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Brief

This design was initiated back in 2021. The idea was to convert our largest grass lawn into a fruit orchard. In February 2022 my father passed away and the works were put on hold. In Spring 2023 we finished implementation.

Figure 1. Design timeline



Goals

This design was performed for our own homestead. The goal was to transform our biggest grass lawn into a fruit orchard that in the future can sustain as with a variety of fruits and at the same time creates excellent habitat for wildlife.

Acknowledgement

The design was tremendously inspired by another permaculture garden “Inspiratoriet” owned by Cecil Rye Olsen. It was inspired on the conceptual level – the overstory (the fruit trees) and the canopy (the berry bushes) layers were for us (and the wildlife); whereas the understory purely for wildlife (with focus on pollen, nectar, habitats and diversity) – as well as it was enabled on the physical level: Cecil giving away as many plants and seeds as you want, again and again and again; and on the spiritual level: Cecil’s teaching of accepting and letting go of control, letting the garden be, and learning to just be in the garden.

Another big influence was Dave Goulson and his amazing books and videos. Him and Cecil opened a new understanding of insects, taught to see the beauty in, and excitement about that world. (“the beauty in the eyes of the beholder”).

Image 1. View from the orchard towards the house



Design Framework

GoSADIME design framework was used for creating the Fruit Orchard design.

GOALS

The main goal for this project is to transform 500+ m² grass lawn into a fruit orchard, in order to reduce meaningless work, obtain yield and increase biodiversity.

Table 1. Design goals derived from permaculture principles and their connection to permaculture ethics

Principle	Goal	ETHICS
Use and value renewable resources	Reduce and preferably eliminate meaningless ¹ resource demanding labor, i.e.: <ul style="list-style-type: none"> - Lawn mowing every second week during the May-October season. Resources used: petrol and human labor. - Hedge trimming annually. Resources used: electricity & human labor. 	<p>Fair Share The desire to reduce the consumption of resources is obviously in line with the idea of setting limits to the consumption of non-renewable energy.</p> <p>Care for people Reducing meaningless, energy draining work.</p>
Use & value diversity	Increase biodiversity	<p>Care for earth Replacing a grass lawn with regenerative ecosystems, boosting biodiversity and soil health.</p>
Obtain a yield	Obtain a yield! Be self-sufficient with berries and fruits during high season	<p>Fair Share: D. Holmgren.: “Reducing our dependency on the global economy and replacing it with household’s economy, we decrease the demand that drives inequities and grow through a self-reliance.”</p> <p>Care for self By increasing own produce of berries & fruits, herbs and greens, we are contributing to our own health that is of high importance, as we must be healthy and secure, to be able to live happy and contributing lives.</p> <p>Care for kids Experiences that we have as kids stay with us for our whole life and form us as individuals. I believe one of the greatest gifts that we can give to our children is the opportunity to live and interact with nature. Unfolding seasons, a taste of a berry straight from a bush, baby plants growing from seeds into magnificent trees, all the living creatures of the wildlife, I believe is the best care we can provide to kids. Holmgren: “exposing very young children to the delight of foraging food in garden they are more likely to grow with deep and intuitive understanding. despite the distractions of youth, these early connections lead to later interest and ease in growing foods as adults”</p>

¹Meaningless (definition) – resource intense (time, energy), repetitive, does not add value or adds questionable value, does not give yield; typically, aimed at keeping things “looking nice”.

SURVEY

The following methods and tools were used during the survey phase.

- ✓ Base map
- ✓ Client's wish list
- ✓ Noting microclimates
- ✓ Mapping problems and limitations
- ✓ Collecting climate data
 - Wind
 - Precipitation
 - Sun hours
- ✓ Soil data
 - Soil samples
 - Plants indicators
 - Acidity testing

Base Map explained

Figure 2. Satellite photo, spring 2021



Figure 3. Elevation curves

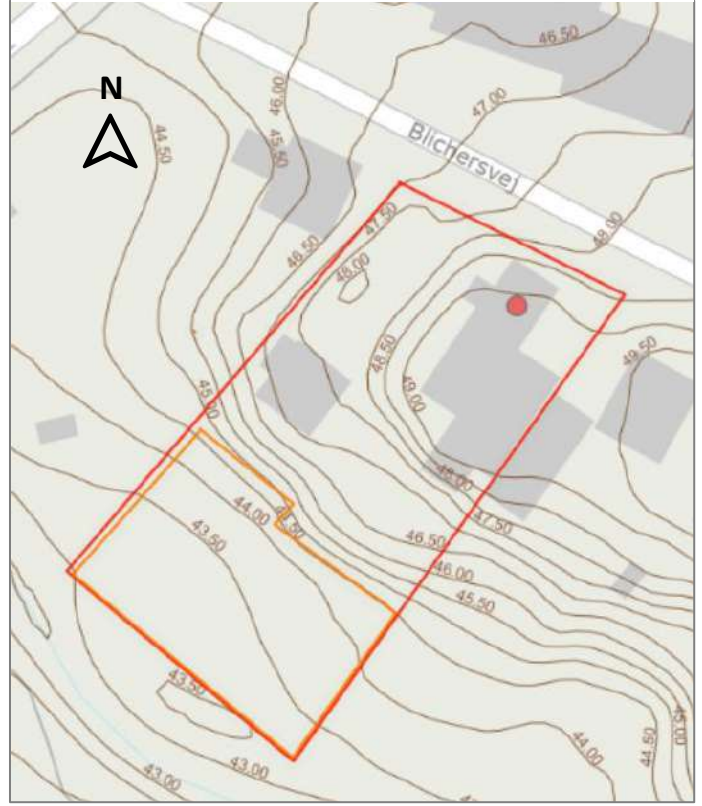


Figure 4. Fruit orchard parameters and area



- Orchard boundaries
- Cadastral boundaries

Source: <https://sdfekort.dk/spatialmap>

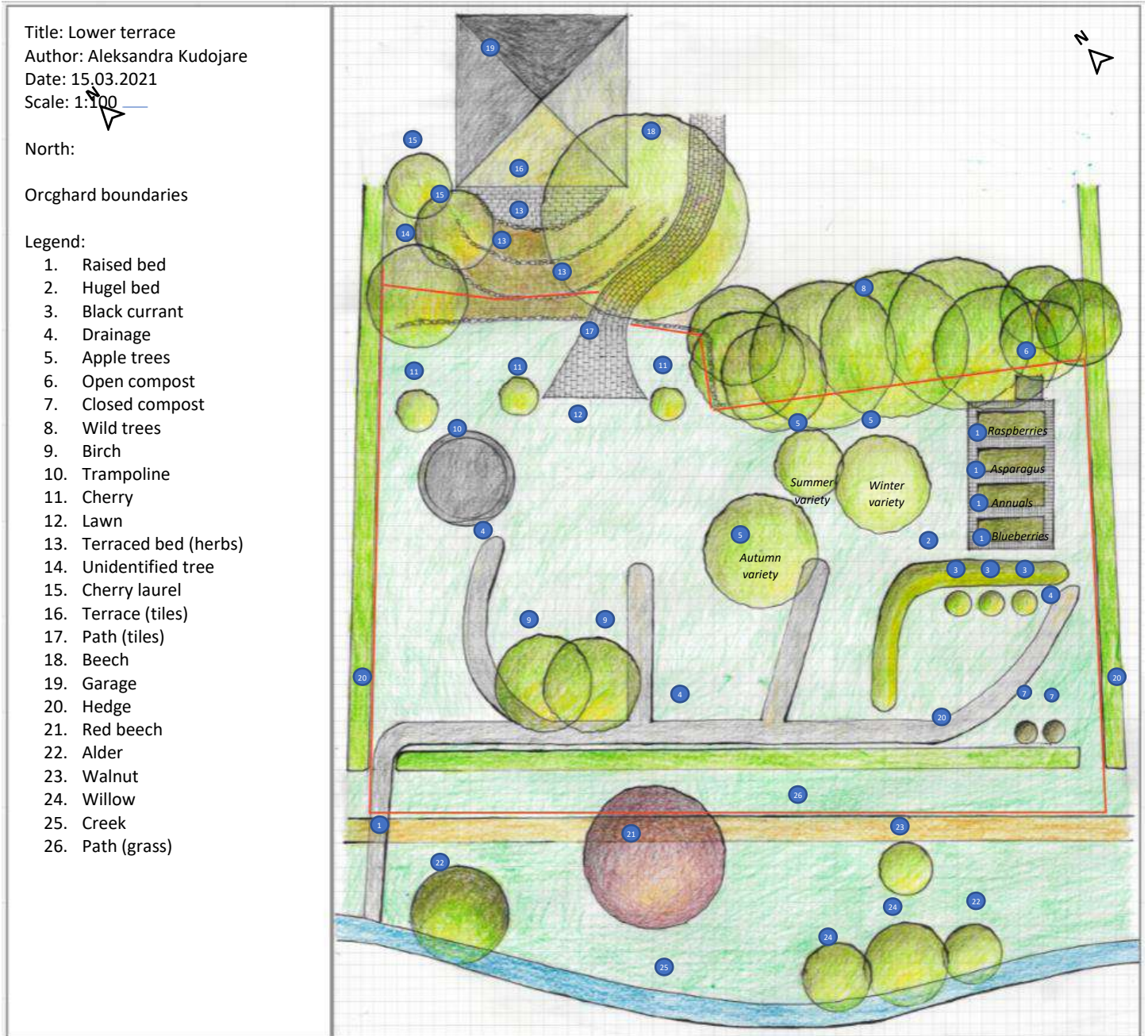
The figures above illustrate relative placement of the Fruit Orchard. It is located in the lowest part of the area. The overall Fruit Orchard area is 564 m². **Error! Reference source not found.** provides a detailed Base Map of the area. Systems, elements and their functions are discussed in greater detail in the ANALYSIS section, [“Base Map element analysis – “Keep or let go”](#)”.

Overall, currently the area is used for (functions):

- Food production, small scale:
 - o Apples, raspberries, blueberries, black currants
 - o Garlic, onions, parsley, dill,
- Composting area
- Kids outdoor time, using the trampoline

The area requires regular maintenance effort, in the form of lawn mowing.

Figure 5. Base Map over lower terrace



Household's wishes

This section presents the household's wish list for the area.

The design must include:

- Smaller dedicated area / places for the annuals, such as dill, parsley, leeks, garlic, squash
- Place for compost should be set aside
- Place for trampoline
- Walking paths shall not be too narrow
- As many fruit trees and shrubs as possible

Noting microclimates

Warm microclimate (HEAT TRAP?)

I have noticed one area that I believe has a warmer microclimate. Observation: In 2020 several pattypan squashes were planted in the Hugel bed (🌱). As there were few squashes left, these were planted in the only available location at that time, in the new established circle under the cherry tree (🌳) (Figure 7) After the first frosty night in October, the squashes in the Hugel bed were destroyed. I was very surprised to find that the others were not affected and continued giving fruits until mid-November.

Explanation:

The observation above has a good explanation. This location has Southern exposition, it is protected from the North-West by the hedge and North-East by the slope. Furthermore, the field stones are heated up by the sun during the day and release the heat during the night, flattening the temperature curve (Figure 6).

Figure 6. Microclimate explanation

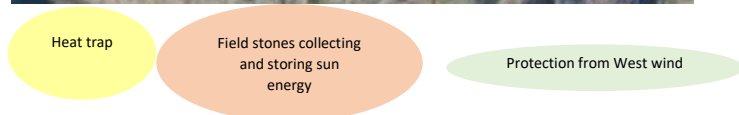


Figure 7. Pattypan squash placement in 2020



Wet zone

One doesn't need to be a careful observer to notice that the lower part of the terrace is a wet area (Figure 8). After a few days of rain, there are water puddles. I believe the rainwater cannot run out to the creek, due to the hill behind the hedge (likely man-made). The neighbors on both sides have a more natural downward slope towards the creek and don't experience such a wet zone.

In 2018 there was a very dry summer. Unfortunately, I don't have a picture, but it was striking to see the clear border that divided the area into two parts: green and brown-yellow.

Drainage has been created in 2020. It is expected to secure drained soil to the depth of 60 cm.

Figure 8. Wet zone and shaded area



Mapping of problems and limitations

Shaded areas

In Figure 8, shaded area is mapped that is the result of a tree massive on the North-East side. This causes the apple trees to grow in a skew pattern in search for the sun light.

Wet zone

As mentioned, in the previous section, Noting microclimates, there is a wet zone, that we need to be mindful about. The shortcomings as well as the possible opportunities are described in the ANALYSIS section.

Slugs & Snails

Depending on a variety, slugs and snails can be either perceived as useful or pest animals². Below, the observed species are listed. DAFOR framework is used intuitively.

Table 2. Observed snails in 2020

Dominant	Abundant	Frequent	Occasional	Rare
	<ul style="list-style-type: none"> - Spanish Slug (<i>Arion vulgaris</i>) - Orange-banded Arion (<i>Arion fasciatus</i>) 	<ul style="list-style-type: none"> - Black slug (<i>Arion ater</i>) 	<ul style="list-style-type: none"> - Leopard slug (<i>Limax maximus</i>) 	
	<ul style="list-style-type: none"> - White-lipped Snail (<i>Cepaea hortensis</i>) - Grove snail (<i>Cepaea nemoralis</i>) - Copes snail (<i>Arianta arbustorum</i>) 			<ul style="list-style-type: none"> - Roman snail (<i>Helix pomatia</i>)

The most destructive species is the Spanish slug. Depending on the year, their population varies. With increased use of straw mulch in the past year, population of the Orange banded Arions has increased, as well as their destructive impact on the garden. These two varieties are considered in the ANALYSIS section.

² <https://www.bolius.dk/snegle-i-haven-nyttedyr-eller-skadedyr-12544>

Image 2. Jonathan excited about snail races



Common blackbird

The reason that common blackbird is listed in the Addressing problems and limitation section is due to its destructive impact on berry produce, including strawberries, cherries, blueberries. Additionally, they are tossing away mulch material, when looking for earthworms, leaving the bare soil. I haven't observed them taking the slugs, only earthworms.

Soil

Soil sample

Soil samples have been taken from the locations for use in a jar test.

The result is as follows: (incl. pictures)

Clay → 2 mm out of 39mm = 5%

Silt → 13mm out of 39mm = 33 %

Sand → 24 mm out of 39mm = 62%

Furthermore, when taking the samples, it was observed that soil is very compressed (when drainage was performed, the extracted soil was afterwards compressed into the area around. Also, it has unhealthy rotten, swamp-like smell.

Figure 9. Soil analysis result – sandy loam



Plant indicators

Most of the area is a lawn. For the past 7 years no manipulations (such as moss removal, use of fertilizers, addition of grass) to improve the quality of the lawn has been undertaken. In 2020 most of the area has not been mowed in order to observe and record plant species in the lawn. The lawn consists of many varieties, which are not spread in a homogenic manner. Some spots are dominant by clover, others by bugleweed or buttercup. There are also some areas where plants are more mixed, i.e., grass, moss, horsetail in equal proportions.

The DAFOR framework is therefore used intuitively for the whole area.

Table 3. Observed plant species in summer 2020

Dominant	Abundant	Frequent	Occasional	Rare
- Grasses - Moss	- Clover - Buttercup - Horsetail	- Sorrel - Field balm - Dandelions - Pilewort	- Thistle - Bird's eye speedwell - Bugle weed - Bird's foot trefoil	- Field pansy

The plant cover, if properly interpreted, can be used as an indicator of the soils on which it grew: soil types, soil texture and soil chemical composition.³ Several sources⁴ suggest that horsetail is an indicator for poor soil and poorly drained soil.

Wet zone:

Plants that grow especially on low-lying, moist and poorly drained soil are **horsetail and buttercup**.

Nutrient-poor soil:

Among plants that require little nutrition and often occur on nutrient-poor, unfertilized soil are especially **horsetail**.

Acidic soil:

Plants that thrive especially on acidic soils with low reaction rates are **sorrel & bird's eye speedwell**.

Moss in a lawn is also an indicator for compacted soils, poorly drained soils, low soil fertility & acidic soils.

Soil conclusion

Even though several sources suggest that horsetail indicates nutrient poor soil, I am not convinced, as the growth overall is very lush. Based on the collected data the soil is compacted and sandy loam.

³ Holzer XXX

⁴ <https://www.boerglumparken.dk/indikatorplanter/>
<https://www.haveabc.dk/38/indikatorplanter>

Climate data

Sun

Figure 10. Sunshine hours summed up for Denmark for 2020 (Source: Vejrarkiv (dmi.dk))

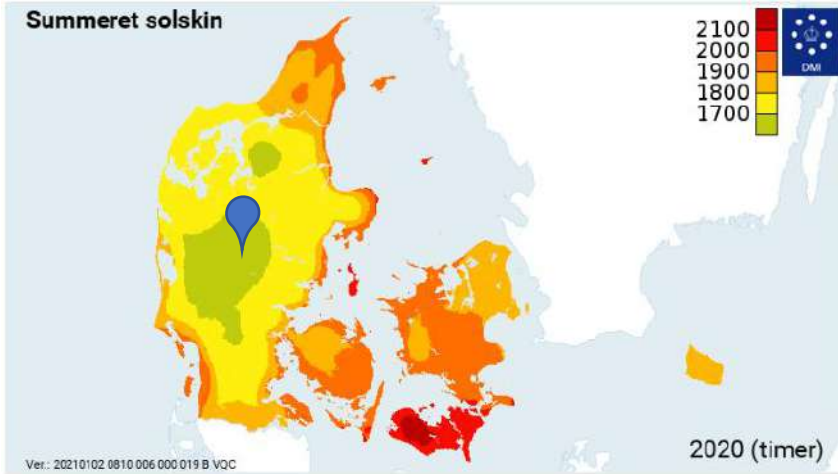
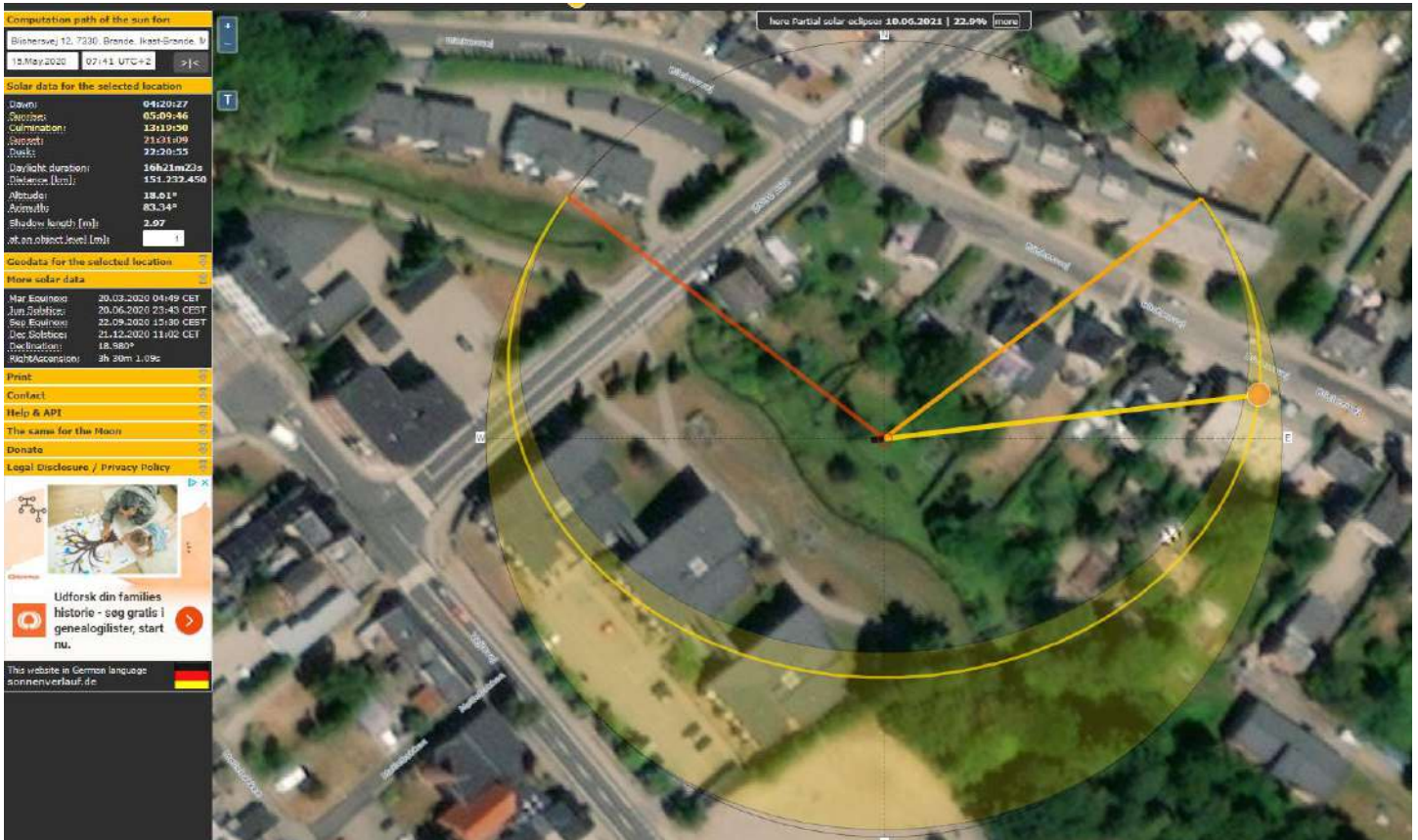


Figure 11. Sun path for mid-May (Source: suncalc.org)



Conclusions: we live in the area of Denmark with least sun hours per year. The area itself has a very good sun exposure. Apart from the shaded zone. (March, equinox, mid-summer (12:00))

Wind

Wind statistics obtained from a wind turbine in Brande, in the period 27.04.2020-27.04.2021 (1 year), showing powerful West and South-West winds that are typical for Jutland.

To some extent we are protected by the buildings and the trees that are intended as the wind break barrier (Figure 13). Despite that, we experience that the wind finds a way and that there is a wind tunnel. The Fruit orchard area is less impacted due to its lower location and partial protection by the hedge. Much stronger impact is experienced by the mid and high terraces.

Figure 12. Wind rose for Brande 2020-2021

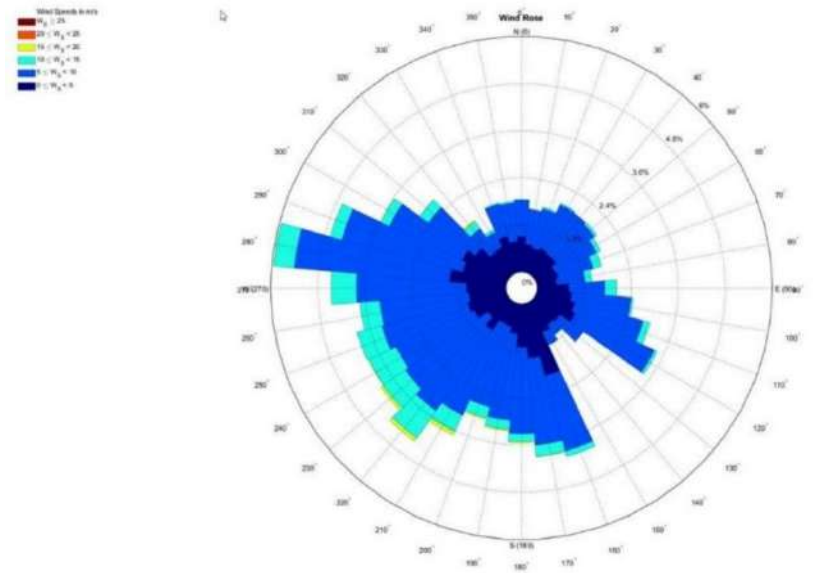


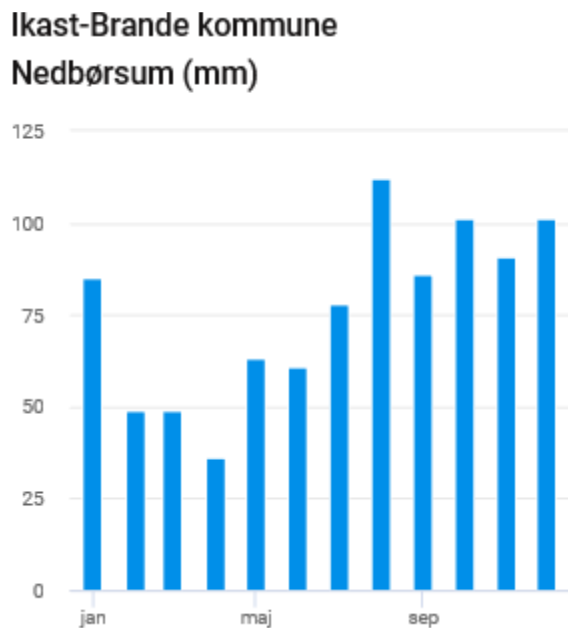
Figure 13. Wind tunnels and wind barriers



Precipitation

All the data on precipitation is taken from DMI⁵

Figure 14. Monthly precipitation references for 2006-2015



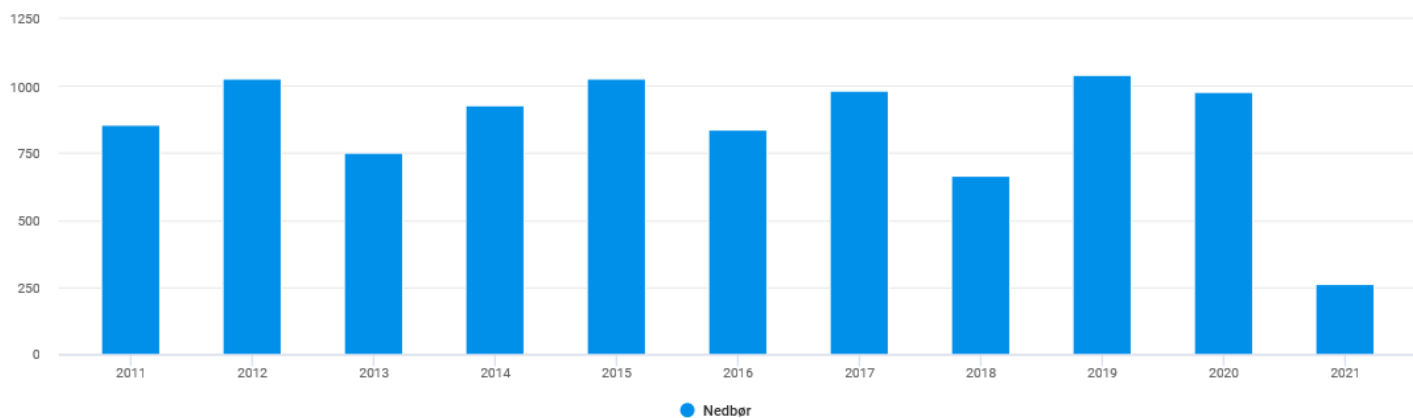
Spring is the driest season; this has been observed for quite a few years now.

Figure 15. Annual precipitation for Ikast-Brande municipality

Nedbør ▼

Ikast-Brande kommune

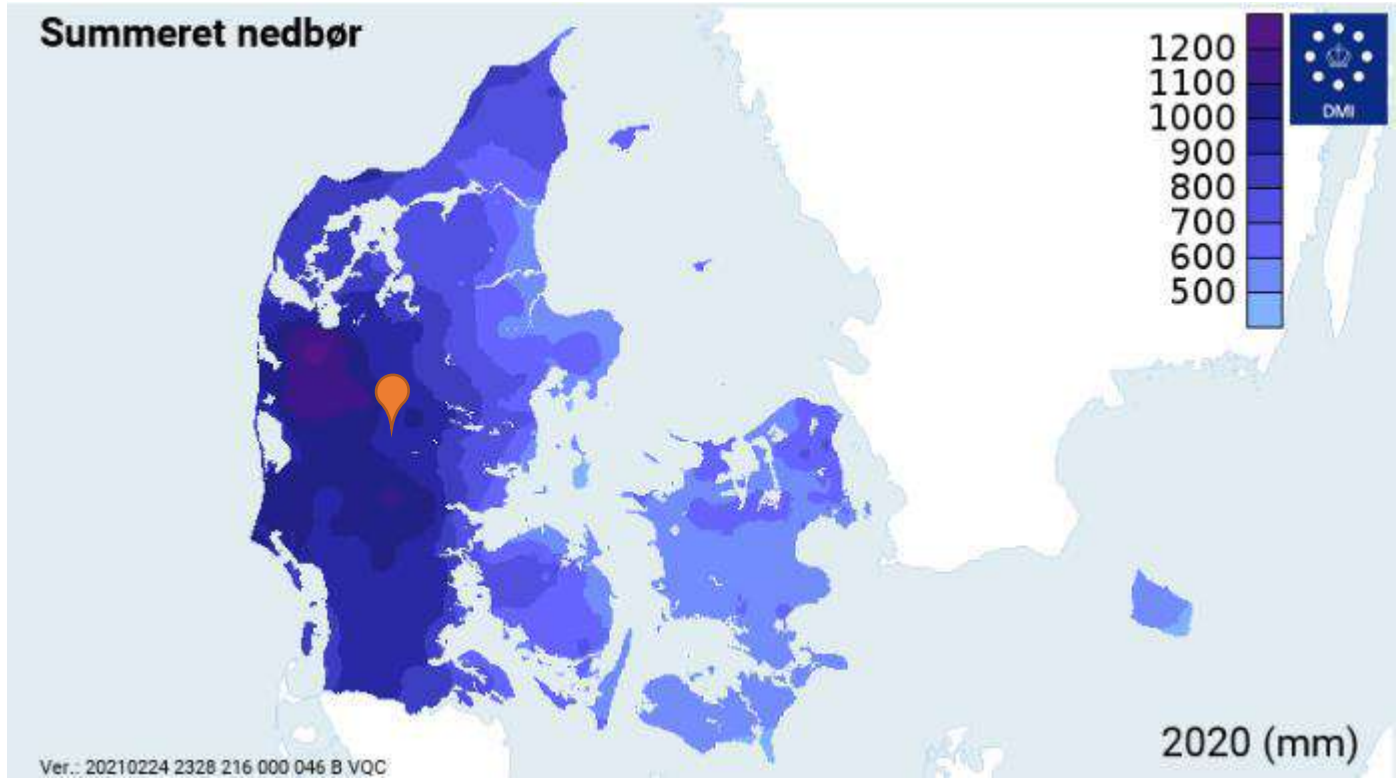
Nedbør (mm)



On average, 900 mm precipitation per year, from that point of view we are in a very fortunate position. 2018 was a very dry year.

⁵ <https://www.dmi.dk/vejarkiv/>

Figure 16. Annual rainfall for 2020



ANALYSIS

The following methods and tools were used during the survey phase:

- ✓ Element-function based “Keep or let go” analysis
- ✓ Addressing problems and limitations
- ✓ Systems functions and elements
- ✓ Bubble design

Base Map element analysis – “Keep or Let Go”

Table 4. Keep or let go decision summary for existing elements

Element	Functions	Considerations	Keep	Let go
Wooden boxes / raised beds	Food production: raspberries, asparagus, annuals, blueberries	Boxes are old (12 years old) and not in the best condition. The area is somewhat protected from slugs by the snail fence. Some boxes do not function well - raspberries have crawl into the asparagus and dominate them. Ideally raspberries and asparagus to be replaced. Blueberries are working very well and it’s a shame to move them.	X (blueberry and annuals)	X (raspberry and asparagus)
Birch trees	Drying up the wet zone Birch sap tapping	Tapping is not optimal on the two standalone trees. I am leaning towards removing them due to their shadowing factor. Furthermore, if removed they will be a source of wood chips, that can be used as a material for the paths.		X
Hugel bed	Food production: Annuals in 2020	Established in 2020 it was used for growing annuals, especially heat loving varieties, such as tomatoes, pattypan squash, tomatillo, basil. In 2021, it was not used for planting annuals due to other priorities and was regrown by the weeds. The design of this hügel bed was found to be highly impractical, as it was blocking the “main road”. I think we would benefit from disassembling (at least partially) it and utilizing the material in the newly designed areas.		x
Apple tree 1	Food production: Summer Apples	Gives apples every second year, young tree	x	
Apple tree 2	Food production: Autumn Apples	Old tree that we attempt to renew, very delicious, affected by disease in 2021.	x	
Apple tree 3	Food production: Winters Apples	Apples that give best harvest, every second year.	x	
Hedge 1	Wind protection	This hedge is owned by us. It is the most important wind protection for the lower terrace. Should be kept until an alternative solution (if any) is found.	x (until replaced by an alternative)	
Hedge 2	Wind protection	Shared with the neighbor	x	
Hedge 3	Wind protection	Shared with the neighbor	x	

Open compost	Compost creation	The target within this design is to decide on the future location.	TBD	TBD
Closed Compost	Compost creation	Same as above	TBD	TBD
Trampoline	Kids' fun	Target is to find the right place.	x	
Drainage	Drainage	Built in 2020.	x	
Drainage TOP material	To mark where the pipes are	Field stones were used to mark where the drainage was built. Was found to be not practical, not functional : difficult for us to move around; leaves and other particles get stuck, so the look is not what it was intended. The stones can be used for creation of raised beds or spiral beds.		x
Black currants	Food production	3 bushes, especially one variety is very productive. However, they suffer from aphids and fungal diseases. Perhaps the soil is too wet.	x	
Cherries	Food production (10 berries in 6 years)	6-year-old trees: 2 sweet cherries and one sour. The cherries were originally planted in the lawn. They were not really growing. In 2020 a circle 2m in diameter was created, by putting compost, potatoes and 30 cm of straw mulch, which had a fantastic effect. The trees responded with a strong annual growth and we finally tasted some of the varieties. Sour cherry suffers from cherry moniliosis disease every year. Sweet cherries suffer from black aphids. (many ants in the area, dry and warm sand under the tiles and field stones).	X (1 of them)	X (2 of them)
Lawn	Mulch material Occasional football game	Freshly mowed grass is a fantastic mulch material, that I really like working with. Therefore, I would like to keep smaller area that can be mowed mechanically; and otherwise utilize the area for increasing biodiversity and obtaining yield.		X (most parts)

Micro-climate impact on design

“Heat trap”: the warmer micro climate zone shall be tried out for growing heat loving varieties, such as figs, peaches, mulberry. It is important not to plant trees that will later shadow this area.

Addressing problems and limitation

Wet zone

Table 5. Approaches to handling wet zone challenges

Type of garden	Description	Personal preferences
Wet garden	Work with nature Consider pond Plants that tolerate wet soil What trees?	Creek already nearby Plenty of toads and frogs High level of precipitation, the whole garden is anyway quite moist Very little knowledge
Raised garden	Drainage should help Raised beds	Higher establishment effort with raised beds Would very much like to make garden drier, thinking it will help on balancing the microclimate (Fungal diseases in plants?) Keen on having more fruit trees & bushes in the garden Willows in the design Pumping plants: birches

Shadowed area

This area would be a perfect area to leave the grass lawn. The area could also be used to establish a mist bank for plants production. Also, in the future can be fenced in and utilized for chickens.

Slugs

Over time I've tried different methods, some more humane than others, some more efficient than others. All of them require an effort and killing other creatures is never a giving or re-energizing experience. The only method that is currently occasionally practiced in case of overwhelming damage is cutting slugs with scissors.

My strategy for coping with them:

- Grow varieties that slugs are not interested in (e.g. garlic, berry bushes, etc.)
- Grow perennial plants, that seem to be more resilient and robust towards the slug attacks
 - (in 2021 I observed that the established perennial vegetables in the forest garden (mid-terrace) suffered a lot less than in 2020 when these were newly planted, also when compared to the new plants added in 2021)
- Attract wild ducks from the creek to nest on our shores 😊 (duck tube in the creek, no success either in 2021 or in 2022)
- Increase biodiversity (leopard slugs, toads, other birds, hedgehog) to attract natural enemies
- Accept them – Live and let live – D. Holmgren “We must accept all life forms as valuable no matter how inconvenient they are to us or to other life forms that we value.”

Black birds

My strategy for coping with black birds:

- Accept them and enjoy their singing
- Experiment with berry varieties that attract them and are less valuable for humans (The fruit orchard movie)
- Learn more regarding how they benefit the garden (Lately, I learnt that they are eating not only earthworms, but also chaffers)

Functions systems elements

Following Mollison’s principle “each important function should be supported by multiple elements”, the below analysis is done to understand how we can support the critical functions, both which elements can be used and what actions need to be done.

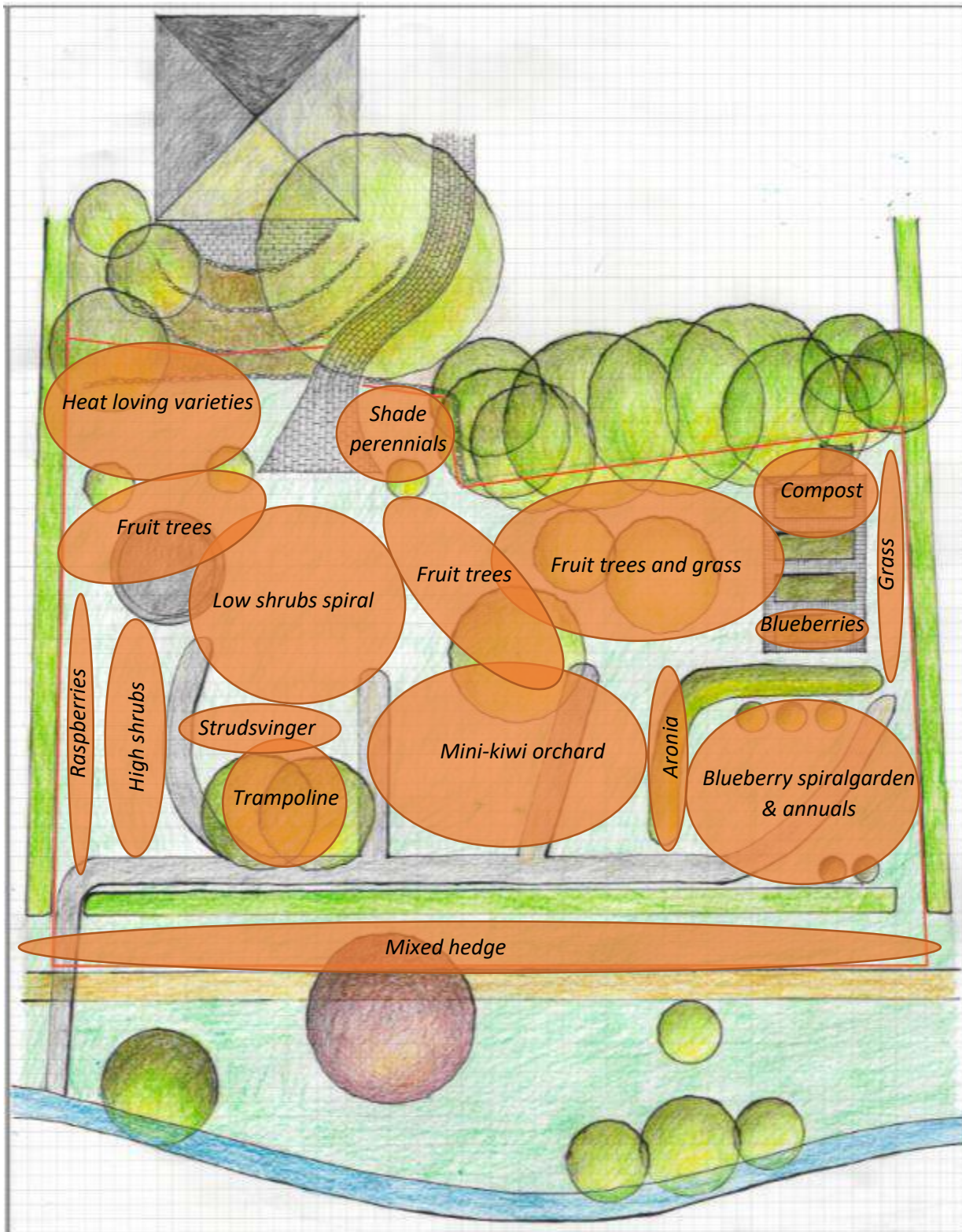
Table 6. Function-System-Element analysis

Function	System	Element	Action
Soil improvement	Mulch	Straw, leaves, grass	Add during 1-3 year (e.g. each fall)
	Green Manure	Red clover, yellow mustard, phacelia	Can be used in the 1-2 year (e.g. spring or autumn)
	Perennial ground cover	Ground-ivy, bugleweed, wild strawberries, yellow archangel	High focus from first year on to establish proper groundcover
	Nitrogen fixing plants	<p>Annuals: Red clover, all beans</p> <p>Perennials: Comfrey, lupine, spring pea (<i>Lathyrus vernus</i>), blue wild indigo (<i>Baptisia australis</i>)</p> <p>Shrubs: California lilac (<i>Ceanothus</i>), Silver berry, Autumn Olive, Sea buckthorn, Bay berry (<i>Myrica</i>), Siberian pea-shrub (<i>Caragana arborescens</i>)</p> <p>Trees: Alder, Black locust</p>	Consider these elements for the design
Food production	Fruits	Apple, pear, cherry, plum, quinces, persimmon, dead man’s finger	Include in the design, give a try to heat loving varieties, but bear in mind that we are in the cold zone of Denmark, with least sun hours per year. Focus on the more robust yields.
	Berries	Cornelian cherry, mulberry, currants, gooseberries, elderberry, wineberries, blackcurrants, blueberries, honey berries	Include in the design
	Nuts	Hazel, walnut	Include in the design
Biodiversity	Food	Plants that have pollen and nectar in different time of the year Different types of plants to attract different types of insects (e.g., umbellifers)	Consider these elements for the design
	Water	Creek, pond, water containers	Consider for the design, how to incorporate water
	Habitat	Branches, bee hotels, natural stone bunks, birdhouses	Incorporate into a design

Bubble design

Bubble design is a great tool that helps design from pattern to detail principle. Bubbles are easy to move around in the analysis phase in search of the best solution.

Figure 17. Final bubble design



Design

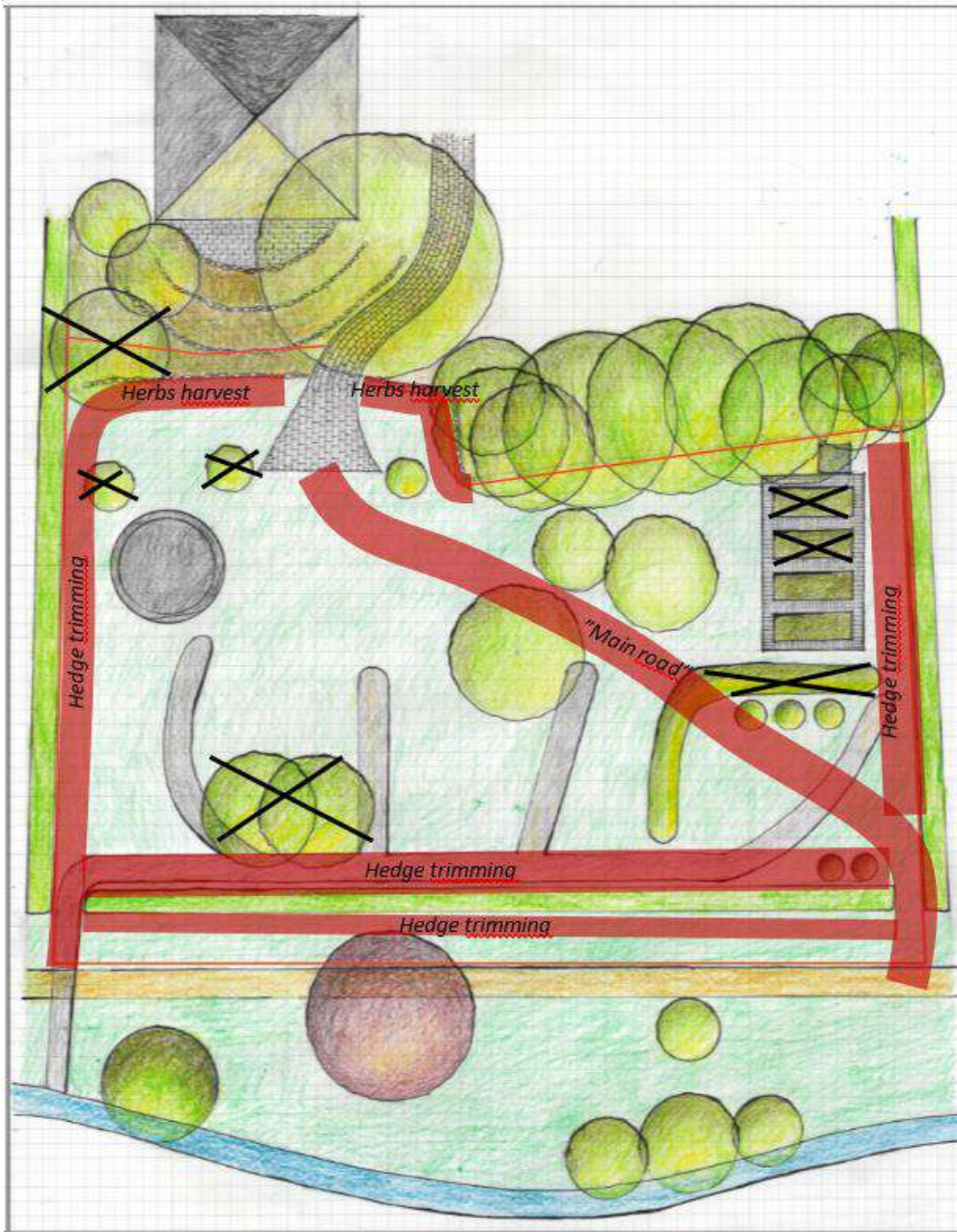
The following tools were used to arrive at the final design map:

- ✓ Flow map
- ✓ Placement map
- ✓ Design map
- ✓ Biodiversity habitat map

Flow map

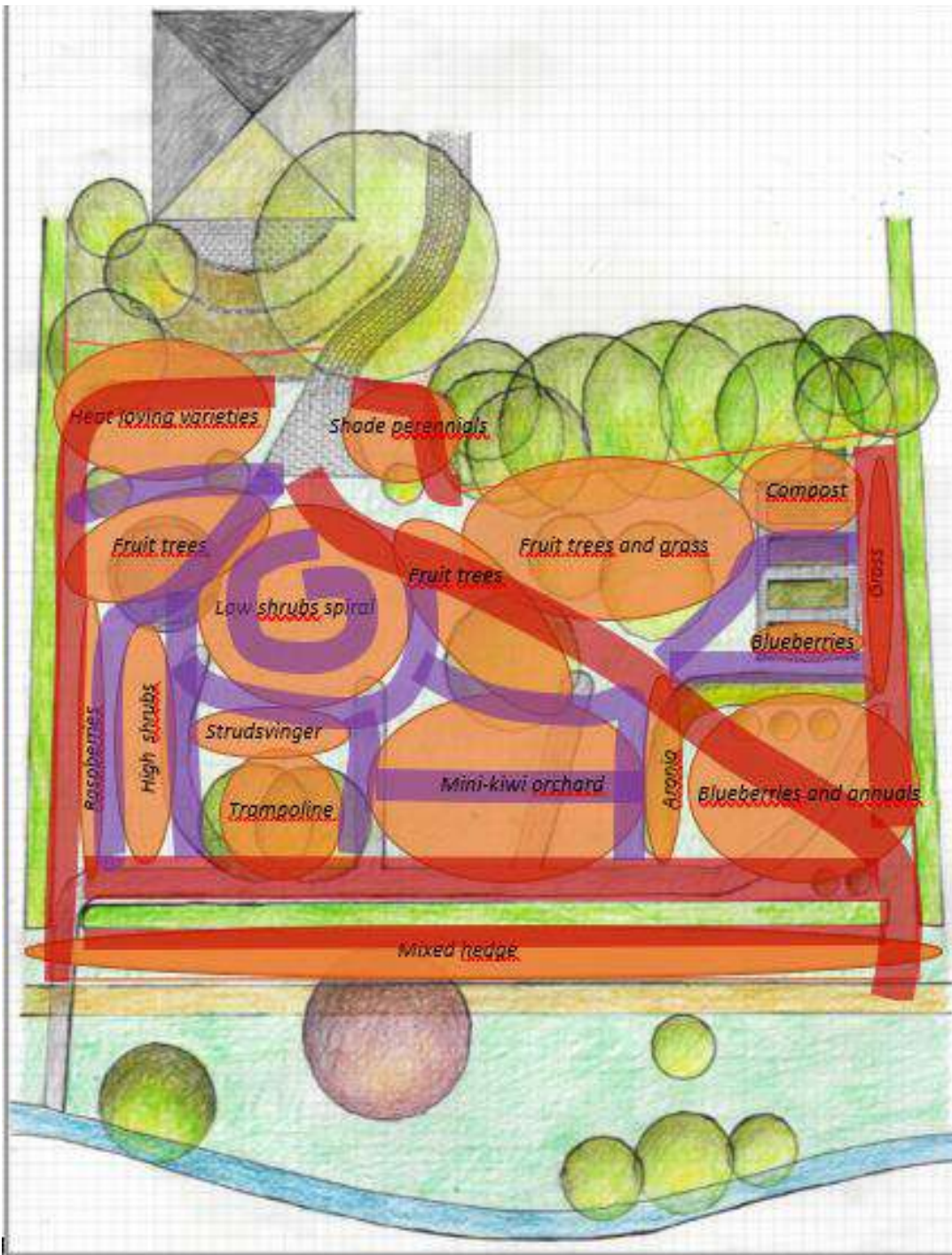
The below map shows the elements that will be removed as well as the main paths. These are must-haves in order to enable hedge trimming. "The main road" as we have observed, is how we want to move around the garden.

Figure 18. Flow map - Main paths



By combining this map with the bubble design, it is easy to see all the additional paths needed.

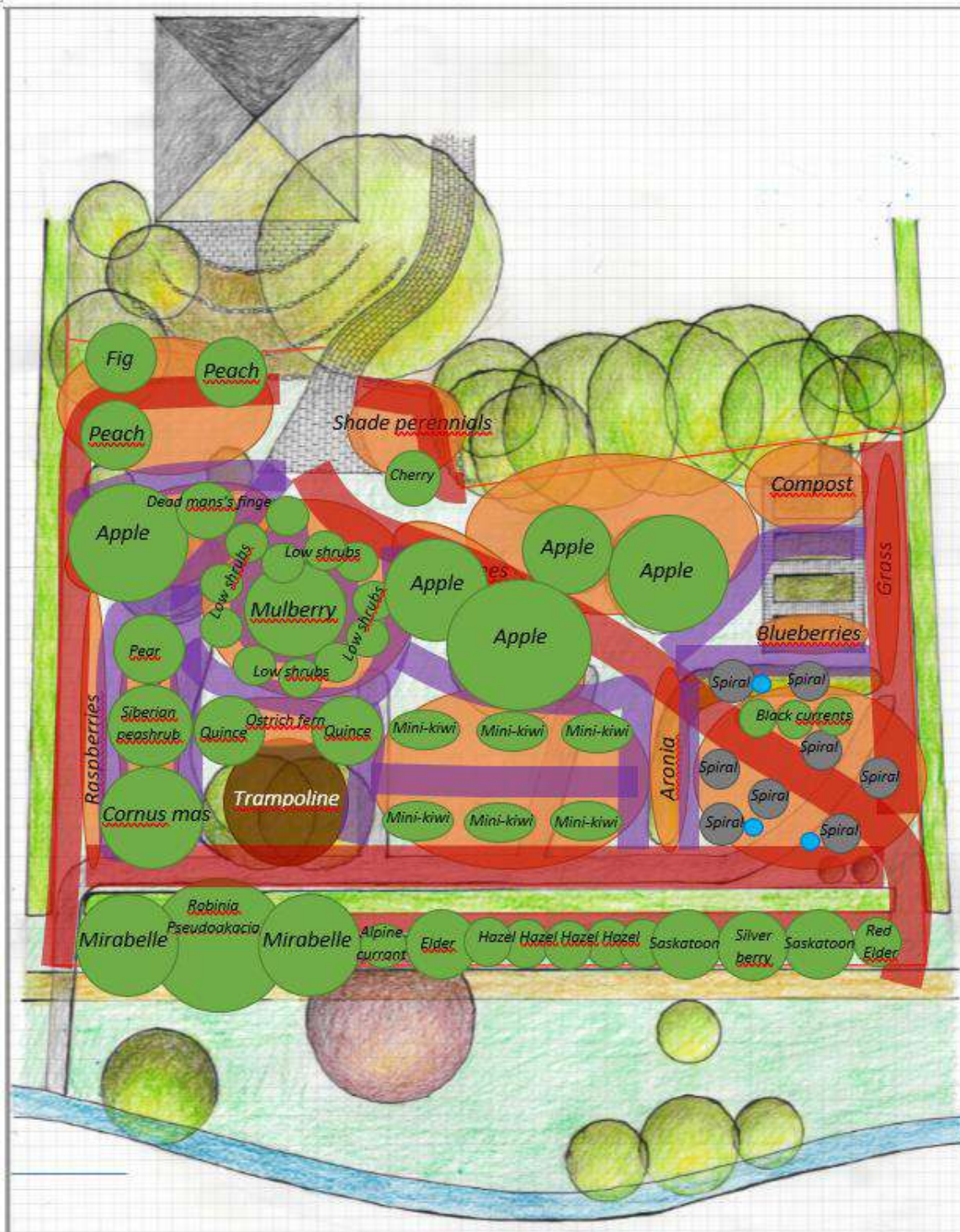
Figure 19. Flow map - Additional paths (in purple)





Placement map

And now plotting all the desired elements:

Figure 20. Placement map



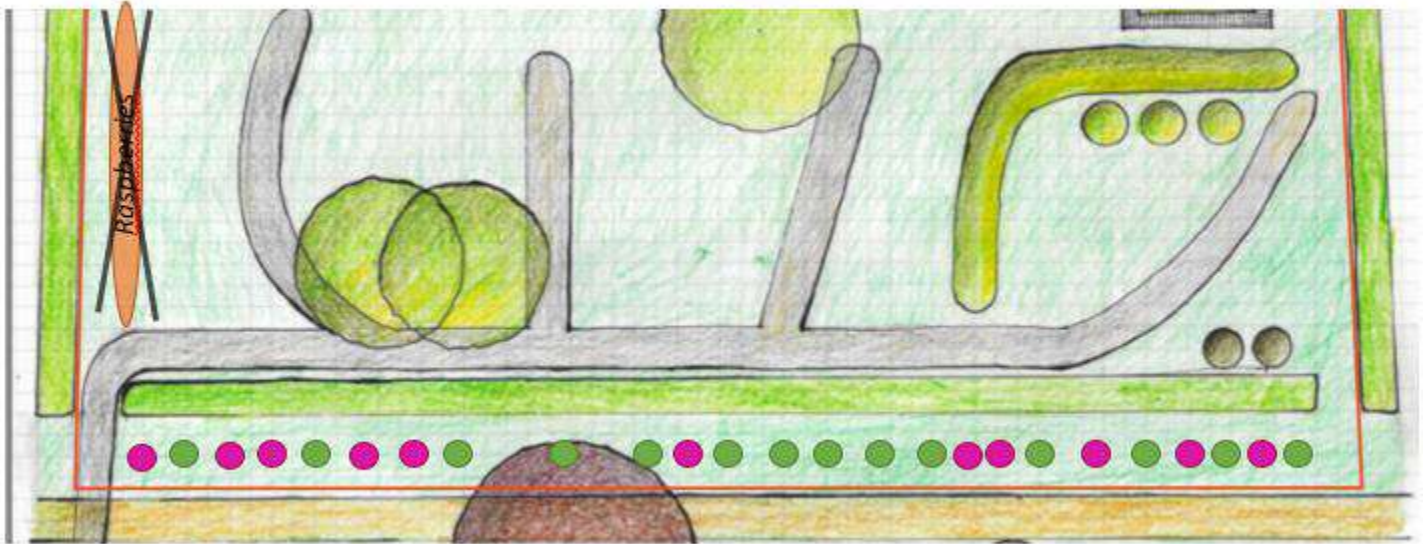
-  Raised spiral beds
-  Water containers

Final design

As you will notice the final design had a few modifications compared to the initial placement map:

1. Raspberries were moved due to runners behind the hedge. Here the problem with runners is solved by the drainage. This bed will be used for Jerusalem artichokes and bamboo.

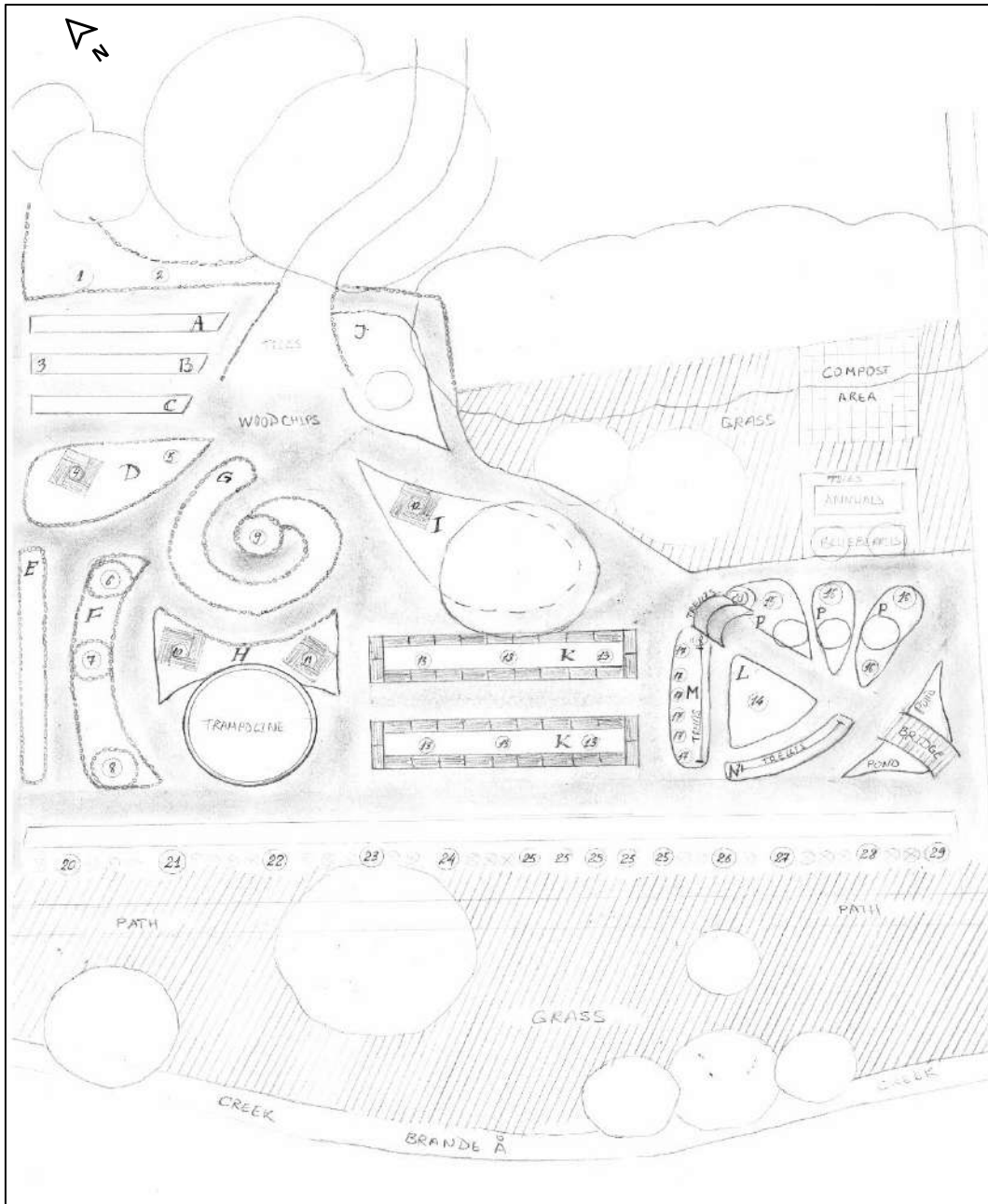
Figure 21. Design change - raspberries replaced and blueberries omitted



- Raised spiral beds
- Water containers

2. Blueberry spiral garden, difficulty to acquire concrete ring. (initially we thought they would be freely available at the landfill). I would like to try and create a warmer microclimate here. Aronia will provide addition wind shield. A small pond is added to reflect the sun light.

Design map



LEGEND

- Field stones
- Straw bales
- Wood chips
- Grass
- Raspberry

PLANTS

1. Fig, "Brown Turkey"
2. Peach, "Revita"
3. Peach, "Riga"
4. Apple, "Topaz"
5. Dead Man's Finger (DMF)
6. Pear, "Conference"
7. Siberian Pea Shrub
8. Cornelian Cherry
9. Mulberry, Alba
10. Quince, "Aromatnaja"
11. Quince, "Anatolian Red"
12. Apple, "Holsteiner Cox"
13. Actinidia arguta
14. Persimon
15. Szechuan pepper
16. Blueberry
17. Aronia
18. Grape
19. Rose
20. Mirabelle plum, "First"
21. Black Locust
22. Mirabelle plum, "Carlsen Skjødt"
23. Alpine currant
24. Elderberry
25. Hazelnut
26. Saskatoon, "Balerina"
27. Silverberry
28. Saskatoon, "Obelisk"
29. Elderberry (red foliage)

BED A / B / C
 Regular shaped with snail fence for leafy greens and herbs that are particularly loved by slugs
 Annuals (A & B): Dill, parsley, cilantro, leeks
 Perennials (C): perennial onions and sorrels

BED D
 Daylilies
 Paeonies
 Comfrey
 Caraway
 Yarrow
 Roses

BED E
 Bamboo
 Jerusalem artichokes

BED F
 Evening primrose
 Cicely
 Lovage
 Chicory
 Peach-leaved bellflower
 Marjoram
 Black salsify
 Agastache
 Lungwort
 Field balm
 Bugleweed

BED G
 Red currant
 Black currant
 White currant
 Gooseberry
 Honeysuckle
 California lilac
 Bay berry (Myrica)

BED I
 Blackberries

BED L
 Perennial kale
 Artichokes and Cardoon

BED M
 Grapes

BED K
 Annuals

BED H

BED N
 Tayberry

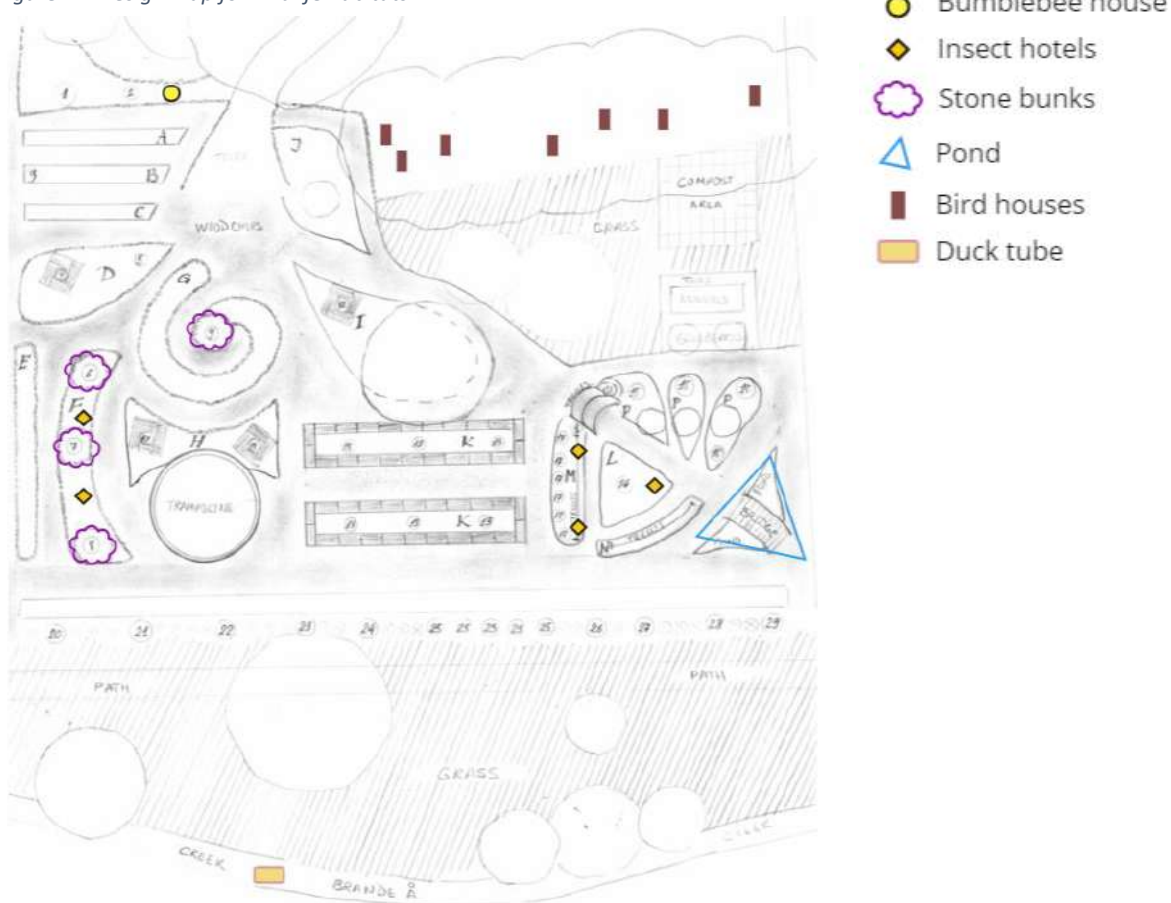
BED J
 Skilla
 Hosta
 Lamb's ear
 Chicory
 Bronze fennel
 Marjoram
 Salsify
 Garlic
 Red Plantago
 Field balm
 Mint
 Mallows

Habitats

The Design includes creation of different types of habitats. The map below shows the proposed placement of these.

- Pond – magnet for all life
- Bumblebee house for bumble bees
 - [How to make a bumblebee nest box - YouTube](#)
 - [Humlebihus - Humlebibo - Unik bolig til humlebien - FRI FRAGT på bibo — Haveteknik.dk](#)
- Insect hotels, for different bees
 - [How to make a very simple bee hotel that works - YouTube](#)
 - [How to make a solitary bee hotel \(update 2019\) - YouTube](#)
- Raised beds of stones, for kryb, lizzards
- Birdhouses
- Duck tube, to attract wild ducks by creating nesting opportunities
 - [Duck tubes: Giv andemor en hjælpende hånd - Netnatur](#)

Figure 22. Design map for wildlife habitats



Implementation

Input and sourcing overview

First, I created an overview of the required inputs. Then I listed three categories to how these can be procured: can we get it somewhere for free, do we have it already, or do we need to buy. It was extremely satisfying to put this on paper and see how relatively few things we need to buy. I also decided to label each source whether it is locally sourced and whether it is considered a waste by the source (“produce no waste”). I really think it is amazing. Along the way there were even more positive adjustments. Thus, originally, I expected that we would be buying wood chips (and that was a downside of choosing this cover material), but then I asked a local service that was taking the two birch trees down for us, if they had access to wood chips and they replied that they drive it to landfill daily, and instead they can drop it off at our place. Basically, any day I can let them know if I need that and they will drop off the woodchips free of charge because it’s a waste for them.

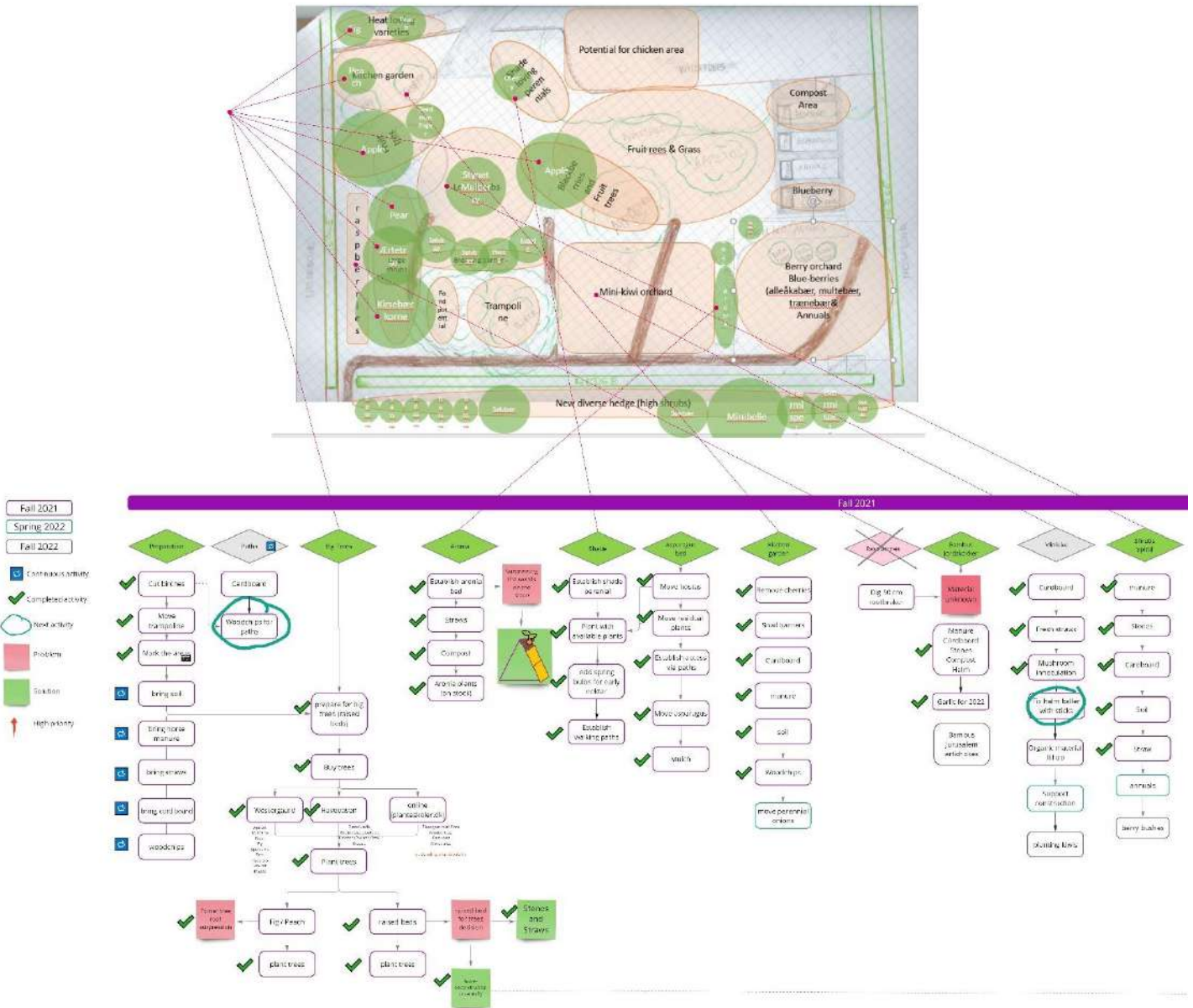
Figure 23. Inputs - sourcing overview



Planning

To plan the activities, I need a framework that is not too rigid and doesn't require a lot of details and maintenance, as the executors are ourselves; but allows to have good structure and to maintain an overview. I decided not to work with Gantt charts but rather with steps and flows. I needed a system that could reflect "What has the priority? What can be started immediately? What are the connections between elements?" I have developed a kind of a crazy system in Miro, but it was working fine for us. Below is a snapshot of this tool in use, in the fall of 2021.

Figure 24. Planning framework in Miro



As mentioned, we have not managed to implement as intended. The works were continued in Spring 2023 after more than a year's break. We have implemented everything but the pond, insect hotels, and trellis so far.

Executing

2021

Implementation works started in 2021. In the summertime we have removed the birch trees and transferred the design to the ground (lawn), using the lawn mower and some sticks to mark the spiral bed. Then we gradually started building the layers for the beds and establishing paths.

Image 3. Taking down the birch trees



Image 4. Marking the paths in the lawn



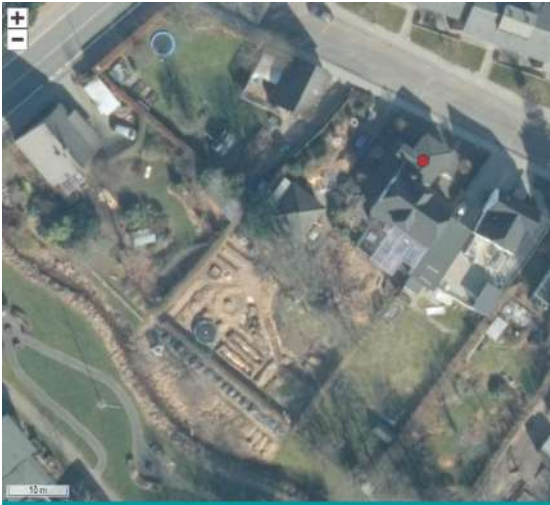
Image 5. First trees and herbs planted



Image 6. Central spiral bed filled with compost soil



Image 7. Degree of completion by 2022



2023

In spring 2023 we continued the establishment works. For the paths we have ordered a truck of woodchip that filled our entire driveway. We established the new area and reinforced old paths (as we could see it was a good idea).

Figure 25. Woodchips received and works continued



Image 9. Enjoying a break on the last grasslawn left



Image 8. Old paths reinforced with fresh woodchips and cardboard underneath



Monitoring

We spent summer 2023 monitoring and observing how the design unfolds in the garden.

What we saw was an abundant and excessive growth:

- In all the plants we planted
- In all the weeds that were coming through
- In all the paths being overgrown
- In the annual growth of the trees that were planted in 2021, which comprised between 70 -100 cm

Image 10. Some paths overgrew entirely.



Image 11. Giants in the garden: tree spinach



Image 12. Blackberries



Image 13. Ostrich fern bed next to the trampoline



Image 14. Field scabiosa flowers



Image 15. Native plants for insects, mixed bed



Evaluation

Table 7. Evaluation of design goals

<p>Reduce and preferably eliminate meaningless¹ resource demanding labor, i.e.:</p> <ul style="list-style-type: none"> - Lawn mowing every second week during the May-October season. Resources used: petrol and human labor. - Hedge trimming annually Resources used: electricity & human labor. 	<ul style="list-style-type: none"> - Mowing has been reduced considerably - Hedge trimming remains. Although the shrubs planted to replace the bottom hedge exhibit pleasing growth. In the future we might get rid of this hedge. <p>We've reduced meaningless work, but so far we increased meaningful work.</p>
<p>Increase biodiversity</p>	<p>What has been done for biodiversity: Many native species: herbs and shrubs added, stone, bunks, strawbales, mulch material, water tub.</p> <p>What has not been implemented yet: Insect hotels, pond and trellis.</p>
<p>Obtain yield, be self-sufficient with berries and fruits during high season</p>	<p>Fruit trees and shrubs take time to mature and start giving yield. We saw a good annual growth, and a few fruits. We hope in 2024 to taste more of the things we've planted.</p>

Methods

We have tested some methods while establishing the orchard.

Table 8. PMI evaluation of use permaculture techniques

	Pros	Cones	Interesting
<p>Raised beds using strawbales</p>	<p>Fast establishment effort A lot of organic material available for the newly planted trees Good at retaining water</p>	<p>Decomposed very fast If not reinforced → leaves bare roots</p>	<p>Not recommended for perennial growth Can be used only for annual beds creation</p>
<p>Lasagna method</p>	<p>This method allows to plant straight away as you are adding large amount of compost soil on top of cardboard.</p>	<p>Resource intensive method Implementation in fall didn't hold very well Neither did the March round</p>	<p>We were surprised it didn't work as intended, first in the autumn and then in the spring. More on that in the Reflection section.</p>

Reflection

Process

The process overall was somewhat frustrating, primarily due to a massive establishment effort: resources, labor and time, as well as the need to rework/reestablish the paths that didn't end up giving the desired results. At the same time this somewhat painful process led to a greater learning, and to what I believe is a more in-depth understanding and acceptance of the nature and the forces in the garden.

When I was creating the garden I had an image in my head of abundant beds that are surrounded by the paths, with sharp edges. It was still a human-controlled garden. Imposing my way and will on the garden. Imposing my understanding of beauty in the garden. The feedback that the garden is giving provokes me to rethink my design, to challenge the conditions. Do we need all that space being neat and sharp, if we claim this is an insect garden and a fruit orchard? Can I truly let go and accept? Can we trust the garden in its unfolding power and let it emerge the way it wants. This excessive growth doesn't threaten the yield that we intend to harvest, everything thrives in the garden. It's only the look that is not as I intended it.

Framework

I have used GoSADIME framework. I find this framework very well suited for land based designs, as it guides you and helps moving from one phase to another in a structured way. For large land designs I would recommend also doing a separate design, e.g., using Design Web, to address social aspects, to ensure a giving and rewarding process. Such things as how to use pausing and appreciation as tools for keeping going, analyzing own helpful and unhelpful patterns in relation to time management and work morale can be very helpful to help executing the design.

Ethics

I have connected ethics with the goals of the design. Until now I have mostly been using ethics in this "passive" way, i.e. deciding what I want to do and then explaining how this fits the ethics.

In the next designs I want to try doing it the other way around and use the ethics as the tool that helps to make decisions. E.g., for this design it could have been done the following way: design goal - I want to have a fruit orchard combined with an insect garden. How do Ethics guide me in doing so?

Earth care: regenerate soil → use permaculture methods to nourish soil, capture CO₂, use perennials.

People Care: care for oneself → firstly: I am the main resource behind this projects, how do I take care of myself doing this design, as my plate is quite full already (→ this is where Design web and some social permaculture principles could have come into picture). Secondly: taking care of others → my kids want to do something fun in the garden, and not the monotonous establishment work. How can I involve them more? Instead of pressing and speeding up the process, maybe slowing down. E.g., build insect hotels would be most interesting for kids.

Fair share: reduce resources, less dependence on the system → maximise self-sufficiency to what is meaningful in our situation.

Share with nature → we have to share with all the other living beings, we shall not take everything, take half, let the black birds take aronia and the blueberries, accept.

To conclude, in this case using people care as a tool could have changed the way the design was made, making it more people centered.

Tools

What worked well:

System-Function-Element analysis had the biggest impact both during the analysis and decision making. Thinking in terms of functions and needs is very helpful when you strive for “more” permaculture.

This was my first real experience using design map. It doesn't come easily, but I can see how this enhances design. Moving from flow map, to bubble map to final design was very helpful. In the future, I must investigate a better, and a more digitalized way to work with maps and layers.

What was I missing:

I am not very happy with how the goals were set. I recommend using SMART tool for goal setting. E.g., my goals were not time bound – “being self-sufficient with berries and fruits” is too far in the future to tell if we were successful. A smarter goal would have been “to plant X number of fruit trees and berry bushes” or “to plant nitrogen fixing trees, every fourth one planted”.

Methods

I have also been thinking whether we have chosen the methods correctly? Especially with regards to grass conversion. Taking into the account that the area was quite big and had some strong weeds in the grass lawn, we could have chosen other transformation methods. Perhaps the one that takes longer and at the same time is more passive. For example, adding a lot of hay and having chickens walking around the entire area for two years. We don't have chickens, and at the moment we don't have any energy for chickens, but maybe we could have started with chickens and e.g., planting the trees only. I realize this is a lot of maybes, but I think these speculations are also learningful.

Mistakes are unavoidable, but as long as we learn, they are priceless.

Principles

I have used principles to set the goals for this design. These helped to narrow down the focus: we wanted to obtain a yield for us, increase diversity, and limit the use of non-renewable resources.

Another principle that I find to be very powerful is each important function shall be supported by several elements. Thinking in terms of functions gives a lot of meaning and assures that we produce something sustainable.

Going forward the principles that I shall be embracing are:

Accepting feedback that the garden provides, as well as creatively use & respond to change. Nothing is static. Everything is in motion, and this shall be accepted with gratitude and invitation to be creative rather than resistant.

Lessons learnt

The first biggest lesson was when Karoline, my first mentor, was visiting me after the design was done. I expected her to push for more green areas, more plants, more trees on our entire property. I was so surprised when every time I was saying “Here we could maybe have walnuts, and here maybe chestnuts”, she replied with questions: “Do you need it? Do you have time for it? Do you like eating them?” This deep people care was on one hand really touching, and on the other hand it was something that at the time I had not considered in the design.

The second biggest lesson is about having trust in the nature and letting go of control. Not jumping into right and wrong conclusions and allowing emergence. Visiting and observing Cecil's garden, witnessing the love that Cecil has for her garden, her acceptance (of the “mess”) and allowance (of the “wild”), was very contrasting to my own struggle and frustration with the garden. Importance of stopping to see what is wrong and what needs to be fixed or made pretty.

Progress as designer / permaculture practitioner

Compared to the first design this was a much more intended design, with greater use of permaculture toolbox and principles. I acquired greater theoretical and practical permaculture experience. The mistakes were “painful” but they led to a deeper understanding and connection to nature (thanks to the seasonal retreats in “Inspiratoriet”).

Top tips

- Importance of people care for land-based designs
- Having trust in the nature, truly allowing emergence. Connecting on a deeper level with the garden.
- Start small and don't forget about having fun along the way. Incorporate pausing, momentum, and appreciations as tools in your design.
- Be ready to make mistakes. They are inevitable, but as long as you learn from them – they are priceless!