



Demonstration of Animal-Aided Design approach

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GLOSSARY

EC	European Commission
EU	European Union
HR	Handlungsraum der Stadtentwicklung / Urban Development Action Area
IHRK	Integriertes Handlungsraumkonzept / Integrated Urban Development Plan
ISEK	Integriertes Stadtteilentwicklungskonzept / Integrated Urban Regeneration Implementation Plan
M	Project Implementation Month
NEB	New European Bauhaus
NEBourhoods	Creating NEBourhoods Together
NGO	Non-Governmental Organisation
NPL	Munich Neuperlach
OA	Open Access
T	Task
WP	Work Package
Organisation Name (Consortium)	
AGM	Architekturgalerie München e.V.
BYF	Bayerische Forschungsallianz GmbH / Bavarian Research Alliance GmbH
GC	Green City e.V.
HM	HM Hochschule München University of Applied Sciences
HM:UniverCity	HM Innovationsnetzwerk / HM Innovation Network
MGS	MGS Münchener Gesellschaft für Stadterneuerung mbH
MS	UnternehmerTUM MakerSpace GmbH
MUC	Landeshauptstadt München / City of Munich
MUC CCI	Kompetenzteam Kultur- und Kreativwirtschaft / Team of Excellence for the Cultural and Creative Industries
MUC CULT	Kulturreferat / Department of Arts and Culture
MUC LED	Referat für Arbeit und Wirtschaft / Department of Labor and Economic Development
MUC PLAN	Referat für Stadtplanung und Bauordnung / Department of Urban Planning and Building Regulations
SCE	Strascheg Center for Entrepreneurship
STR	Str.ucture GmbH
SAAD	Studio Animal-Aided Design GmbH
SSR	Studio Stadt Region Forster Kurz Architekten und Stadtplaner Partg Mbb
TUM	Technische Universität München / Technical University of Munich
UTUM	UnternehmerTUM GmbH
Organisation Name (in Cooperation with)	
MER	Münchner Ernährungsrat e.V.
MIN	Münchner Initiative Nachhaltigkeit
OTH	Ostbayerische Technische Hochschule Regensburg
Organisation Name (Associated Partners)	
BDA	Bund Deutscher Architektinnen und Architekten e.V.
BDA-By	Bund Deutscher Architektinnen und Architekten Bayern e.V.
ByAK	Bayerische Architektenkammer, Körperschaft des öffentlichen Rechts / BAK – Federal Chamber of German Architects
BYD	Bayern Design GmbH

1 PROJECT OVERVIEW

“Creating NEBourhoods Together” is one of the six lighthouse demonstrators of the New European Bauhaus funded by the EU to address the great challenges of climate, environment, and health. The aim is to collaborate on the European Green deal to create more sustainable, inclusive, and beautiful living environments across the EU. In Munich-Neuperlach (NPL), one of Europe's largest post-war urban expansion areas, NEBourhoods is collaborating with citizens and stakeholders from culture, science, and business to implement ten actions from all fields of urban development, encompassing circular construction and redesign of residential and commercial buildings, innovative forms of mobility and energy communities, biodiversity and green space concepts and nutrition and youth culture. Encouragement of entrepreneurial thinking and action and practical implementation in co-creative processes support the formation of sustainable neighbourhoods in liveable, inclusive, and beautiful cities of the future.

Combining co-creation and entrepreneurship while putting culture and creativity at the core of the transformation process, the project is delivering accessible and empowering solutions, providing roadmaps and kickstarting actions to make the EU Green Deal beneficial for all in Neuperlach and beyond. With meticulous care, the district is being cultivated to become a resilient urban innovation landscape. Over this two-year period, we have been creating NEBourhoods together, demonstrating how circular thinking and acting in society and the economy can be realised, how the green transformation in construction, mobility, energy, food and health can be activated and how public spaces can be enhanced.

2 INTRODUCTION

2.1 OBJECTIVE OF THE NEB ACTION ANIMAL-AIDED DESIGN

Animal-Aided Design is one of the “NEB-Actions for nature- and climate-adapted Spaces and Circularity” within Work Package 4 of the NEBourhoods Project. In urban areas today, the amount of animal species decreases dramatically. With the application of Animal-Aided Design (AAD), we are able to integrate wildlife into architecture and open space planning, and thus fostering human-nature relationships. AAD does not only create valuable niches for birds, reptiles or insects in cities – but also increases the quality of life of city dwellers. Our recent research has shown that the acceptance of AAD measures is greater, if design for wildlife is combined with good design for humans. The development of AAD-measures to experience nature, to revitalise habitats and to strengthen the ecological diversity fits within standard planning procedures and allows transformations at a local scale.

AAD contributes to the implementation of green infrastructure that not only provides aesthetic benefits but also supports animal diversity. The aim of applying AAD in a participative or even co-creative manner is to create sustainable and resilient neighbourhoods that benefit both people and nature and help reconnect people with nature.

2.2 OBJECTIVE OF THIS DELIVERABLE

This report highlights the demonstration of Animal-Aided Design in the context of the “Creating NEBOurhoods Together” project in Munich-Neuperlach. It recounts the important steps taken to develop and build “AAD-Demonstrator(s)”, as well as arrive at the “AAD-Toolbox”: a catalogue of structural, vegetation and maintenance measures that will enable the requirements of 14 target species to be taken into account in new construction, renovation, redesign and maintenance of the built environment in Neuperlach (NPL) in a co-habitative manner.

2.3 DIVERSIONS FROM ORIGINAL GOALS

SAAD has recently completed a comprehensive AAD as part of a research project in Munich with one of the big housing associations (also present in NPL) in 2023. Initial stakeholder meetings and scouting for locations and collaborations for the AAD-Demonstrator in Neuperlach showed some to little openness for new experimentation (housing associations, City of Munich) and a lack of availability of space and ownership (for some stakeholders). Furthermore, a great part of the housing stock is in mixed private ownership (Wohnungseigentümergeinschaften). This makes involving residents in a co-creative process very complex. After a long scouting phase, the realisation of short-term, concrete transformations in the form of a demonstrator was a challenge. This was made even more difficult by the short duration of the NEBOurhoods project and its ambition for co-creation. As a result, and in line with the overall NEBOurhoods vision, we changed the approach and picked up local stakeholder initiatives. Our partners for the demonstration of AAD are:

- Kids and Youth Centre “Come In”: very local, very bottom-up, under City of Munich green space maintenance
- Shopping Mall “pep”: very central, very visible, high motivation for transformation.

2.4 NEB-ACTION TEAM

The project team of the NEB-Action Animal-Aided Design is an interdisciplinary team at Studio Animal-Aided Design, formed of Landscape architects: Prof. Dr. Thomas E. Hauck, Christine Jakoby, Qingyu Liang and biologist Dr. Ariane Mutzel and supporting staff Nuria Keeve and Paul Wiegand.

The team was supported by the NEBourhoods Transition Hub Team (University of Applied Sciences and City of Munich's Team of Excellence for the Cultural and Creative Industries) and creatives for the co-creation of transition, by Münchner Gesellschaft für Stadterneuerung mbH (MGS) for replication, by Architekturgalerie München e. V. (AGM) for communication and the City of Munich (MUC) as a central stakeholder for advice and support.

For the realisation of the AAD-Demonstrator “Nisthocker” (“nesting stool”) we were supported by students from the Technical University Vienna, Institute of Urban Design and Landscape Architecture in the following study formats of the Master's degree programme under Prof. Thomas E. Hauck and Prof. Susann Ahn: Analytic approach and concept designs of cohabitation: „Animal Spaces & Beastly Places“ in Neuperlach in cooperation with NEBourhoods, winter semester 2023/24; and: Detailed Design and Implementation Planning based on the student design “Austauschbörse”, summer semester 2024. The construction of the demonstrator was part of the semester module and was professionally supervised and guided by a carpenter, Phillip Castilleja in the first week of July 2024.

3 APPLICATION OF ANIMAL-AIDED DESIGN

3.1 BIOLOGICAL AND SPATIAL ANALYSIS

In order to determine the regional species pool of Neuperlach, SAAD collected the available biological data on species occurrences and surrounding areas (20km radius from NPL centre – Hanns-Seidel-Platz). Information was retrieved from databases of the species protection mapping (ASK data; Bavarian Environment Agency, LfU) as well as GBIF (Global Biodiversity Information Facility), and local biodiversity monitoring. A spatial analysis of the built environment and green corridors in NPL was undertaken and maps with the target species potential were produced.

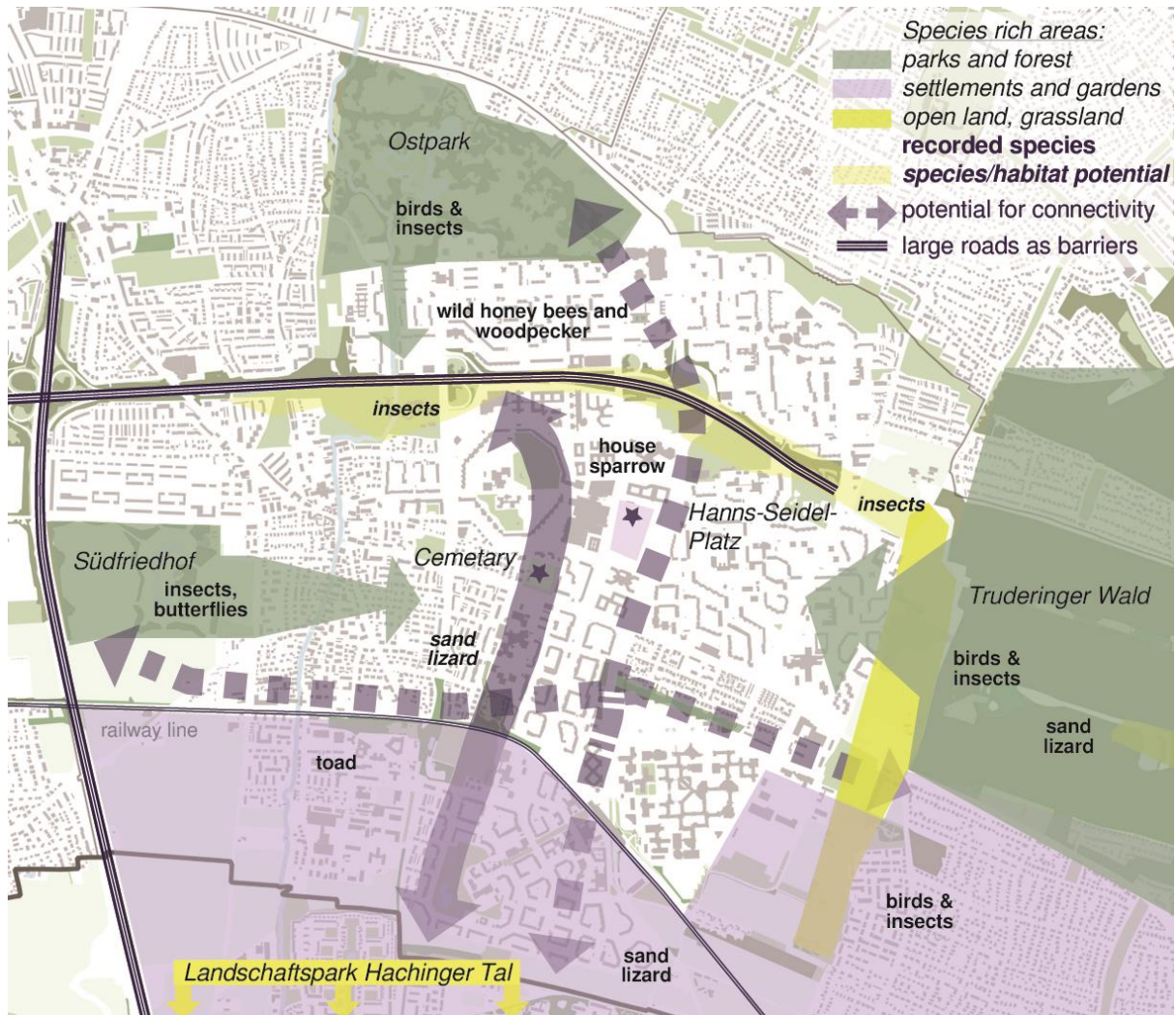


Figure 1: Species potential and spatial connectivity. Image Source: NEBourhoods/ SAAD, base map SSR

3.2 TARGET SPECIES SELECTION

AAD uses a target species approach. In species selection, socio-cultural criteria are important, alongside conservation aims, the site potential and limitations of the area. The habitat requirements of the target species are the starting point for wildlife-inclusive planning. AAD lists all habitat requirements in the animal life cycle that must be met, to provide conditions for successful establishment. AAD can be applied at various planning levels, from single buildings to a district or an entire city and at different scales of transformation, from a small garden to an amenity area or a whole park. It is important to select target species depending on the project specifics and in a participative way.

On May 12th 2023, we held a workshop for the participative selection of suitable target species for Neuperlach with a total of eight external participants including local stakeholders (housing association, church representative), experts of local biodiversity (Landesbund für

Vogelschutz, LBV) and representatives from the different biodiversity-associated departments of the City of Munich (Departments of Planning and Building Regulations, Public Construction – Gardening, Climate and Environmental Protection). Information on 40 animals and animal groups was presented in the form of species cards. The cards presented information on: chance of direct experience, potential for conflict, protection & conservation status, local reference and possible measures for settlement. In several rounds, the team discussed the suitability of different species based on the following questions:

1. Captivating and exciting:

Which species could Neuperlach residents be enthusiastic about?

2. Low-threshold: For which species great effect could be achieved with little effort?

3. Exemplary: For which species could a specific measure be implemented quickly and easily as a demonstrator?

4. Protection and conservation: For which species are urgent measures needed in Neuperlach?

5. Typical and site specific: Which species have a strong local connection to Neuperlach?

In every round the participants were handed 2-3 species cards and were invited to cast their votes on the best suitable one. Each theme round, the votes were represented by coloured stickers. In total 11 target species were selected with the overall highest scores. 3 more species were added by SAAD later, to capture different functional relations of wildlife-inclusive design in urban areas.

A list of all target species with information on the selection criteria, red list status Germany, perceivability and closest sighting in NPL can be found in Appendix 1.



Figure 2: Question rounds at species selection workshop. Image Source: NEBourhoods/ Leonie Lux

Säugetier Fassaden & Freiräume	Vogel Fassaden & Freiräume
Pipistrellus pipistrellus Zwergfledermaus	Passer domesticus Haussperling
Erlebnis Schnelle Zickzackflüge, jagt gerne in Uferbereichen von Gewässern und an Strassenlaternen hohe vom Menschen hörbare Soziallaute	Erlebnis Gut zu beobachten, da wenig scheu Tschilpende Männchen über Nistplatz sitzend bei Nahrungssuche in Trupps, hüpfend am Boden beim Staubbaden
Konfliktpotential Akzeptanz: hoch, löst allerdings bei manchen Menschen Ängste aus	Konfliktpotential Akzeptanz: hoch Konflikte: lautes Tschilpen
Schutz & Gefährdung Rote Liste D 2020: ungefährdet Rote Liste Bayern: ungefährdet saP-Art	Schutz & Gefährdung Rote Liste D 2016: Vorwarnliste saP-Art
Ortsbezug Sichtungen in Fauststrasse (Trudering); Theodolindenstrasse (Harlaching)	Ortsbezug Sichtungen: 618 nächste Sichtung: 68m
Maßnahmen & Umsetzbarkeit Spaltenquartiere an Gebäuden Sommerquartiere v.a. an warmen süd- und ostseitigen Hauswänden Winterquartiere meist in der Nähe, oft am selben Gebäude	Maßnahmen & Umsetzbarkeit Nistkästen an Gebäuden; Staub- und Wasserbäder insektenreiche Staudenflächen zur Nahrungssuche dichte Sträucher und Hecken als Rückzugsort

Figure 3: Species cards with highest point scores. Image Source: NEBourhoods/ SAAD / animal photos via Wiki Commons: Jeffdelonge and Frank Derer



Figure 4: Species cards and localisation in NPL. Image Source: NEBourhoods/ SAAD/ Leonie Lux










<p>Insekten Freiräume</p>  <p>Wildbienenart: Lehmwand als Nistplatz</p> <p>Erlebens: Fressen der Nahrungspflanze von Blüte zu Blüte (an Lehmwänden, Baum-Hohlräumen)</p> <p>Konfliktpotenzial: Akzeptanz hoch Konflikte nicht aggressiv, sondern nur sehr selten</p> <p>Schutz & Gefährdung: Roten Liste 2010: ungefährlich</p> <p>Ordnung: Schmetterlinge 27. Invertebrata Schichtung 14 (Insekten)</p> <p>Maßnahmen & Umsetzbarkeit: Fortschrittliche Maßnahmen (z.B. Freiräume, Blühende Fassaden und Lehmwände)</p>	<p>Insekten Freiräume</p>  <p>Wildbienen: Sandbienen</p> <p>Erlebens: Auf Blüten von Pollen- und Nektarsuche (auf Sandböden kann Nektar aus Blüten gewonnen werden)</p> <p>Konfliktpotenzial: Akzeptanz hoch Konflikte nicht aggressiv, sondern nur sehr selten</p> <p>Schutz & Gefährdung: Roten Liste 2010: ungefährlich</p> <p>Ordnung: Schmetterlinge 27. Invertebrata Schichtung 14 (Insekten)</p> <p>Maßnahmen & Umsetzbarkeit: Fortschrittliche Maßnahmen (z.B. Freiräume, Blühende Fassaden und Lehmwände)</p>	<p>Insekten Freiräume</p>  <p>Wildbienenarten: In Hohlräumen nistend</p> <p>Erlebens: Auf Blüten von Pollen- und Nektarsuche (in Hohlräumen kann Nektar aus Blüten gewonnen werden)</p> <p>Konfliktpotenzial: Akzeptanz hoch Konflikte nicht aggressiv, sondern nur sehr selten</p> <p>Schutz & Gefährdung: Roten Liste 2010: ungefährlich</p> <p>Ordnung: Schmetterlinge 27. Invertebrata Schichtung 14 (Insekten)</p> <p>Maßnahmen & Umsetzbarkeit: Fortschrittliche Maßnahmen (z.B. Freiräume, Blühende Fassaden und Lehmwände)</p>	<p>Insekten Freiräume</p>  <p>Schmetterlingsart der Feuchtwiesen</p> <p>Erlebens: Fressen der Nahrungspflanze</p> <p>Konfliktpotenzial: Akzeptanz hoch Konflikte keine</p> <p>Schutz & Gefährdung: Roten Liste 2010: Überlebensgefährlich</p> <p>Ordnung: Schmetterlinge 27. Invertebrata Schichtung 14 (Insekten)</p> <p>Maßnahmen & Umsetzbarkeit: Fortschrittliche Maßnahmen (z.B. Freiräume, Blühende Fassaden und Lehmwände)</p>	<p>Insekten Freiräume</p>  <p>Schmetterlingsarten der Wiesen, Mager-/Trockenrasen</p> <p>Erlebens: Fressen der Nahrungspflanze (auf Wiesen und Trockenrasen)</p> <p>Konfliktpotenzial: Akzeptanz hoch Konflikte keine</p> <p>Schutz & Gefährdung: Roten Liste 2010: Überlebensgefährlich</p> <p>Ordnung: Schmetterlinge 27. Invertebrata Schichtung 14 (Insekten)</p> <p>Maßnahmen & Umsetzbarkeit: Fortschrittliche Maßnahmen (z.B. Freiräume, Blühende Fassaden und Lehmwände)</p>
<p>Vögel Freiräume</p>  <p>Seidenschwanz</p> <p>Erlebens: Fressen der Nahrungspflanze (auf Ästen und Zweigen)</p> <p>Konfliktpotenzial: Akzeptanz hoch Konflikte keine</p> <p>Schutz & Gefährdung: Roten Liste 2010: Überlebensgefährlich</p> <p>Ordnung: Schmetterlinge 27. Invertebrata Schichtung 14 (Insekten)</p> <p>Maßnahmen & Umsetzbarkeit: Fortschrittliche Maßnahmen (z.B. Freiräume, Blühende Fassaden und Lehmwände)</p>	<p>Vögel Begrünte Fassaden & Freiräume</p>  <p>Freibräuter</p> <p>Erlebens: Fressen der Nahrungspflanze (auf Ästen und Zweigen)</p> <p>Konfliktpotenzial: Akzeptanz hoch Konflikte keine</p> <p>Schutz & Gefährdung: Roten Liste 2010: Überlebensgefährlich</p> <p>Ordnung: Schmetterlinge 27. Invertebrata Schichtung 14 (Insekten)</p> <p>Maßnahmen & Umsetzbarkeit: Fortschrittliche Maßnahmen (z.B. Freiräume, Blühende Fassaden und Lehmwände)</p>	<p>Vögel Freiräume</p>  <p>Grünspecht</p> <p>Erlebens: Fressen der Nahrungspflanze (auf Ästen und Zweigen)</p> <p>Konfliktpotenzial: Akzeptanz hoch Konflikte keine</p> <p>Schutz & Gefährdung: Roten Liste 2010: Überlebensgefährlich</p> <p>Ordnung: Schmetterlinge 27. Invertebrata Schichtung 14 (Insekten)</p> <p>Maßnahmen & Umsetzbarkeit: Fortschrittliche Maßnahmen (z.B. Freiräume, Blühende Fassaden und Lehmwände)</p>	<p>Vögel Fassaden & Freiräume</p>  <p>Halbhöhlenbräuter</p> <p>Erlebens: Fressen der Nahrungspflanze (auf Ästen und Zweigen)</p> <p>Konfliktpotenzial: Akzeptanz hoch Konflikte keine</p> <p>Schutz & Gefährdung: Roten Liste 2010: Überlebensgefährlich</p> <p>Ordnung: Schmetterlinge 27. Invertebrata Schichtung 14 (Insekten)</p> <p>Maßnahmen & Umsetzbarkeit: Fortschrittliche Maßnahmen (z.B. Freiräume, Blühende Fassaden und Lehmwände)</p>	

Figure 5: Species cards and point scores. Image Source: NEBourhoods/ SAAD/ animal photos Wiki Commons

3.3 PARTICIPATORY SPECIES WALK: “ARTENPARCOURS”

In cooperation with creatives Sarah Dorkenwald (from the NEBourhoods creative pool) and Karianne Fogelberg (UnDesignUnit) as well as an expert on urban bees, Florian Remter, SAAD was contributing to two public walks: “Neuperlach for the Animals - A Participatory Species Walk” through Neuperlach. The first one took place during Munich Creative Business Week 2023 with about 30 participants of different design backgrounds and local residents. The second one was much smaller and took place with local stakeholders of NPL (nature organisations Bund Naturschutz & LBV; St.Michael Caritas; MGS). As Animal-Aided Design is a species centred approach, the “Artenparcours” gave the opportunity for participants to change into the perspective of the animals. Using playfully staged design research methods, the parcours opens up new perspectives on the city as a shared living space of animals and humans. With the use of Props and Activity cards, open spaces in NPL were visited and viewed through the eyes of animals. At the same time, it was a chance to create awareness of more-than-human design and planning in cities.



Figure 6: Artenparcours. Image Source: NEBourhoods/ SAAD, Qingyu Liang

More information on the species walk: <https://www.nebourhoods.de/events/artenparcours/>
and
<https://undesignunit.com/neuperlach-der-tiere-partizipativer-artenparcours-mit-zukunftsforum/>

3.4 LIVING LABS FOR THE CO-CREATIVE APPLICATION OF AAD

The set-up of a Living Lab facilitated by the Transition Hub team has been a great opportunity to invite perspectives of other disciplines and users of an open space. First contact with local biodiversity stakeholders (Bund Naturschutz) and creatives was made in April 2023 during a Living Lab Kick-off event. Over the summer further contacts with local stakeholders were fostered in close collaboration with the Transition Hub, and locations for the implementation of measures for the selected target species scouted. It soon became clear that housing associations were somewhat willing to engage with the topic but didn't appear to be the right partner for building a demonstrator within the project period. With support from the Transition Hub, we embarked on the co-creative development of the „AAD Demonstrator” and “AAD-Toolbox” and its application for the 14 target species in NPL.

3.4.1 Co-creation Process Toolbox and AAD-Demonstrator Come In

The initiative came from the manager of the kids and youth centre Come In, as a group of children was wishing to enhance the biodiversity in their garden. Come In was identified as a suitable stakeholder for testing AAD-measures at very local level and with “hands-on” implementation. The Living Lab Come In:

- Is an example of a conversion (or retro-fit) where the City of Munich is maintaining the green space
- Allowed testing of elements for the AAD-Toolbox

We invited Sarah Dorkenwald from the NEBourhoods creatives' pool into the design development and process design of the AAD-Toolbox for NPL, i.e. information design of the target species portraits, developing props and tools for analysing the space for change and configuring workshop scenarios for different stakeholders. Having very successfully organised and run the participative Artenparcours together with her design partner Karianne Fogelberg as UnDesignUnit, we decided to include both as much as possible in the process. The Toolbox was developed and refined in several Co-creation meetings and design reviews. We tested the AAD Toolbox-prototypes in different settings: During the application of AAD for the garden in Come In, and at a stakeholder workshop during MCBW 2024.

3.4.1.1 AAD Co-Creation Workshops Come In

Together with the Transition Hub and creatives we ran a series of all-afternoon workshops (14:00-18:00) for the application of AAD.

1 Co-Envisioning:

Which animals have been seen in the garden? Which areas are most used by kids? What are the animals' needs (use of props and activities for 3 target species)



Figure 7: Co-Design Workshop and results. Image Source: NEBourhoods/ SAAD

2 Co-Design:

With kids: Which habitat elements are suitable? How and where do they fit in the garden?

With head gardener: Which habitat elements are suitable? How and where do they fit in the garden? What are the maintenance constraints?



Figure 8: Co-Designed plan for AAD-measures. Image Source: NEBourhoods/ SAAD

3 Co-Build:

Together with the kids and staff, a range of habitat elements was built: Sand lens, dead hedge, stone pile, clay nesting-box, rainwater chain and temporary water area, wildlife friendly planting.



Figure 9: Construction Workshop AAD-Demonstrator Come In. Habitat elements: dead hedge, stone pile and sand lens for target species Common Redstart and Sand Lizard. Image Source: NEBourhoods/ SAAD Christine Jakoby, Peter Brooren

For the development of the AAD-Toolbox we tested an array of tools and props during the Co-Envisioning and Co-Design phase, some of which were deemed to be most suitable to generate and keep interest and engagement in the workshops with the kids. Upon reflection with the staff, using different props and activities was very beneficial for the workshops.

Tools / Elements / Props	Test Come-In	Test MCBW	Use in Toolbox
Small Site Flags red/green	Spatial analysis, use of garden	-	optional
Small Site Flags Animals	Spatial analysis occurrences	-	optional
Activity Cards	Information on animals	Artenparcours	optional
Props: bee vision spectacles, sand lizard string etc.	Change of perspective	Artenparcours	optional
Field-Trip Cards	Spatial analysis and habitat characteristics	-	-
Target species flyers with checklist of critical needs / habitat elements	Information on animals and site suitability	Site suitability	Site suitability
Site model / aerial picture / site plan	Usage negotiations	Location of usage and spatial potential	Spatial potential for target species habitat elements
Critical Needs-Icons (stickers)	Spatial potential for target species needs	Spatial potential for target species needs	(Replaced with habitat elements stickers)
Photos Habitat Elements	Examples of designs	Mapping and design examples	Design examples as reference

3.4.1.1 Long-term maintenance of AAD-measures

The meeting with the maintenance manager for Come In garden (MUC) at the design phase was important for coordinating the implementation and especially knowing which elements would fit in the current maintenance regimes. New regimes should be discussed at replication and planning stage of future AAD-projects. Contact with local garden maintenance firms showed a high motivation for wildlife inclusive design, with some firms already leading in wildlife sensitive maintenance. Our idea to set-up a training workshop for firms in NPL might follow at a later stage. A follow-up meeting with staff from Come In was held to review the measures and to put up signs for the maintenance and replication of each measure.

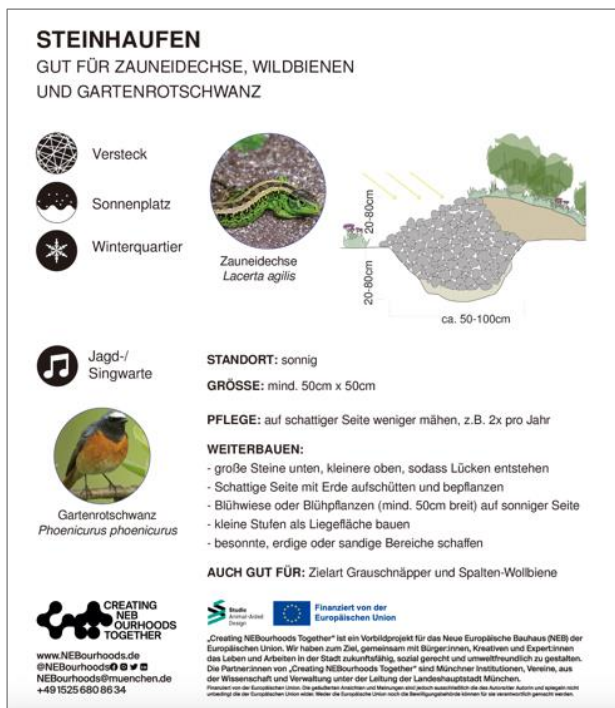


Figure 10: Example and handover of signs. Image Source: NEBourhoods/ SAAD, Christine Jakoby

3.4.2 Co-creation Process Demonstrator pep Shopping Mall

Supported by the Transition Hub team, we held an initial meeting with the Technical and Centre Management of the large shopping mall pep in February 2024. We discussed the implementation of an AAD-Demonstrator. Pep had been identified as an important local stakeholder and landowner (retail group ECE Marketplaces GmbH & Co.KG) of semi-public space, with a great willingness to cooperate. The mall is located in the centre of NPL.

- Local partnership for transformation with possibility of Europe-wide replication
- Testbed for biodiversity measures

3.4.2.1 Development and Implementation of AAD-Demonstrator

As described in chapter 2.4 the call was opened to students from the TU Vienna to develop a design for co-habitation that could act as an AAD-Demonstrator in NPL. This happened before SAAD started the cooperation with pep (winter semester 2023/24), as location and stakeholder scouting were ongoing. Once the connection with pep management (Martin Schwarz and Sascha Schönherr) was made with the support of a member of the Transition Hub, we reviewed proposals for possible retrofitting of the pep building complex and outdoor areas with AAD measures and how these could fit into the framework of the shopping centre's possibilities for change.



Figure 11: Application of AAD as “retro-fit” at the building complex of the shopping centre pep, with suitable target species. Image Source: NEBourhoods/ SAAD

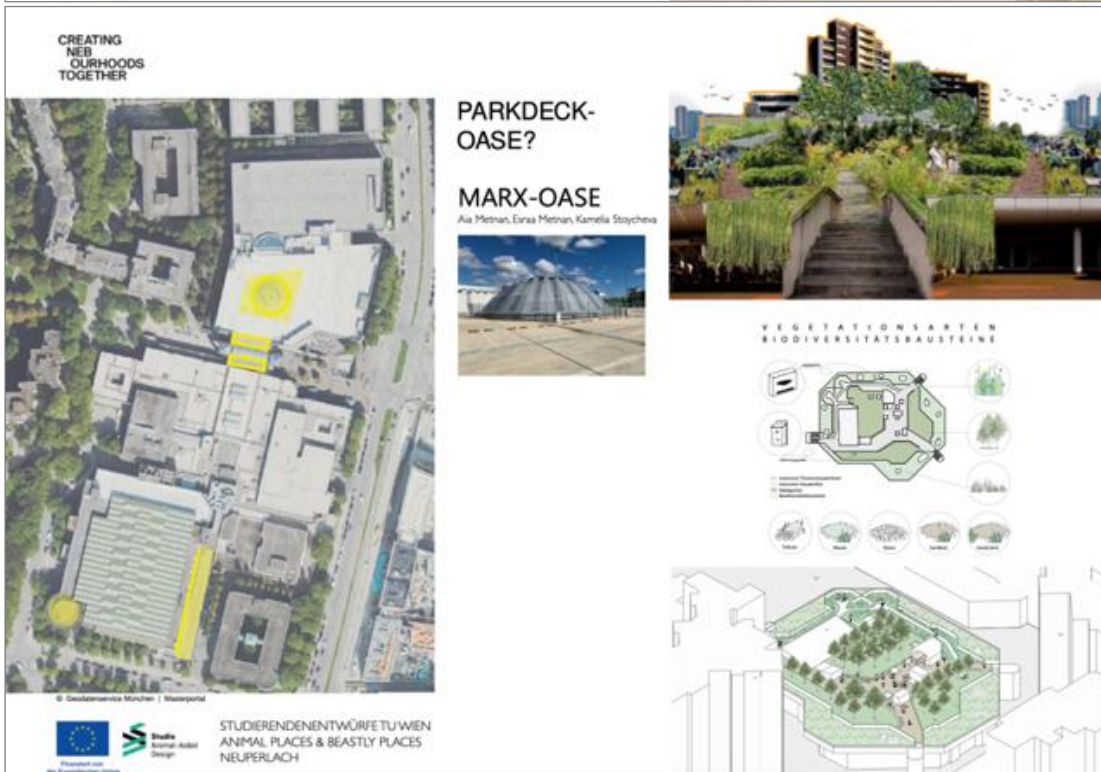


Figure 12: AAD-Student designs in pep context. Image Source: NEBourhoods/ TUW: Aia Metnan, Esraa Metnan, Kamelia Stoycheva; Kitai Hiroka; Raya Veselinova, Hannah Hribek, Larissa Landa; SAAD

Within the summer semester project 2024 of Prof. Thomas Hauck and Prof. Susann Ahn, students from TU Vienna further detailed the initial designs for NPL. This included several co-creative sessions with the pep management, with the aim for implementation in July 2024. One of the designs entitled “Austauschbörse” was adapted to be set within a new green roof on the southern multi-story car park. Ideas for other designs, such as bee nesting aids, an urban roof garden, nesting aids for birds and roosts for bats were integrated into this implementation design. The students drew up an implementation plan for the design and calculated the material quantities and costs. A construction schedule was set-up and in cooperation with SAAD the final “Nisthocker” (nesting stool) was developed.

The AAD-Demonstrator Nisthocker was built collaboratively by the team of students with the carpenter Phillip Castilleja, Prof. Susann Ahn, and team SAAD (Prof. Thomas Hauck and Christine Jakoby) in one week, the first week of July 2024. Tools and machinery came from the TU Vienna, pep technical team and Maker Space UnternehmerTUM. The Nisthocker was set up at its temporary location, Vorplatz Charles-de-Gaulle-Straße 2a, which is at the central rear entrance to the shopping centre and at the main pathway through the big iconic appartement block ring of Neuperlach (Wohnring).

Freiraum und Bebauung - „Neuperlach“
 Sommersemester 2024 | Landschaftsarchitektur

EXPLOSIONS AXO

AUSTAUSCHBÖRSE

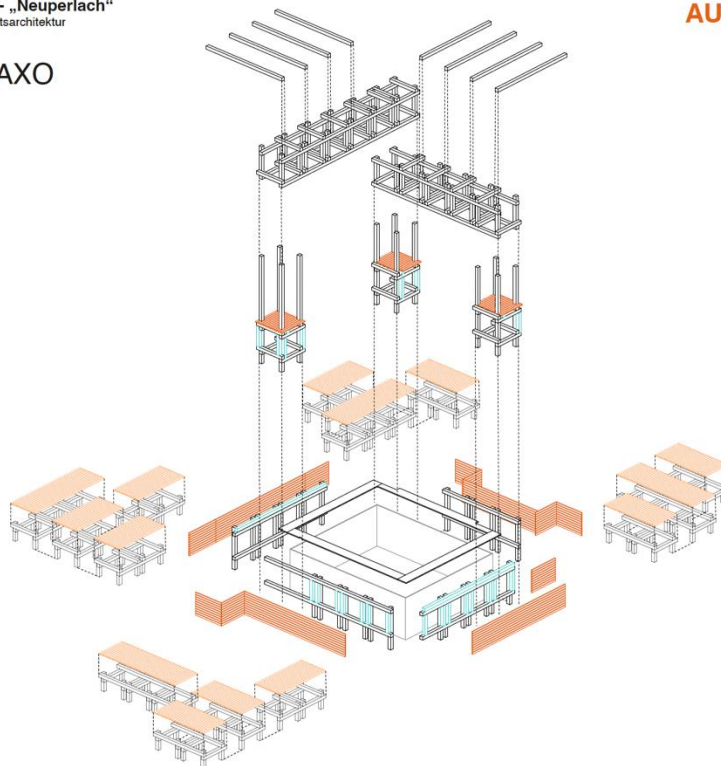
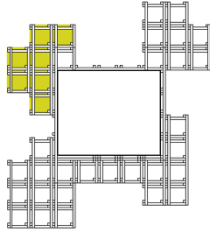


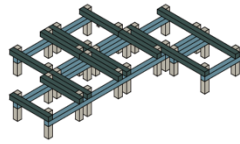
Figure 13: Axonometric explosion drawing of Nisthocker. Image Source: NEBourhoods/ TUW

Bauplan - Bauteil A

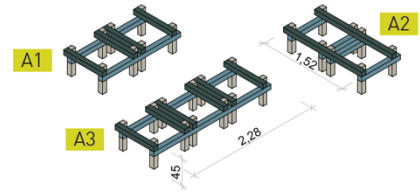
Verortung



Axonometrie



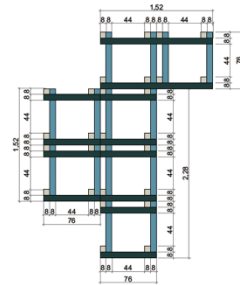
Explosionsaxonometrie



Modulanforderungen

Materialwahl	Beschreibung	Länge (m)	Stärke	Höhe	Menge
MODUL_A1					
Konstruktionsholz Fichte BauB	Vertikale 45	0,45	0,08	0,08	8
Konstruktionsholz Fichte BauB	Horizontale 76	0,76	0,08	0,08	4
Konstruktionsholz Fichte BauB	Horizontale 152	1,52	0,08	0,08	2
Flachblech					3
Winkelschraubung					1
MODUL_A2					
Konstruktionsholz Fichte BauB	Vertikale 45	0,45	0,08	0,08	12
Konstruktionsholz Fichte BauB	Horizontale 76	0,76	0,08	0,08	6
Konstruktionsholz Fichte BauB	Horizontale 228	2,28	0,08	0,08	2
Flachblech					4
Winkelschraubung					7
MODUL_A3					
Konstruktionsholz Fichte BauB	Vertikale 45	0,45	0,08	0,08	8
Konstruktionsholz Fichte BauB	Horizontale 76	0,76	0,08	0,08	4
Konstruktionsholz Fichte BauB	Horizontale 152	1,52	0,08	0,08	2
Flachblech					4
Winkelschraubung					2

Grundriss
1:20



Grundriss
1:20

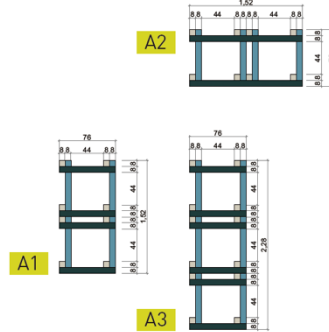


Figure 14: Construction details Nisthocker. Image Source: NEBourhoods/ TUW

Students involved in the design and build of the Nisthocker were: Julia Ahm, Todor Andonov, Emanuel Braun, Sebastian Fehringer, Arianna Fois, Clara Frühwald, Nina Verena Gsöllpointner, Maike Heßmann, Maria Rosa Hochreiter, Marie Kaiser, Annalena Kindt, Sophia Lanner, Sandra Obermann, Julia Olf, Sophie Philipp, Tobias-Christoph Piesch, Anastasia Prozorovska, Eliana Ray, Philip Gideon Marius Riedel, Laura-Marie Sipple, Paula Johanna Tappe.

The total cost of the AAD-Demonstrator Nisthocker is 10,500 Euros.

Including: high quality semi-mature shrubs, lightweight soil substrate, robust timber structure prepared for outdoor use, and outdoor quality hardware (screws, bolts etc.)

Excluding: labour costs and tools hire/ transport costs

Additional information on the Nisthocker can be found here:

<https://www.nebourhoods.de/en/news/20240705-nebourhoods-nisthocker>



Figure 15: NEBourhoods AAD-Nisthocker. Image Source: NEBourhoods/ SAAD Christine Jakoby

The Nisthocker, "NEBourhoods Nesting Stool", is "a modular timber structure that provides not only seating and sunbathing decks but also space for trees, perennial shrubs and edible plants, as well as sunshades and nesting aids for birds, and wild bees. It is a sculpture that combines habitats for people, animals and plants." At its current location it is a very successful AAD-Demonstrator for promoting urban biodiversity and fostering contact with nature in the city.

3.4.2.2 Implementation of biodiverse roof garden as Demonstrator

Designs originally included the Nisthocker as a feature within a new to be installed biodiverse roof garden on a parking deck at pep. The Transition Hub helped set up a local garden group, with interested residents in NPL and a local gardener. The garden would be run with the support of NEBourhoods' project partner Green City e. V. for the first year after the project ends to be fully established (funds still need to be secured). Details of the co-habitative garden space will be co-creatively planned in ongoing meetings with the new garden group and the pep management, supported by Peter Brooren of the Transition Hub team. Meanwhile the construction design is further detailed and implementation planned by SAAD. For this, SAAD and pep will continue to work beyond the NEBourhoods project. The realisation is planned for spring 2025.

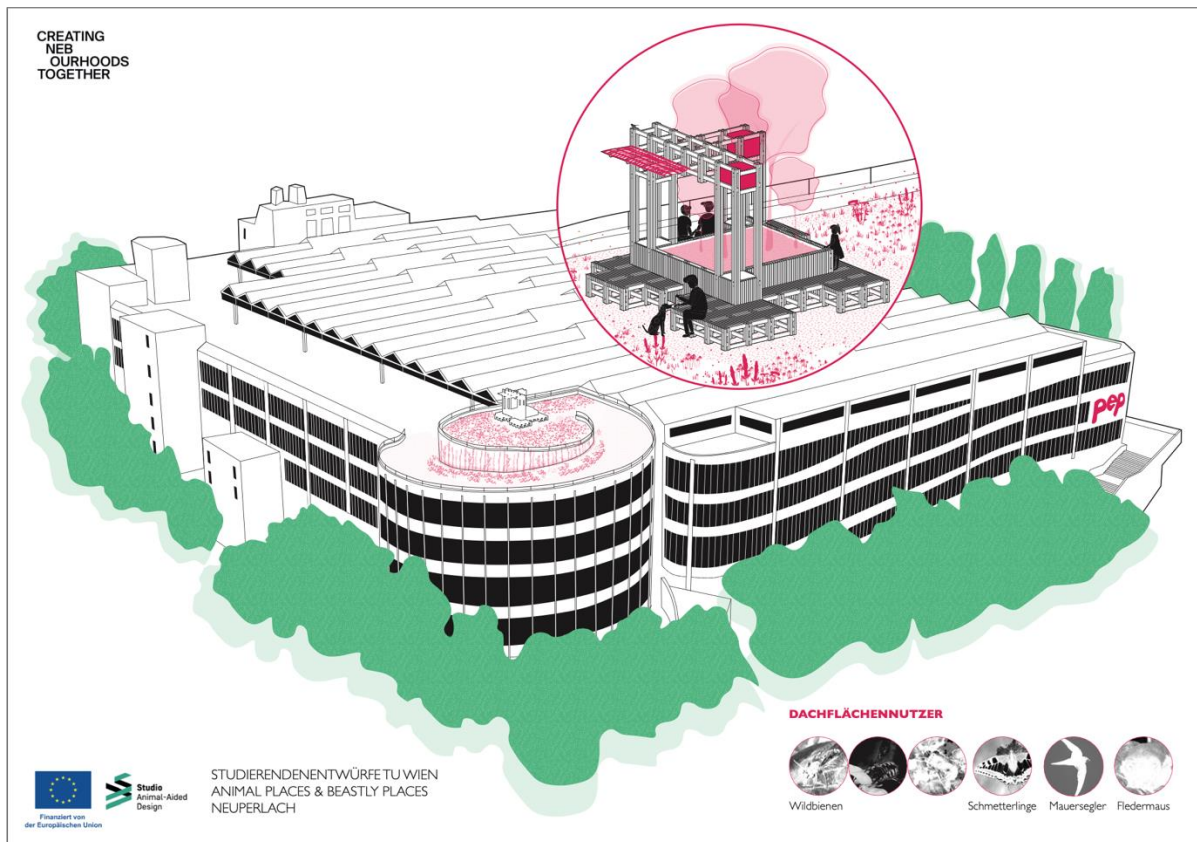


Figure 16: Initial design concept for biodiverse roof garden. Image Source: NEBourhoods/ SAAD, Nuria Keeve



Figure 17: Initial meeting for biodiverse roof garden. Image Source: NEBourhoods/ TH Natalia Chikanchi

3.4.3 Co-Creation and Testing of AAD Toolbox Application

In cooperation with Sarah Dorckenwald from the creative pool, SAAD developed a prototypical toolbox for the inclusion of wildlife into planning procedures and transformations in Neuperlach. Besides the workshops with kids at Come In, the toolbox prototype was tested with various participants during an open workshop format at the Munich Creative Business Week (MCBW). The group included invited stakeholder: a representative of the City of

Munich, Department of Climate- and Environmental Protection, a biologist, a social designer, an architect, a designer.



Figure 18: AAD-Toolbox application at Charles-de-Gaulle-Str 2a Vorplatz and mapping result. Image Source: NEBourhoods/ Peter Brooren, SAAD

The concrete application of tools from the prototype for participative planning of an open space helped shape the process, as well as choice of elements for the final AAD-Toolbox. Tools included: five exemplary target species flyers with checklists of habitat requirements, stickers of species needs in the form of icons, photos of habitat element and an aerial picture for the spatial mapping of elements.

3.5 KEY LEARNINGS

- The co-creation process was time intensive, but opened up a variety of ideas, that a small design team would not have been able to come-up with. It was also possible to develop and test an array of different “tools” and allowed experimentation with different users in various workshops.
- It is important to note that people from different disciplines speak different languages (we already experienced this at the start of our interdisciplinary work within SAAD). Factor in enough time for discussion, willingness to adjust and a big margin for trial and re-design until the final result.
- Involve people that will be tasked with the maintenance at an early stage. In the case of the City of Munich, this started a process of generating a willingness to change maintenance routines, towards wildlife inclusive methods. It also highlighted, that budgetary constraints (at the maintenance stage) will have to be addressed at the outset of a project. Therefore, new developments should factor in the new routines in the planning stage. Regeneration projects will have to be backed by citywide or companywide efforts, which includes adequate machinery and skilled staff. Small scale transformations would ideally transfer some of the maintenance to the users, i.e., weeding of the “sand lens” habitat element in the garden of Come In could be done by the kids who built it.
- It is important to be flexible and adapt engagement strategies. For this it helps to reflect on each step taken in the co-creation process, as the ways to engage and motivate stakeholders varies within different contexts. In the case of Come In, for example, motivation was based on community interest and local commitment to enhance biodiversity, as well as the desire to improve the quality of life in their garden/neighbourhood. This would also count for partners like housing associations and home owner groups. It contrasts with the pep, where motivations are based more towards strategic benefits and long-term goals. Here, and perhaps with other stakeholders in the real estate, partners are often looking for ways to enhance the green infrastructure in a multifunctional and resource efficient way (shading, greening, quality of outdoor space); as well as to strengthen their position on environmental, social and governance themes in the market.

4 NEBOURHOODS AAD-TOOLBOX (PROTOTYPE)

The NEBOurhoods AAD-Toolbox includes a catalogue of measures for meeting the critical needs of 14 selected target species in new developments or refurbishments of buildings and open (green) spaces in NPL. It will be available as a brochure on the NEBOurhoods website for use by interested stakeholders and is therefore written in German. In the AAD-Toolbox we highlight synergies with climate-sensitive urban design and energy retrofitting of buildings, and present practical solutions for the promotion of urban biodiversity. The different elements of the toolbox allow a process of participation. Its application could be described as following:

As a first step, the most suitable animal species should be chosen from the 14 target species selected for Neuperlach, depending on the specific location. An overview sheet of the critical needs of the target species shows the habitat elements in the main categories: food, shelter, reproduction and hygiene. With this overview, an initial project and location-specific site analysis follows, to determine whether and which of the individual habitat elements are already present or can be easily implemented. Here it is important to consider the possibility of independent migration of the respective species to the project site. Species, such as the sand lizard for example, are dependent on structurally rich migration corridors. The critical habitat factors of the respective target species can be analysed in more detail and checked against a checklist and visuals in the target species flyers. The habitat elements listed here for each of the target species, form the basis for planning concrete measures on site. As an important step, an aerial photograph or plan of the site can be used for mapping out the habitat potential. The compact measure sheets in the AAD-Toolbox, provide information on the size, installation/construction and maintenance of the habitat elements. It is encouraged, that new designs are developed. Examples of designs are shown in the latter part of the toolbox. As a last step, the site-specific implementation needs to be planned, for which further information can be found in the AAD-Database (see following chapter). A list of all habitat elements (vegetation and structural) with information on the type, function and functional element, related target species and combination with other elements can be found in Appendix 2.

The City of Munich and Münchner Gesellschaft für Stadterneuerung mbH (MGS) are planning to integrate AAD into new projects. Other stakeholders like housing associations and real estate developers of NPL are informed about the AAD-Toolbox and encouraged to use it for new buildings and regeneration of the housing stock. The process design of the Toolbox allows a participative process for the enhancement of biodiversity in a neighbourhood. It is therefore also suitable to be used in schools or at local community level. Above all, it allows people to reconnect with nature and contribute to a bottom-up expansion of green infrastructure in urban areas.

The AAD-Toolbox for Neuperlach is downloadable on the NEBOurhoods website:

<https://www.nebourhoods.de/results>

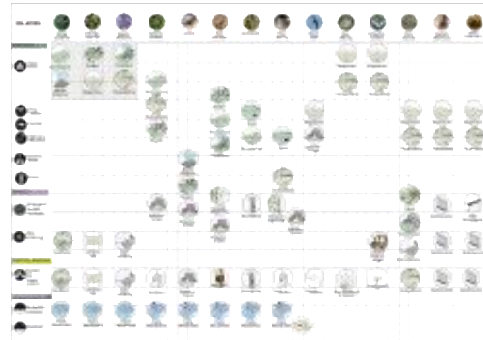
USER GUIDE AAD-TOOLBOX NEBOURHOODS

„MY ANIMAL-AIDED DESIGN“

STEP 1

OBSERVE

Have a look at the **Overview of Measures** and their respective functions for the target species. Find out, for which of the animals your project location is most suitable.



STEP 2

CHECK

Chose a **Target Species Flyer** and find out more about the animal. Check your project site: What does it already offer for the target species and what is needed for it to be attracted to move and live here?



STEP 3

PLAN

How could you create a pleasant place for you, as well as different animal species? Print out an aerial picture or a plan of the project site and start mapping what's already there. Use the **Stickers** to map and plan where you want to build additional **Habitat Elements** that are needed for the target species.



STEP 4

DESIGN

Look at the **Habitat Elements**, for different target species in more detail. Chose, and design your site specific version of it, using the measure sheets in the **Toolbox Brochure** for more information. Look for building instructions, make a list of materials needed and get some tools. Then you can start to build!



Figure 19: User guide to AAD-Toolbox NEBOurhoods. Image Source: NEBOurhoods/ Sarah Dorckenwald, SAAD

5 DATABASE (PROTOTYPE)

5.1 OBJECTIVE OF THE DATABASE

Connected to the AAD Toolbox is a web-based database. This open-source database provides planners and architects (or other interest groups and stakeholders) with a tool that helps to integrate the needs of wild animal species into architectural and open space/public realm projects. Essentially the database lists all 14 target species identified for NPL and their respective critical needs in form of habitat elements and the associated plant species.

5.2 APPLICATION OF THE DATABASE

Via the user interface, animal and plant species can be selected and possible habitat elements with corresponding measure and maintenance recommendations (as well as images and links where applicable) are suggested. The search function works in all directions, i.e., entering a habitat element such as 'sand lens' should lead to possible animal and plant species as well as the associated information. Equally, entering one target species name, the associated habitat elements are presented.

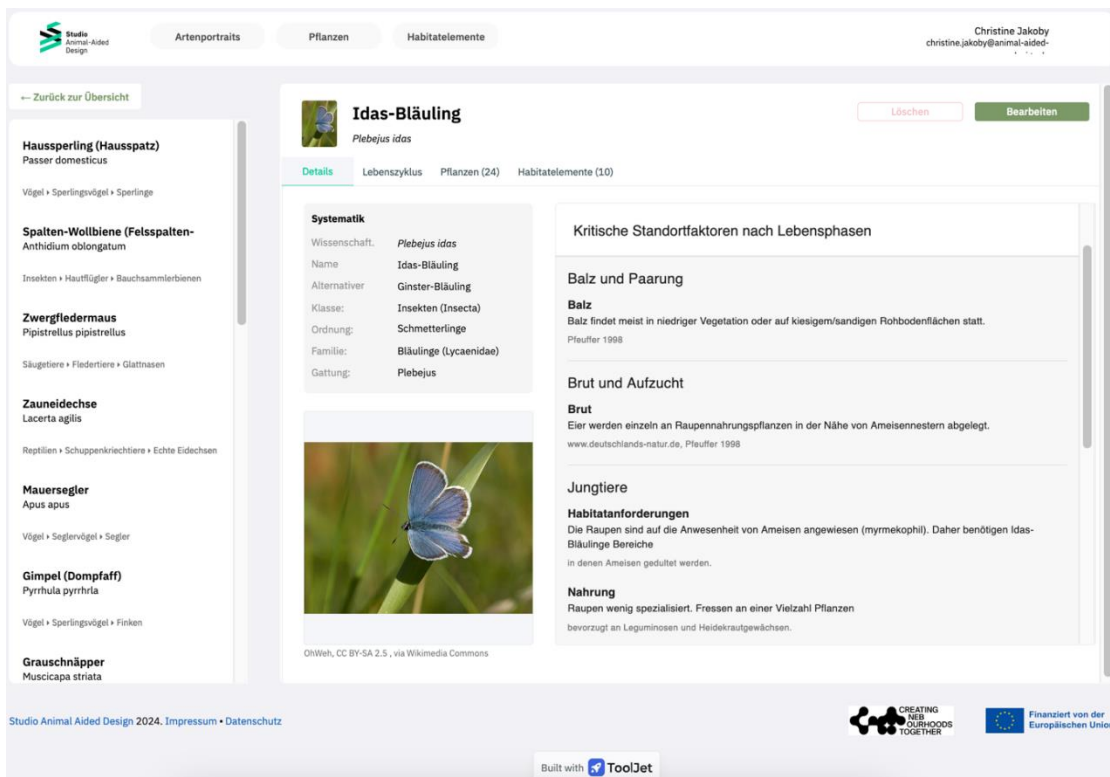


Figure 20: Screenshot AAD-database, example species portrait. Image Source: NEBourhoods/ SAAD

Verknüpfte Habitatelemente Habitatelement verknüpfen

Vegetation (8) Dachbegrünung (2)

Search

NAME	FUNKTION	FUNKTIONSELE...	LEBENSPHASE(N)	ANMERKUNGEN
(Wild-)Staudenfläche	Nahrung	Nektar	adult	
Blumenwiese	Nahrung	Nektar	adult	
Krautsaum	Nahrung	Nektar	adult	
Magerrasen	Nahrung	Nektar	adult	
Ruderalfläche	Balz	Fläche	adult	
Ruderalfläche	Eiablage	Pflanzen	Ei	
Ruderalfläche	Nahrung	Nektar	adult	
Sträucher	Nahrung	Nektar	adult	

8 Records 1 of 1







Figure 21: Screenshot AAD-database, example of habitat elements functional relation. Image Source: NEBourhoods/ SAAD

Artenportraits Pflanzen Habitatelemente Christine Jakoby christine.jakoby@animal-aided-... 

Pflanzenportrait

Eberesche Löschen Bearbeiten In NaturaDB öffnen

Details Verknüpfte Zielarten

Search

DEUTSCHER NA...	WISS. NAME	KLASSE	KLASSE (WISS.)	ORDNUNG	ORDNUNG (WIS...	ZWECK	ANMERKUNGEN	QUELLEN
Bärtige Sandbiene	Andrena barbilabris	Insekten	Insecta	Hautflügler	Hymenoptera	Pollen- und Nektarquelle	beliebte Pollenquelle	Witt 192
Hausperling	Passer domesticus	Vögel	Aves	Sperlingsvögel	Passeriformes	Nahrung (Beeren, Insekten)		
Gartenrotschwanz	Phoenicurus phoenicurus	Vögel	Aves	Sperlingsvögel	Passeriformes	Nahrung	Gelegentliches Nestlingsfutter, von Anfang Juli bis zum Wegzug von Adulten sporadisch verzehrt	Glutz von Blotzheim

Figure 22: Screenshot AAD-database, example of plants functional relation. Image Source: NEBourhoods/ SAAD

The Database is a web-based solution, that is independent of the end user's operating software. The database was set-up through a sub-contractor (Christian Konrad at We-Arise) and allows the SAAD team to update and expand the information as well as entering new animal species, plant lists, habitat elements in the future.

Link for access to database:

<https://app.tooljet.com/applications/species-portrait-and-habitat-database/>

6 APPENDICES

Appendix 1 and Appendix 2 on the following pages.

APPENDIX 1: SELECTED TARGET SPECIES FOR NEUPERLACH

APPENDIX 2: HABITAT ELEMENTS FOR TARGET SPECIES

APPENDIX 1: SELECTED TARGET SPECIES FOR NEUPERLACH

Group	Scientific name	German Common name	English Common name	Selection criteria	Red list status Germany	Perceivability	Closest Sighting Measured from Hanns-Seidel-Platz in the centre of NPL
Bats	<i>Pipistrellus pipistrellus</i>	Zwergfledermaus	Common pipistrelle	> Nature experience (high perceivability) > Species of the Biodiversity strategy Munich	LC (Least Concern)	> hunts in twilight and around street lights	ca. 450 m
Bats	<i>Vespertilio murinus</i>	Zweifarb-fledermaus	Parti-coloured bat	> High conservation priority > Species of the Biodiversity strategy Munich	DD (Data Deficient)	> chirping calls in mating season	ca. 4600 m
Reptiles	<i>Lacerta agilis</i>	Zauneidechse	Sand lizard	> High conservation priority	NT (Near Threatened)	> sun basking on stonewalls, rocks and deadwood	ca. 600 m
Butterflies	<i>Papilio machaon</i>	Schwalbenschwanz	Swallowtail	> Nature experience (high perceivability)	LC (Least Concern)	> large > striking yellow-black wing patterns > "hilltopping" in mating season	Neuperlach
Butterflies	<i>Plebejus idas</i>	Idas-Bläuling / Ginster-Bläuling	Idas blue	> Very high conservation priority > Munich regional centre of distribution in Bavaria > Nature experience	VU (Vulnerable)	> blue wing colouration	Neuperlach

Group	Scientific name	German Common name	English Common name	Selection criteria	Red list status Germany	Perceivability	Closest Sighting <small>Measured from Hanns-Seidel-Platz in the centre of NPL</small>
Birds	<i>Apus apus</i>	Mauersegler	Common swift	> Nature experience (high perceivability) > Species of the Biodiversity strategy Munich	LC (Least Concern)	> "screaming parties" around nesting areas during summer evenings (10-20 swifts gather in flight calling loudly) > hunting flights in higher altitude	Neuperlach
Birds	<i>Muscicapa striata</i>	Grau-schnäpper	Spotted flycatcher	> High conservation priority	NT (Near Threatened)	> makes stunts from conspicuous perches to hunt for flying insects	ca. 1200 m
Birds	<i>Passer domesticus</i>	Haus Sperling	House sparrow	> High conservation priority > Nature experience (high perceivability)	NT (Near Threatened)	> well adapted to living around humans > not very shy > sociable and convivial during all seasons	Neuperlach
Birds	<i>Phoenicurus phoenicurus</i>	Garten-rotschwanz	Common redstart	> High conservation priority > Nature experience (high perceivability) > Species of the Biodiversity strategy Munich	NT (Near Threatened)	> conspicuously coloured > makes sallies from low perches to hunt for insects on the ground or in flight	ca. 1200 m
Birds	<i>Picus viridis</i>	Grünspecht	European green woodpecker	> Nature experience (high perceivability) > Indicator species for half-open landscapes (Bund Naturschutz)	LC (Least Concern)	> striking plumage coloration > loud calls > feeds on ants on the ground	Neuperlach
Birds	<i>Pyrrhula pyrrhula</i>	Gimpel	Eurasian bullfinch	> Nature experience (high perceivability)	LC (Least Concern)	> pretty plumage colouration > usually seen as a pair	ca. 960 m

Group	Scientific name	German Common name	English Common name	Selection criteria	Red list status Germany	Perceivability	Closest Sighting <small>Measured from Hanns-Seidel-Platz in the centre of NPL</small>
Wild bees	<i>Andrena barbilabris</i>	Bärtige Sandbiene	Bearded miner bee	> High conservation priority	NT (Near Threatened)	> "swimming" movements during nest building in sandy soil > often aggregations of nests	Neuperlach
Wild bees	<i>Anthidium oblongatum</i>	Spalten-Wollbiene	Oblong woolcarder bee	> High conservation priority	NT (Near Threatened)	> strong black and yellow markings and green eyes > collects nesting material from "hairy" plants	ca. 600 m
Wild bees	<i>Anthophora plumipes</i>	Frühlings-Pelzbiene	Hairy-footed flower bee	> Nature experience (high perceivability)	LC (Least Concern)	> fast hovering flights between flowers > one of the first active bees in spring > looks similar to a small bumble bee	Neuperlach

APPENDIX 2: HABITAT ELEMENTS FOR TARGET SPECIES

Habitat Element_type	Habitat Element_name	Function	Functional Element	Target Species	Combine with
Vegetation	Lawn	Food	Insects	Common redstart, Green woodpecker, House sparrow	(Long) Grass strips
Vegetation	Flowering lawn	Food	Insects, pollen/nectar	Common redstart, Green woodpecker, Bearded miner bee, Oblong woolcarder bee	(Long) Grass strips
Vegetation	Wildflower meadow	Food	Insects, pollen/nectar	Common redstart, Common swift, European bullfinch, House sparrow, Spotted flycatcher, Common pipistrelle, Parti-coloured bat, Sand lizard, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	(Long) Grass strips
Vegetation	Nutrient-poor dry grassland	Food	Insects, pollen/nectar, seeds; sand	Common redstart, Common swift, European bullfinch, House sparrow, Spotted flycatcher, Common pipistrelle, Parti-coloured bat, Sand lizard, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	(Long) Grass strips
Vegetation	Nutrient-poor dry grassland with occurrence of ants	Food	Insects, pollen/nectar	Common redstart, Common swift, European bullfinch, House sparrow, Spotted flycatcher, Common pipistrelle, Parti-coloured bat, Sand lizard, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	
Vegetation	Ruderal surfaces	Food; egg-laying site; courtship	Insects, pollen/nectar, seeds; sand	Common redstart, European bullfinch, House sparrow, Spotted flycatcher, Common pipistrelle, Parti-coloured bat, Sand lizard, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	stone pile; dead wood
Vegetation	(Wild-) Herbaceous perennials	Food	Insects, pollen/nectar	Common redstart, European bullfinch, House sparrow, Spotted flycatcher, Sand lizard, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	

Habitat Element_type	Habitat Element_name	Function	Functional Element	Target Species	Combine with
Vegetation	(Wild-) Herbaceous fringe	Food; refuge	Insects, pollen/nectar, buds, fruits, berries, seeds	Common redstart, European bullfinch, House sparrow, Spotted flycatcher, Common pipistrelle, Parti-coloured bat, Sand lizard, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	wilflower meadow; flowering lawn
Vegetation	(Long) Grass strips	Food; refuge	Insects, seeds	European bullfinch, House sparrow, Sand lizard	wilflower meadow; flowering lawn
Vegetation	Shrubs	Food	Insects, pollen/nectar, buds, fruits, berries, seeds	Common redstart, European bullfinch, House sparrow, Spotted flycatcher, Idas blue, Bearded miner bee, Hairy-footed flower bee	wilflower meadow; flowering lawn
Vegetation	Dense shrubs	Nesting; food; refuge	Dense branches; buds, fruits, berries, seeds	Common redstart, Common swift, European bullfinch, House sparrow, Spotted flycatcher, Common pipistrelle, Parti-coloured bat, Sand lizard	Conifers
Vegetation	(Native) Hedgerows	Nesting; food; refuge	Dense branches; buds, fruits, berries, seeds	Common redstart, Common swift, European bullfinch, House sparrow, Spotted flycatcher, Common pipistrelle, Parti-coloured bat, Sand lizard	Conifers; herbaceous fringe
Vegetation	Groups of shrubs (Shrub-Clumps)	Nesting; food; refuge	Dense branches; buds, fruits, berries, seeds	European bullfinch, House sparrow, Sand lizard	
Vegetation	Trees	Food	Insects, pollen/nectar, buds, fruits, berries, seeds	Common redstart, European bullfinch, House sparrow, Spotted flycatcher, Sand lizard, Bearded miner bee, Hairy-footed flower bee	
Vegetation	Deciduous trees and shrubs	Nesting; food	Dense branches; buds	European bullfinch	
Vegetation	Orchard meadow	Courtship; food	Branches, fruit, insects	Common redstart, Spotted flycatcher	wilflower meadow; flowering lawn
Vegetation	(Young) Conifers	Nesting	Dense branches	European bullfinch	dense shrubs; dense hedges

Habitat Element_type	Habitat Element_name	Function	Functional Element	Target Species	Combine with
Vegetation	Groups of trees	Sleeping place; nesting; food	Cavities, insects	Green Woodpecker, Common pipistrelle, Parti-coloured bat	wilflower meadow; flowering lawn; shrubs; (wild) herbaceous perennials
Vegetation	Climbing plants (self-clinging)	Nesting; refuge; sleeping place	Dense branches	House sparrow, Spotted flycatcher	nesting aids; green roof; planting
Vegetation	Climbing plants with support structure	Nesting; refuge; sleeping place; food	Dense branches; pollen/nectar, fruit	House sparrow, Spotted flycatcher, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	nesting aids; green roof; planting
Vegetation	(Raised) Vegetable beds	Food; egg-laying	Nectar, leaves; stems	Swallowtail	
Vegetation	Vertical plant stems/branches	Overwintering	stems/branches	Swallowtail	
Vegetation	Umbelliferous plants	Food; egg-laying	Nectar, leaves; stems	Swallowtail	
Vegetation	Areas of Aubrieta-planting	Courtship	Flowers	Hairy-footed flower bee	
Structural element	Shallow water area	Drinking and/or bathing	Water	Common redstart, Common swift, European bullfinch, House sparrow, Spotted flycatcher, Common pipistrelle, Parti-coloured bat, Sand lizard, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	
Structural element	Sandy area (min. depth 20 mm)	Dust bath	Sand	House sparrow	
Structural element	Unpaved area of bare soil	Dust bath	Sand/ dust	House sparrow	
Structural element	Sand lense / Sand bed (min. depth 50 mm)	Egg-laying site	Sand	Bearded miner bee	Losely piled logs of different stem diametre (20-200 mm)

Habitat Element_type	Habitat Element_name	Function	Functional Element	Target Species	Combine with
Structural element	Sand lense / Sand bed (min. depth 30 mm)	Egg-laying site	Sand	Sand lizard	Losely piled logs of different stem diametre (20-200 mm); Horizontal dead wood; Dead hedge; stone pile, herbaceous fringe; (long) grass strips; ruderal surface
Structural element	Wide pavement joint filled with sand	Egg-laying site	Sand	Bearded miner bee	wildflower meadow; flowering lawn; (wild) herbaceous perennials
Structural element	Stone piles	Perch; hiding place, hibernation	Stones; cavities	Common redstart, Spotted flycatcher; Sand lizard; Oblong woolcarder bee	herbaceous fringe; (long) grass strips; ruderal surface; wildflower meadow
Structural element	Dry stone wall	Perch; hiding place; basking spot; hibernation; egg-laying site	Stones; cavities	Common redstart, Spotted flycatcher; Sand lizard; Hairy-footed flower bee, Oblong woolcarder bee	herbaceous fringe or (long) grass strip min. 0.5m; sand lense on sunny side
Structural element	Stone filled gabione	Perch; hiding place; hibernation; egg-laying site	Stones; cavities	Common redstart, Spotted flycatcher, Sand lizard, Oblong woolcarder bee	herbaceous fringe or (long) grass strip min. 0.5m; sand lense on sunny side
Structural element	Horizontal dead wood	Perch; hiding place; basking spot;hibernation	Logs; cavities	Common redstart, Spotted flycatcher; Sand lizard	herbaceous fringe; (long) grass strips; ruderal surface; sand lense
Structural element	Dead wood filled gabione	Perch; hiding place, hibernation		Common redstart, Spotted flycatcher; Sand lizard	herbaceous fringe; (long) grass strips; ruderal surface; sand lense (on sunny side)
Structural element	Dead hedge	Perch; hiding place; hibernation	Cavities	Common redstart, Spotted flycatcher; Sand lizard	herbaceous fringe; (long) grass strips; ruderal surface; sand lense (on sunny side)

Habitat Element_type	Habitat Element_name	Function	Functional Element	Target Species	Combine with
Structural element	Brushwood-leaf pile	Hiding place; hibernation	Cavities	Sand lizard	wildflower meadow; (wild) herbaceous perennials; herbaceous fringe; (long) grass strips; dense shrubs; native hedgerow; groups of shrubs
Structural element	Bird feeders	Food	Seeds	Common redstart, European bullfinch, House sparrow	Shrubs; trees
Structural element	Compost area/ compost heap	Food	Insects	Common redstart, House sparrow, Spotted flycatcher	herbaceous fringe; stone pile; horizontal dead wood
Roost / Nesting aid	Wild bee clay nesting aid	Nesting	Clay cavity	Hairy-footed flower bee	wildflower meadow; (wild) herbaceous perennials
Roost / Nesting aid	Cavities or nest boxes on trees; entrance hole Ø 32-34 mm	Nesting	Cavities	House sparrow	Shrubs; trees; native hedgerow; climbing plants
Roost / Nesting aid	Façade cavities or nest boxes; entrance hole Ø 32-34 mm	Nesting	Cavities	House sparrow	Shrubs; trees; native hedgerow; climbing plants
Roost / Nesting aid	Cavities or boxes on trees; entrance hole Ø 32-48 mm	Nesting	Cavities	Common redstart	
Roost / Nesting aid	Cavities or boxes on trees; oval entrance hole 30x50 mm	Nesting	Cavities	Common redstart	

Habitat Element_type	Habitat Element_name	Function	Functional Element	Target Species	Combine with
Roost / Nesting aid	Open-front nest box; opening 50 mm height	Nesting	Cavities	Spotted flycatcher	Native hedgerow, Shrubs and trees in direct vicinity
Roost / Nesting aid	Façade cavities or swift nest boxes; entrance hole Ø 50 mm	Nesting	Cavities	Common swift	
Roost / Nesting aid	Façade cavities or swift nest boxes; entrance hole wide oval 40x60 mm	Nesting	Cavities	Common swift	
Roost / Nesting aid	Crevice roost in building façade (maternity roost)	Rearing pups	Crevices	Common pipistrelle, Parti-coloured bat	wildflower meadow; (wild) herbaceous perennials; herbaceous fringe;
Roost / Nesting aid	Crevice roost under parapet	Sleeping place	Crevices	Common pipistrelle	wildflower meadow; (wild) herbaceous perennials; herbaceous fringe;
Roost / Nesting aid	Insulated crevice roost in building façade (winter roost)	Hibernation	Crevices	Common pipistrelle	wildflower meadow; (wild) herbaceous perennials; herbaceous fringe;
Roost / Nesting aid	Crevices/ crevice roosts in building façade (summer roost)	Sleeping place	Crevices	Common pipistrelle, Parti-coloured bat	wildflower meadow; (wild) herbaceous perennials; herbaceous fringe;

Habitat Element_type	Habitat Element_name	Function	Functional Element	Target Species	Combine with
Roost / Nesting aid	Insulated crevice in high building (winter roost)	Hibernation	Crevices	Parti-coloured bat	wildflower meadow; (wild) herbaceous perennials; herbaceous fringe;
Roost / Nesting aid	Crevice roost on trees (summer roost)	Sleeping place	Crevices	Parti-coloured bat	wildflower meadow; (wild) herbaceous perennials; herbaceous fringe;
Roost / Nesting aid	Crevice roost on trees (maternity roost)	Rearing pups	Crevices	Parti-coloured bat	wildflower meadow; (wild) herbaceous perennials; herbaceous fringe;
Green roof	Biodiverse green roof - prairie planting	Food	Insects; pollen/nectar; buds, fruits, berries; seeds	Common redstart, Common swift, European bullfinch, Green woodpecker, House sparrow, Common pipistrelle, Parti-coloured bat, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	Sand lense; Sand areas; Horizontal dead wood; Stone pile
Green roof	Biodiverse green roof - dry grassland	Food	Insects; pollen/nectar; seeds	Common redstart, Common swift, European bullfinch, Green woodpecker, House sparrow, Common pipistrelle, Parti-coloured bat, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	Sand lense; Sand areas; Horizontal dead wood; Stone pile
Green roof	Biodiverse green roof and Photovoltaic	Food	Insects; pollen/nectar; buds, fruits, berries; seeds	Common redstart, Common swift, European bullfinch, Green woodpecker, House sparrow, Idas blue, Swallowtail, Bearded miner bee, Hairy-footed flower bee, Oblong woolcarder bee	Sand lense; Sand areas; Horizontal dead wood; Stone pile