

Meðhöndlun ofanvatns

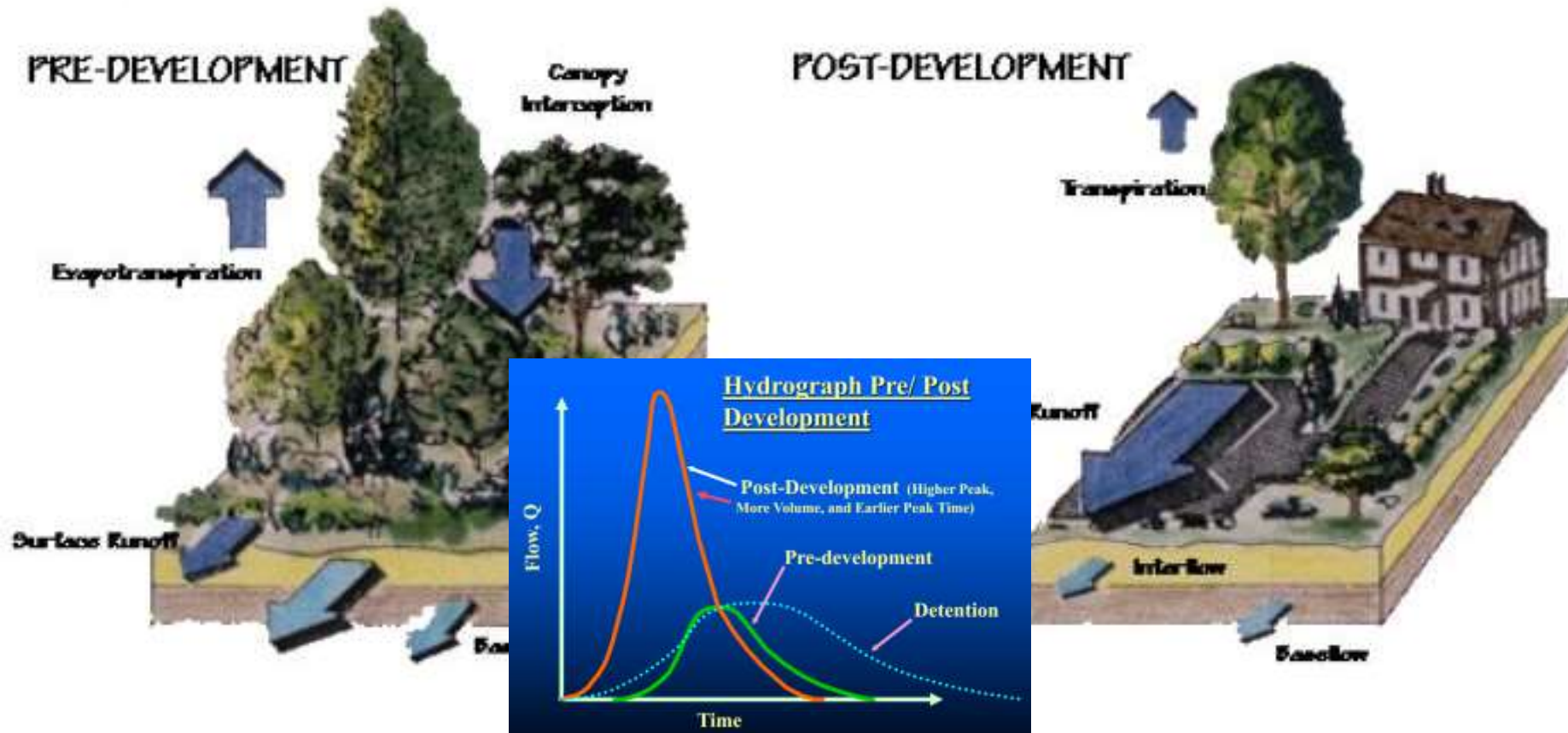
- og næstu skref á Íslandi -

Sigurður Grétar Sigmarsson
Vatnsauðlindaverkfræðingur

Aðalfundur Vatns- og fráveitufélags Ísland
2. maí 2018

Meðhöndlun ofanvatns = „stormwater management“

WATER BALANCE



Þrjár greinar ofanvatnsmeðhöndlunar

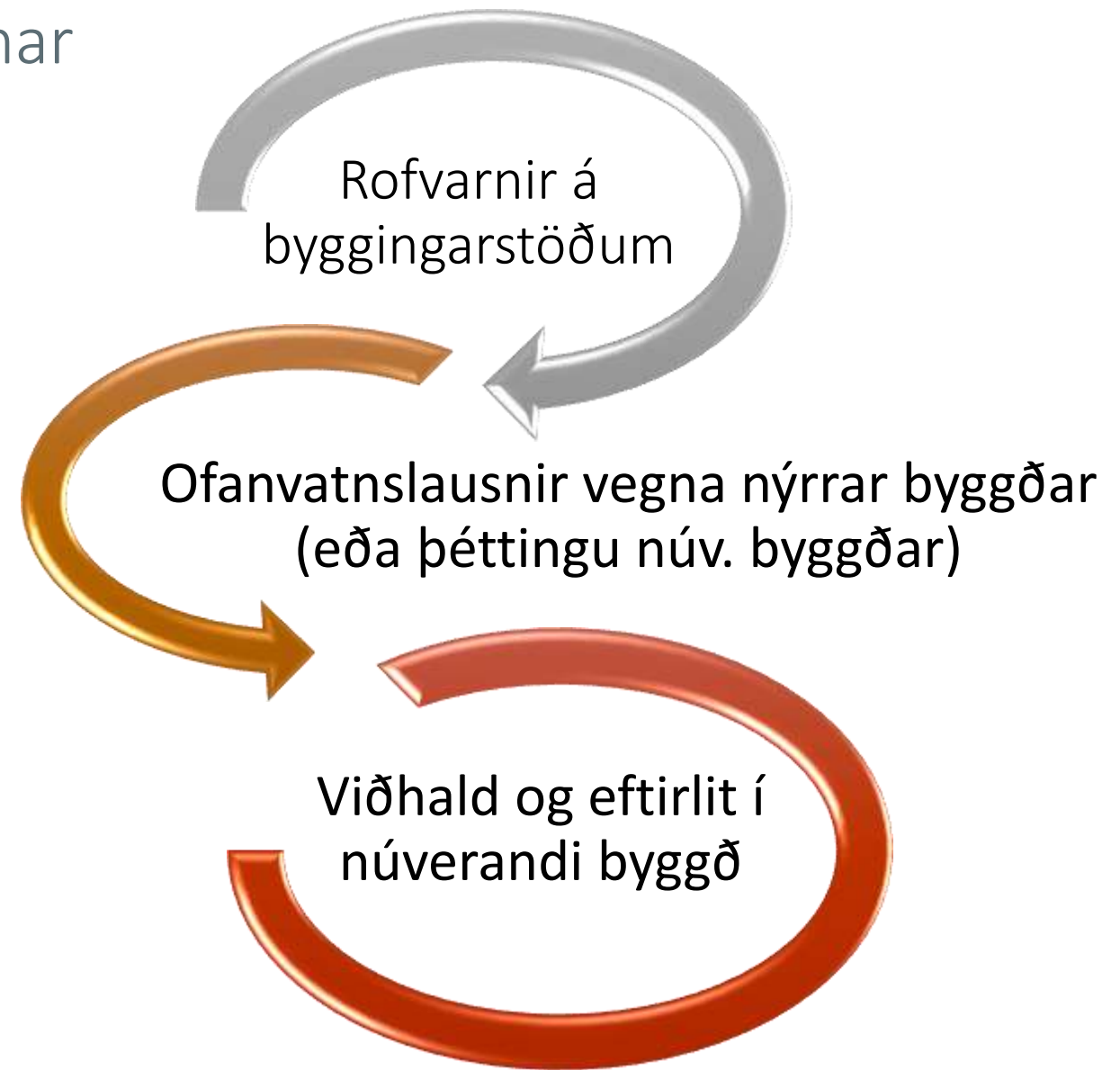
1. Construction site management

- Erosion and sediment control

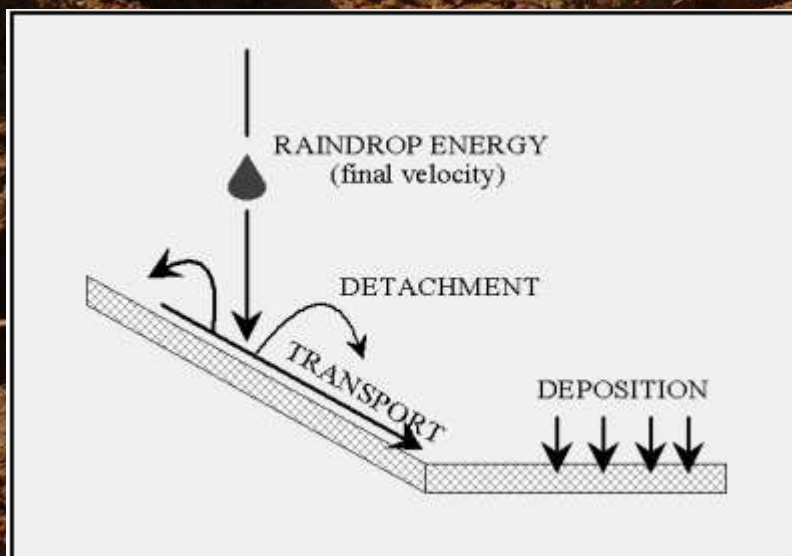
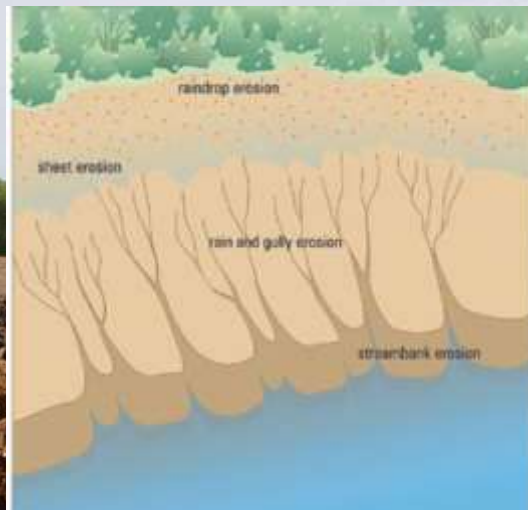
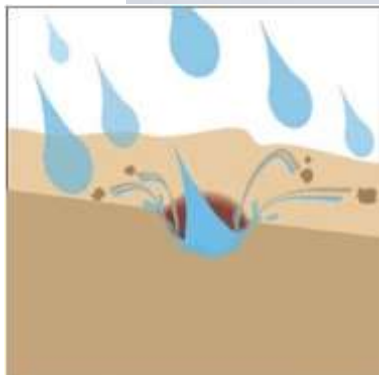
2. Post-construction management

- Stormwater control measures

3. Maintenance and monitoring



1. Rofvarnir á byggingarstöðum



1. Rofvarnir á byggingarstöðum

„Surface Protection“

Stytta tíma þar sem mold/jarðvegur er í hættu á að renna af svæðinu



Sáð fræum
(eða leggja
þökur)



Strá og
strámottur

„Sediment Control“

Koma í veg fyrir að mold/jarðvegur fari af byggingarstað



Jaðarstjórnun?? „Perimeter control“



Götuhreinsun
„Street sweeping“



Skurðstopparar „Ditch checks“

1. Rofvarnir á byggingarstöðum



- Þörf á þessu á Íslandi?

2. Ofanvatnslausnir

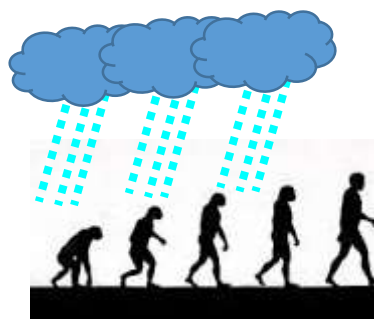
- Aðferðafræði eða hönnuð kerfi sem taka við afrennsli frá byggð og meðhöndla á ákveðin hátt
- Hannaðar og útfærðar með skilgreind markmið:
 - a) Flóðavarnir („flood control“)
 - b) Vatnsgæði („water quality“)
 - c) Írennsli („recharge/baseflow“)
 - d) Vernd árfarvegjar („channel protection“)



2. Ofanvatnslausnir

Þróun ofanvatnsstjórnunar

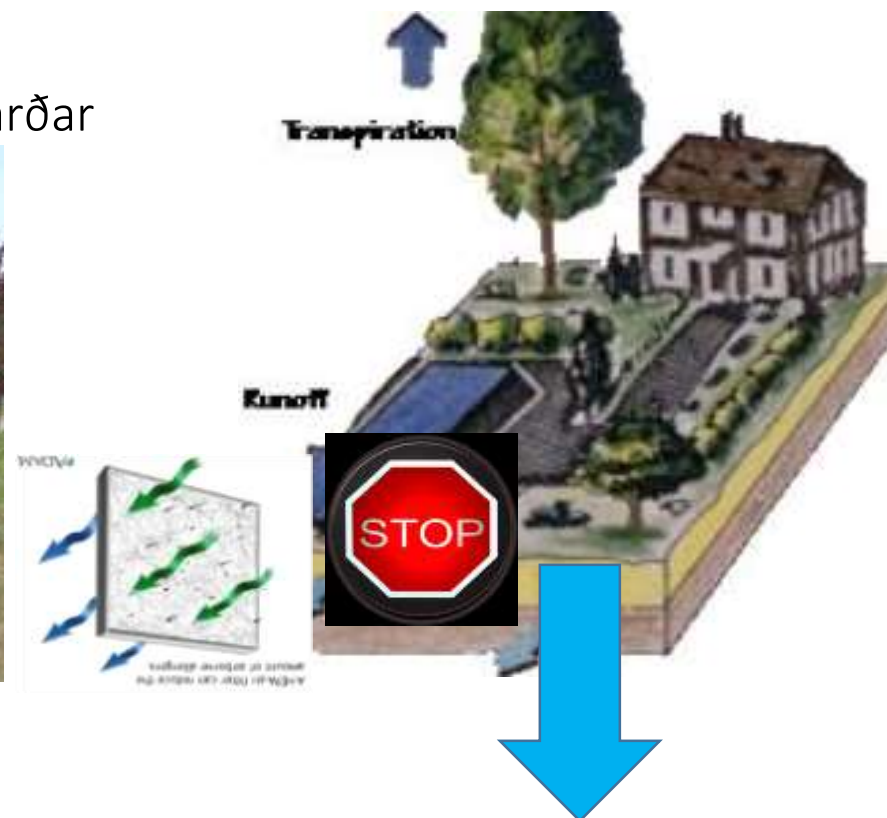
Miðlunartjarnir



Siturlautir/regngarðar

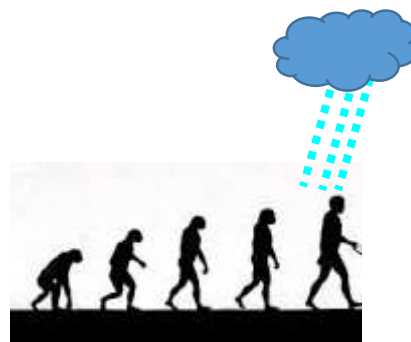


Settjarnir



2. Ofanvatnslausnir

Blágrænar ofanvatnslausnir



En á Íslandi?...



Í útlandinu:

- Yfirleitt vel skilgreint í lögum og reglugerðum
- Yfirleitt hafið vegna einhverrar þarfar
- Hver er þörfin á Íslandi?

Markmið

- Ísland þarf að marka sér stefnu í meðhöndlun ofanvatns
- Vatnsgæði:
 - Vatnatilskipunin hefur rammann sem hægt er að vinna undir:
 - Vatnsgæði vatnshlota
 - *13. grein vatnalaga: Manngerð og mikið breytt vatnshlot.*
- Flóð og yfirföll einfaldra fráveitukerfa
 - Ríki eða sveitarfélög og geta sett sértækari reglur vegna t.d.
 - þéttingar byggðar (infill development)
 - Enduruppbyggingar byggðar (redevelopment)

Tillaga:

1. Vernd viðtaka – leitast skal við að viðhalda náttúrulegri hringrás vatns og meðhöndla mengunarhættu
2. Takmarka skal magn afrennslis í einföld fráveitukerfi
3. Halda skal aftur afrennslis innan *svæðis* til þess að lágmarka flóðahættu neðar í fráveitukerfi

Viðmið – „criteria“

Tillaga:

- Töluleg innrömmun á markmiðunum eða eigindleg fyrirmæli
 - Geta t.d. verið flokkuð niður eftir:
 - Markmiðum
 - Viðtaka – (vatnshlotum)
 - Svæðum
 - framkvæmdatíma
- Vatnsgæði – vatnsmagn
 - Viðkvæm – síður viðkvæm
 - Ár og stöðuvötn - sjór
 - Ósnortið land
 - Núverandi þéttbýli
 - Á byggingartíma eða eftir byggingartíma

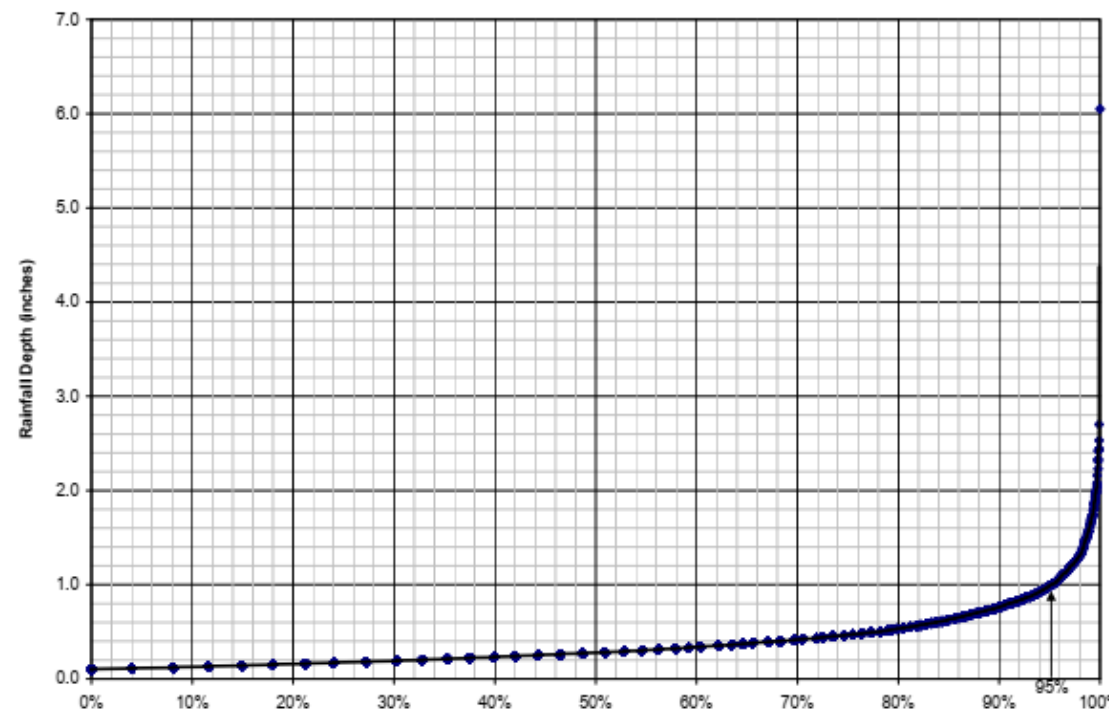
Viðmið – Vatnsgæði

- Tillaga:

Fyrstu X mm af öllu ógegndræðu manngerðu yfirborði skulu leiddir í gegnum hreinsikerfi

- Hreinsigráða færi eftir áhættumati á
 - A) viðtaka – vatnsgæðamarkmið vatnshlats
 - B) mengunarhættu manngerðs yfirborðs
- Hreinsigráða t.d. skilgreind sem:
 - Eitt, tvö, eða þrjú hreinsistig eða...
 - X% af heildarsviflausnarefni (TSS) fjarlæggt

- Meta þarf betur vatnafræði á Íslandi til þess að skilgreina hvað „X“ ætti að vera
 - T.d. 90% regnviðburður



Viðmið – Vatnsgæði

- SuDS á Englandi dæmi

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation Indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

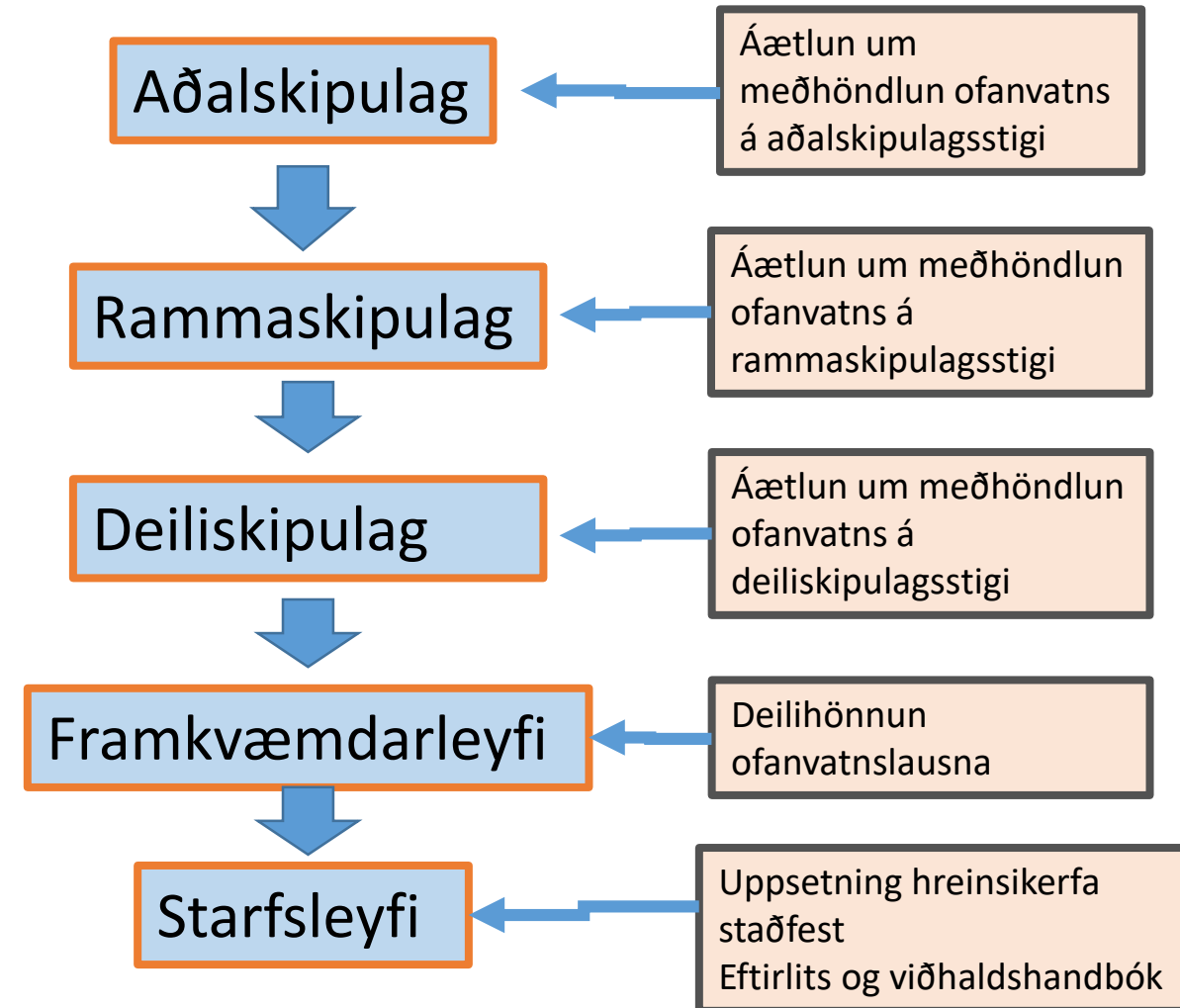
Viðmið – Vatnsmagn

Tillaga:

- Engin aukning á vatnsmagni upp að 10 ára endurkomutíma miðað við óraskað land
- Skilgreina þarf hvað telst óraskað land
- Þar sem:
 - Lagnakerfi er takmarkandi (yfirföll):
 - Dæling er takmarkandi:
 - Halda aftur af rennsli þar til toppur í kerfinu hefur farið framhjá
 - Hleypa vatnsmagni sem ísig í jarðveg en ekki út í kerfi

Ferlið

- Áætlun um meðhöndlun ofanvatns „Stormwater Management Plan“
 - Fylgir öllum stigum skipulags en með mismunandi nákvæmni
 - Drífur þörf fyrir gagnasöfnun fyrr í ferlinu
 - Inniheldur:
 - Núverandi ástand (vatnafar, jarðfræði, gróðurfar, landnotkun)
 - Skilgreina viðmið „criteria“ sem fara á eftir (viðtaki, landnotkun, svæði)
 - Rennslisleiðir, stærðir, ofanvatnskeðja, hönnunarforsendur og útreikningar
 - Viðhalds og eftirlits handbók



Leiðbeiningar

- Hönnun og framkvæmd

ALGJÖRT LYKILATRIÐI

- Þarf af innihalda:

- Kynningu á hugmyndafræði og tilgangi
- Markmið og viðmið
- Hönnunarleiðbeiningar – útfærslur og deilihönnun
- Aðferðafræði við útreikninga

The SuDS Manual

Of langur

C.2	Stage 1: Strategic surface water management objectives	889
C.3	Stage 2: Conceptual design	905
C.4	Stage 3: Outline design	905
C.5	Stage 4: Detailed design	908
C.6	References	937



50-100bls

Everyone with an interest in SuDS	Part A : Introduction to the SuDS Manual A high-level introduction to the concept of SuDS, what they are and why we need them. Executive summary Introduction to the SuDS Manual	5 11
Those responsible for policy or decision making	Part B : Philosophy and approach The philosophy of SuDS and their role in managing water quantity and water quality, whilst maximising the benefits for amenity and biodiversity. How to design SuDS to deliver these objectives by following design criteria and standards. Chapter 1: The philosophy of SuDS Chapter 2: Introducing the SuDS design approach Chapter 3: Designing for water quantity Chapter 4: Designing for water quality Chapter 5: Designing for amenity Chapter 6: Designing for biodiversity	18 32 36 50 66 80
	Part C : Applying the approach The design process and how to apply the design criteria and standards presented in Part B to different types of development. Chapter 7: The SuDS design process Chapter 8: Designing for specific site conditions Chapter 9: Designing for roads and highways Chapter 10: Designing for urban areas	94 128 142 156
	Part D : Technical detail Detailed descriptions of different types of SuDS components, with guidance on design, construction, operation and maintenance. Chapter 11: Rainwater harvesting Chapter 12: Green roofs Chapter 13: Infiltration systems Chapter 14: Proprietary treatment systems Chapter 15: Filter strips Chapter 16: Filter drains Chapter 17: Swales Chapter 18: Bioretention systems Chapter 19: Trees Chapter 20: Pervious pavements Chapter 21: Attenuation storage tanks Chapter 22: Detention basins Chapter 23: Ponds and wetlands	206 232 256 270 290 302 312 332 360 386 436 472 484
Those responsible for delivering and managing SuDS schemes	Part E : Supporting guidance Additional guidance to support the planning, design and implementation of SuDS. Chapter 24: Hydrology and hydraulics: design methods and calculations Chapter 25: Infiltration: design methods Chapter 26: Water quality management: design methods Chapter 27: Pollution prevention strategies Chapter 28: Inlets, outlets and flow control systems Chapter 29: Landscape Chapter 30: Materials Chapter 31: Construction Chapter 32: Operation and maintenance Chapter 33: Waste management Chapter 34: Community engagement Chapter 35: Costs and benefits Chapter 36: Health and safety	506 542 560 596 604 630 654 674 690 708 716 734 758
	Appendices Appendix A: Glossary and abbreviations Appendix B: Frameworks and checklists Appendix C: Design example	778 802 888

3. Eftirfylgni og viðhald

ANNAÐ ALGJÖRT LYKILATRIÐI

- Núverandi kerfi
- Blágrænar ofanvatnslausnir
 - Aðallega gróður
 - Mun ódýrara en hefðbundið viðhald
- Viðhaldsáætlun
 - Einföld og aðgengileg



6.0 SuDS and Landscape Maintenance – Summary

	Frequency	Unit Rate	Total
REGULAR MAINTENANCE			
1 LITTER MANAGEMENT			
1.1 Pick up all litter in SuDS and Landscape areas and remove from site	12 visits monthly		
2 GRASS MAINTENANCE – all cuttings to wildlife piles			
2.1 Mow all grass verges, paths and amenity at 35-50mm with 75mm max. Leaving grass in situ	As required or monthly		
2.2 Mow all dry swales, dry SuDS basins and margins to low flow channels and other SuDS features at 100mm with 150mm max. Cut wet swales or basins annually as wildflower areas	4-8 visits as required Annually		
Wildflower areas stemmed to 50mm in Sept or at end of school holidays	1 visit annually		
Or Wildflower areas stemmed to 50mm on 3 year rotation: 30% each year	1 visit annually		
3 INLETS AND OUTLETS			
3.1 Inspect monthly, remove silt from slab aprons and debris. 80mm tin round for access	12 visits monthly		
4 HARD SURFACES – not applicable			
4.1 Sweep all paving regularly. Sweep and suction brush permeable paving in autumn after leaf fall	1 visit		
OCCASIONAL TASKS			
5 INSPECTION AND CONTROL CHAMBERS – not applicable			
5.1 Annual inspection, remove silt and check free flow	1 visit		
6 WETLAND AND POND VEGETATION			
6.1 Wetland vegetation to be cut at 100mm on 3 – 5 year rotation. 30% each year. All cuttings to be removed to wildlife piles or from site.	As required		
7 SILT MANAGEMENT			
7.1 Inspect swales, ponds, wetlands annually for silt accumulation	1 visit		
7.2 Excavate silt, stack and dry within 10m of the SuDS feature, but outside the design profile where water flows, spread, take and overseed	As required		



Næstu skref

- Ráðgjafanefnd – “Technical Advisory Committee”
 1. Skilgreina markmið og viðmið
 2. Útbúa grunngögn
 - vatnafræði 90% regnviðburð
 - Afrennslisstuðul fyrir óraskað land eða meðalafrennsli
 3. Leiðbeiningar
- Útgáfa reglugerðar um meðhöndlun ofanvatns?....
- Halda áfram með vitundarvakningu og þjálfun og
- sjá til þess að rétt sé haldið á hönnun og framkvæmd...

Fyrstu skrefin verða að takast vel!

