Living Nishi-Tokyo

Design for a farming community

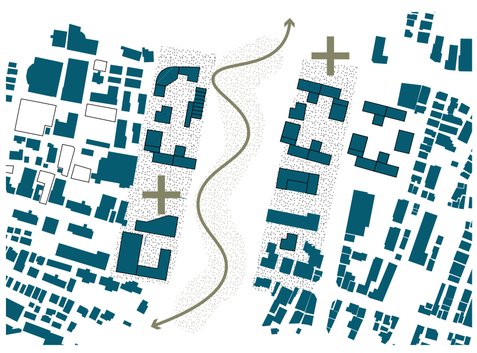
Urban concepts for future Nishi-Tokyo | アーバンデザイン

Current situation

Generic frame of Nishi-Tokyo urban texture.
Farmlands are fragmented and divided into small pieces between buildings.
Urban sprawl doesn't encourage slow mobility. Shriking population causes a high number of vacant houses.

Proposal

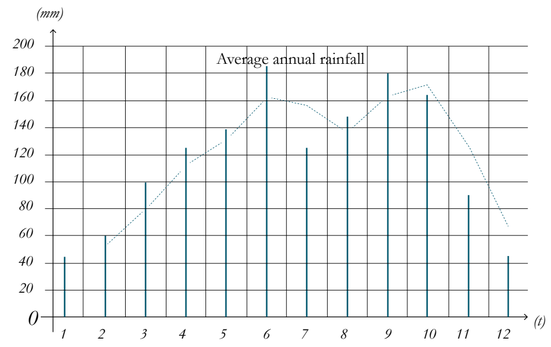
Green corridor + density + mixed use developments



New mixed-use dense development can counteract urban sprawl. Population decline can be an opportunity to improve quality of public and green spaces. Nishi-Tokyo needs more density in between a productive green corridor that can help preserving agricultural fields.

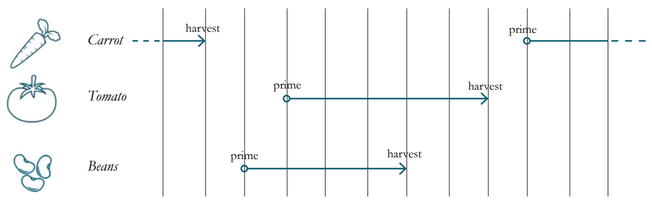
Scenario for a green corridor | 緑の廊下

Harvesting system capacity calculation | 計算



Source: NOAA

Planting period



Source: FAO

How much water 1m² of crop needs?

Variables : **Environment and type of products**

Environmental variables calculation

$$ET_0 = p\,(0.46\,T_m + 8) \quad \text{(mm/day)}$$

ET_0 = Environmental factor
p = Daily % of annual daytime hours at every latitude
T_m = Average T

Type of products calculation

$$K_C = \text{Crop factor} \quad \text{(-)}$$

From sheet:
- Type of products (tomato, cabbage, etc.)
- Growing period (initial, developing, central, harvesting phase)

$$\boxed{ET = ET_0 \times K_C} \quad \text{(mm/day)}$$

Water volume calculation

$$V_{in} \xrightarrow{\text{from rainfall}} V_{(mm/month)} \times S_{roof\ (m2)} \times 1000$$

$$V_{out} \xrightarrow{\text{watering}} S_{crop} \times ET \times (30 - \text{number of rain days}) \times 1000$$

Water volume offset calculation

(Tank dimension)

Source: FAO

$$\text{Tank total capacity} = V_1 - V_2$$

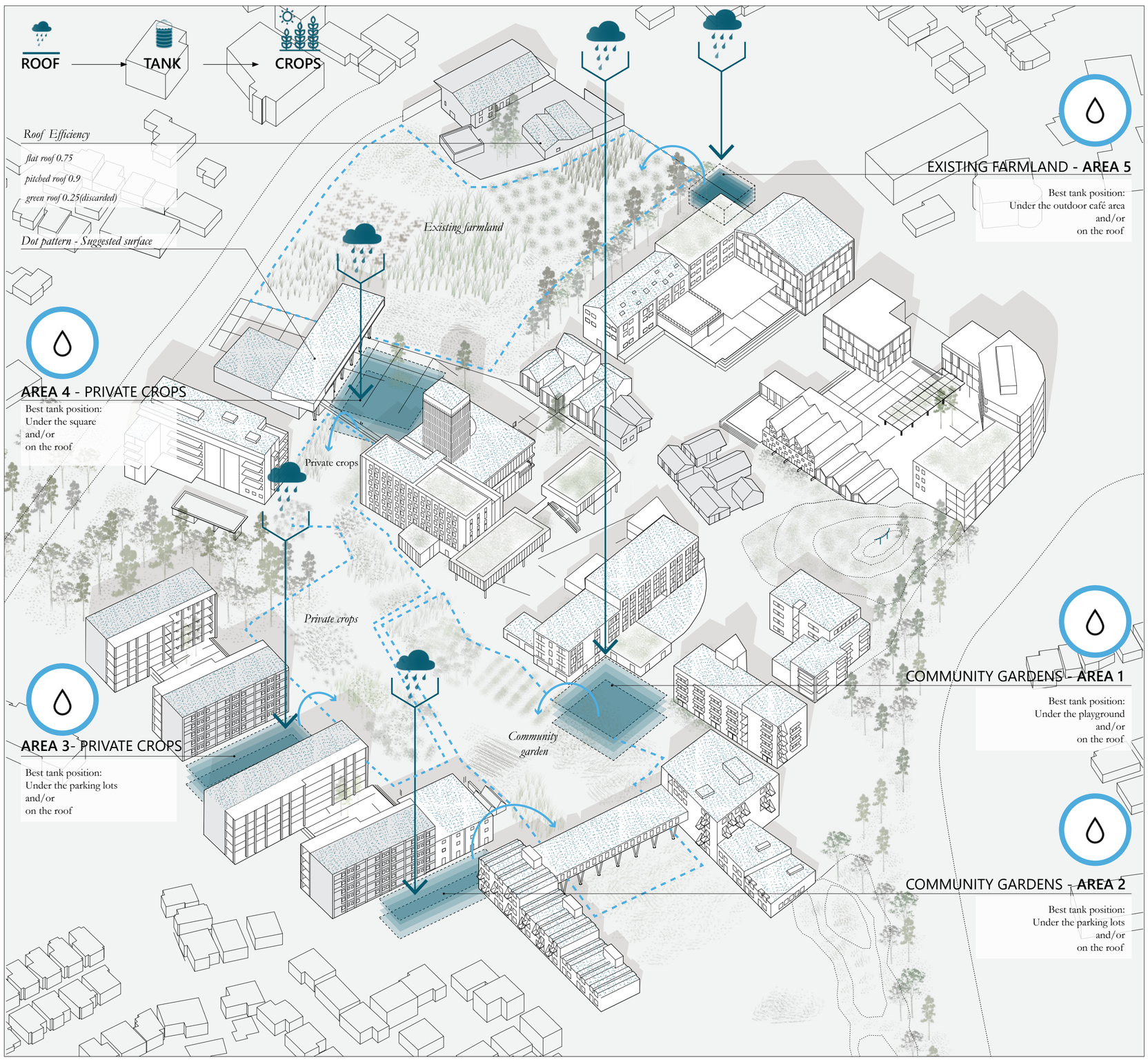
V_1 = MAX (Δ "in" volume to "out" volume)
In April (month 04)

V_2 = MAX (Δ "out" volume compared to "in" volume)
In August (month 08)

Results

50m² of roof surface are necessary to water **75m²** of crops thanks to an **9000L** tank (*e.g. Kessel Aqabase Standard*). These figures show that, due the large projected crop surface of **5500m²**, to satisfy the whole system are necessary **75 tanks** with 9000L capacity. Tanks can be placed underground or on roof top. On the right, an illustration shows the most appropriate area to place tanks.

Harvesting rainwater | 雨水を収穫する



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