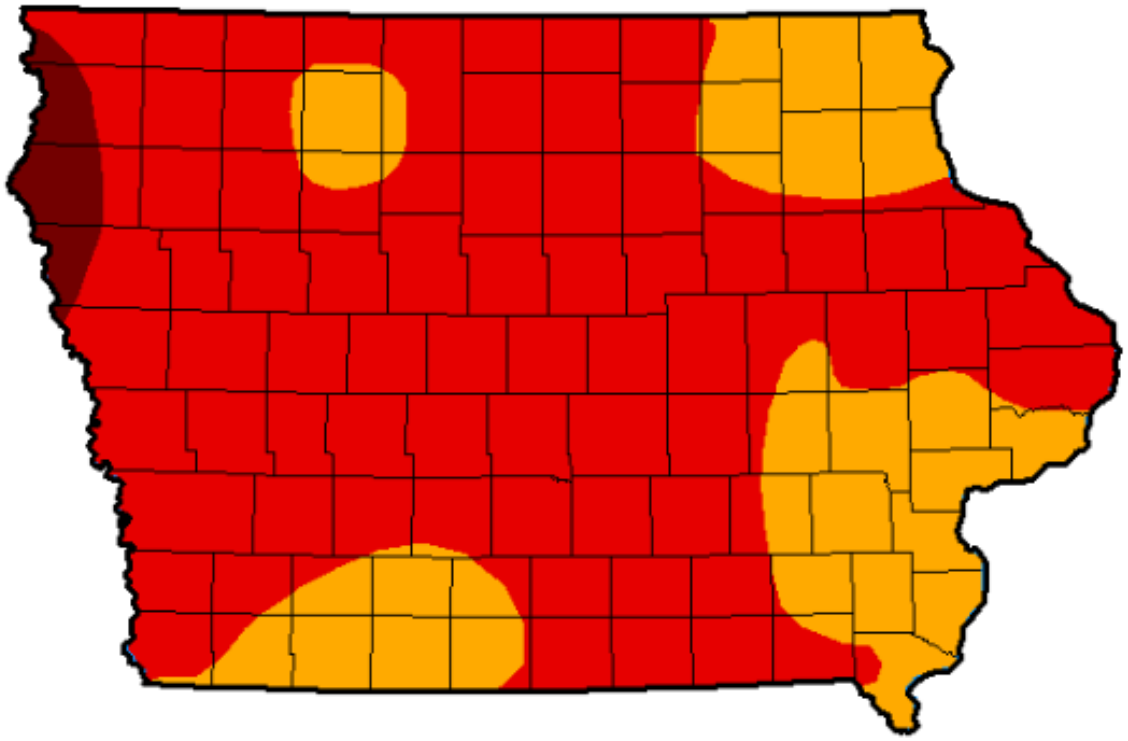
FIFTY SHADES OF GRAY INFRASTRUCTURE: WATER WHIPLASH & THE FAILURE TO CREATE RESILIENT CITIES

Jonathan Rosenbloom | 2019 RMLUI | University of Denver

UNCERTAINTY & INFRASTRUCTURE

U.S. Drought Monitor

Iowa



October 9, 2012

(Released Thursday, Oct. 11, 2012)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	100.00	75.31	2.52
Last Week *10-02-2012*	0.00	100.00	100.00	100.00	75.31	2.52
3 Months Ago *07-10-2012*	0.00	100.00	66.40	12.70	0.00	0.00
Start of Calendar Year *01-03-2012*	60.99	39.01	30.33	24.15	0.00	0.00
Start of Water Year *09-25-2012*	0.00	100.00	100.00	100.00	65.77	2.52
One Year Ago *10-11-2011*	14.95	85.05	57.46	14.49	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Matthew Rosencrans

CPC/NCEP/NWS/NOAA

USDA

National Drought Mitigation Center

NOAA

WATER WHIPLASH: QUANTITY OF WATER

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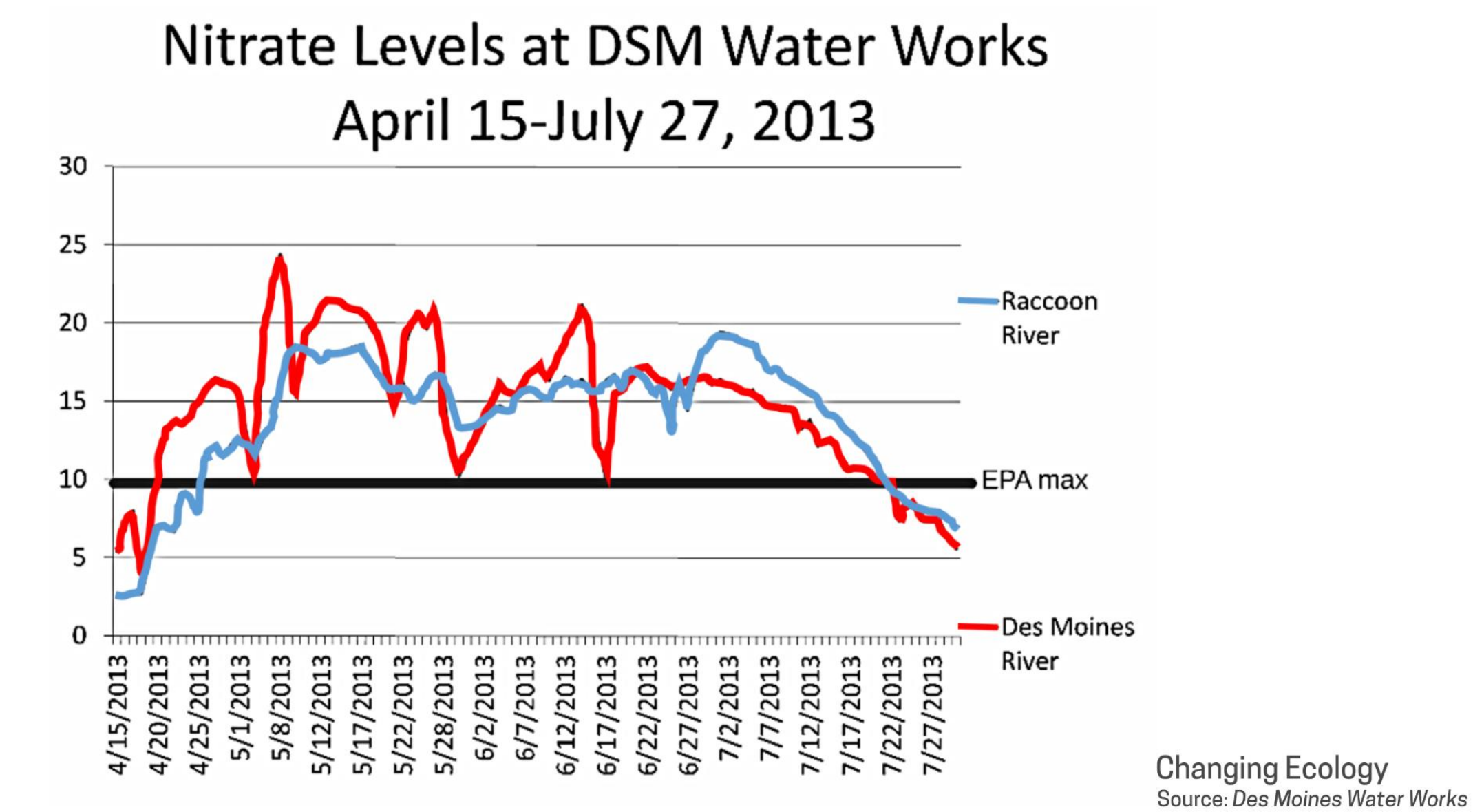


WATER WHIPLASH

"This year's Hurricanes Irma, Maria, and Harvey: are reminders that we live in an era of standardized disasters . . . . [I]n other areas relating to infrastructure . . . Irma provided a case study in precariousness."

Amy Davidson Sorkin, *In the Dark*, The New Yorker, at 37, Sept. 25, 2017

MENDOCINO COMPLEX, CAMP, THOMAS, & CARR WILDFIRES

"[New normal] sounds like we left the old normal. . . and arrived at. . .a new stasis. . . . Unfortunately, that's not what our climate projections are telling us. . . . [T]his is one step on a very long staircase that's heading toward extreme conditions."

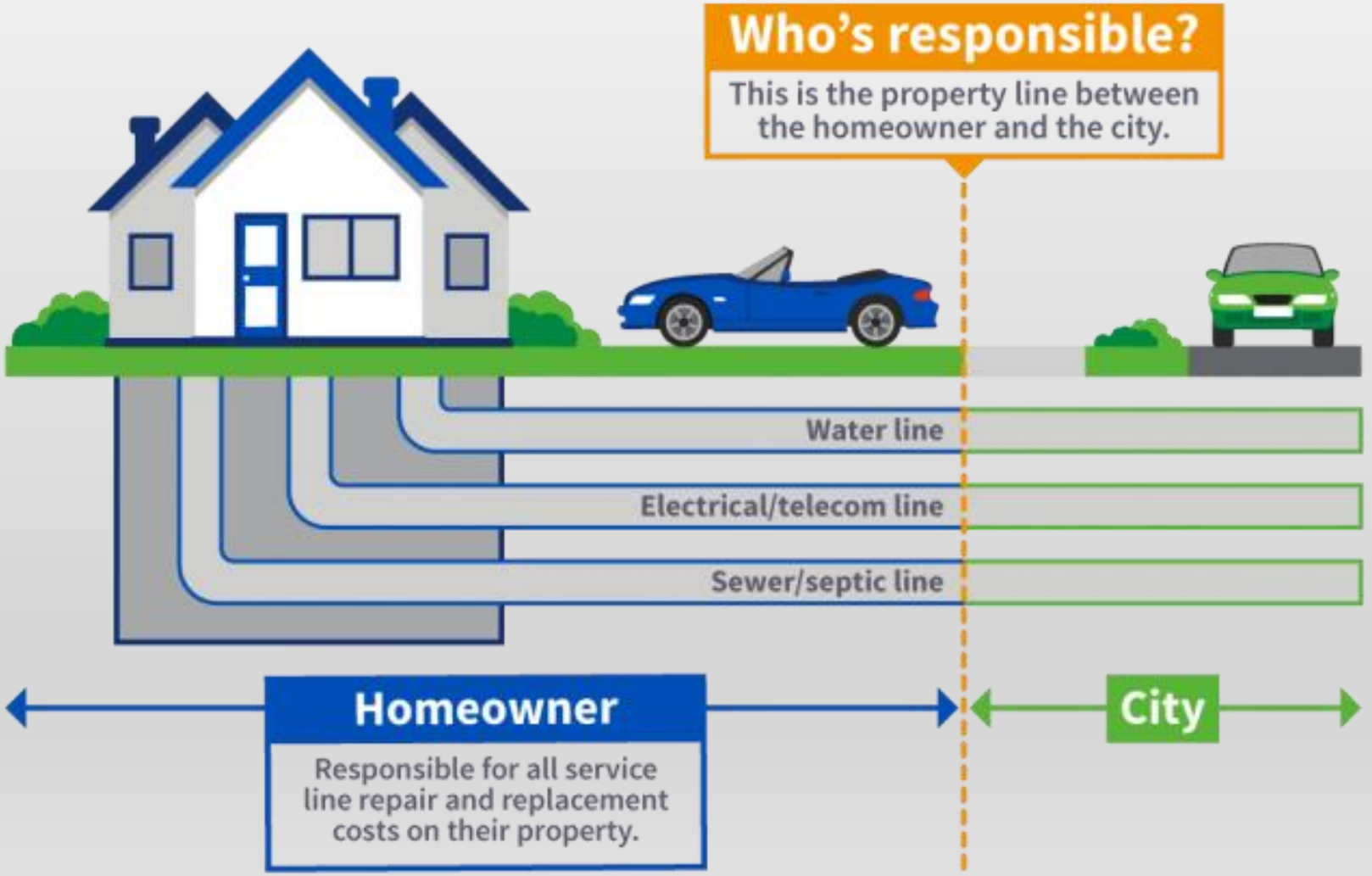
Crystal Kolden, fire scientist, U. of Idaho

ALREADY VULNERABLE INFRASTRUCTURE

- *"[T]he Nation's infrastructure suffer[s] from chronic underinvestment, system failures and service shortfalls."*
- National Infrastructure Advisory Council, Water Sector Resilience Final Report and Recommendations (2016).

- American Society of Civil Engineers gave U.S. infrastructure a D+, noting infrastructure:
- "is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. . . . [T]he system exhibits significant deterioration. Condition and capacity are of serious concern with strong risk of failure."
- 2017 Infrastructure Report Card, American Society of Civil Engineers (2017).

CURRENT STATE OF LAND USE LAW & SYSTEM VULNERABILITIES



STATIONARITY

"In a system anticipating transformation, in a flip from one state to another, laws are truly of limited help, because the transformed system has unknown key variables and processes and unknown risks and opportunities emerge."

C.S. Holling, *Response to "Panarchy and the Law,"* 17 ECOLOGY AND SOCIETY, no. 4 (2012).

GRAY INFRASTRUCTURE EXAMPLE: PARKING

LAND USE	PARKING STANDARDS
Parks (public or private)	10 spaces per acre for passive recreation; 20 spaces per field for active recreation
Roller and/or ice skating rink	1 space for each 150 sq. ft. of skating surface area
Swimming pools	1 space for each 50 sq. ft. of water surface area
Movie theatres	1 space for each 4 seats
Golf courses	5 spaces per green and 1 space per 300 sq. ft. of gross floor area
Golf driving ranges	1 space per tee or 1 space per 15 feet of driving line, whichever is greatest
Auditoriums, exhibition halls, community centers, fraternal organization	1 space for each 100 sq. ft. of gross floor area
COMMUNITY SERVICES	
Churches, synagogues, temples, and funeral homes	1 space for each 3 fixed seats (or 54" of bench-type seating) 1 space for each 40 sq. ft. of general reception/gathering area
Community gardens* (accessory to an approved principal use) (See YMC 15.04.060(G))	None
Community gardens* (with planting area of 0.25 acres or less)	None
Community gardens* (with planting area of more than 0.25 acres and up to 0.5 acres)	2 spaces
Community gardens* (with planting area of more than 0.5 acres up to 1 acre)	4 spaces

Minimum slots:
Yakima, WA Tbl. 6-1

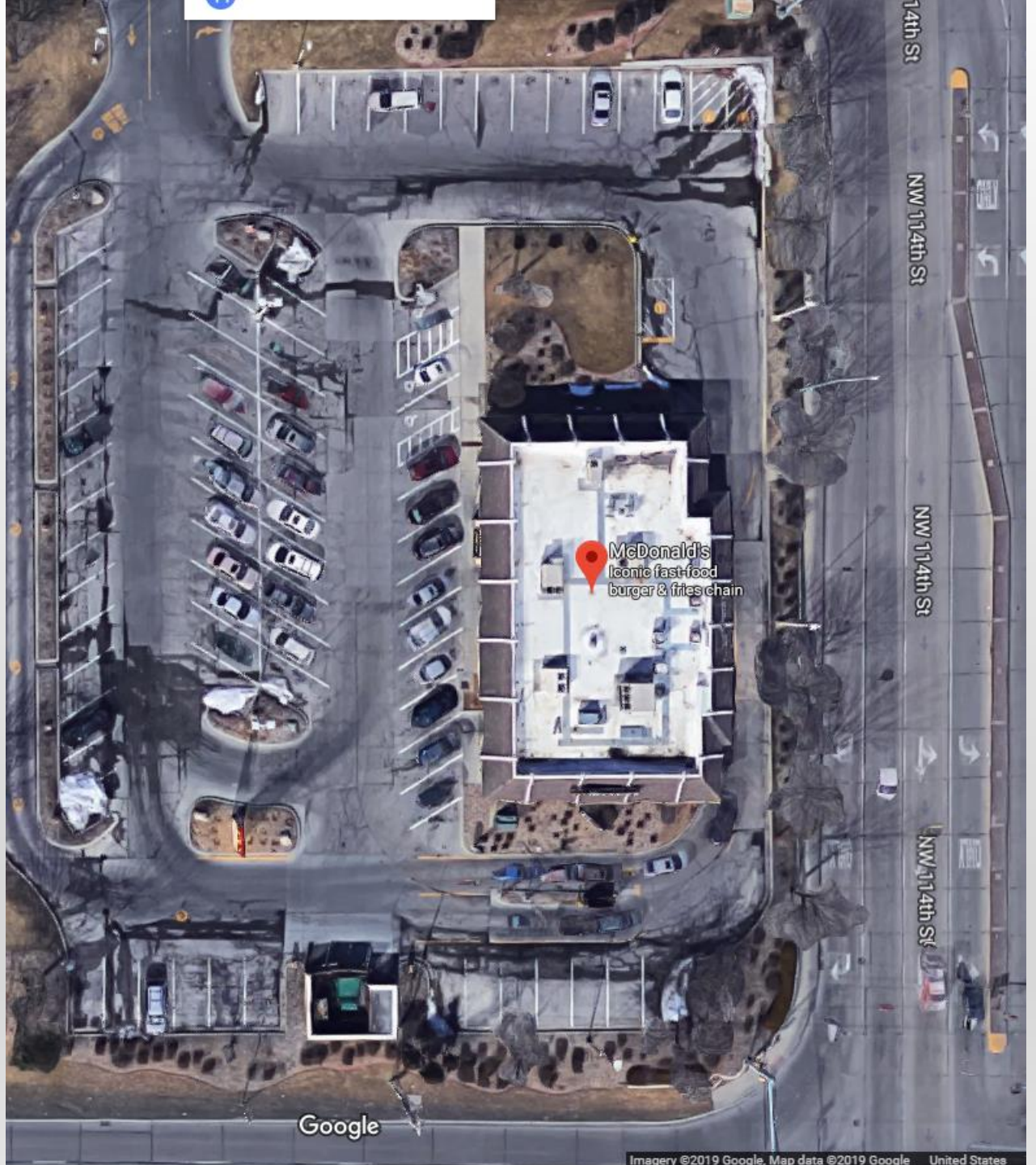
MATERIALS & SIZE REQUIREMENTS

- Impervious Materials Required:
- *"Coppell, Texas, Sec. 12-31-1 and 2 . . . . surface parking shall be allowed only on a paved concrete surface."*

- Minimum Size Required:
- *"Naples, Florida, Sec. 12-31-5. . . . a parking space shall be a minimum of nine feet wide and a minimum of 19 feet long."*

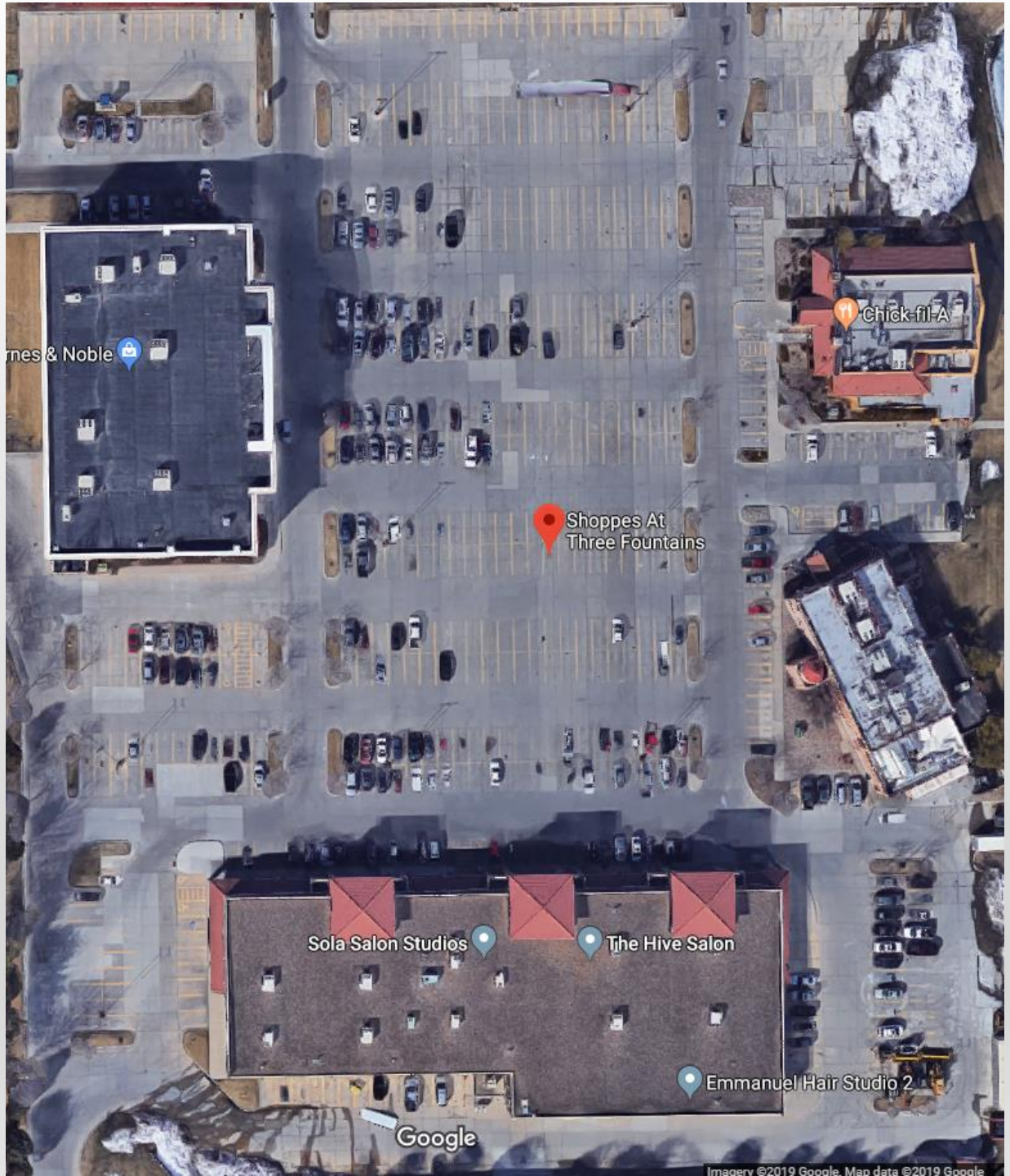
PARKING IN ACTION

- Clive City Code requires fast food restaurants to provide 15 parking spaces per 1,000 sq. ft. floor area.
- 4,000 square foot fast food restaurant would have to provide a minimum of 60 parking spaces.
- Lot could be three to four times the size of the restaurant.



PARKING IN ACTION

- Code required a minimum of 448 parking spaces for the development.
- 691 parking spaces were requested and built.



TREES VS. GRAY INFRASTRUCTURE

- Des Moines, IA Code Secs. 42-550—42-557
- Sec. 42-555

- *"[O]ne replacement tree for every new tree removed that is over 12 inches in diameter at breast height and two for every tree over 18 inches . . . .*

  . . . . Tree removal shall be allowed without mitigation . . . when . . . such . . . removal is required to conform with any . . . infrastructure requirements including . . . streets, sidewalks, and stormwater detention . . . ."

TREES VS. GRAY INFRASTRUCTURE

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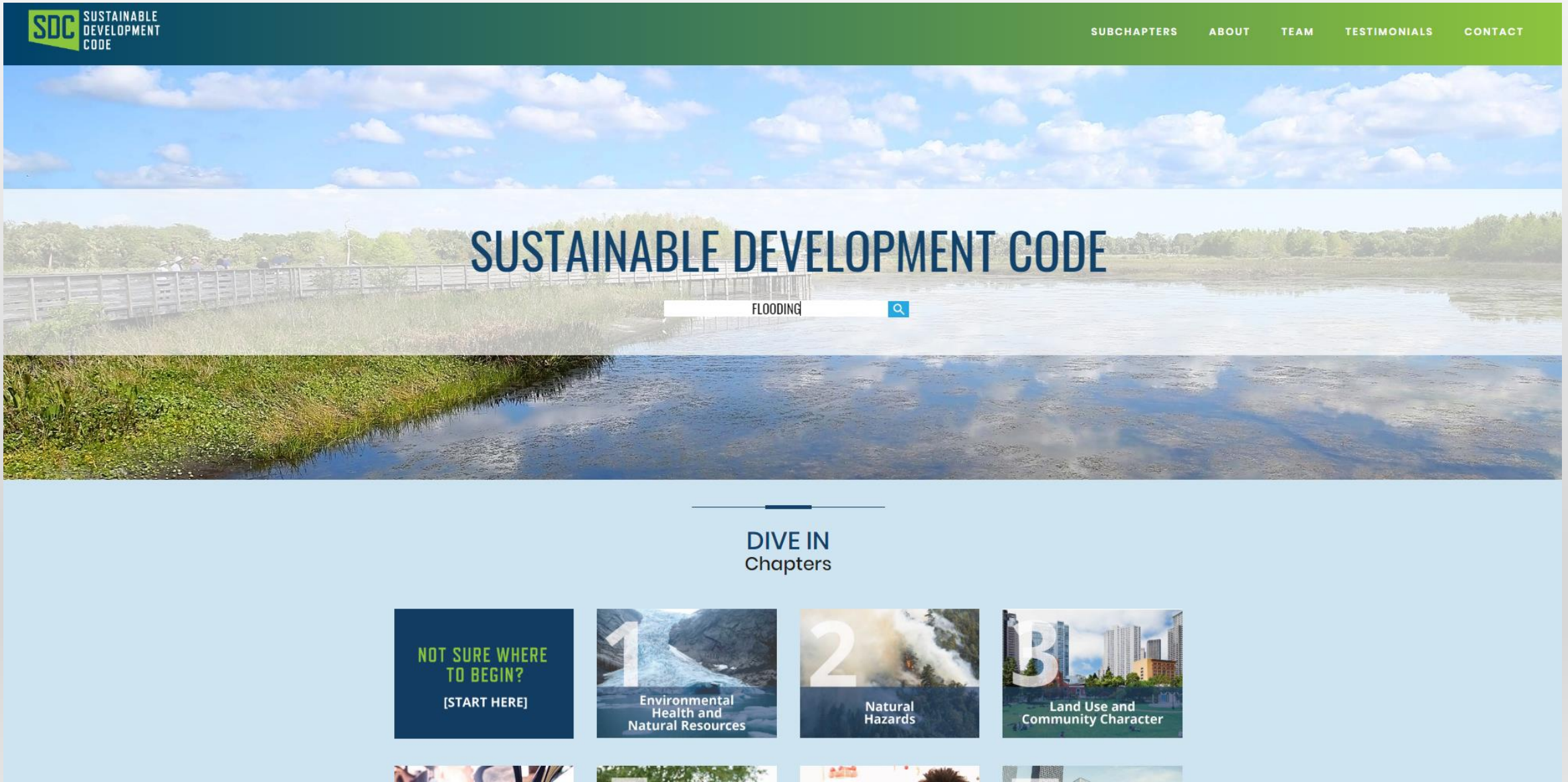

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CHAPTER 1 : ENVIRONMENTAL HEALTH AND NATURAL RESOURCES


1.1 CLIMATE CHANGE


1.2 LOW-IMPACT DEVELOPMENT AND STORMWATER MANAGEMENT


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1.4 WATER SUPPLY QUALITY AND QUANTITY


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2.3 COASTAL HAZARDS


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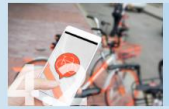
4.2 BICYCLE MOBILITY


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CHAPTER 5 : COMMUNITY


5.1 HOUSING AFFORDABILITY


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6.1 COMMUNITY HEALTH AND SAFETY


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7.1 WIND ENERGY


7.2 SOLAR ENERGY


7.3 OTHER ENERGY GENERATION SYSTEMS


7.4 DISTRICT ENERGY SYSTEMS


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SDC SUSTAINABLE DEVELOPMENT CODE

SUBCHAPTERS ABOUT TEAM TESTIMONIALS CONTACT

	Remove Code Barriers	Create Incentives	Fill Regulatory Gaps
Best	• DISTRICT HEATING AND COOLING ZONES • RENEWABLE ENERGY FOR HISTORIC BUILDINGS	• ENACT PROPERTY ASSESSED CLEAN ENERGY PROGRAM • PROMOTE RENEWABLE ENERGY WITH INCENTIVES • PROPERTY TAX EXEMPTIONS FOR RENEWABLE ENERGY SYSTEMS	• CREATE SAFE ROUTES • CREATE URBAN GROWTH AREA • ENERGY BENCHMARKING, AUDITING, AND UPGRADING • ESTABLISH URBAN SERVICE AREA • EXPAND TREE CANOPY COVER • REQUIRE WATER EFFICIENT LANDSCAPING • THIRD-PARTY CERTIFICATION REQUIREMENTS • VEGETATION PROTECTION AREAS • ZERO NET ENERGY BUILDINGS
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Parking Maximums

Brandon Hanson (author), Jonathan Rosenbloom & Christopher Duerksen (editors)

INTRODUCTION

Off-street parking maximum standards in zoning ordinances limit the construction of parking lots that are larger than necessary. Local governments across the U.S. have routinely set parking *minimums* in their land development regulations for various types of uses.[1] The purpose of parking minimums is to insure that there are sufficient off-street parking spaces for each development based, typically, on the building use and size.[2] Increasingly, local governments recognize the need to limit parking for a variety of reasons and therefore establish parking *maximums* in their regulations, establishing an upper bound for the number of spaces allowed for a specific use, thus controlling the amount of land and impervious surface associated with parking.[3] Some jurisdictions permit developments to exceed maximums upon the performance of certain criteria, such as increasing permeable surfaces.

EFFECTS

While off-street parking is an aspect of most developments, impervious parking lots can have a number of detrimental effects. First, they prevent groundwater infiltration and increase storm water run-off.[4] Such run-off can increase downstream erosion and flooding as well as polluting rivers and lakes. Additionally, impervious parking lots may

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EXAMPLES

Hartford, CT

Hartford manages parking lot sizes by setting out parking maximums though a table of uses classifications.[18] The code sets out specific minimum and maximum numbers of parking spaces for many use classifications.[19] Hartford also includes a catch-all rule for uses not covered in the table.[20] The maximum number of spaces for uses not listed is no more than 110% of the parking minimum.[21] Developers must determine which use category a development falls into. For example, a restaurant would qualify as a place of eating.[22] This category allows three parking spaces for every five people of the restaurant's maximum capacity.[23] If the restaurant had a maximum of 100 customers, then the maximum parking spaces would be 60 parking spaces. If the use maximum is not specified, the developer need only calculate the minimum and multiply by 1.10 to find the maximum. This helps Hartford control the amount traffic and vehicle use in and out of the developments in question.

To view the provision see Hartford, CT, Zoning Regulations § 7.2.2 (B) (2018).

ADDITIONAL EXAMPLES

Charlotte, NC, Code of Ordinances, Zoning, § 9.1208 (6) (2018) (sets parking minimums and maximums in transit-oriented districts only).

Flagstaff, AZ, Zoning Code § 10-50.80.040 (C) (1) (2018) (sets a maximum amount of parking at five percent higher than the minimum).

Vancouver, Canada, Parking Bylaws § 4 (2019) (implements conventional parking maximums as wells as a total parking cap in the downtown area).

Denver, CO, Municipal Code § 30-50 (2018) (requires developer to ask special permission to include parking above the parking minimum).

New Haven, CT, Zoning Ordinances § 45 (8) (D) (2018) (provides for a parking maximum in mixed-use districts of three spaces per 1,000 square feet).

Burlington, MA, Zoning Bylaw §§ 7.2.4, 7.2.5 (2015) (sets both parking minimums and maximums for various types of developments).

Knoxville, TN, Zoning Regulations Art. 5 § 7 (D) (2018) (creates parking minimums and maximums with exceptions from the department of engineering).

New York, NY, Zoning Resolution Art. 2 Ch. 5 (2018) (creates parking maximums, no minimum requirements for specific buildings).

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Pervious Cover Minimums and Incentives

EXAMPLES

Fairway, KS

Fairway has enacted ordinances that set mandatory permeable surface minimums for new development within the city.[26] The ordinance mandates a percentage of permeable and open space for Single Family Residential Districts, Business Districts, and Mixed Use Districts. For example, within the Single Family Residential Districts, any lot under 10,000 square feet must meet the 60% permeability standard.[27] This regulation also applies to lot sizes between 10,000 square feet and 30,000 in which the first 10,000 square feet must meet the 60% permeable requirement, and the remaining lot must meet 75% permeable requirement.[28] Finally, for lots over 30,000 square feet, the first 10,000 square feet must be 60% permeable, up to 30,000 square feet must meet the 75% permeability rate, and the remaining square footage must be 100% permeable.[29] The city also requires a mandatory minimum of green space within Mixed Space districts, and requires specific permeability and vegetation minimum for the space. [30]

To view the provision see Fairway, KS, Code of Ordinances Sec. 15-264 Zoning Districts.

Minneapolis, MN

Minneapolis enacted an ordinance in 2010 to revise its zoning code to allow pervious

ADDITIONAL EXAMPLES

Tybee Island, Ga., Land Development Code § 3-080(C)(5) (requiring new residential driveways and replacements of more than 50 percent of existing driveways be constructed of permeable materials designed to allow retention of at least the first one-inch of stormwater).

St. Petersburgh, Fla., Land Development Reg. § 16.40.090.3.3(6)(C) (allowing ribbon driveways as an acceptable alternative to standard driveways).

Duarte, CA, Development Code § 19.52.060 (C) (includes permeable pavement as a consideration in the sustainable development practices in the city).

DC Department of Energy & Environment, Permeable Surface Rebate Program (2017) (describes voluntary rebate program to create incentives for the use permeable pavement within the city with administration handled by a local nonprofit).

Waupaca County Shoreland Protection Ordinance, § 9.0 (establishes maximum allowable impervious coverage of residential, commercial, industrial or business land use within three hundred feet of the ordinary high-water mark).

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Expand Tree Canopy Cover

EXAMPLES

Charlotte, NC

To increase the citywide tree canopy cover to 50% by the year 2050, Charlotte requires a tree protection plan to accompany any application for grading, building, change of use, and zoning.[16] The plan must contain a root protection plan for any tree over two inches in diameter.[17] Charlotte also uses "tree save areas," which are areas in which an existing tree canopy exists that can be measured in square feet.[18] For residential developments, a minimum of 10% of the lot must be dedicated to a tree save area. For commercial developments, 15% of the lot must be dedicated to a tree save area. No building can be erected within ten feet of the edge of any tree save area. Developers are prevented from disturbing tree save areas unless the city grants a permit to do so.[19] Even if a permit is granted, the city may require the developer to "mitigate" the loss.[20]

If a developer fails to plant the required number of trees, a $50 fine per tree is assessed. Each day constitutes a new violation until the required planting occurs, up to a maximum fine of $1,000.[21] Further, if a developer causes damage that results in the total loss of a tree, s/he will be liable for the market value of that tree, up to a maximum of $20,000.

In a carrot and stick type approach, Charlotte also creates a number of incentives for developers who contribute more than they are required to the tree canopy. To encourage preservation of existing trees, a developer can seek an exemption from additional planting requirements if the developer preserves existing "heritage" trees. Heritage trees are trees listed on the *North Carolina Big Trees list*.[22] Residential properties with an area saving existing trees receive setback reductions.[23] Developers who dedicate a tree save area to a common open space can receive density bonuses if the titleholder covenants to maintain the area as a common open space.[24] Additionally, some developments may

ADDITIONAL EXAMPLES

Ventura Cty., CA, Code of Ordinances § 8178-7.6.1 (2016) (requiring developers to plant 10 protected trees for each protected tree removed during development).

Erie, Colo., Unified Development Code §10.6.2 (C) (9) (2017) (granting developers of commercial and multifamily residential properties a reduction in required parking spaces for the preservation of trees beyond what is required by law).

Lake Forest Park, Wash., Municipal Code §§ 16.14.070 (2017) (establishing canopy coverage goals for different types of properties which are used in determining whether a tree removal permit will be granted).

Fort Worth, Tex., Code of Ordinances, App. A: Zoning Regulations § 6.302 (2009) (raising the city's canopy cover to 30% by requiring minimal levels of canopy cover on developments, but reducing the requirements if trees are planted elsewhere).

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	Remove Code Barriers	Create Incentives	Fill Regulatory Gaps
Best	• LARGE-LOT AND PRESERVATION ZONING IN RURAL AREAS • LIMIT PUDS NEAR SENSITIVE NATURAL AREAS • RESTRICT SEPTIC SYSTEMS NEAR SIGNIFICANT WILDLIFE HABITATS		• CREATE URBAN GROWTH AREA • ESTABLISH URBAN SERVICE AREA • EXPAND TREE CANOPY COVER • REQUIRE MITIGATION OF LOST CRITICAL HABITATS • REQUIRE WETLAND HABITAT IMPACT ANALYSIS • VEGETATION PROTECTION AREAS
Better	• ALLOW COMMUNITY SEPTIC SYSTEMS		• OPEN SPACE IMPACT FEES • REGULATE DOMESTIC PETS IN WILDLIFE HABITAT AREAS • REQUIRE NATIVE TREES AND REMOVAL OF INVASIVE TREES • REQUIRE REMOVAL OF EXOTIC VEGETATION • SETBACKS PROTECTING SENSITIVE HABITATS
Good	• CLUSTER/CONSERVATION SUBDIVISION IN RURAL/URBAN AREA • PREFERRED DEVELOPMENT SITES • SHARED DRIVEWAYS TO AVOID FRAGMENTATION OF HABITAT	• GREEN ROOFING	• ADOPT WILDLIFE-FRIENDLY FENCING STANDARDS • GREEN ROOFING • REQUIRE USE OF NATIVE PLANTS/VEGETATION

THANKS & PLEASE JOIN US!
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- Incorporate the drafting of the Code into courses
- Jonathan.Rosenbloom@drake.edu
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