

Rock Bridge Memorial State Park Conservation Overlay

Rationale and Request to City Council, October 4, 2021 from Gans Creek Allies (<https://saveganscreek.com>)

Rationale

1. **Because** Rock Bridge Memorial State Park (RBMSPP) is an important natural, recreational, aesthetic, educational, and economic asset to the City of Columbia and the surrounding area and deserves special protection;
2. **Because** the greatest threat to the Park is development through removal of trees, soil disturbance, and over the long term, the amount of impervious surface cover in stream watersheds in areas just outside the park (*a short list of relevant research is included*);
3. **Because** the people of Columbia, Boone County, and the State of Missouri support protection of Rock Bridge Memorial State Park (RBMSPP) and its environs as demonstrated by over **2000 signatures** to the petitions included with this request, along with recommendations to **revise ordinances and zoning** to protect sensitive natural areas in the 2013 Columbia Imagined document, the 2010 East Area Plan, and the 2007 Bonne Femme Watershed Project (*a list of the relevant strategies, action items, and recommendations from the 3 documents is included*).

Request

The Gans Creek Allies request that the Columbia City Council appoint an ad hoc committee to develop a **Conservation Overlay District** to be added to the Universal Development Code that will protect the natural assets and experiences of nature in land in the Park by limiting the extent and kinds of development that can take place on the land near the Park.

1. The Conservation Overlay should – at a minimum - propose **stricter standards** than those currently in place for **stream buffers, flood plains, Karst, the tree canopy, and erodible soils, plus specific limitations on impervious cover** that, as can be shown by research published in refereed scientific journals (professional opinions are not sufficient), will protect the health of streams and their biodiversity. The overlay should also set guidelines and standards for alternative models of development that provide for homes while significantly limiting impervious surface. Clustered conservation subdivisions (page 131 in Columbia Imagined) are an example.
2. The conservation overlay should – at a minimum – include the area between **Route K on the west, Gans Road on the north, Highway 63 on the east, and the boundary of Rock Bridge Memorial State Park on the south.**
3. The conservation overlay should **automatically apply** to any parcels of land within the proposed area at the time of annexation, and requests for annexation and zoning should incorporate overlay conditions. Until then, county zoning and ordinances should apply.
4. The protections of the conservation overlay should be **inherent** in development plans that are allowed and not dependent on the understanding, training, and good will of developers, builders, and homeowners, or the ongoing functioning of a Home Owners Association or Best Management Practices that require long-term monitoring and maintenance.
5. Finally, we request a **moratorium of 18 months** on annexation and zoning of parcels within the proposed area to give the ad hoc committee time to develop the overlay and the council and community time to consider it.

Appointees – We will be able to provide a list of possible appointees to the ad hoc committee that includes representatives of conservation groups and land owners.

Columbia Imagined 2013

E3. Environmental Management

P1. Adopt alternative development regulations

S1. Adopt a conservation zoning district (M)

A1. Establish a zoning district to delineate regulated natural preservation areas where disruption of natural landscape features is minimized and a connected, uninterrupted network of streams, parks, trails, and wildlife corridors (i.e. green infrastructure) is maximized.

P5. Enhance tree preservation standards and invasive species management

S1. Encourage land preservation (L)

A1. Reduce ambiguities in the subdivision and zoning codes by refining language to be more specific in its intent and implementation; encourage preservation of usable/accessible open space in planned unit developments (PUDs)

S2. Implement conservation subdivision standards (H)

A1. Establish policies in City and County code encouraging the preservation of common open space in subdivisions through the adoption of conservation (cluster) subdivision standards.

East Area Plan 2010

Action 7. Encourage land preservation through subdivision and zoning code regulations. Outcome: Reduce ambiguities in the subdivision and zoning codes by refining language to be more specific in its intent and implementation; encourage preservation of usable/accessible open space in planned unit developments (PUDs)

Action 8. Implement conservation subdivision standards. Outcome: Establish policies in City and County code encouraging the preservation of common open space in subdivisions through the adoption of conservation (cluster) subdivision standards

Bonne Femme Watershed Project 2007

Goal 2. Conserve recharge and karst areas with special protections

Strategy 1. Design Manual/Performance Based Goals – The level of service (following Columbia’s proposed stormwater manual and ordinance) will be more restrictive (e. g. by one or two points on the level of service scale) in karst and recharge areas than in other areas.

Strategy 2. Zoning – Zoning ordinances will establish specific criteria for development in karst recharge areas. These should include defining levels of stormwater quantity and quality, and limiting new sanitary sewers to no discharge systems

Strategy 6. Zoning and Subdivision Regulations; Design Manual – Consider a plan to provide special protections to karst and recharge areas.

Goal 3. Ensure that changes in land use do not increase downstream flooding or channel instability, or decrease water quality.

Strategy 1. Design Manual – The level of service for stormwater runoff flow characteristics post-development shall be no less than pre-development

Strategy 2. Encourage Low Impact Development (LID) – Local governments should establish additional zoning and subdivision regulations that allow LID as a matter of right (i.e. approval will be expedited).

Goal 4. Encourage low impact development as a way to maintain or improve water quality

Strategy 2a. Revise local government’s development regulations to promote environmentally sensitive deciding and maintenance.

Strategy 2b. The level of service (following Columbia’s proposed stormwater manual and ordinance) will be more restrictive (e.g. by one or two points on the level of service scale) in susceptible watersheds (following maps 6.0E, 7.3E and 8.2B of the Sub-watershed Sensitivity Analysis than in less susceptible watersheds. See <https://www.cavewatershed.org/sensitivity-analysis.asp> for maps

Goal 8. Maintain clean water without unnecessarily restricting property rights.

Strategy 3. Revise local governments’ ordinances and design manuals to enable reductions in impervious surface by allowing flexibility in street width, sidewalks, etc.

Goal 11. Ensure that BMPs do not unreasonably affect housing affordability

Strategy 2. Zoning - Amend zoning regulations to allow for increased density in exchange for improved stormwater quality and quantity management. (*inserted - only by providing for clustering of home on smaller lots*)

Goal 12. Ensure that certain areas receive special protections while maintaining the economics of urbanization.

Strategy 1. Zoning- Zoning regulations will reflect the sensitivity of the watershed/sub-watershed. This will allow for economic growth while protecting sensitive sub watersheds.

Impervious Surface Research

This is a sample of the research available on the impacts of impervious surface and the ability of Best Management Practices (BMPs) to mitigate the effects of impervious surface. While there are *numerous* complicating factors, it is so widely recognized that impervious surface above a certain level will affect stream health, that much of the recent scientific literature appears to be devoted to figuring out how to solve the problem rather than proving the relationship. Papers are listed in order of publication. For each there is a link to a PDF, or if that is not available, to the abstract of the paper. Summaries were prepared by Jan Weaver.

1996. **Impervious surface coverage: the emergence of a key environmental indicator.** C. L. Arnold Jr., & C. J. Gibbons. *Journal of the American Planning Association* 62(2): 243-258.

PDF: <https://acad.carleton.edu/curricular/BIOL/classes/bio252/ArnoldandGibbon96APA.pdf>

Impervious surface coverage is a quantifiable land-use indicator that correlates closely with the adverse impacts of runoff.

2003. **Impervious surface area as a predictor of the effects of urbanization on stream insect communities in Maine, USA.** C. C. Morse, A. D. Huryn, & C. Cronan. *Environmental Monitoring and Assessment* 89: 95-127.

PDF: <https://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=0&sid=0defe7e4-9149-445d-86ad-53a00829ee8f%40sdc-v-sessmgr01>

In 20 catchments, there was an abrupt decline in stream insect community richness when total impervious surface was above 6%.

2007. **Impacts of urban land-use on macroinvertebrate communities in southeastern Wisconsin streams.** K. F. Stepenuck, R. L. Crunkilton, & L. Wang. *Journal of the American Water Resources Association* 38(4): 1041-1051.

Subscription required: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1752-1688.2002.tb05544.x>

Urbanization severely degraded stream macroinvertebrate communities where impervious surface was greater than 8%. Anything between 8 and 12% represented a threshold where even minor increases were associated with sharp declines in diversity.

2010. **Responses of benthic macroinvertebrates to environmental changes associated with urbanization in nine metropolitan areas.**

T. F. Cuffney, R. A. Brightbill, J. T. May, & I. R. Waite. *Ecological Applications* 20(5): 1384-1401.

PDF: <https://ca.water.usgs.gov/pubs/2010/CuffneyEtAl2010.pdf>

The responses of macroinvertebrates along gradients of urban intensity were investigated in 9 areas. There was little resistance to urbanization, and levels of impervious cover that have been suggested as protective, still impacted macroinvertebrates.

2010. **National housing and impervious surface scenarios for integrated climate impact assessments.** B. G. Bierwagen, D. M.

Theobald, C. R. Pyke, A. Choat, P. Groth, J. V. and Thomas, P. Morefield. *Proceedings of the National Academy of Sciences* 107(49):

20887-20892. PDF: <https://www.pnas.org/content/pnas/107/49/20887.full.pdf>

In modeling scenarios of housing density and impervious surface cover, the authors found that compact development, as opposed to Business as Usual dispersed development, could reduce damage to watersheds, as well as lower greenhouse gas emissions.

2013. **Mitigating the effects of landscape development on streams in urbanizing watersheds.** D. M. Hogan, S. T. Jarnagin, J. V.

Loperfido, & K. Van Ness. *Journal of the American Water Resources Association*. 50(1): 163-178.

PDF: https://www.researchgate.net/profile/S-Jarnagin/publication/263594645_Mitigating_the_Effects_of_Landscape_Development_on_Streams_in_Urbanizing_Watersheds/links/5b218835aca272277fa961f7/Mitigating-the-Effects-of-Landscape-Development-on-Streams-in-Ur

Despite the use of the best available sediment and erosion control facilities in areas converted to urban land use, streams in these areas had altered flow, changes in geomorphology, and decreased biotic community health. These had downstream effects.

2014. **Effects of distributed and centralized stormwater best management practices and land cover on urban stream hydrology at the catchment scale.** J. V. Loperfido, G. B. Noe, S. T. Jarnagin, & D. M. Hogan. *Journal of Hydrology* 519: 2584-2595.

PDF available without subscription: [https://www.researchgate.net/profile/S-](https://www.researchgate.net/profile/S-Jarnagin/publication/264543236_J_V_Loperfido_G_B_No_e_S_T_Jarnagin_and_D_M_Hogan_2014_Effects_of_distributed_and_centralized_stormwater_best_management_practices_and_land_cover_on_urban_stream_hydrology_at_the_catchment)

[Jarnagin/publication/264543236_J_V_Loperfido_G_B_No_e_S_T_Jarnagin_and_D_M_Hogan_2014_Effects_of_distributed_and_centralized_stormwater_best_management_practices_and_land_cover_on_urban_stream_hydrology_at_the_catchment](https://www.researchgate.net/profile/S-Jarnagin/publication/264543236_J_V_Loperfido_G_B_No_e_S_T_Jarnagin_and_D_M_Hogan_2014_Effects_of_distributed_and_centralized_stormwater_best_management_practices_and_land_cover_on_urban_stream_hydrology_at_the_catchment)

While distributed BMPs were more effective at lowering stormflow and preserving baseflow than centralized BMPs, they were still not as important as greater forest land cover and less impervious cover in preserving stream hydrology.

2018. **Not all pavements lead to streams: variation in impervious surface connectivity affects urban stream ecosystems.** E. M.

Baruch, K. A. Voss, J. R. Baszczak, J. Delesantro, D. L. Urban, & E. S. Bernhardt. *Freshwater Science* 37(3)

Subscription required: <https://www.journals.uchicago.edu/doi/full/10.1086/699014>

Areas of connected impervious surface had a greater impact on the diversity of macroinvertebrates and their levels of copper, lead, and zinc than areas with less connected impervious surface area.