Analysis of Proposed Impervious Cover Entitlements for CodeNEXT

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Introduction

Impervious cover is any surface that prevents the infiltration of water into the ground, such as roads, parking lots, and buildings. When rainwater falls on impervious surfaces, the increased volume and velocity of runoff from these surfaces can contribute to erosion and flooding and impair water quality by carrying contaminants such as sediment, bacteria, and nutrients into Austin's aquifer and creeks. Impervious cover also displaces soils, trees, and other plants, increasing ambient temperatures and reducing stream baseflows and natural habitat. To minimize these negative effects, the Land Development Code places restrictions on impervious cover.

The Land Development Code has two sets of impervious cover limits – zoning limits and watershed limits. For all existing single family lots and for other types of development within the Urban Watersheds, impervious cover is set exclusively by zoning. For other types of development in the rest of the city, the impervious cover limit is governed by the lower (i.e., more protective) of the two requirements. Watershed Protection uses the maximum impervious cover allowed by the code to model and map floodplains as well as to design upgrades to drainage infrastructure.

CodeNEXT—the City's initiative to revise the Land Development Code—proposes to rezone the entire city. Watershed Protection staff have analyzed whether the maximum impervious cover allowed by CodeNEXT significantly exceeds the maximum impervious cover allowed by current code. Because the City's floodplain models and drainage system capacity analyses are based on fully-developed conditions, an increase in allowed entitlements could potentially impact the extent of the 100-year floodplain as well as the capacity of existing stormwater infrastructure.

Methodology

The analysis was performed using an Excel spreadsheet to calculate and summarize processed Geographic Information Systems (GIS) data. For every parcel within the city limits, the analysis calculated the following values:

- Existing amount of constructed impervious cover based on planimetric data
- Maximum amount of impervious cover allowed under the current Land Development Code by zoning and watershed regulations
- Maximum amount of impervious cover allowed under the proposed Land Development Code by zoning and watershed regulations

If the existing amount of impervious cover exceeds the amount allowed by current or proposed code, the spreadsheet assumed the existing amount of impervious cover in order to provide the highest, most conservative potential estimate of maximum build out.

This analysis does not account for unique environmental features that may be located on a site, including waterways, steep slopes, sensitive features, and trees. The regulatory protections associated with these features (e.g., floodplains, environmental setbacks, net site area calculations, etc.) could potentially lower the total amount of impervious cover for any given site. The CodeNEXT draft states for every zoning category that "the maximum percentage of impervious cover allowed…may not be attainable by a project due to unique site characteristics, such as trees, waterways, and steep slopes. Where necessary, the project shall reduce the amount of proposed impervious cover to comply with other requirements." Given this important caveat, the maximum percentage of impervious cover shown below for each watershed will always be higher than the ultimate anticipated buildout. However, for the purposes of this analysis, the key results to compare and evaluate are the differences between the percentages, rather than the percentages themselves.

Results

The existing impervious cover, as well as the comparison of maximum entitlements under current code and CodeNEXT, is summarized below by watershed. See the map below for the location of watersheds and watershed classifications. Note: The analysis was only performed on parcels within the city limits, so the total acreage for certain watersheds (e.g., Brushy Creek, Maha Creek) is very low compared to the overall size of the watershed. The percentages are totaled at the bottom for all watersheds as well as for the Urban Watersheds (which are denoted by asterisks next to the watershed name).

The analysis showed a slight increase (+0.3%) in the maximum amount of impervious cover allowed by CodeNEXT. However, the Urban Watersheds in the inner core of the City—where the most severe challenges related to flooding, erosion, and water quality generally are located—showed a slight decrease (-0.4%) in the maximum amount of impervious cover allowed by CodeNEXT. The reduction in the urban core is likely attributed to the shift from high-intensity commercial zones (e.g., CS, GR) to transect zones in centers and corridors. This shift resulted in the maximum entitlement for many parcels decreasing from 90 to 95% down to 80 to 90%, depending on the zone.

In multiple Suburban watersheds (e.g., Onion Creek, Walnut Creek, Williamson Creek, Dry Creek East, Maha Creek, and the Colorado River watersheds) the increase in entitlements can be attributed almost entirely to the rezoning of large parcels (e.g., Onion Creek Metro Park, South Austin Regional Wastewater Treatment Plant, North Walnut Creek Greenbelt, Jimmy Clay Golf Course, Circuit of the Americas, and Morrison Ranch Metro Park) from interim Rural Residential (I-RR) to categories that are more in line with the current land use (e.g., Public, Commercial Recreation).

Next Steps

Given the results of this analysis, more detailed modeling by Watershed Protection engineering staff to study the impacts of the proposed zoning on floodplains and infrastructure is not justified at this time. However, Watershed Protection will continue to periodically update floodplain models to reflect changing conditions (e.g., rezoning over time) and improved technology and data. To update a floodplain model and map for a watershed, it typically takes a few years from the start of the floodplain study until the new floodplain maps and models are used by the City of Austin for regulatory purposes. At around the same time the City of Austin begins using the new maps/models to regulate development, the maps and models are provided to FEMA to use for flood insurance premium determination. It takes approximately 18-24 months before the maps are accepted and utilized by FEMA for this purpose.

As part of the larger CodeNEXT effort, Watershed Protection engineering staff are currently working on additional modeling efforts. The first effort will quantify the potential downstream benefits of the proposed CodeNEXT provision related to flood mitigation for redevelopment. Under current code, redevelopment projects that are not increasing impervious cover or changing drainage patterns are generally not required to provide flood mitigation—even if significant downstream flooding exists. Redevelopment projects that do increase impervious cover are only required to mitigate for the difference between existing and proposed impervious cover. CodeNEXT proposes a major new requirement for redevelopment projects to mitigate peak flows back to "greenfield" (undeveloped) conditions. Specifically, sites and subdivisions must reduce the peak runoff generated to match the peak runoff that would be generated by an undeveloped site—as is currently required for new projects on undeveloped land. Tools for mitigating flood impacts include on-site detention, off-site detention, off-site conveyance improvements, or participation in the Regional Stormwater Management Program.

A secondary modeling effort will quantify the potential flood-related impacts associated with residential infill (e.g., additional dwelling units on single family residential lots or tear-down and new construction). As shown in the results table below, although the impervious cover entitlements do not change significantly between the current Land Development Code and CodeNEXT, there is a significant change between the amount of on-the-ground existing impervious cover on single family lots and the maximum amount of impervious cover allowed by current and proposed code. As mentioned in the Introduction section, City of Austin regulatory flood models assume each lot has the maximum allowed impervious coverage under current code, and as such, the models already account for infill. This effort will define the changes to flooding between current conditions and code. Both additional modeling efforts are expected to be complete by fall of 2017.

Finally, as the draft zoning map is refined during the public review process, Watershed Protection will continue to update the impervious cover entitlements analysis detailed above to evaluate whether the results have changed.

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Watershed	Total Acres within City Limits	Existing Impervious Cover (percent)	Allowed Maximum Impervious Cover (percent)		Difference between Current and Proposed Entitlements
			Current Land Development Code	Proposed Land Development Code	
Barton Creek	10,388	16%	18%	18%	0.0%
Buttercup Creek	559	17%	57%	57%	0.0%
Bee Creek	659	6%	12%	12%	-0.3%
Bear Creek	2,661	10%	16%	16%	0.2%
Blunn Creek*	925	48%	67%	67%	0.1%
Buttermilk Branch*	1,060	59%	73%	73%	-0.1%
Boggy Creek*	3,924	43%	63%	63%	-0.3%
Bohls Hollow	2	0%	0%	0%	0.0%
Brushy Creek	4	49%	69%	69%	0.0%
Bear Creek West	297	0%	6%	6%	-0.1%
Bull Creek	14,269	22%	30%	30%	0.1%
Carson Creek	3,312	33%	66%	67%	0.9%
Country Club East	1,172	27%	63%	63%	-0.4%
Country Club West	1,785	45%	66%	66%	0.0%
Cedar Hollow	14	0%	0%	0%	0.0%
Commons Ford Creek	303	1%	13%	13%	0.0%
Connors Creek	395	2%	3%	3%	-0.3%
Colorado River	3,606	17%	55%	56%	1.4%
Cuernavaca Creek	59	3%	20%	15%	-4.5%
Cottonmouth Creek	876	1%	72%	73%	1.3%
Coldwater Creek	175	4%	10%	10%	-0.7%
Decker Creek	4,847	5%	58%	59%	1.0%
Dry Creek East	4,452	13%	57%	63%	5.5%
Dry Creek North	1,368	31%	37%	37%	0.3%
Eanes Creek	1,160	33%	43%	43%	0.0%
East Bouldin Creek*	1,201	53%	69%	68%	-1.2%
Elm Creek	763	19%	54%	55%	1.3%
Fort Branch*	2,168	39%	60%	59%	-1.2%
Gilleland Creek	6,235	4%	67%	67%	0.1%
Honey Creek	24	0%	20%	15%	-4.9%
Hog Pen Creek	191	1%	8%	8%	-0.1%
Harrison Hollow	39	0%	16%	12%	-4.0%
Harper's Branch*	342	52%	63%	63%	-0.2%
Harris Branch	3,630	18%	69%	69%	0.0%

Watershed	Total Acres within City Limits	Existing Impervious Cover (percent)	Allowed Maximum Impervious Cover (percent)		Difference between Current and Proposed Entitlements
			Current Land Development Code	Proposed Land Development Code	
Huck's Slough	109	32%	41%	41%	0.0%
Johnson Creek*	1,154	46%	55%	54%	-0.2%
Little Bee Creek	60	17%	17%	17%	0.0%
Lady Bird Lake*	4,357	40%	55%	54%	-0.6%
Little Bear Creek	907	0%	11%	11%	0.0%
Lake Austin	7,465	6%	19%	17%	-1.6%
Lake Creek	12,302	18%	61%	62%	0.3%
Lake Travis	3,773	4%	9%	9%	0.0%
Little Walnut Creek*	7,277	51%	68%	68%	0.0%
Maha Creek	85	52%	56%	64%	8.5%
Marble Creek	696	19%	56%	56%	-0.4%
North Fork Dry Creek	931	1%	77%	78%	0.2%
Onion Creek	13,913	17%	63%	64%	1.4%
Panther Hollow	2,117	2%	8%	8%	0.0%
Plum Creek	159	0%	65%	65%	0.0%
Rattan Creek	3,513	11%	60%	60%	0.0%
Running Deer Creek	26	0%	16%	12%	-3.7%
Rinard Creek	879	6%	59%	59%	0.0%
South Boggy Creek	2,823	32%	54%	54%	0.1%
South Brushy Creek	3,214	25%	62%	62%	0.0%
South Fork Dry Creek	634	0%	79%	79%	0.0%
Shoal Creek*	8,268	52%	64%	64%	-0.3%
Slaughter Creek	10,981	25%	36%	37%	0.4%
Steiner Creek	37	0%	5%	4%	-1.2%
St. Stephens Creek	656	24%	29%	29%	0.0%
Tannehill Branch*	2,625	43%	67%	66%	-0.4%
Turkey Creek	1,325	1%	9%	9%	-0.1%
Taylor Slough North	957	33%	40%	40%	0.2%
Taylor Slough South	414	41%	45%	45%	0.2%
West Bull Creek	4,242	6%	16%	17%	0.5%
West Bouldin Creek*	1,704	46%	63%	62%	-1.5%
Walnut Creek	22,823	30%	62%	62%	0.2%
Waller Creek*	3,589	58%	71%	71%	0.0%
Williamson Creek	17,895	35%	47%	47%	0.2%
Total	214,775	25%	49.6%	49.8%	0.3%
Urban Watersheds*	38,594	48%	64.4%	64.1%	-0.4%

Appendix: Map of Watersheds and Watershed Classifications