

01. a productive garden



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context

After completing the Permaculture Design Certificate (PDC) I wanted to develop my horticulture & botany knowledge. I took the RHS Level 2 Certificate in Horticulture at RHS Harlow Carr. This design was one of the assignments. It was a hypothetical exercise, but provided an opportunity to practice the design skills I'd learned on the PDC. It also offered a chance to demonstrate permaculture thinking to the tutor and other students on the course.

survey

client brief

"Design a productive vegetable and fruit garden including: beds for permanent vegetable crops, fruit, trained fruit for the walls, a 4 bed rotation system, greenhouse, cold frames, potting shed, compost heap, comfrey patch."

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site characteristics

10m x 20m site, walled on 3 sides (2m high).

Open to the (short) NE side.

Flat site located in Leeds, elevation 75m.

Clay soil, pH around 6.5.

No adjacent buildings or trees shading the site.

Domestic garden; no children or pets visit the garden regularly.

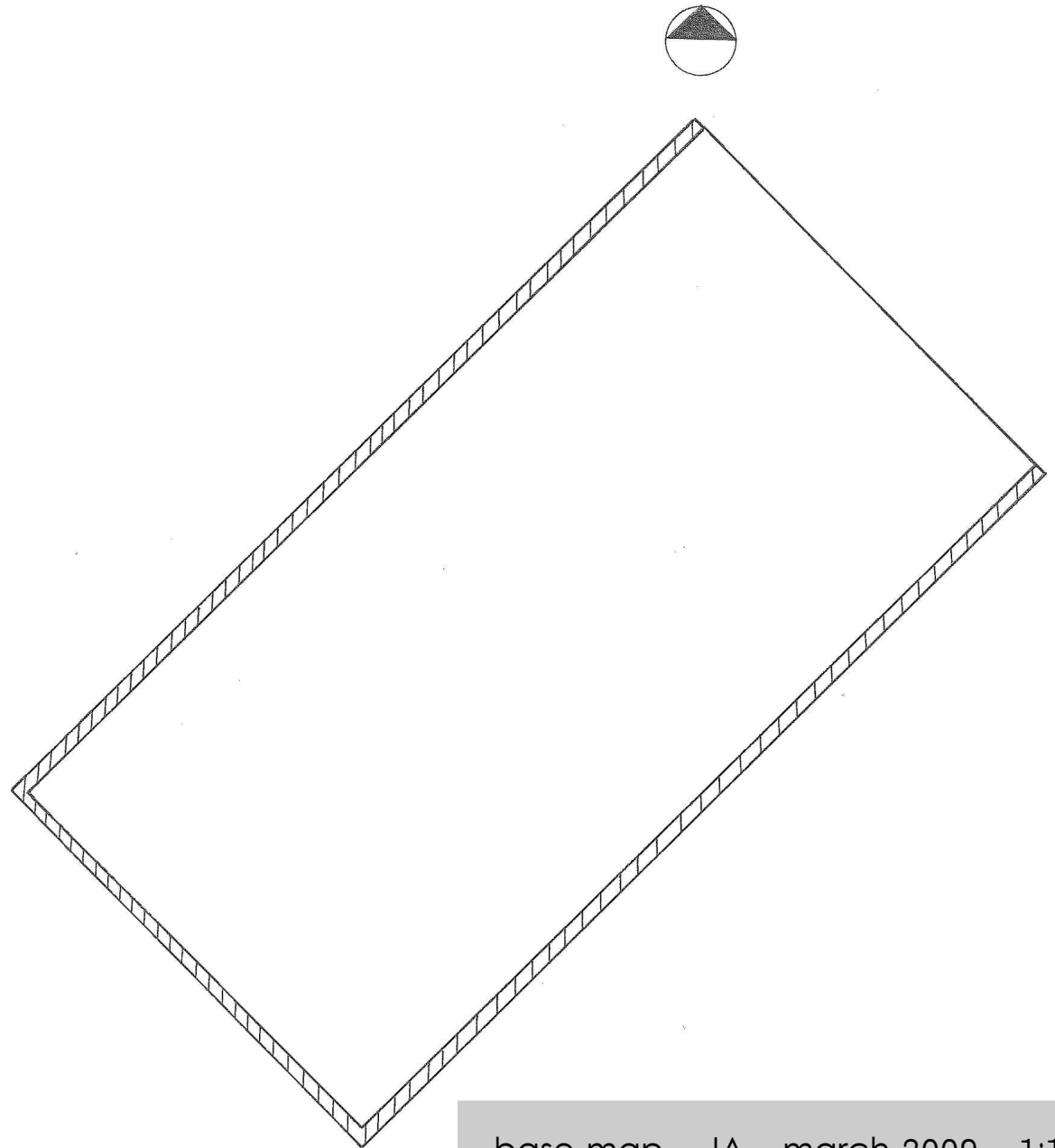
The house is nearby, but the garden is not in the lee of any buildings.

Access is via the north east side.

Mains water is available via a hosepipe.

No services cross the site.

No covenants or bylaws restrict planting choices etc.

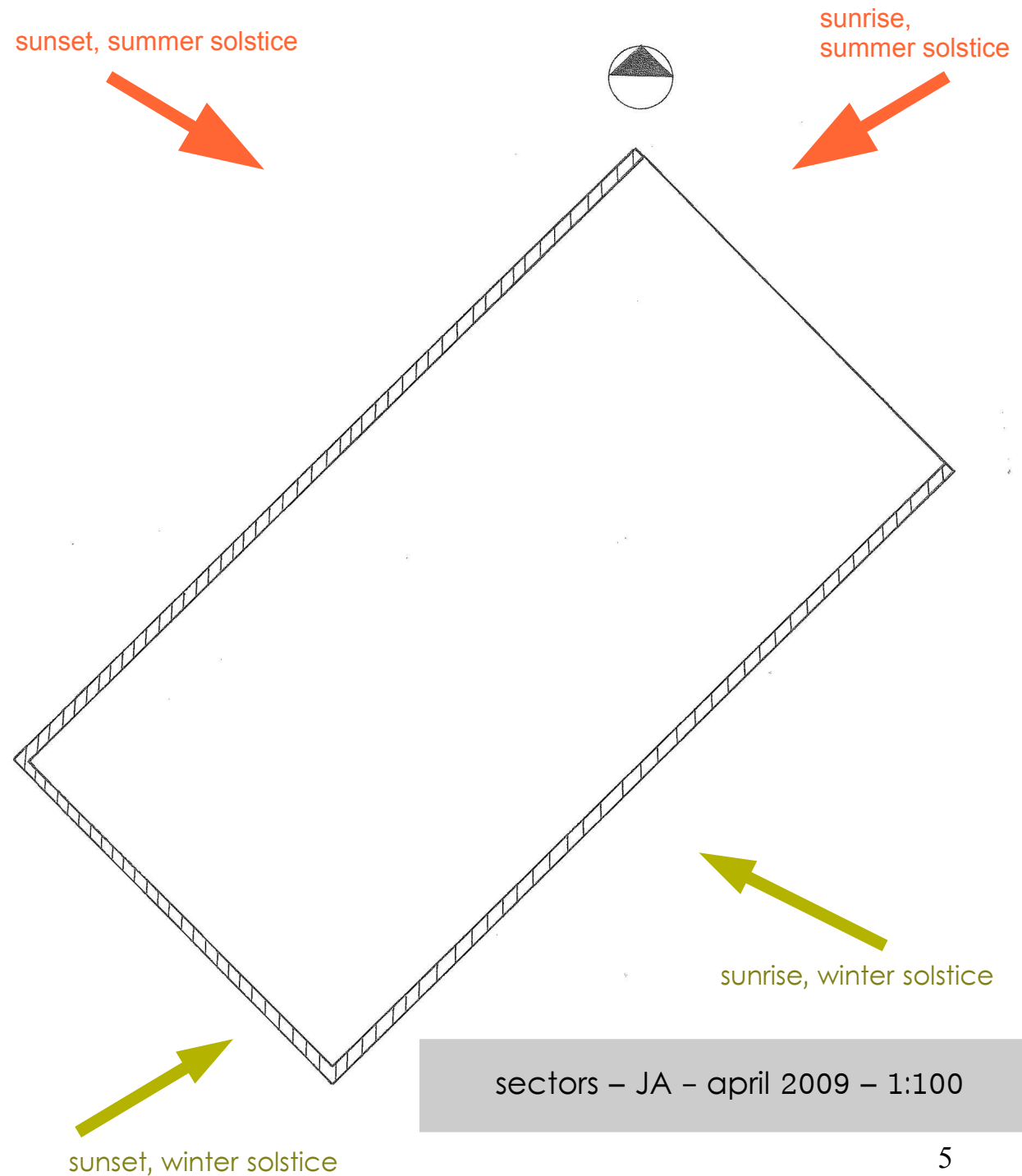


base map – JA – march 2009 – 1:100

sectors

sun

The wall along the north west boundary will receive the most sun. The walls along the south west and south east boundaries will primarily be shaded, although they will receive some sun in the summer in the morning & afternoon respectively.



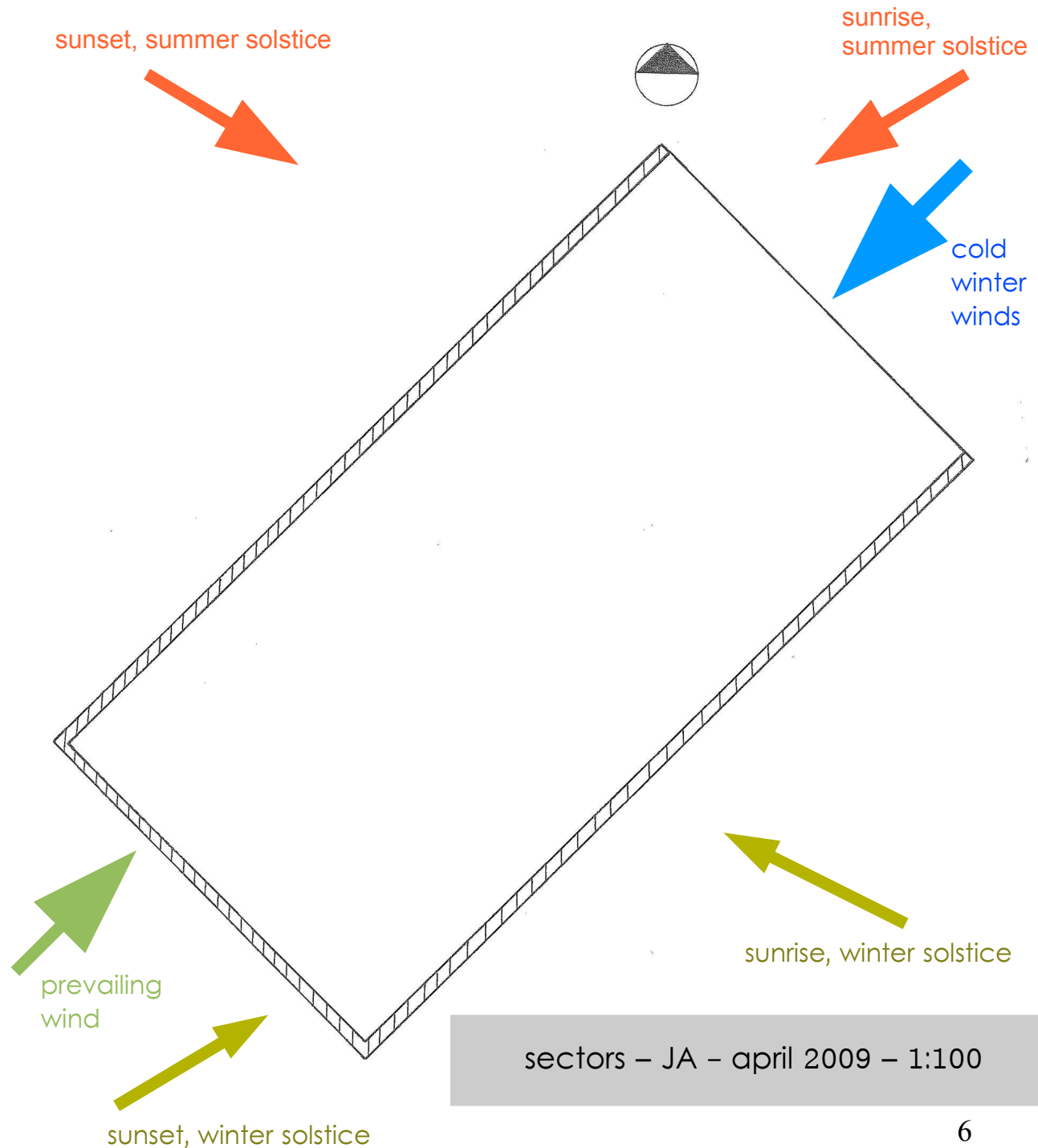
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wind

The south west boundary wall will provide shelter from the prevailing winds, although some turbulence can be expected immediately adjacent to the wall. The site is very exposed to cold winter north easterly winds.



sectors – JA – april 2009 – 1:100

sectors

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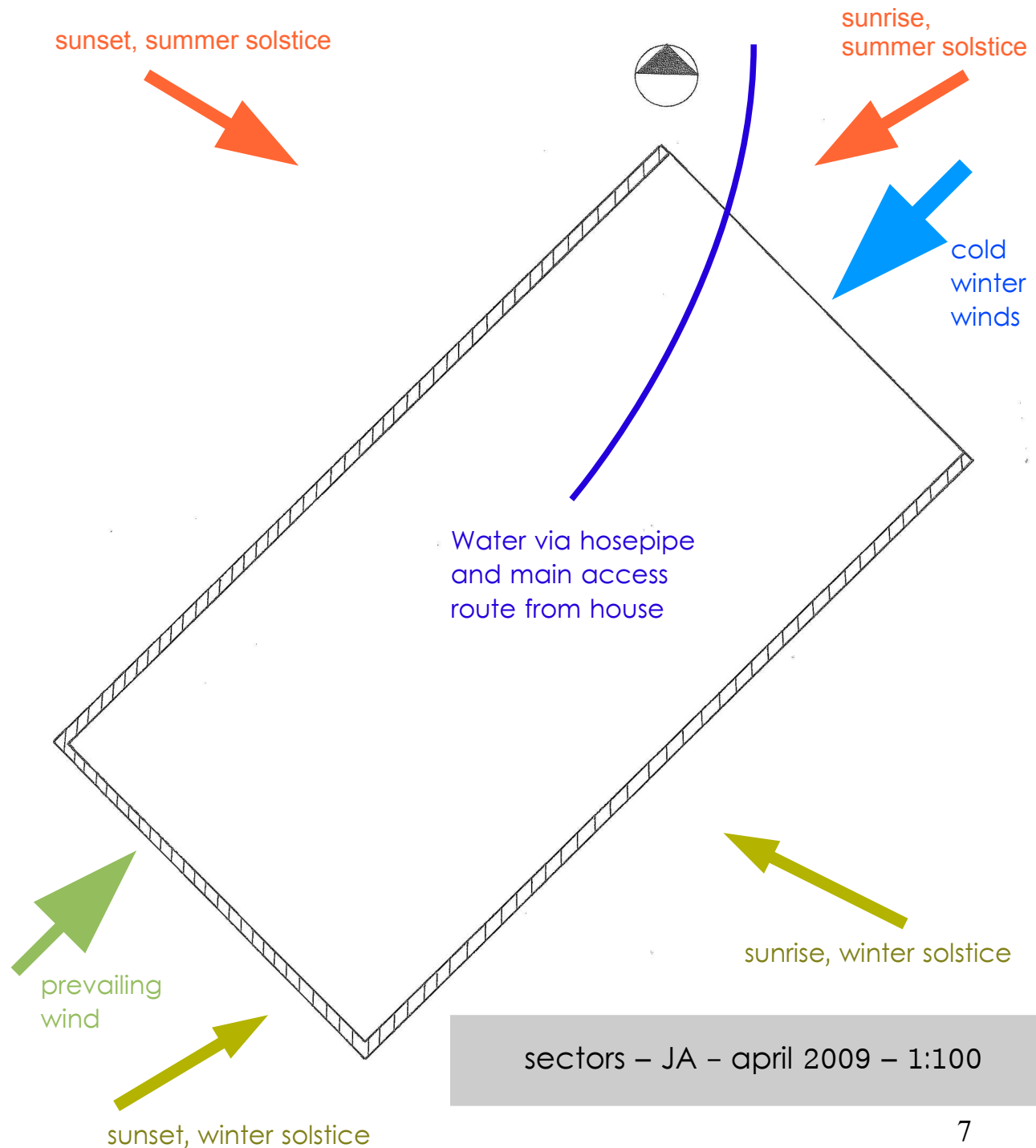
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water (and access)

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sectors – JA – april 2009 – 1:100

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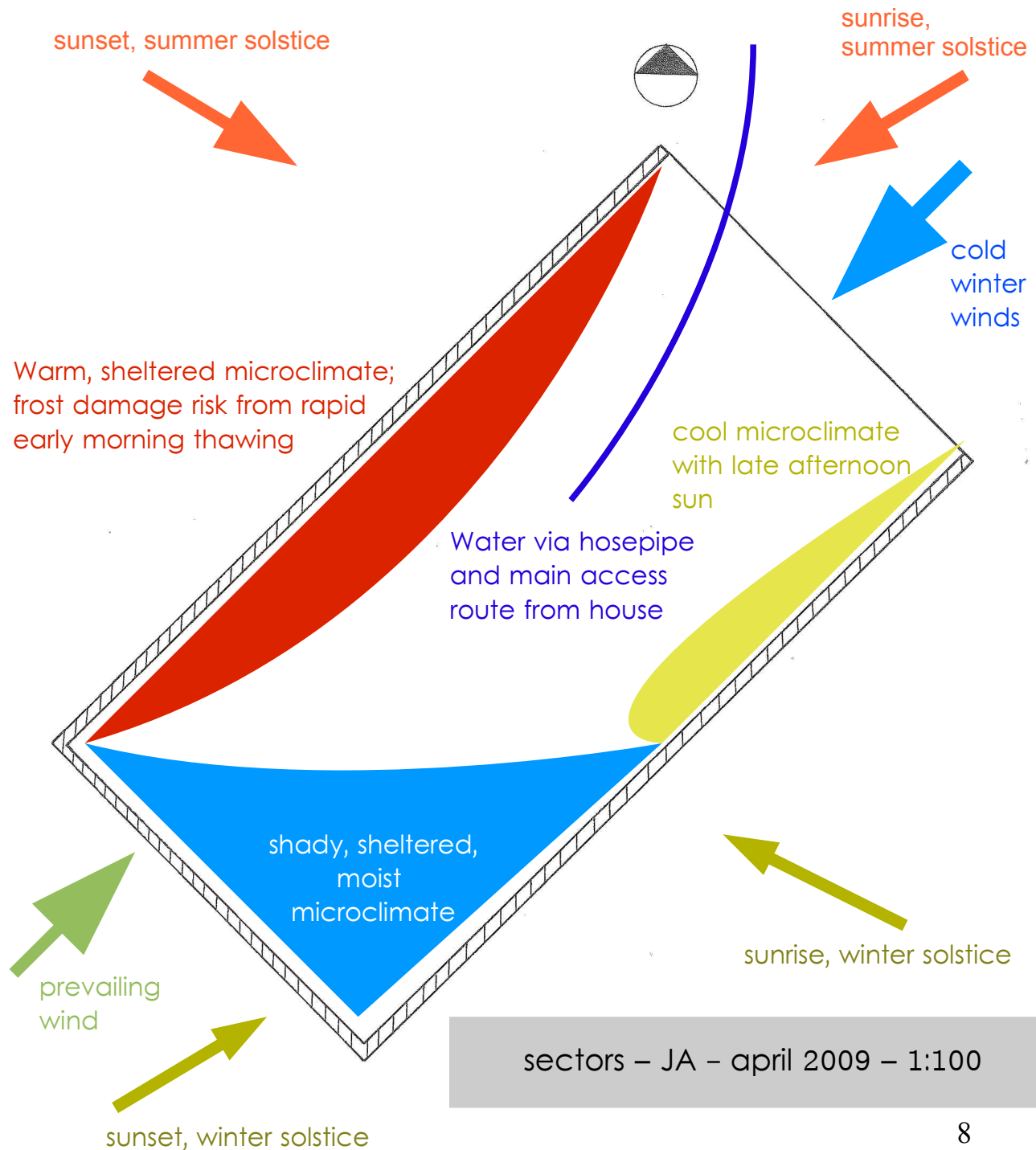
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microclimates

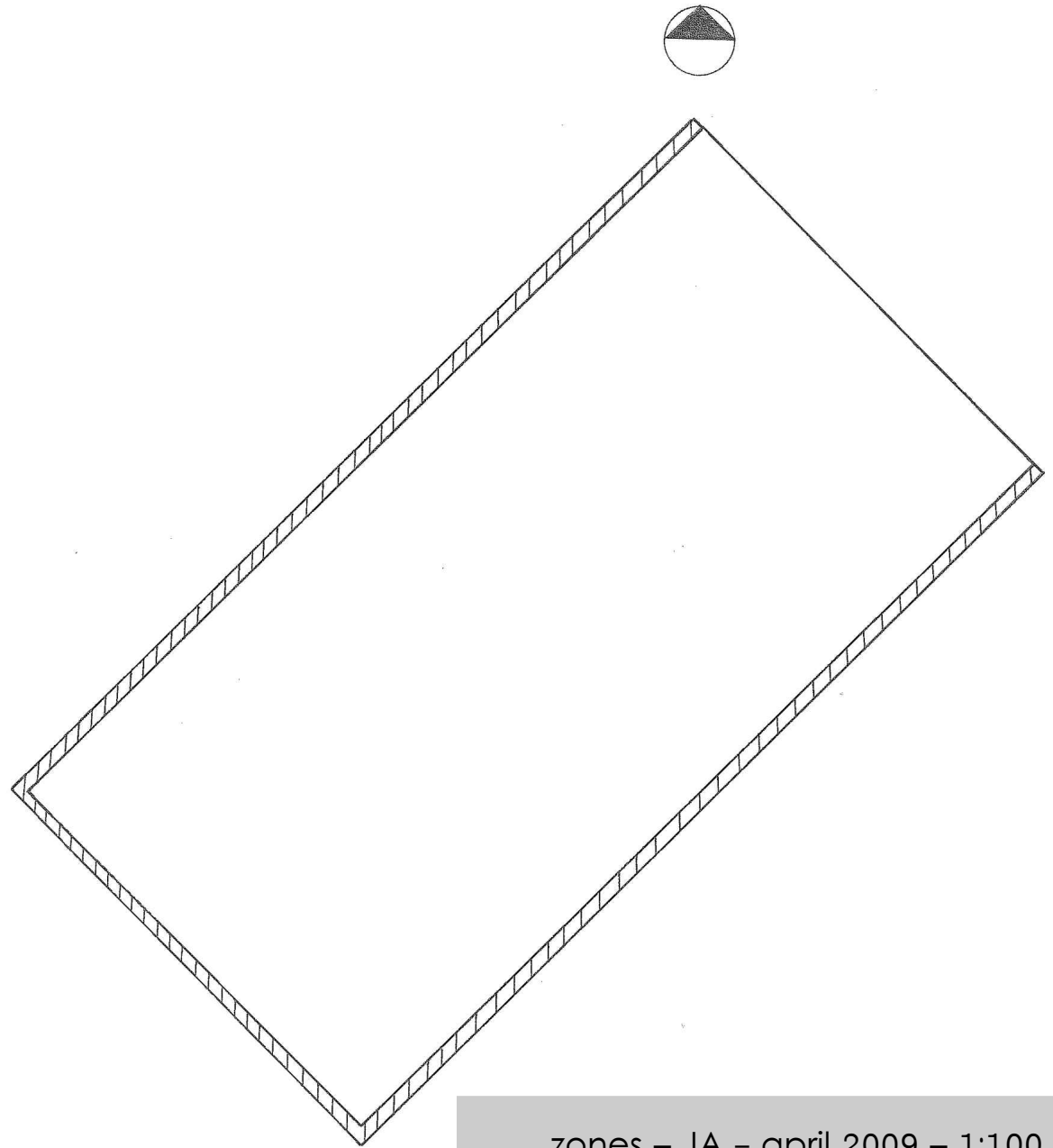
Various microclimates exist across the site, from a warm south-east facing wall to shady and moist corner at the south of the site.



zones

zones

Zones are not arranged in a traditional layout because the pronounced sector effects were deemed to be a higher priority. There is no zone 2 or 4 in this design



zones – JA – april 2009 – 1:100

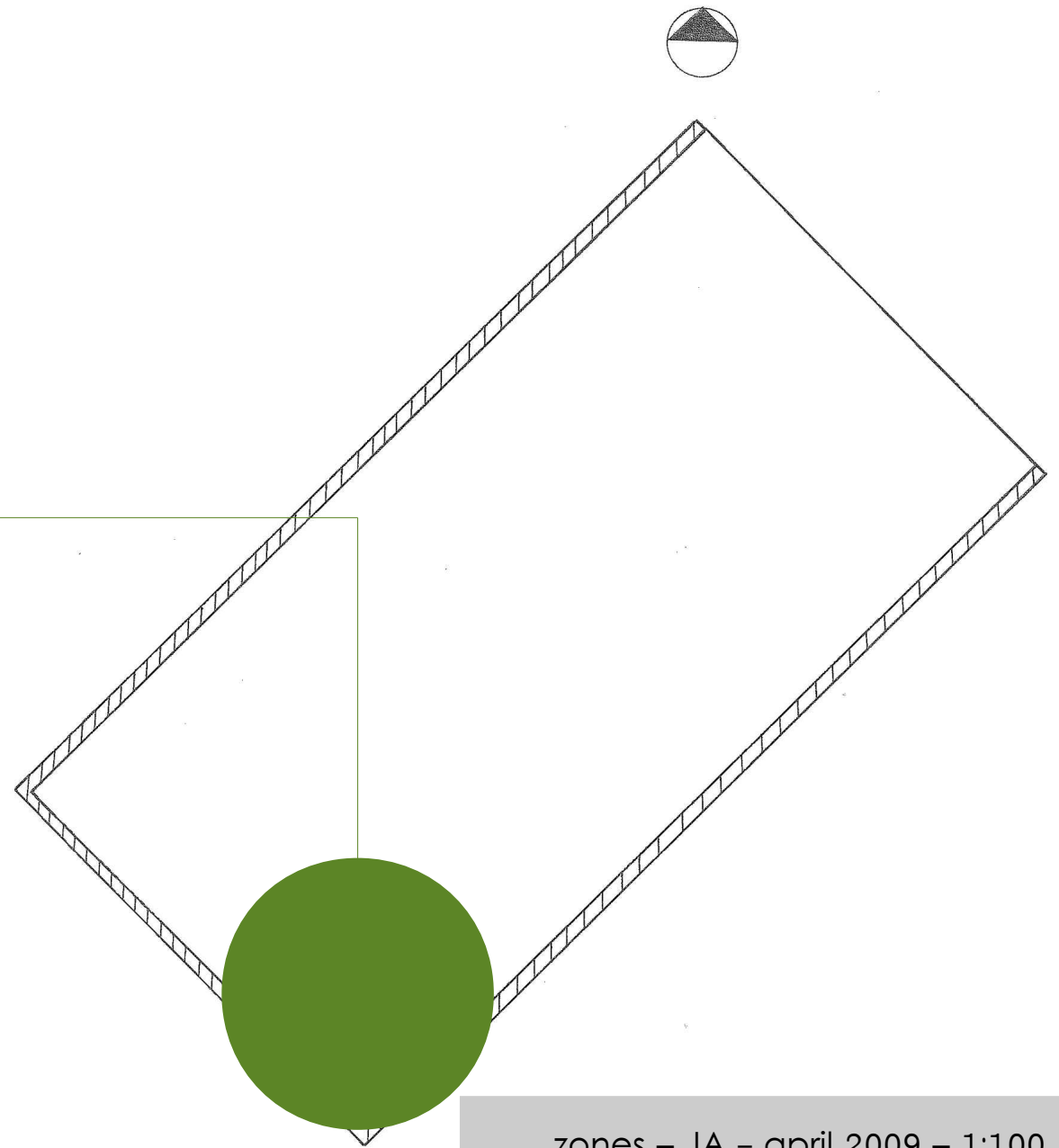
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zone 0

Because the garden is detached from the house, a shed will provide shelter & storage. It is placed in the shadiest corner.



zones – JA – april 2009 – 1:100

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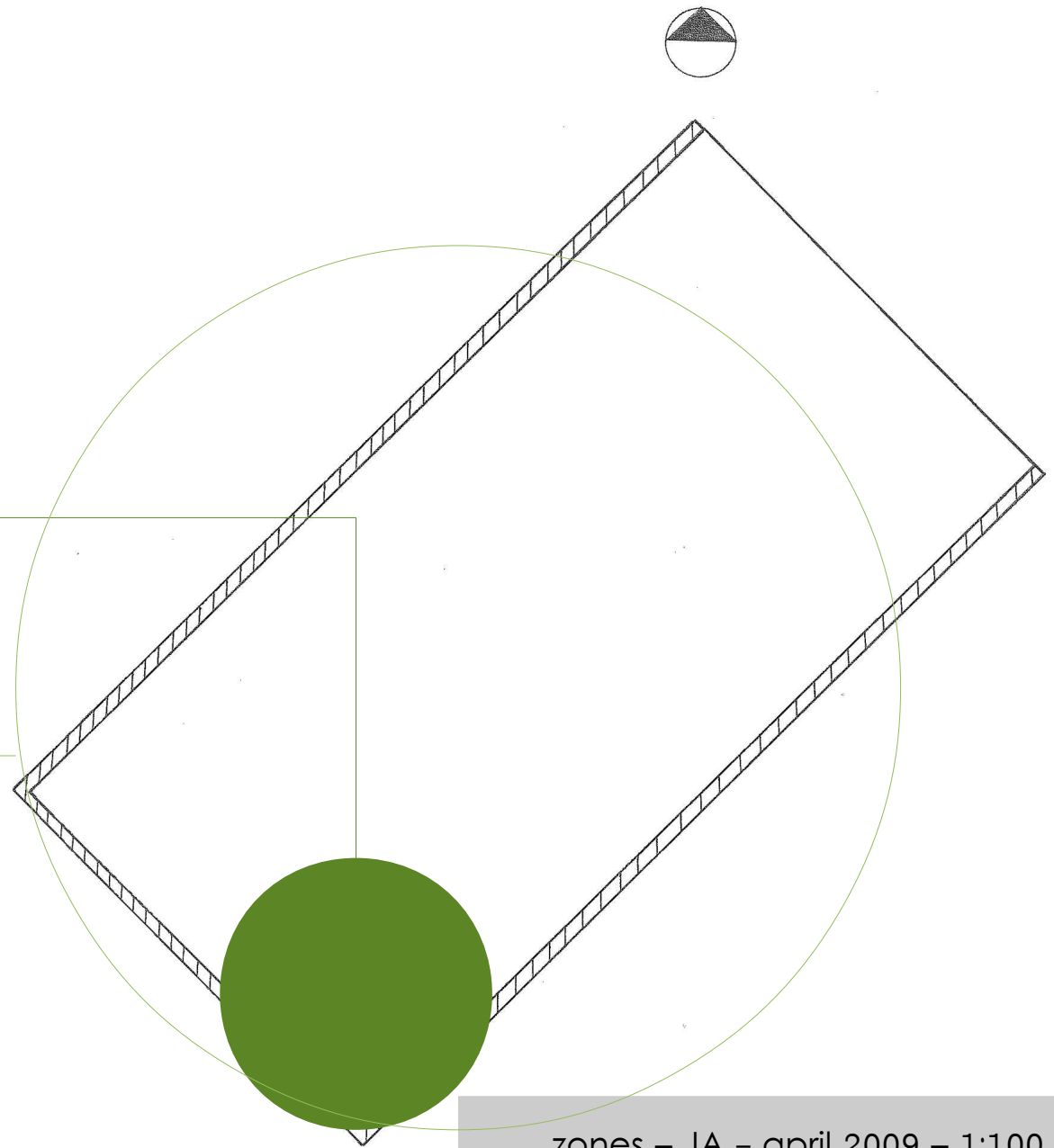
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Most of the garden is given over to zone 1 functions: intensive fruit and veg production.



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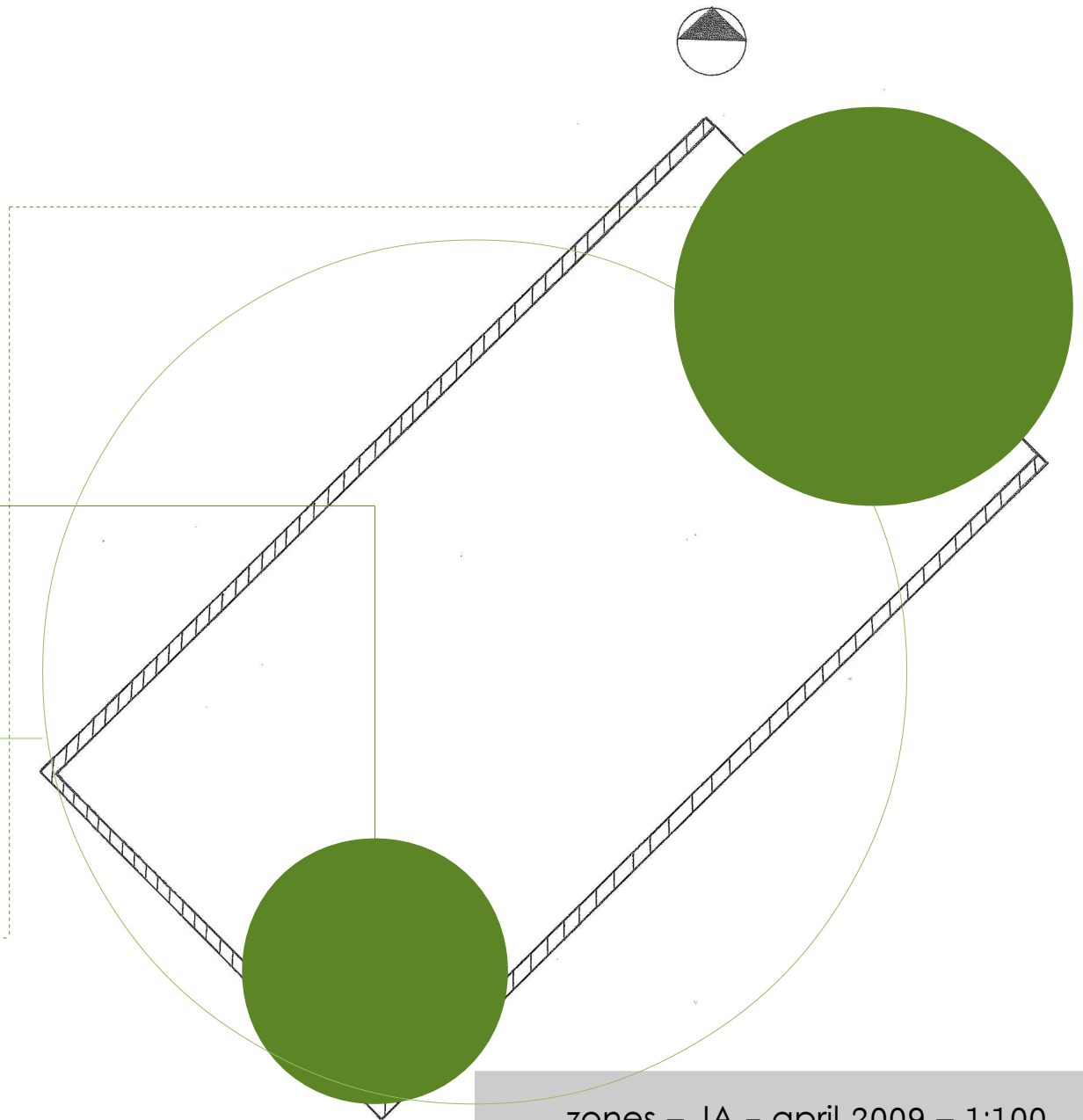
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zone 3

A multi-functional shelter belt will be planted along the north eastern boundary.



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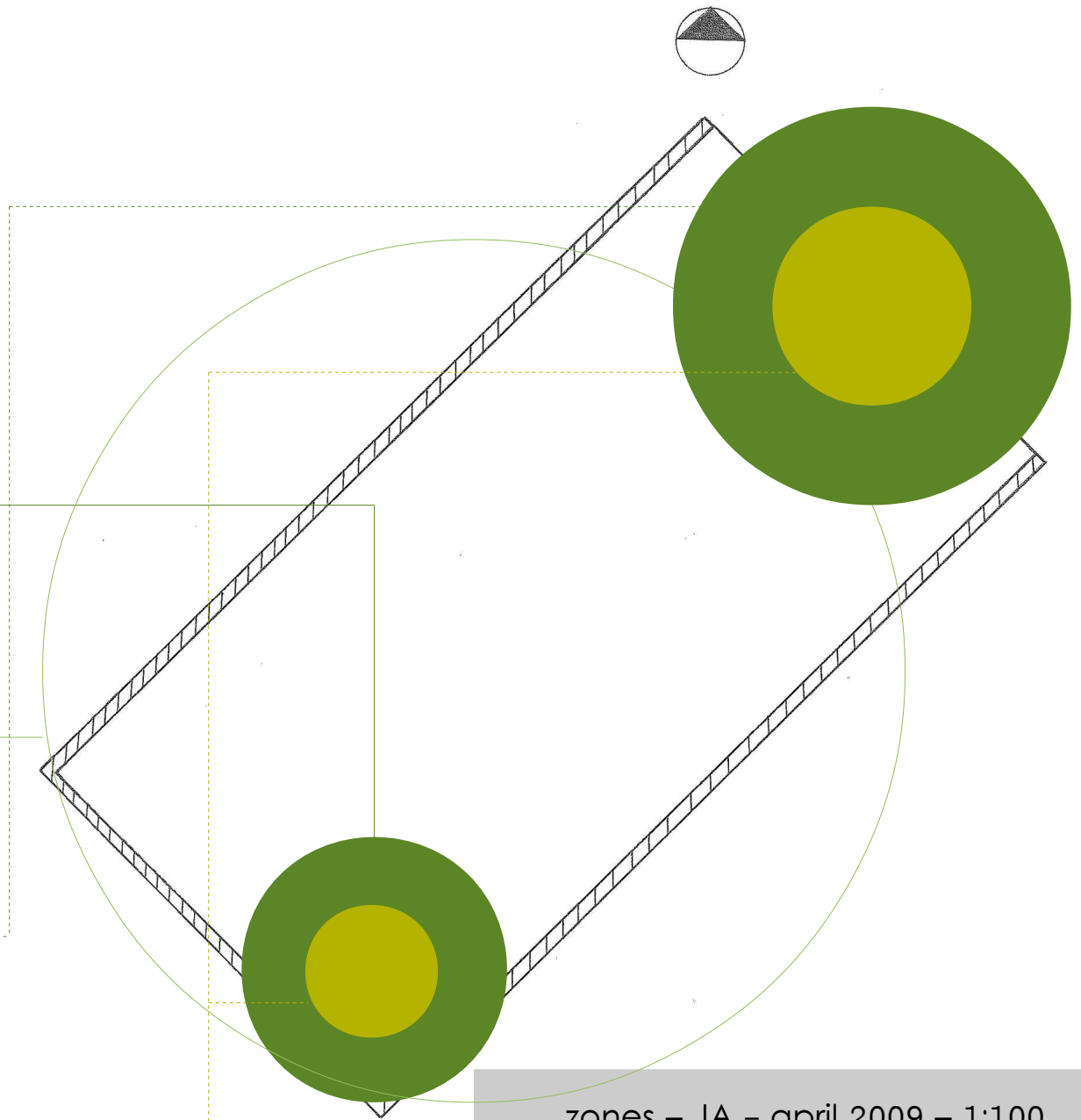
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zone 5

Wildlife habitat will be placed in at least 2 areas

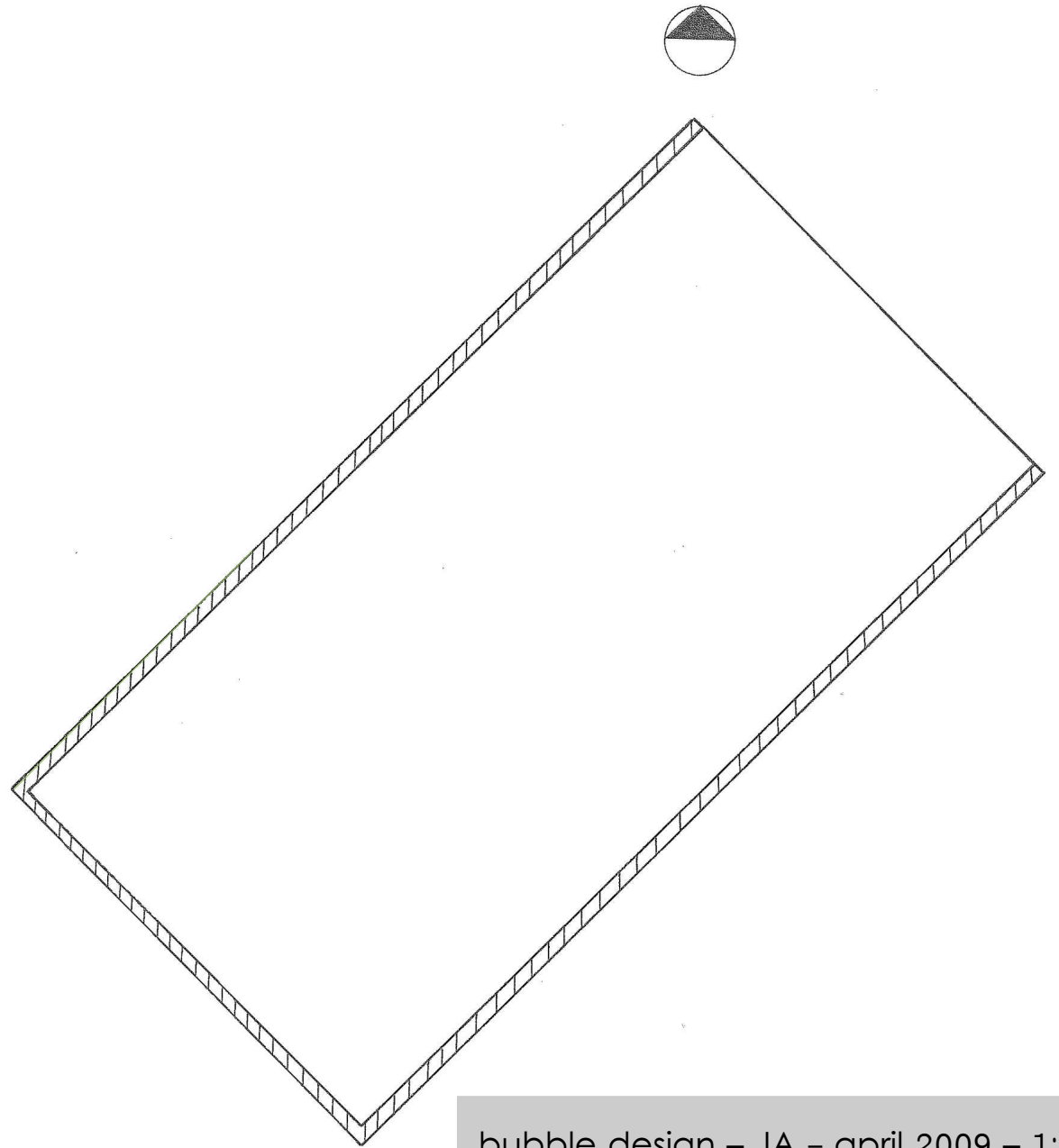


zones - JA - april 2009 - 1:100

design

bubble design

Main elements and areas of production.



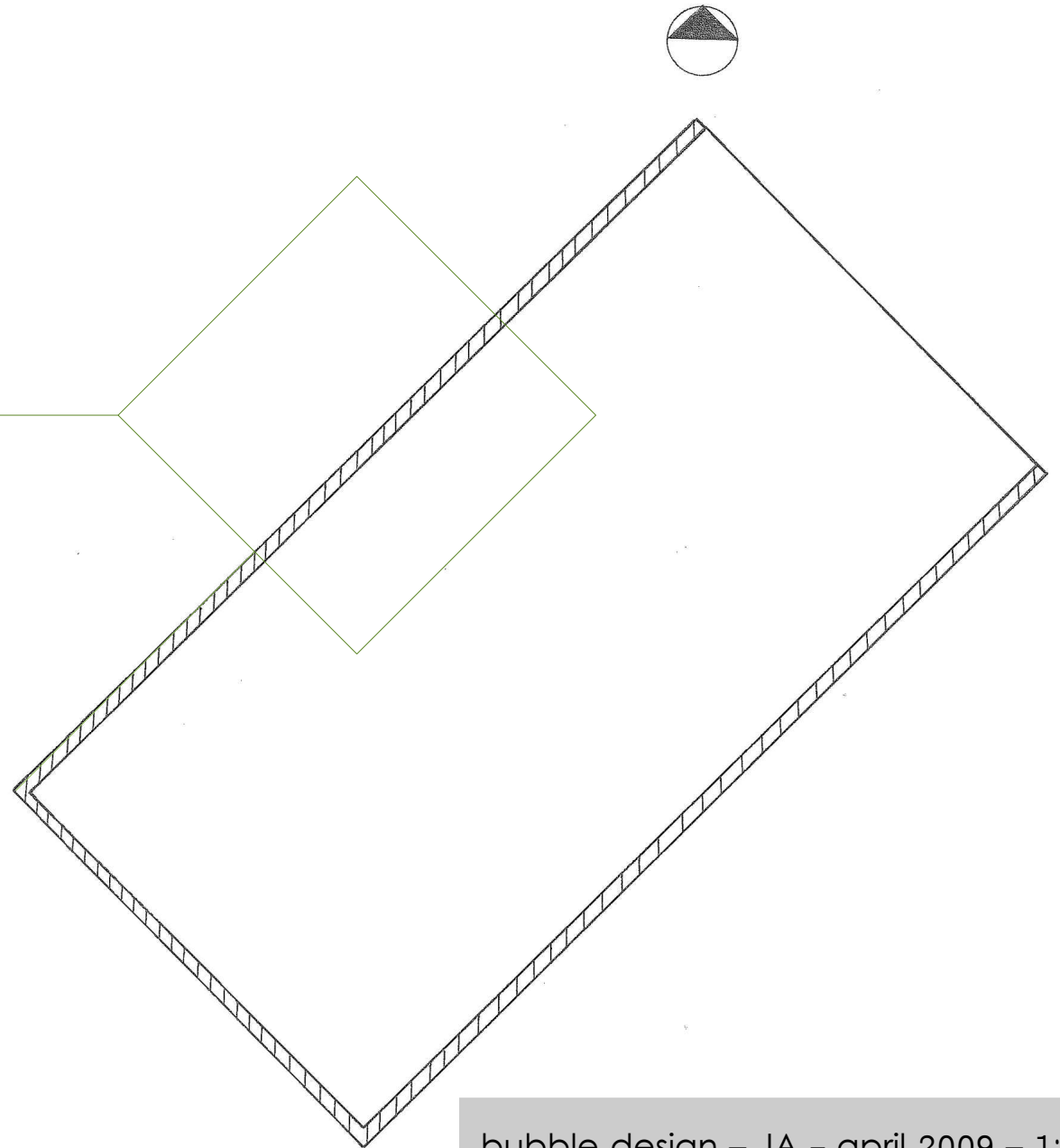
bubble design – JA – april 2009 – 1:100

design

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Main elements and areas of production.

Protected cropping to make maximum use of warm microclimate.



bubble design – JA – april 2009 – 1:100

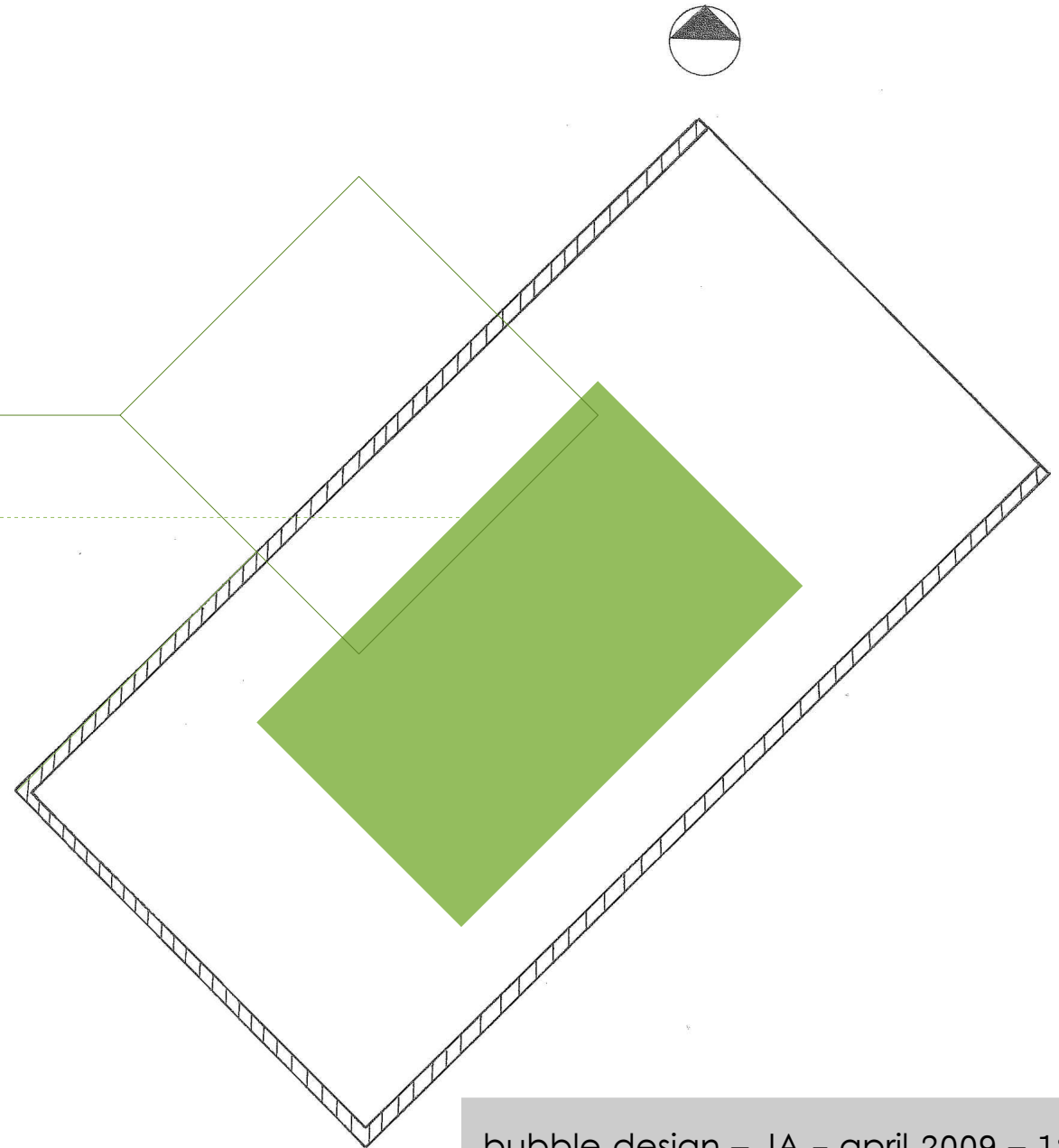
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Annual vegetable beds in centre of garden for maximum sunlight & accessibility



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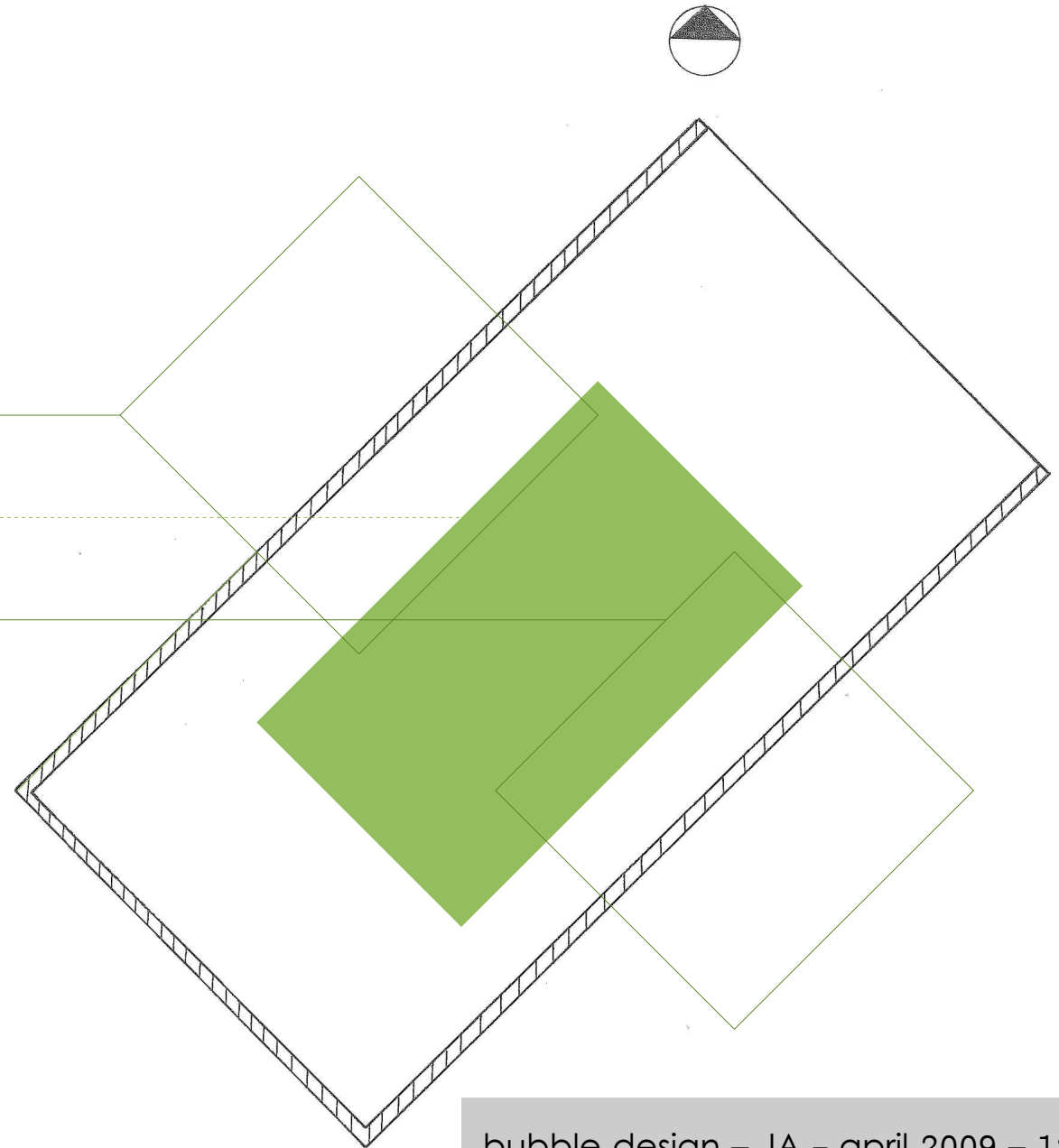
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Compost bins & comfrey in shady area



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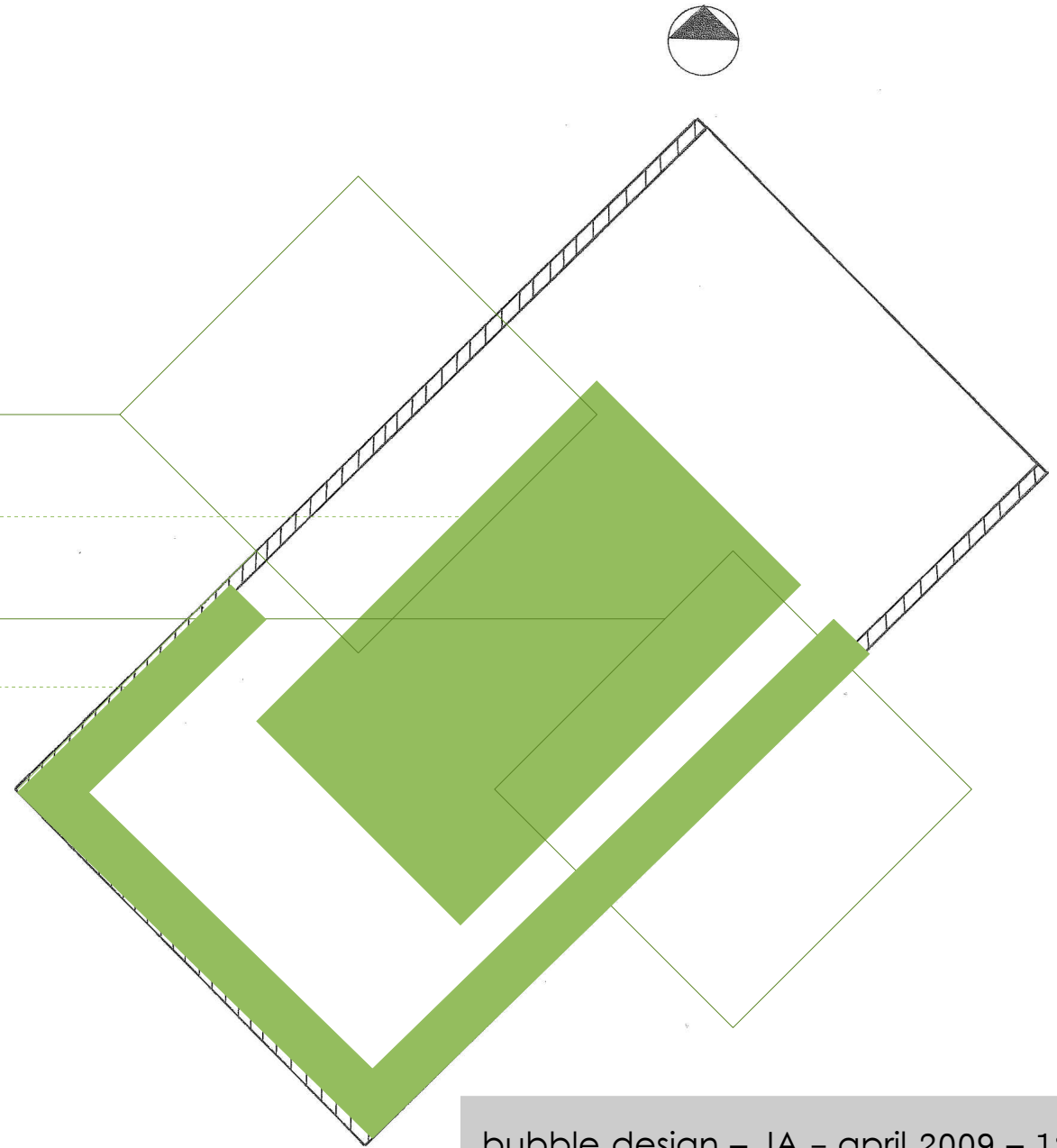
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Trained fruit; varieties selected for microclimates



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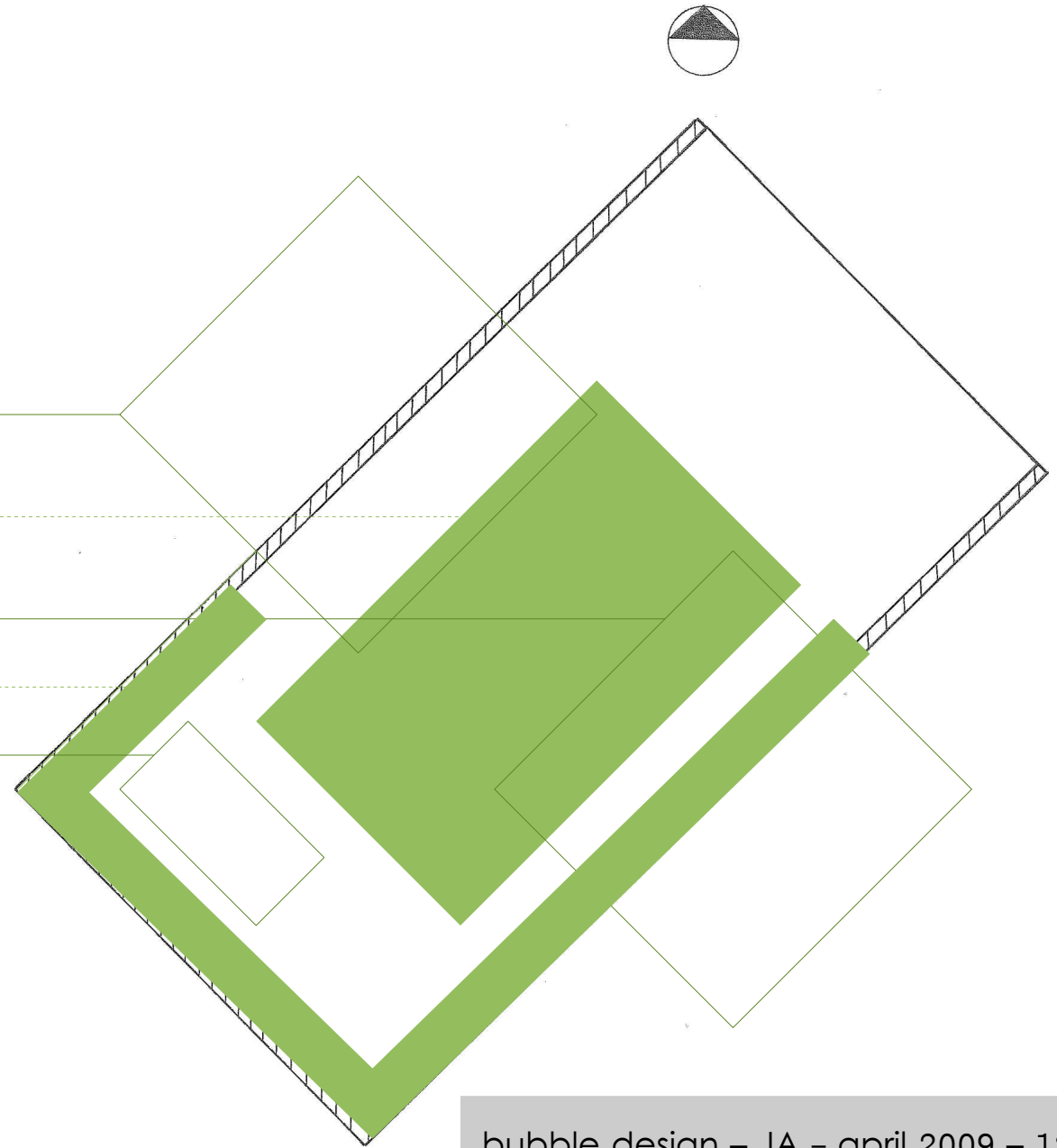
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Perennial vegetables



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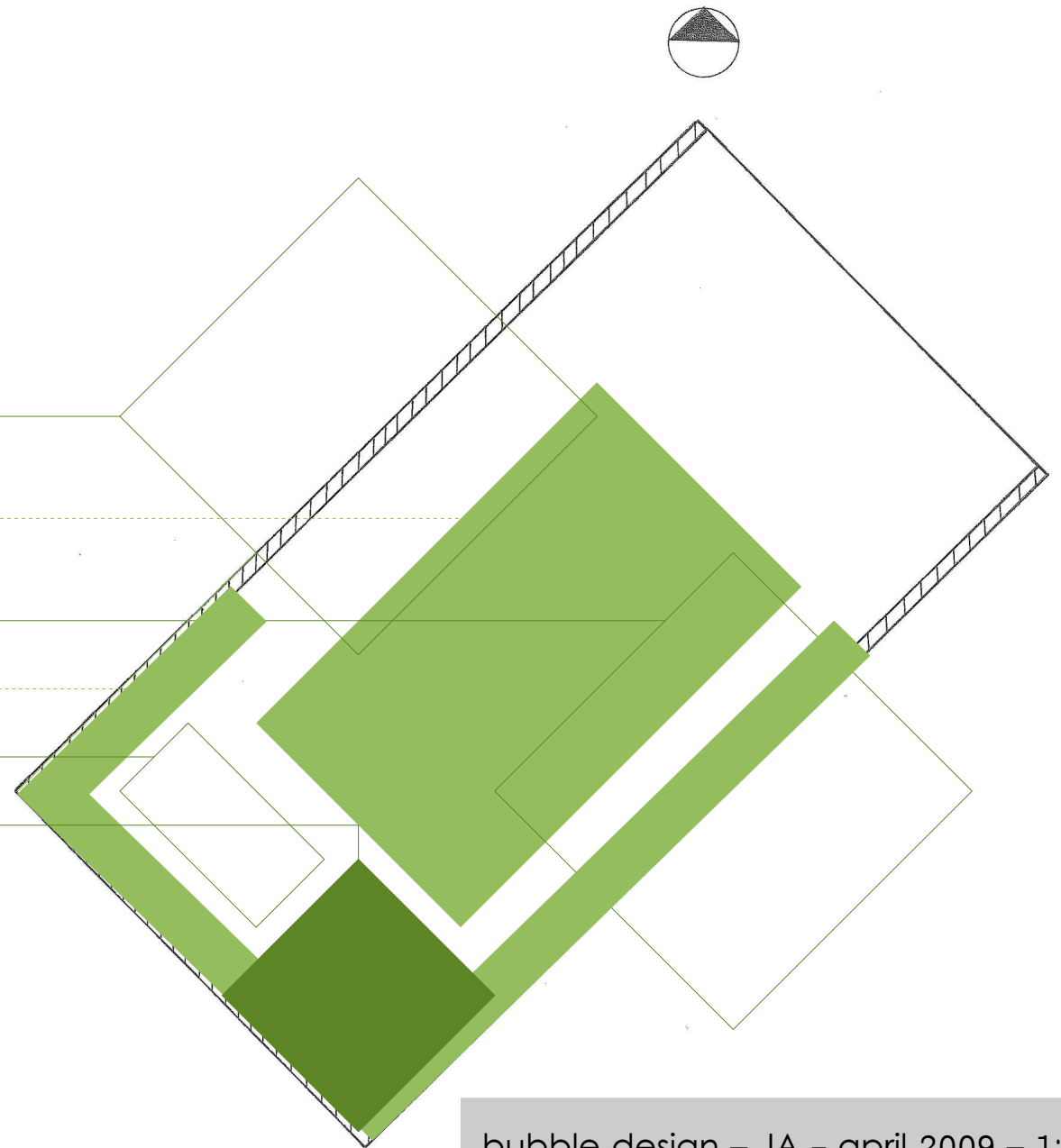
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Shed with green roof - wildflowers



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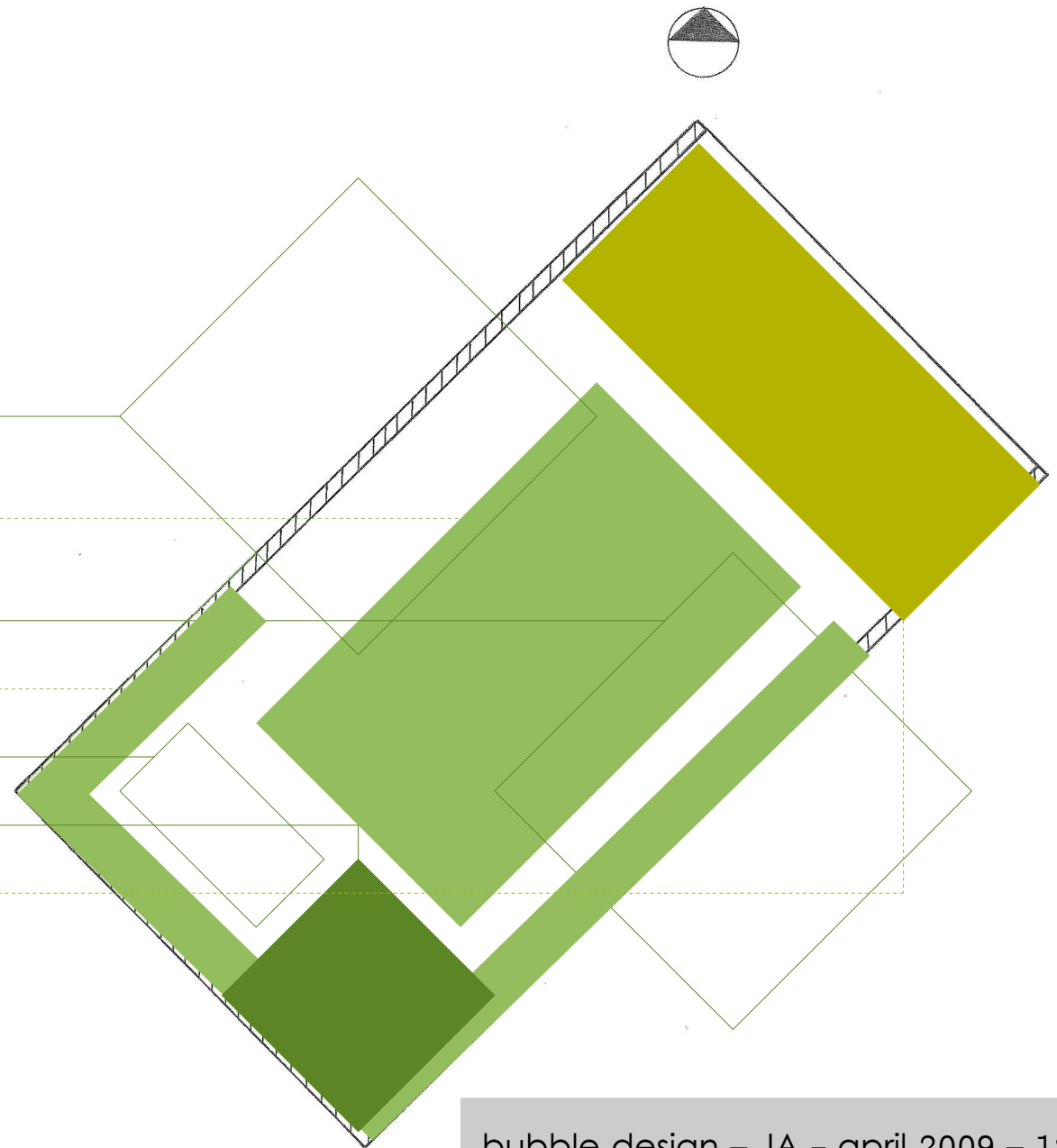
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Shed with green roof - wildflowers

Shelter belt with fruiting trees & wildlife area



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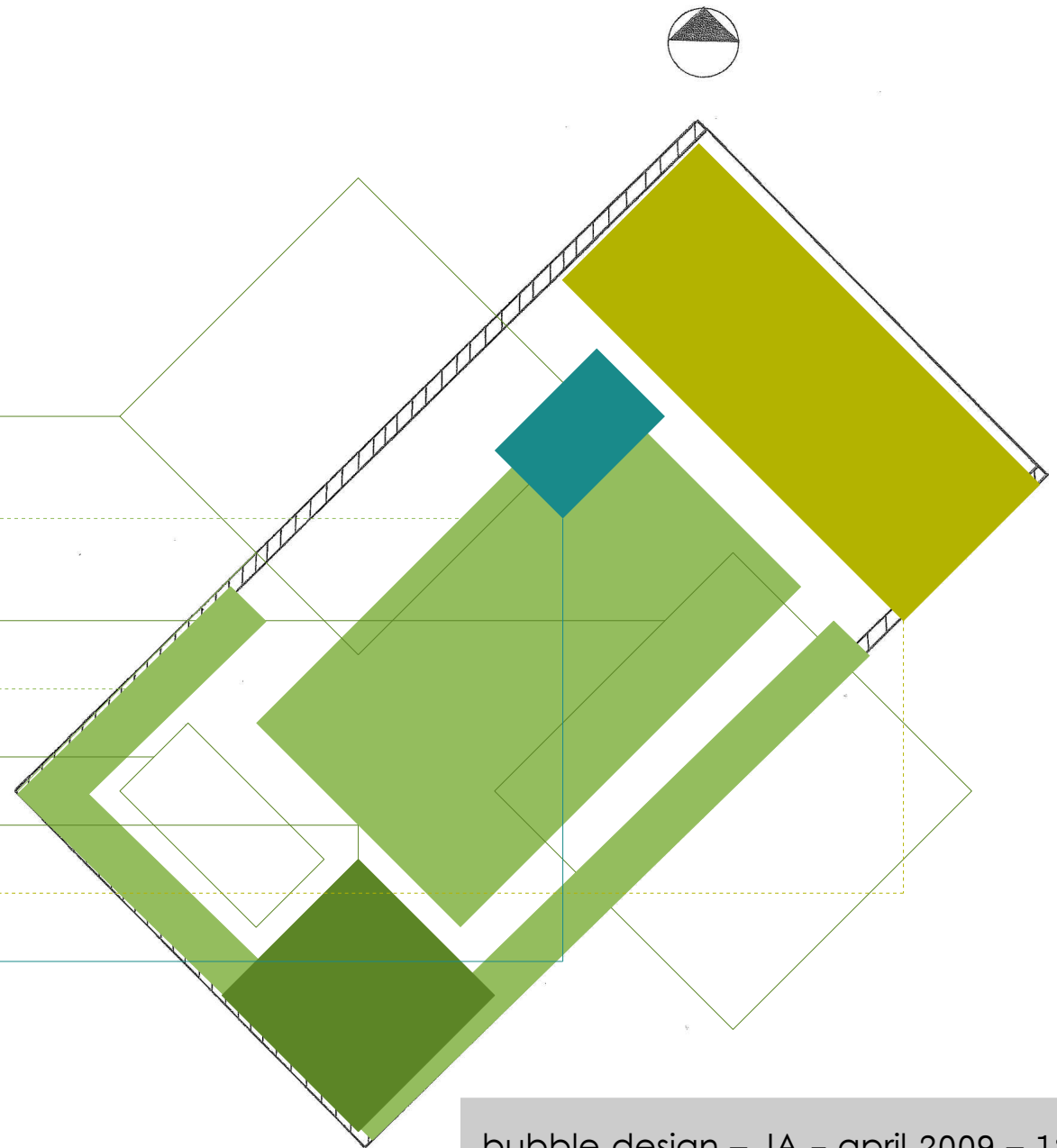
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Perennial vegetables

Shed with green roof - wildflowers

Shelter belt with fruiting trees & wildlife area

Pond for wildlife, thermal mass & light reflection



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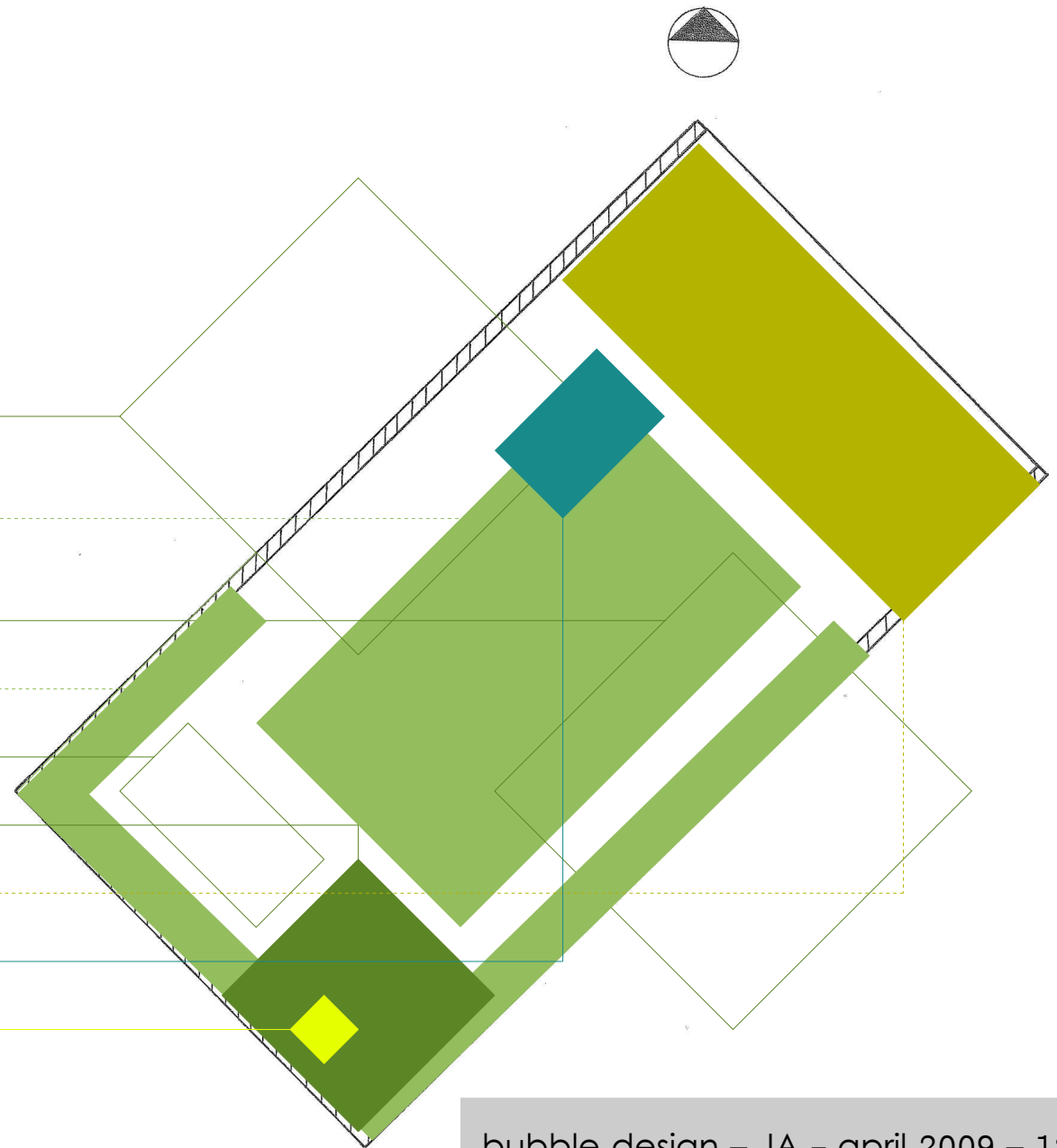
Perennial vegetables

Shed with green roof - wildflowers

Shelter belt with fruiting trees & wildlife area

Pond for wildlife, thermal mass & light reflection

Bees for pollination and honey

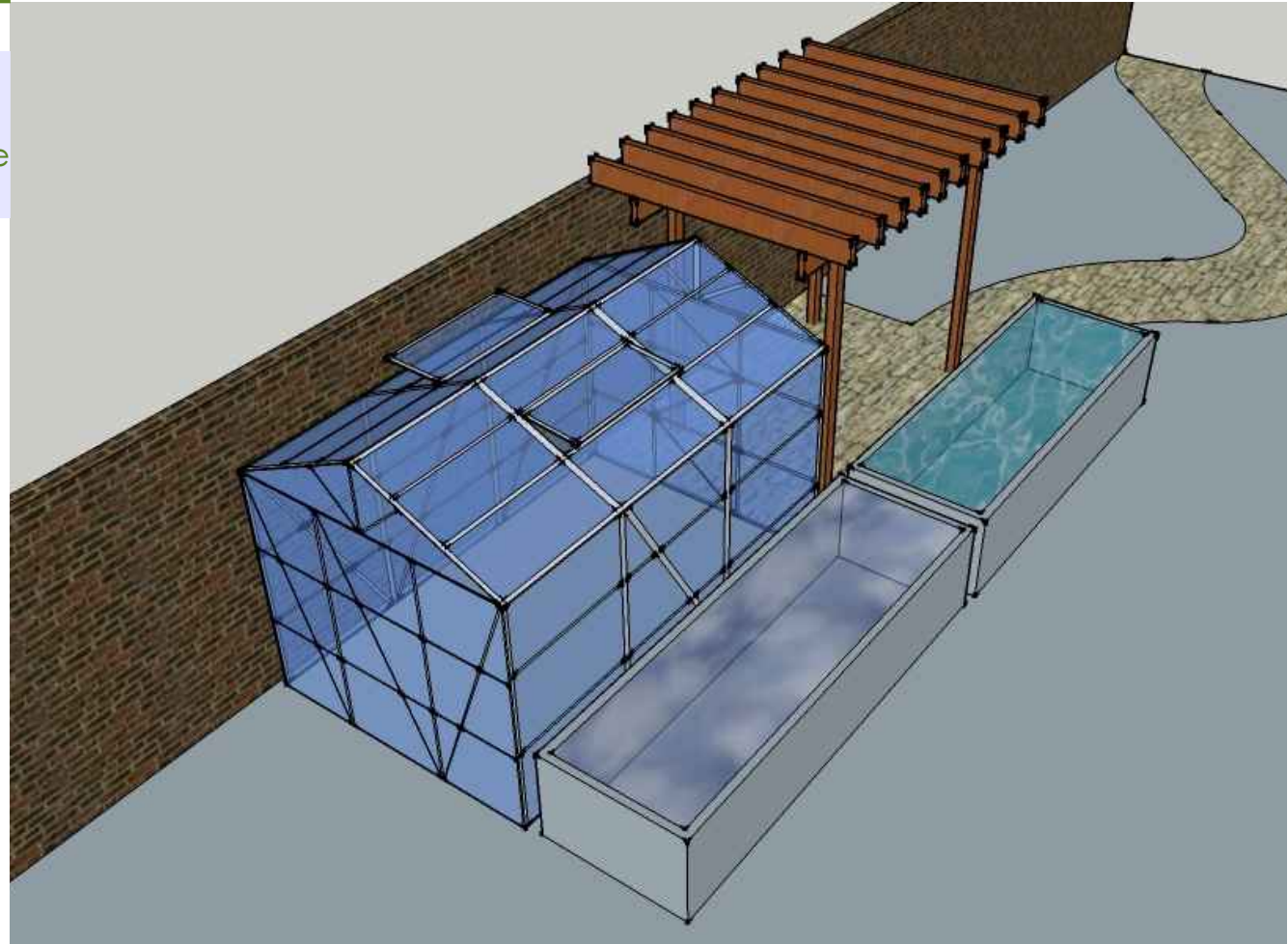


bubble design – JA – april 2009 – 1:100

design

relative location of elements

These elements have been placed to maximise beneficial relationships between them.



elements detail – JA – april 2009

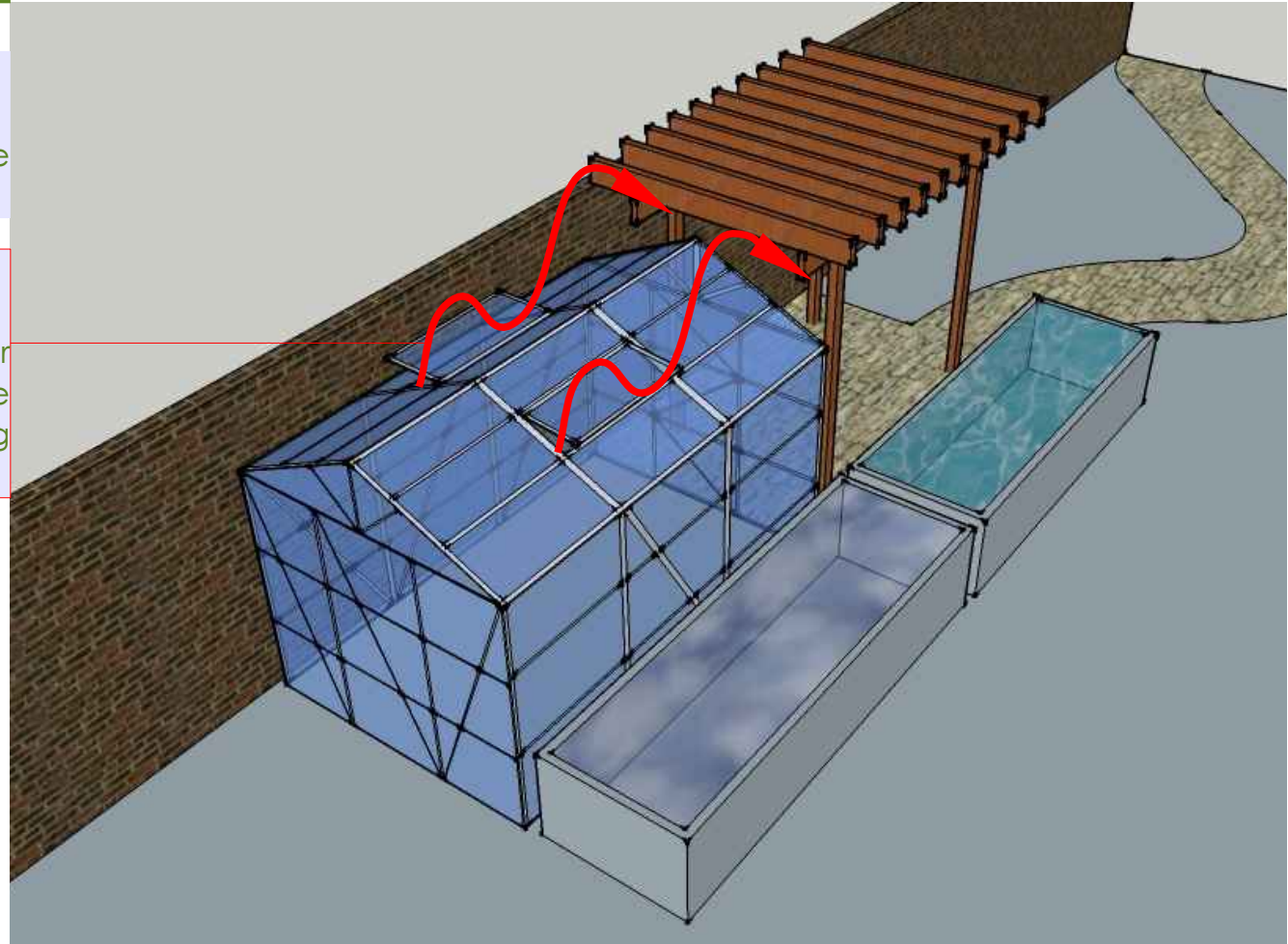
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automatic greenhouse venting

The greenhouse has heat-activated actuator arms to open the vents in hot weather. The warm vented air is then carried by prevailing winds towards crops on the pergola.



elements detail – JA – april 2009

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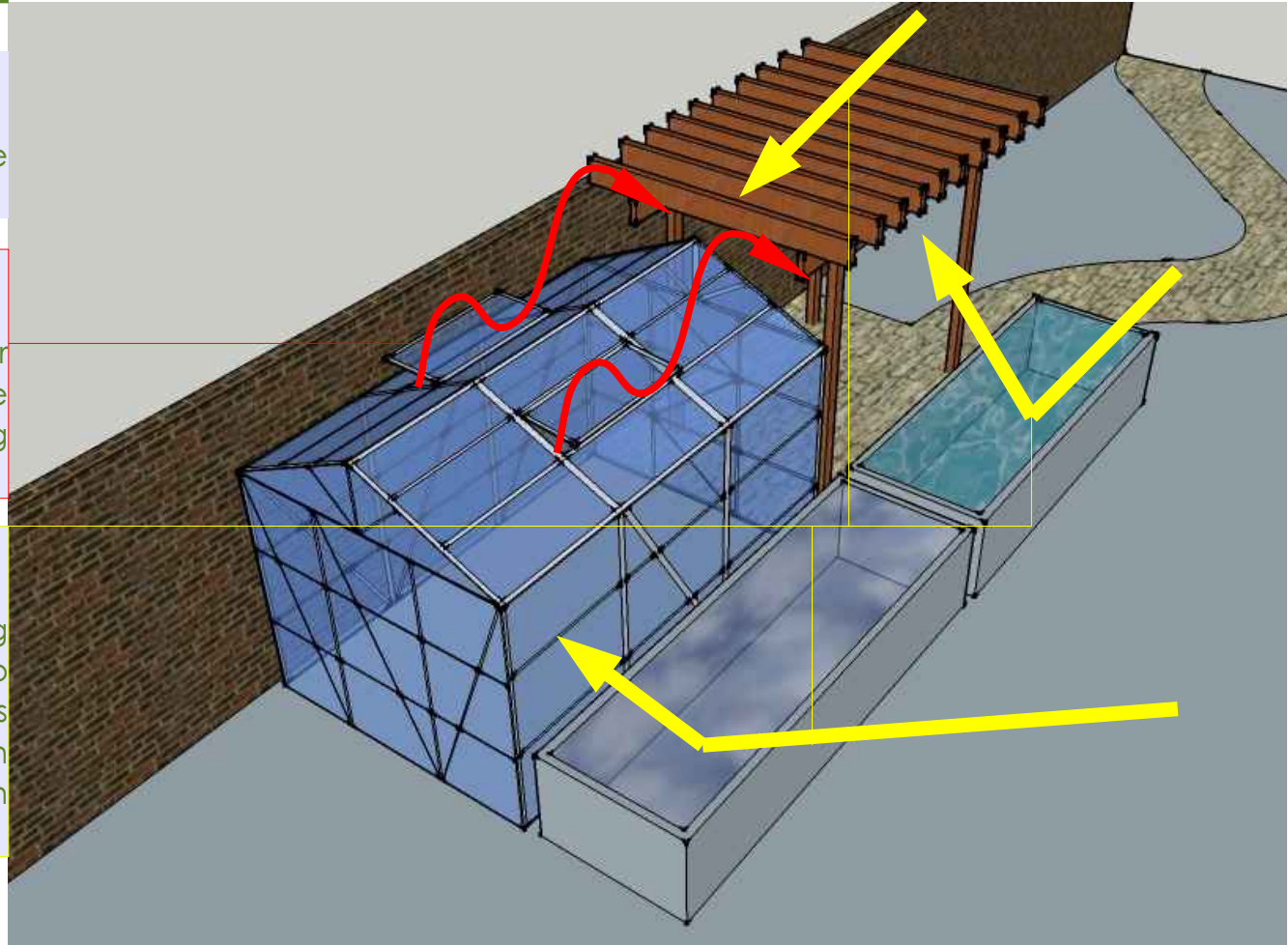
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shade & reflection

The pergola shades the greenhouse from spring morning sun, attenuating frost-damage risk to tender plants inside; the pond surface reflects summer sun into the underside of crops grown on the pergola; cold frames reflect some sun into the greenhouse in winter.



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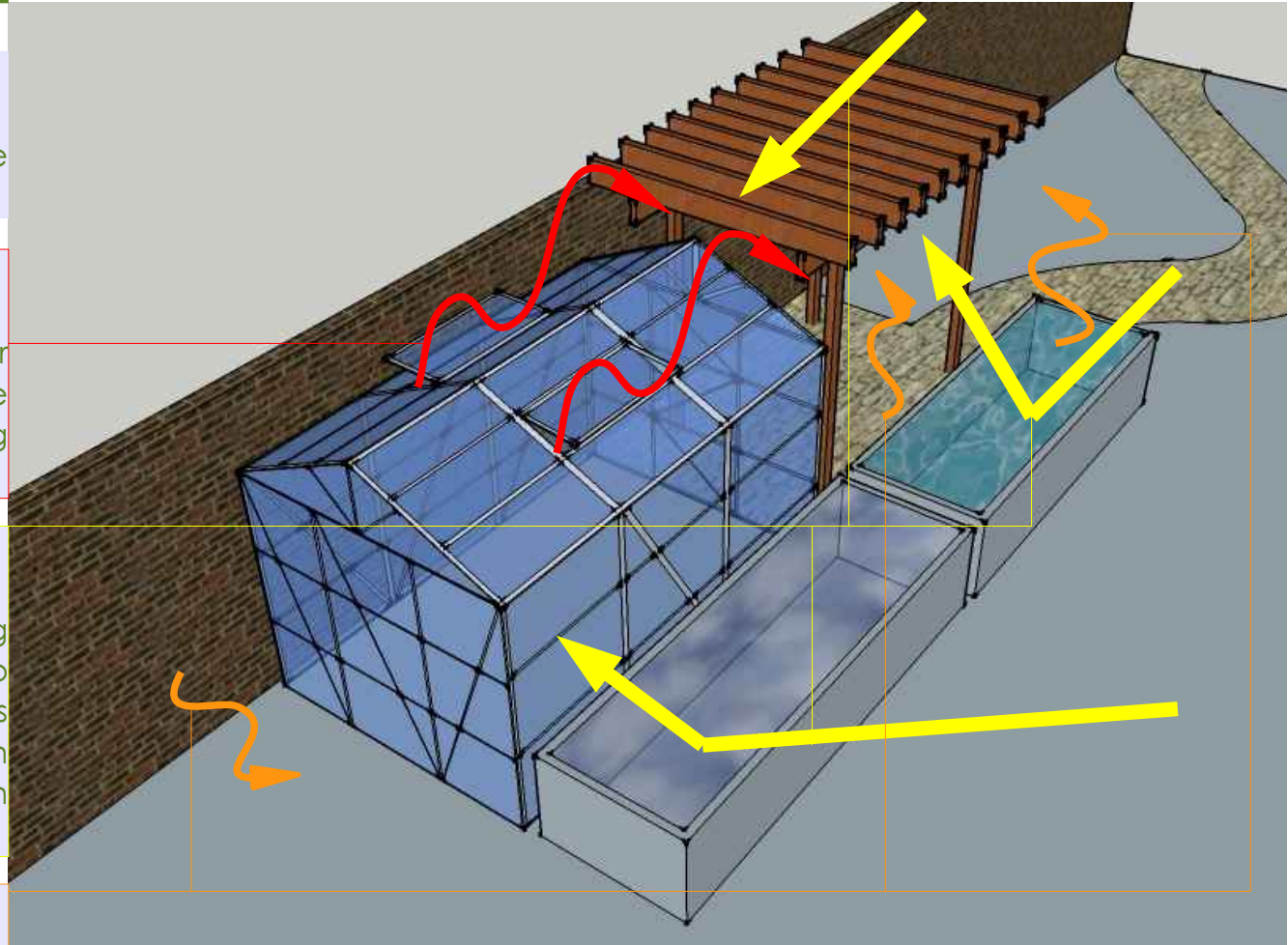
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thermal mass

Walls, paving and the pond store heat from the sun and re-radiate it in the evening, smoothing diurnal temperature fluctuations. This reduces both risk of frost in winter/spring and overheating in summer.



elements detail – JA – april 2009

design

Zone 0

The shed occupies the shadiest spot and I've opted for a Walter Segal style timber frame construction. This delivers enough strength for the turf roof & the point load of a bee-keeper, while keeping the walls slim (vs. say, straw bale), saving space.

Zone 1

The compost bins are placed near to the vegetable beds, where much of the compost is likely to be used. This will also bring the gardener right into zone 1 when they bring kitchen waste: a slight inconvenience but it ensures that the crops get attention.

A microclimate is created to enable grapes on the pergola. The surface of the pond, the cold frames' glazing and the roof of the greenhouse will all reflect some light up into the underside of the vine; also on warm days, excess heat venting from the greenhouse will be carried by the prevailing winds towards the vine. Meanwhile the walls, pond and paved area will act as thermal mass to keep evening temperatures up. If the vine doesn't succeed, a hardier variety such as 'Brant' could be tried, failing that, a Kiwi. Water chestnuts might be grown in the pond in an exceptional summer.

Varieties have been selected to suit their position and to maximise the length of harvesting/storing season. For example, the Black Mulberry is positioned to take advantage of the south facing wall while being sufficiently exposed to allow wind pollination. The apples are in incompatible pollinating groups but the crab apple can pollinate both, yielding apples from August-March. Currant bushes, gooseberries & calendula create a woodland edge.

Zone 3

This uses wind-hardy trees and shrubs and a picket fence which helps to reduce the effect of cold north- and easterly winds when the foliage has fallen. Vertical stacking is achieved with the introduction of a mixed berry understory to fill in the gaps at the base of the trees. Only moderate yields are expected here; the fruit yield is sacrificed for the function of providing shelter.

Zone 5

The alley between the trees is left for wild plants and animals, although this could possibly be used for chicken foraging or mushroom logs. The roof of the shed is planted with wild flowers.

implementation

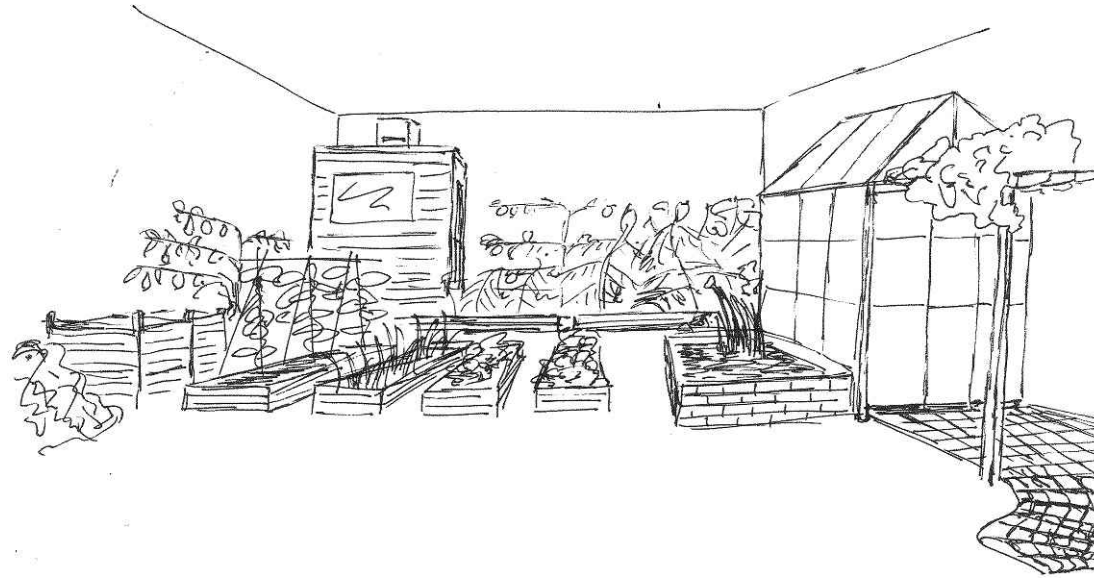
implementation plan

An implementation plan was not required.

However, there are several elements in the design that are potentially significant in terms of cost and/or labour (greenhouse, shed, pond, orchard...), depending on how the materials and labour are sourced.

Using reclaimed/found materials and hosting work days/permablitz would be strategies to address these issues.

Also, phasing the implementation by, for example, planting the fruit trees first could spread the cost over the first few years.



sketch – JA – april 2009

maintenance

maintenance plan

The annual vegetables would be likely to require a high degree of work input. For this reason, they have been restricted to a fairly small proportion of the overall design.

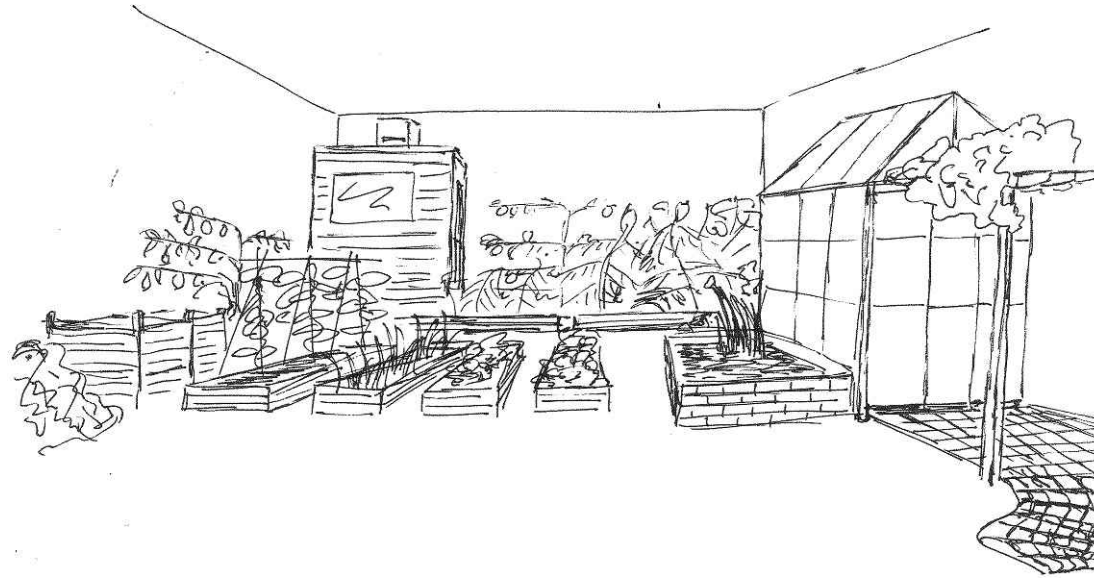
Perennial vegetables will also require an annual maintenance cycle of feeding, pruning and the leaves tidying up.

Likewise, the soft fruit, climbing fruit and top fruit will need pruning/cutting back annually and feeding.

The pond will need leaves clearing out of it annually, and may require occasional weed removal. The path may need occasional sweeping/clearing of leaves.

There will be a need to weed occasionally, particularly in the vegetable beds, and around the fruit trees while they are getting established.

The client would be able to decide whether to make comfrey tea, or opt for the simpler “chop-and-drop” approach.



sketch – JA – april 2009

Application of permaculture ethics

People Care

- The shed allows the gardener to take shelter on site in poor weather
- Gardening is good exercise and supports physical & mental wellbeing
- Fresh fruit & vegetables from the garden supports healthy diet
- More perennials = less digging

Earth Care

- Minimising the area of annual vegetable production reduces the need to turn the soil and deplete it.
- Introducing some zone 5 areas into such a small garden.

Setting Limits to Consumption & Redistributing Surplus

- By setting a limit to the area used for annual vegetable production this design moves away from the conventional approach of attempting to maximise production. Instead, it aims for efficiency – an improved ratio of energy input to energy yield. In so doing, it sets a limit to production (and hence consumption of the resultant produce).
- By creating zone 5 spaces, the design redistributes 'surplus' space to other species; animals, wild plants, fungi etc.

evaluation

principles

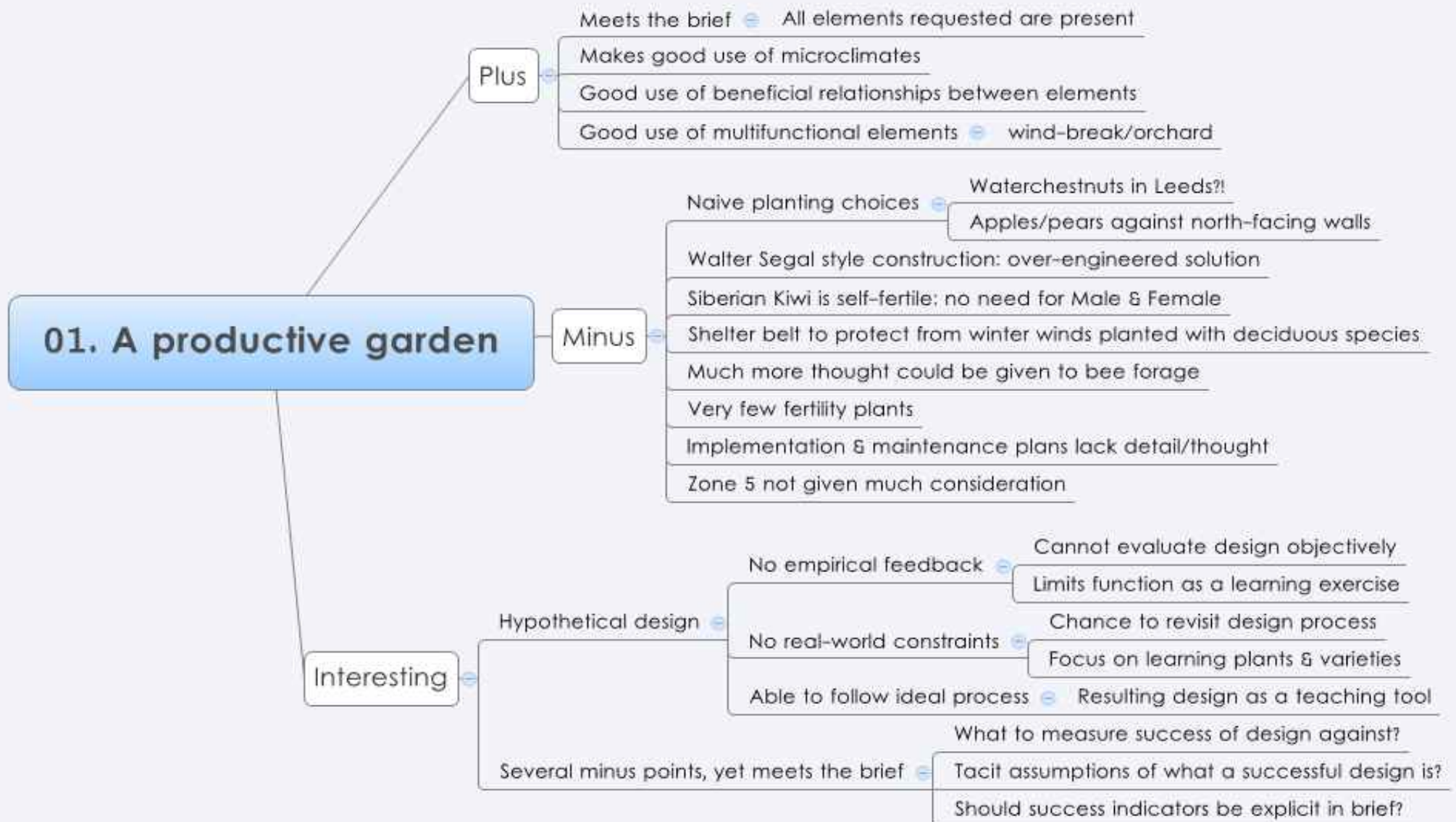
Application of permaculture principles

Observe & Interact	See sector analysis.
Catch & Store Energy	Thermal mass of the walls, paving, water in pond. Water butts.
Obtain a Yield	Edible windbreak; bees obtains a yield from neighbours' gardens.
Apply Self-regulation & Accept Feedback	Monitoring success of vine, water chestnuts and other marginal elements.
Use & Value Renewable Resources & Services	Sun/thermal storage; rain/water butts; bees & pollinators; worms; beneficial predators; 'weeds' as compost, hosts for predators & soil protection;
Produce no Waste	Recycle everything as compost, mulch, leaf mould or wildlife shelters.
Design from Patterns to Details	Sector analysis informed position of zones & 'key elements'.
Integrate Rather than Segregate	Greenhouse/pergola/pond; shed with bees & wildflower 'meadow'; various examples of vertical stacking
Use Small & Slow Solutions	Phased implementation: maiden fruit trees & annual veg. beds in year 1; Greenhouse, paving and pergola in year 2; Pond, cold frames & perennial veg. in year 3, etc.
Use & Value Diversity	Many types of fruit genus, species & variety/cultivar should provide some resilience to pests, diseases & climatic variations. Also, wildflowers on turf roof and semi-wild area in 'orchard' alley encourage further diversity.
Use Edges & Value the Marginal	Understory of edible windbreak; northeast & northwest facing walls; woodland edge.
Creatively Use & Respond to Change	Fruit trees are densely planted; as they grow this will need to be managed through timely pruning, pollarding or selective removal/harvesting of wood (replant with own-root fruit trees & coppice them?).

evaluation

PMI

As a paper exercise, it is impossible to evaluate the success of the design based on empirical evidence. Instead, I performed this PMI evaluation 4 years later, using the knowledge & insight I'd gained in the subsequent years to reflect on it's likely success.



reflection

What went well?

- Learned various new plants & varieties
- An opportunity to practice design process & some of the tools.
- I was able to apply ethics & principles
- I was pleased with some of my ideas (e.g. greenhouse/pergola/pond/cold-frame combination)
- Developed my design presentation style
- No client/real world constraints meant that my imagination could run wild

What was challenging?

- Deciding how to present the design/developing my graphical style.
- A lot of new plants: feeling inexperienced and not knowing what would work in practice.

Long Term Visions & Goals

- To use this design as a teaching resource on intro courses & PDCs: an "ideal" design
- Develop own design skills

Next Achievable Steps

- Create additional materials for students to use: print off copies of base map, make cut-out elements
- Start next design!