

# Risk management in procurement of blue-green roofs

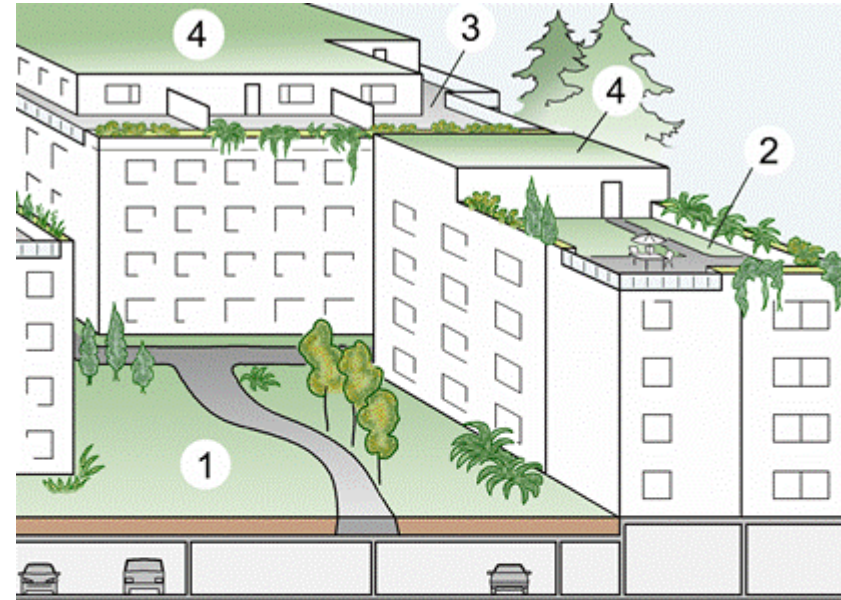
A project owner perspective

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# Green roofs

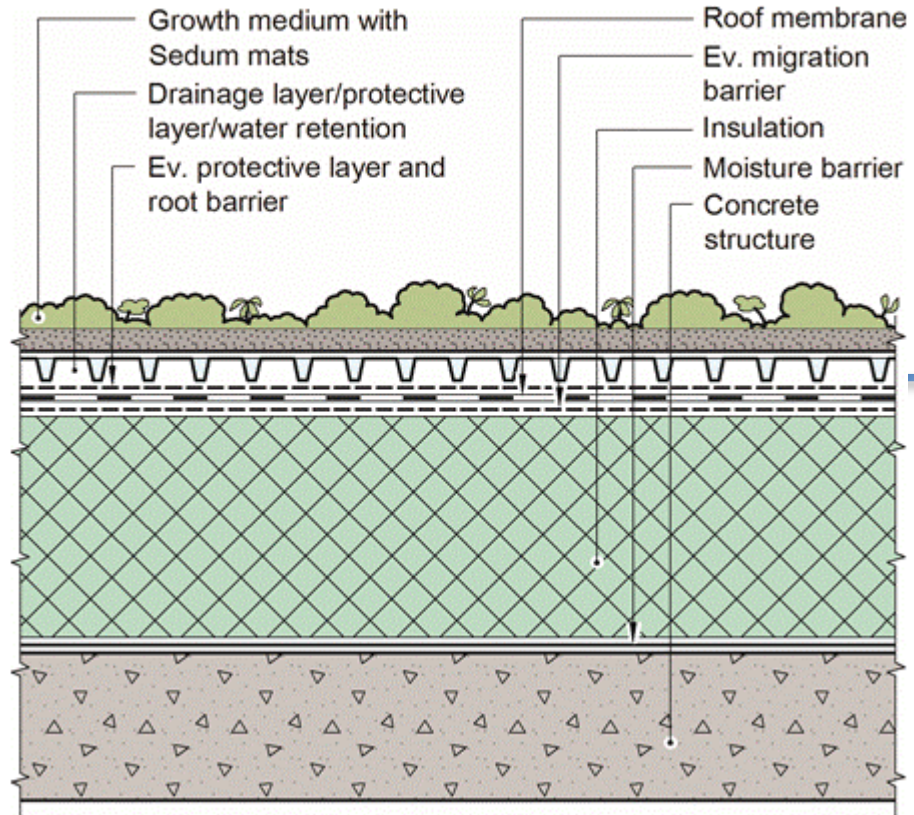


Vegetated roofs on concrete floorplates, for different purposes:

1. Terrace/outdoor area designed for heavy loads, with access for heavy equipment and facilitated for larger plants.
2. Terrace designed for moderate loads from some foot traffic and light vegetation.
3. Family terrace with light vegetation.
4. Extensive green roof, not designed for foot traffic.

# Blue-green roofs

- Green roofs built to manage stormwater
- Drainage/retention layers and greenery built on top of regular compact roof
- Effective at their task, but how do they impact the building?



# Risk and Risk Management Strategies

Risk = Probability x consequences of an **unwanted** event

We only consider quality risks

Risk Management strategies (Hillson 2004):

Avoid

Accept

Share

Transfer

# Research questions

1. What are the challenges and risks related to green and blue-green roofs?
2. What strategies are applied by project owners to control and manage risk related to green roofs in the procurement phase?

## Risk – our focus

- Possible waste – making defective products
- Quality risk – the integrity of the building and its components.
  - Probability of defect not bigger for blue-green roof than for conventional roof.
  - Consequences are greater, as defects are harder to detect and more costly to repair.
  - → Greater risk than conventional roofs, has to be managed to allow large-scale adoption.
  - How could it

## Project owner

- Wants to avoid owning a defect roof.
- Owns the roof from the moment of handover.
  - Warranty period may exist, but it may take longer than that to discover defects.
- Contracts design and construction from specialized companies, separately or in one main contract (design build)



## Method

- Examined public tenders for several green roof projects
  - Public owners (municipal or county level)
  - Pre-design reports
  - Contract form



# What are the risks related to green and blue-green roofs?

- Defects and leakages
  - Wrong design
  - Wrong craftsmanship
- Leakages and defects hard to detect
- Leakages and defects more expensive to repair

## Design build contracts

- Commonly used in public construction projects in Norway.
- The contractor is responsible for design and construction
- Specification is important, otherwise the contractor is free (to cut corners?).

# Findings

- Very variable level of detail specifications.
- No systematic procedure/methodology to handle quality risk.
- The thoroughness of the pre-design report depends entirely on the person who wrote them.
- Risk management strategies are not well visible in bidding documents.

# Strategies for managing risk

- The owner should give detailed specifications (Share/Transfer risk)
  - Solutions, types of product, etc.
  - Integrity test of the finished membrane (before green roof layers are built)
- Inspections during construction and at handover (Avoid/Accept)
- Control of delivered products and workmanship (Avoid/Accept).

Thank you for the attention!

- Questions or comments?