Stormwater Ordinance Workshop - Reference Handout

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Impervious Surfaces

Prevent stormwater infiltration into underlying soils. Examples include buildings, driveways, roads, parking lots, and pathways. Negative impacts include:

Increases

Stormwater runoff volume
Pollutant & suspended solids transport
Downstream geomorphic changes
Saltwater Intrusion

Decreases

Groundwater infiltration/recharge
Water quality conditions
Ecosystem integrity & resilience

SCDNR / NOAA Thresholds*

- >10-20% impervious coverage leads to adverse changes to physical and chemical environment
- >20-30% impervious coverage leads to significant changes in environmental conditions
- Measurable increases in PAHs, trace metals, PBDEs.

USEPA Specific Impact Thresholds

- High algal biomass (> 5%)
- Benthic invertebrates (8-15%)
- Macroinvertebrate diversity & richness (8-12%)
- Fish Biological Integrity (6-11%)
- Geomorphic response patterns (13-24%)
- Channel instability (> 10%)

** Holland et al., 2005; Sanger et al., 2015; Parker et al., 2023*

Kiawah Conservancy Analysis

Region	Impervious Surface Coverage
Wadmalaw Island	1.91%
Dewees Island	2.64%
Johns Island – South	3.30%
Johns Island - North	5.46%
Johns Island - Central	11.52%
Daniel Island	13.96%
Kiawah Island **(unadjusted)**	15.31%
Seabrook Island	15.83%
Mount Pleasant East	18.87%
Pawleys Island	19.66%
Folly Beach	19.86%
Hilton Head Island	20.92%
James Island	23.30%
Sullivans Island	28.40%
West Ashley	28.84%
Edisto Beach	30.63%
Isle of Palms	32.04%
Mount Pleasant West	33.91%
North Charleston	36.73%
Downtown Charleston	56.45%

***Table 1**. Regional comparisons of upland impervious surface coverage. Numbers originate from NOAA CCAP high resolution land cover from 2021-2022. Percentages are generally underestimated due to canopy coverage.*

Kiawah Island (actual)

3725 Total uplands acres*

669 Acres of impervious cover

18% Total impervious area*

354 Acres transportation related

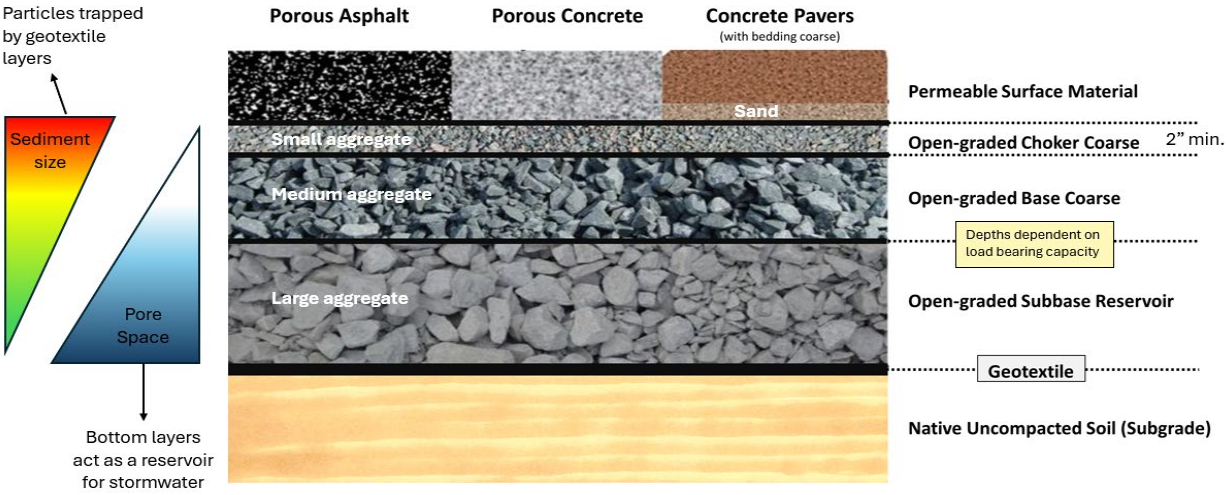
Numbers based on impervious surface geospatial database hand-generated by the Kiawah Conservancy in 2024 to address gaps due to canopy cover.

* = excludes ponds and marshlands

Table 2. Kiawah Island Impervious Surface Coverage by Type

Surface Type	Number	Acreage	Impervious Cover (%)
Buildings	3545	262.32	39.2%
Driveways	2696	112.13	16.8%
Roads & Parking	-	241.94	36.2%
Multi-use pathways	-	43.08	6.4%
Other	58	9.77	1.4%

Pervious Surface Design



Tester	Site	Type	First Pour (in/hr)	Second Pour (in/hr)	Average (in/hr)
Kiawah Conservancy	Oceanwoods	Pavers (with fines)	6.6	-	**6.6**
Kiawah Conservancy	Indigo Park	Pervious Concrete	47.6	39.9	**41.3**
Kiawah Conservancy	Cassique	Pervious Concrete	59	75.5	**70.4**
Kiawah Conservancy	The Sandcastle	Pavers (without fines)	127	149.3	**138.8**
Kiawah Conservancy	Saltmeadow	Pea Gravel	1189.7	1092.1	**1106.5**
Bean et al (2007)	NC, MD, VA, DE	Grid Pavers (=15)	*Pre-maintenance*		**2.7**
Bean et al (2007)	" "	Grid Pavers (=15)	*Post-maintenance*		**5.1**
Bean et al (2007)	" "	Pavers (=9)	*With Fines*		**20.9**
Bean et al (2007)	" "	Pavers (=5)	*Without Fines*		**787.4**
Bean et al (2007)	" "	Pervious Concrete=7)	*With Fines*		**6.3**
Bean et al (2007)	" "	Pervious Concrete (=4)	*Without Fines*		**1574.8**

Table 3. *ASTM C1701 Infiltrometer testing by the Kiawah Conservancy (2024) with reference to previous study in mid-Atlantic states by Bean et al. (2007) using similar methods. The data provided is related to surface infiltration, not subsurface design.*

Nature-Based Solutions Manual

Group	Minimum Infiltration Rate (in/hr)	Hydrologic Soil Group
A	0.3 – 0.45	High infiltration rates. Deep, well drained sands and gravels
B	0.15 – 0.30	Moderate infiltration rates. Moderately deep, moderately well drained soils with moderately coarse textures (silt, silt loam)
C	0.05 – 0.15	Slow infiltration rates. Soils with layers, or soils with moderately fine textures (clay loams)
D	0.00 – 0.05	Very slow infiltration rates. Clayey soils, high water table, or shallow impervious layer

Treatment Train – utilizing a chain of several green-infrastructure practices for stormwater mitigation. *See QR code to the left.*

Example:

Rain Barrels → Pervious Surfaces → Rain Gardens → etc.