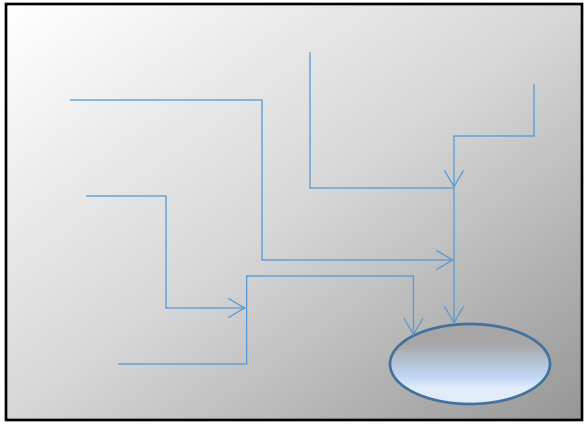
Some Details

- The Importance of Source Control
- Green roofs
- the “5m Rule”
- other options

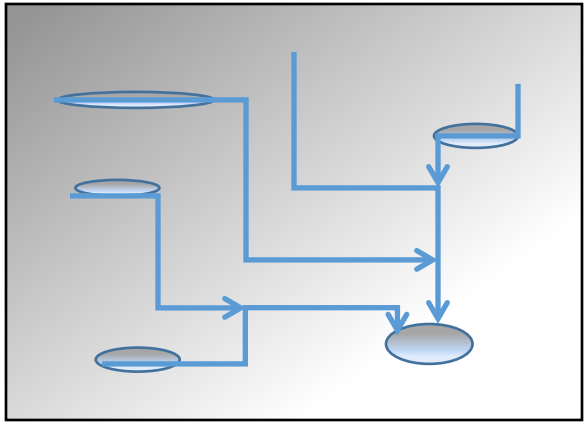
Source Control

- Better to manage runoff where it lands than to gather it at a downstream location where hydraulic loads and pollutants are more concentrated.

Collect over catchment (End of pipe)



Mange at Source



What is a Green Roof?

Green roofs, or vegetated roofs, or living roofs are systems that are essentially roofs with vegetation placed upon them in a way to provide benefits. The installation of a green roof may be for various reasons and will almost always provide a suite of additional benefits.

The 2 main categories of roof are;

- **Extensive** green roof – thin growing layer and low maintenance; most commonly sedum mat system
- **Intensive** green roof – deep growing layer and generally more managed and higher amenity with larger plants including trees; a park on the roof

Green Roof Types

Extensive;

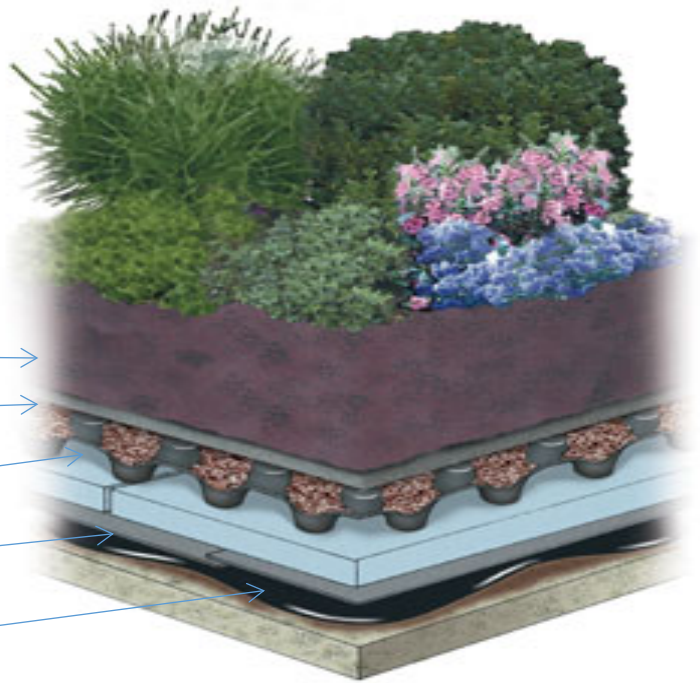
Glenco

Intensive;

Scottish Parliament

What you don’t see…

- Typically a green roof will have discr layers between roofing surface and vegetation;
  - Substrate
  - Geotextile
  - Water Storage
  - Root Barrier
  - Waterproofing



Why provide Green Roofs?

Benefits include (in no particular order);

- Climate change & adaptation
- General environmental, economic & social benefits
- **Flood mitigation**
- Water quality improvements
- Health and well being
- Habitat & Biodiversity
- Air quality improvements
- Building thermal efficiency
- Reduced whole life cost
- Noise reduction
- Urban heat island effect reduction

A green "Barrel" roof, Duff Street, Edinburgh

Habitat & Biodiversity

- Changing climate will see species become more threatened
- New buildings in green field sites will remove habitat – green roofs can be used to replace this loss
- Green roofs can provide important, undisturbed refuges for wildlife – Swiss and UK studies have shown rare invertebrate populations within green roofs.

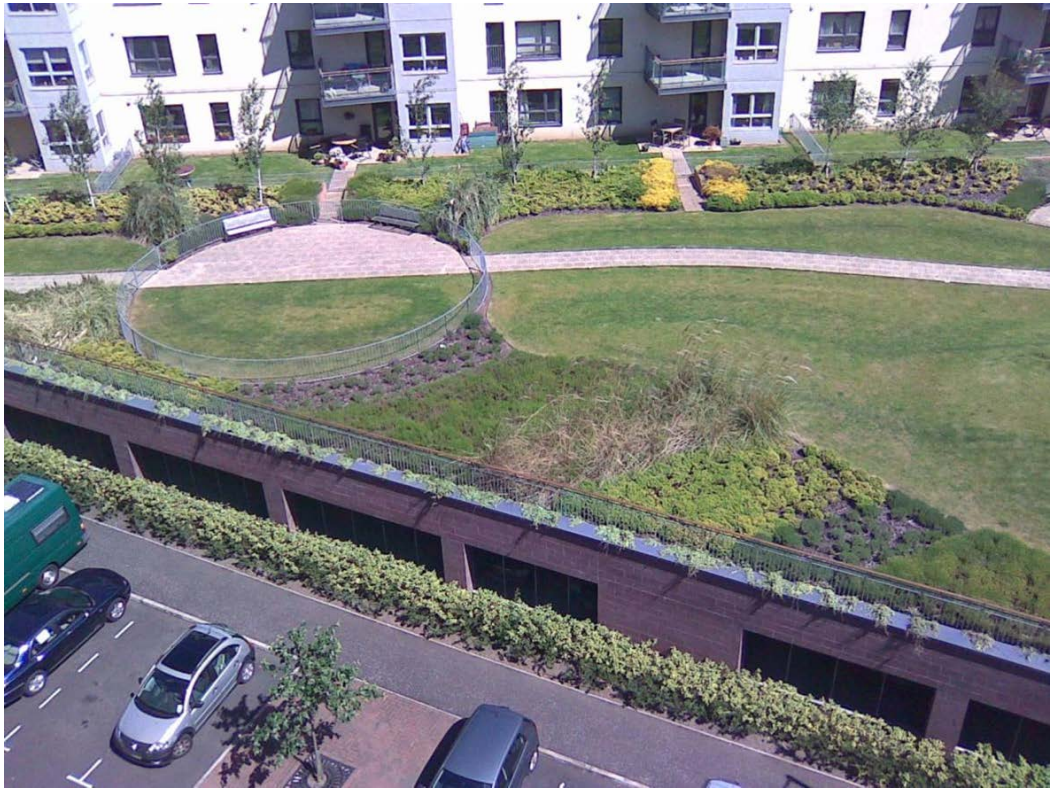
North American Studies

- Toronto Study
  - If green roofs were installed on roofs greater than 350 m^2 in size
  - Would cover at least 75% of the roof area
  - Energy savings from air conditioning $21m
  - 4.15kWh/m2
- Chicago Study
  - City wide green roofing would save the equivalent of a small nuclear power station

Leith – Spot the Green Roof?


Portland Gardens
N Leith Sands
Leith Sands
Image Printers
Summerside Blinds
N Leith Sands
Portland Rew
Cclasp
Park My Auto
A901
N Leith Sands
Portland Gardens
Ocean Dr
Clark Chemist
Hamburgh Pl
Lindsay St
Ocean Drive Dental Care
Britannia Spice Indian
©2011 Google - Imagery ©2011 DigitalGlobe, GeoEye, Getmapping plc, Infoterra Ltd & Bluesky, The GeoInformation Group, Map data ©2011 Tele

Portland Gardens, Leith



Discussion

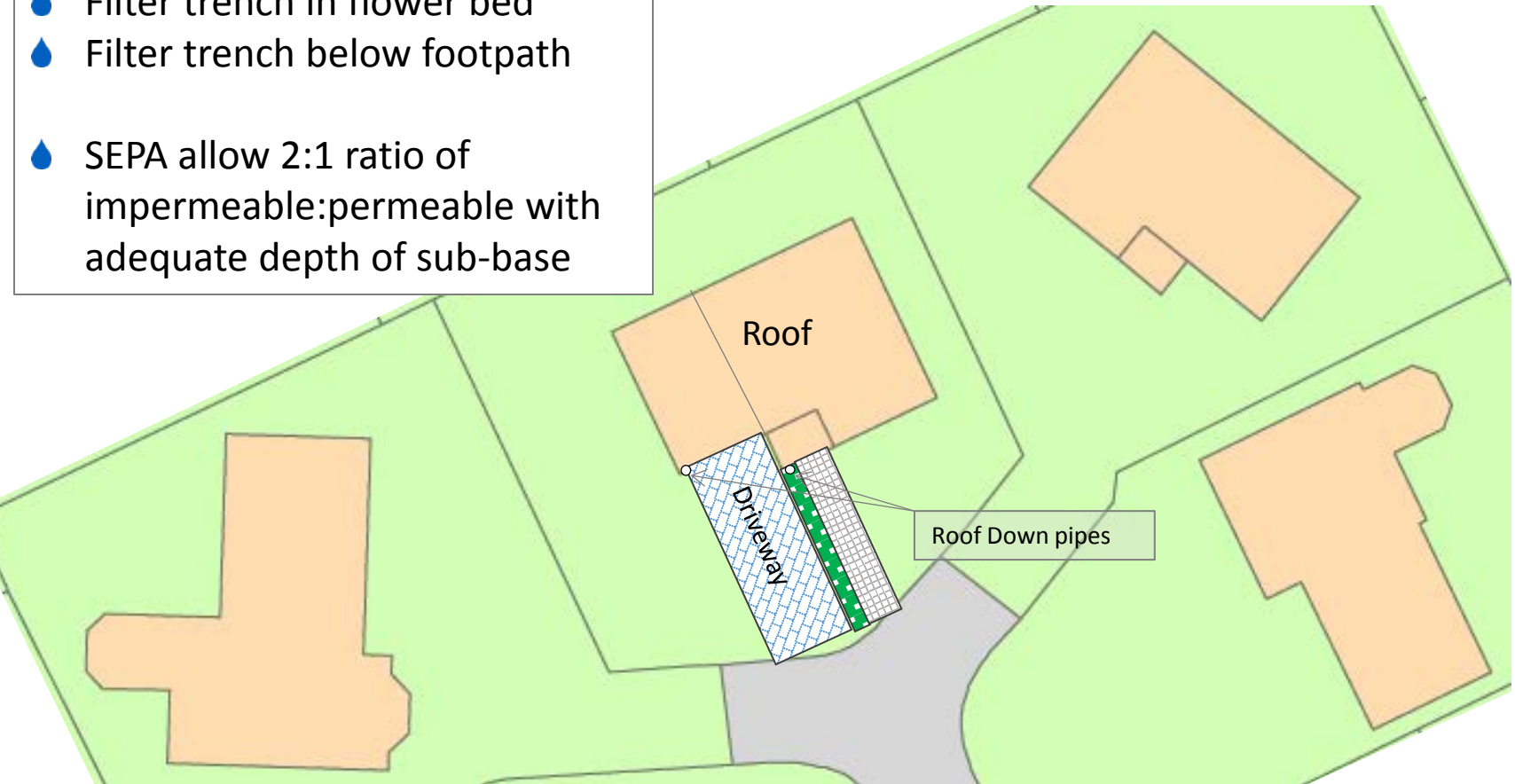
The 5 metre Rule - “Deem to Satisfy”

- Flatted housing development
- Permeable paving in shared surfaces
- Prepared sub-base is wrapped in impermeable membrane
- Sealed unit
- No infiltration

Roof drains to;

- Permeable paving in drive
- Filter trench in flower bed
- Filter trench below footpath

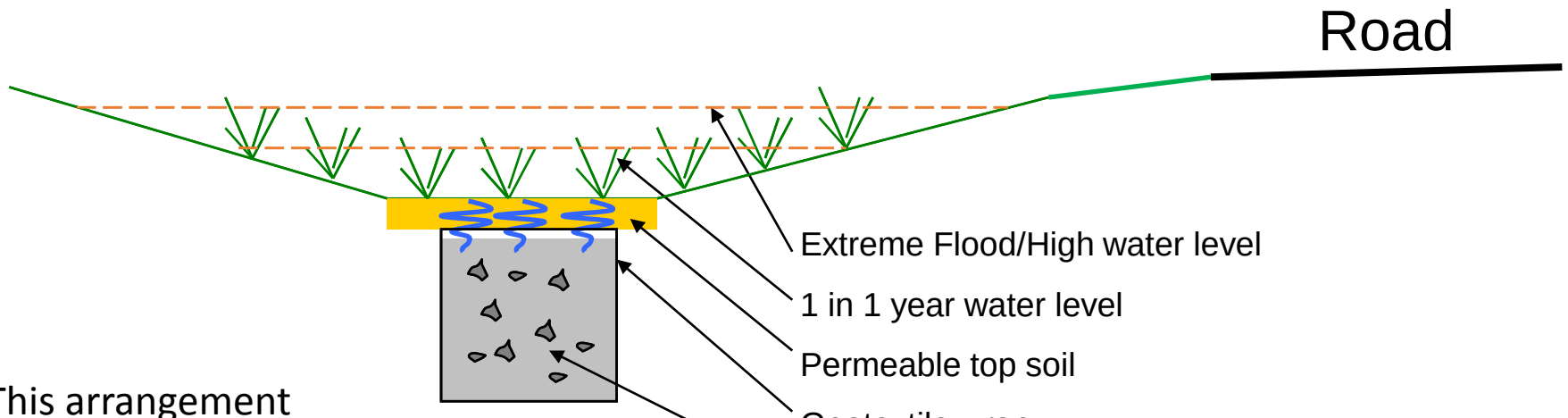
- SEPA allow 2:1 ratio of impermeable:permeable with adequate depth of sub-base



Soakaways & Perm Paving

- It is quite acceptable to have permeable paving adjacent to buildings – same as grassed area/garden next to building
- Not acceptable to take large area of surface drainage to a small location immediately adjacent to buildings
- Fact Sheet by geo-tech engineer; http://www.susdrain.org/files/resources/fact_sheets/09_12_fact_sheet_suds_close_to_buildings.pdf

Cross Section of an “Underdrained” or Dry Swale



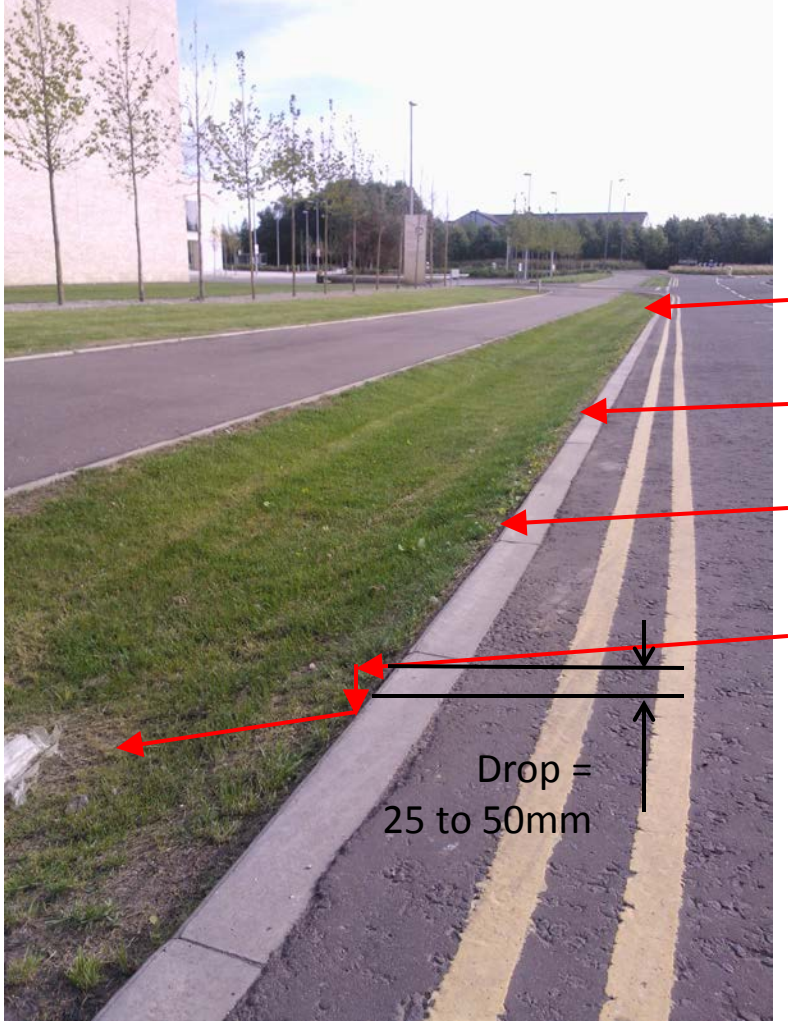
This arrangement constitutes 2 levels of treatment for SEPA


Swales don’t have to be straight or flat
Swale in flatted development

Allow for New Growth

- To allow for lateral flow into the swale there must be a drop or at least level from road.

- Newly established grass will “bulk-up” as it matures and fills the swale, so allow for this in the design.



Don’t put loose soils above permeable surfaces

SEPA Edinburgh Office Car Park

Around 10 years with no maintenance on paving

Occasional landscaping overspill – no impact on hydraulic function

Edge detail has limited signs of blinding but otherwise fine

SUDS Vs Conventional

Dingwall - Porous Tarmac

Headwalls – why?

- Headwalls are constructed as standard in many cases
- Often there is no need
- Expensive
- Unsightly
- Unsafe..?

- Alternative is a mitred or chamfered pipe profiled to meet the bank slope

Mitred or chamfered inlets

Western Harbour, Malmo

Questions?