area in yet another part. On the easternmost and westernmost sides are the areas planned for housing and mixed use.

The choice of site had several reasons:

- The area is in close proximity to the Alna river. The “untouched” nature feeds the project with already existing wildlife and nature, and also showcases the tension between a dense urban fabric close to nature.
- The area of Breivoll is a part of the development of Hovinbyen, the largest current urban development project in Norway. There are plans for a train station at Breivoll along the existing train tracks, and it is projected to be a public transportation hub. There are no design proposals for the train station.
- Breivoll is currently an area characterized by industry, factories and larger retail buildings that is planned to be redeveloped into a dense urban hub. This gave the project an opportunity to build on an already developed site.
- The train station will most likely be the first structure built in connection with the development of Breivoll. The station has the potential to set a precedence for how the development will relate to its surrounding nature.

## Nature inclusive design

In my pre-diploma I researched nature inclusive design and the conditions for biodiversity, so that going into the design, I could implement this from the start of the process. Following is a short summary of the most important considerations that needed to be incorporated into the project for a successful nature inclusive design:

- **Connectivity:** The connectivity of green spaces, plants and trees both within the site and the sites surrounding areas. Barriers and low connectivity of green spaces isolates species within small areas which lower their chances of survival
- **Land use:** Development of unused nature areas leads to fragmentation of habitats. The main focus must be to develop on already developed areas. If incorporating unused land in the project is unavoidable, assigning developed areas to be rewilded should be prioritized.
- **Food and nesting availability:** To successfully invite other species into our urban fabric, the basic needs of food and shelter needs to be facilitated for. These conditions vary from species to species, so a careful consideration into what species are likely to inhabit the area needs to be considered
- **The site and the building as an ecosystem:** Implementing designs that can mimic the conditions of an existing ecosystem can inform footprint, green spaces and choice of building shape and structure and provide sustainable conditions for biodiversity.
- **Ecological traps:** The way we build our structures can sometimes be harmful for our nature, and sometimes we do well intentioned things that may have an adverse effect. Light pollution from buildings can disrupt the patterns of bats, birds and insects, asphalt and glass facades reflect light in a way that attracts insects away from their preferred habitats, and planting vegetation that serves as food sources in the wrong area (for example a heavily trafficked one) can cause more harm than good.

## The design

### Large scale intervention

An important part of the design principal was to touch as little unused land as possible. The main intervention of the design was to lower the train tracks, making it possible to establish a green bridge connecting both sides of the train tracks. The terrain on the east side of the tracks is raised to compensate for the terrain height differences and facilitate for a smoother connection between the two sides. The raised terrain is supported by a retaining wall. This intervention was important to achieve proper connectivity between both sides of the train tracks and the river and will also facilitate for using the same principle for future crossings over the train tracks. As an urban strategy, this establishes the train station as the main connector between the two sides of Breivoll, strengthening the place as the hub of the area.

### Green bridge

The green bridge acts as an open connector between the areas of Breivoll. The landscape established on top of the bridge aims to connect the green spaces of the nature of Alna river fluently into the urban fabric, facilitating for future development to continue the green space from the train station. The green space aims to mimic the properties of a typical low density coniferous forest characterized by berries and heathers.

### Retaining wall for Sand martin

The retaining wall supporting the raised terrain gets a double function by drilling holes in the stones and filling up the backside with sand, mimicking the Sand martins natural habitat.

## The structure

The main structure is a timber frame construction. The construction rests on a concrete foundation. The concrete foundation is covered by perforated bricks. The structure is laid out in a grid encompassing the green bridge. In the middle of this structure there is a staircase and elevator taking you down to the platform. Rising above the elevator shaft is a clocktower, signifying the station's location from afar. The platform is covered by a green roof. These are the main functions of the structure:

- The open timber frames with its ribbons of cross braces ample provide room for birds. Birds need structures to use as landing platforms between flights and also thrive in areas where they have structures that hides them from predation.
- The construction encompasses the bridge and station area, establishing the space as a public area meant for more than just transit. The structure can be used as leisure area and hold markets and other public events.
- The construction on the northern part of the bridge is an enclosed space meant to hold the basic functions of the train station, consisting of a ticket and service booth, ticket machines, café, public bathrooms, elevators and technical room and storage.
- The facade of the enclosed space has built in bird and bat dwellings
- The perforated bricks in the foundation serves as dwellings for insects
- The clock tower houses nesting for House martens, a high flying bird
- the roofs over the platform and the station building are green roofs.
- The left over space underneath the station building is reserved for a bat winter dwelling.

## Conclusion

Working with solving the logistics of a train station and that of designing for urban biodiversity has been a challenge, but in the end I think including elements of nature inclusive design in the project enriched the train station. Nature is important to us humans, not only for the obvious benefits of having a healthy planet that provides us with resources, food and oxygen, but being surrounded by nature is vital to our mental health and well being. Specifically for the train station, one can imagine the noise of the train hissing on the tracks being subdued by a white noise blanket of bird song.

Working with this diploma I have come to have a greater understanding of how nature and its species relates to our structures and how we as architects can take them into consideration as we take up more and more space on the planet.