

Executive Summary Knox County and City of Knoxville Ordinance Review Report

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Prepared for:
**Knox County
and
The City of Knoxville**

Prepared by:



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BACKGROUND AND PURPOSE OF THE ORDINANCE REVIEW

In 2001, the City of Knoxville and Knox County entered into an agreement that led to adoption of an Urban Growth Plan for the region. Part of the agreement calls for the County to adopt drainage standards for development that are “at least as strict as” the drainage standards used by the City. This agreement applies to any drainage basin containing water that flows from the County into the municipal boundaries of the City.

In association with the 2001 Agreement, Knox County adopted the City’s ordinance as an interim measure. Since that time, the County has drafted a proposed Stormwater Ordinance to comply with federal and state NPDES Phase II regulations, while also addressing recommendations of the Knox County Site Planning Roundtable. The proposed ordinance is still undergoing review and therefore has not yet been adopted into regulation. As a part of the review, Tetra Tech, Inc. was subcontracted through the ARCADIS Team to perform an expert, independent, and unbiased analysis of the proposed Knox County ordinance relative to the City’s ordinance, the 2001 Agreement, and federal and state NPDES Stormwater requirements.

The purpose of the ordinance review is to determine whether the proposed County ordinance meets the criterion of being at least as strict as the drainage standards used by the City. To conduct this review, ARCADIS called upon Tetra Tech to provide a technical interpretation of the ordinances’ provisions addressing:

- Stormwater volume and peak flows
- Stormwater quality
- Erosion prevention and sediment controls (EP&SC)
- Construction specifications and standards
- Monitoring and enforcement

and to compare them for compliance with the 2001 Agreement. Additionally, Tetra Tech has been asked to place the ordinance review in the context of compliance with NPDES Phase I and Phase II Stormwater Program requirements. Based on these comparisons, Tetra Tech was to provide a general assessment of the Knox County and City of Knoxville stormwater regulatory relationships, along with recommendations for improved collaboration and consistency regarding ordinance administration, enforcement, and development cost impacts.

In conducting this work, a four-pronged review process was applied. The four areas of analysis were:

1. Technical comparison of ordinance provisions using site-scale computer models to simulate development impacts.
2. Comparison of construction specifications and EP&SC in the ordinances and design manuals.
3. Comparison of development review processes.
4. Comparison of monitoring and enforcement programs.

It should be noted that the difference in age and experience of the City and County’s respective programs created a significant challenge for comparing anything beyond written provisions for the County’s proposed ordinance versus the City’s adopted ordinance. In essence, the City has a well-established stormwater quality program with over 10 years of experience in implementation under the NPDES Phase I regulations. The County, on the other hand, is just beginning to build a stormwater quality program under the NPDES Phase II requirements to add to its existing stormwater quantity and floodplain management programs. Drafting of a post-construction stormwater ordinance is one of the first steps in

creating the quality component for the stormwater program, and implementation of the new provisions will occur in the years to come. Application of development review processes and monitoring and enforcement programs associated with the proposed new ordinance provisions – critical for long-term success – have yet to occur for the County. Therefore, Tetra Tech’s analysis in these areas focused on recommendations for future program development.

Key Findings

Site-Scale Analysis

For *water quality impacts*, Tetra Tech evaluated potential sediment, total phosphorus, and total nitrogen loading from new development. A site-scale analysis was performed, simulating example residential and commercial development designs under the current City and proposed County ordinances. Tetra Tech found that the County designs are at least as protective as the City’s in mitigating water quality impacts. For *hydrologic impacts* (i.e., water volume impacts such as flooding and channel erosion), Tetra Tech evaluated storm event runoff volume, changes to storm event peak flows, and changes in annual runoff; the latter being the least important in terms of direct risk of impairment. The site-scale analysis of hydrologic impacts found that overall, the County’s proposed ordinance is at least as protective as the City’s current ordinance for reducing development impacts, with the exception of increase in annual runoff volume. Increase in peak flow and pollutant loading are of greater concern since they have stronger and well-documented impacts on water quality, and the performance of the designs under the County ordinance meets or exceeds the performance of the City designs.

Construction Specifications and EP&SC Analysis

The overall ordinance requirements for both the City and County pertaining to construction specifications and EP&SC during land disturbance are very similar. For land disturbance, both use practices consistent with Tennessee Department of Environmental Control (TDEC) erosion prevention and sediment control requirements, and little additional information pertaining to EP&SC is provided by the City or County. However, the County is required to align EP&SC requirements with TDEC’s Construction General Permit per TDEC requirements. For post-construction design requirements (i.e., requirements for controlling stormwater runoff after all construction is completed), overall volume and peak flow post-construction requirements are very similar. In addition, both have water quality treatment standards that vary in restrictiveness depending on the contributing drainage area and percent imperviousness.

Regarding specifications for pipe material, the City requires the use of reinforced concrete pipe (RCP) for riser pipes and other typical applications, whereas the County has more flexible standards allowing other pipe materials to be employed, although still requiring RCP for large storm event conveyance. Tetra Tech determined that governmental discretion should be allowed in the use of RCP; however, the County should have minimum requirements on the use of RCP in order to be “as strict as” (i.e., as protective as) the City’s standards. The overarching criteria that should be used to determine the minimum requirements for RCP are potential impacts on flooding and water quality. The County has agreed to amend its Draft Manual to establish minimum requirements for RCP to ensure its design standards/specifications will be at least as strict as the City’s. (See Recommendations Section for minimum requirements.)

Development Review Process Analysis

Tetra Tech found that both the City and proposed amended County development review processes are strong and progressive. Both programs have similar stormwater management criteria or performance standards, however the underlying approaches to meeting stormwater management criteria are different. For example, the County has proposed a “better site design” approach driven by site conditions and performance standards, while the City’s engineering approach is driven by design and performance specifications. Both of these stormwater management and development review program approaches are used by other local governments.

The City and County both have a thorough development review process – the City process having been implemented for a decade under its Phase I program, and the County having proposed an amended process to implement its draft ordinance and design manual under its more recent Phase II program. Under the existing and proposed processes, prior to issuing permits the City and County staff:

- Conduct voluntary pre-design meetings and mandatory pre-construction meetings.
- Review conceptual plans for site development, EP&SC plans, stormwater master plan and hydrologic/hydraulic computations, subdivision and site plans, stormwater BMP maintenance covenants, and as-built certifications.
- Conduct site inspections.

In both the existing and proposed development review processes, both ordinances have remedies if non-compliance is detected during plan review or site inspection. Both ordinances have very strong performance standards which guide their development review process.

Tetra Tech has found that the County’s proposed amended development review process meets the intent of the City-County 2001 Agreement, with the agreed upon revision of the Draft Design Manual regarding RCP as discussed above, and recommendations for enhanced inspections, enforcement, and maintenance capability discussed in the following sections.

Monitoring and Enforcement Analysis

The proposed County and existing City ordinances’ enforcement provisions are very similar. The primary difference in terms of enforcement is the City’s ability to perform enforcement and maintenance and recover its costs. However, although the legal framework is present for County enforcement and maintenance, the County’s stormwater program needs to be strengthened to carry out routine enforcement and maintenance duties to meet the proposed ordinance requirements and to meet the “as strict as” requirement per the City-County Agreement.

Knox County has recognized the need to strengthen elements within its stormwater program in order to better enforce requirements related to its NPDES Phase II permit and the requirements of the proposed ordinance. Knox County has increased construction inspection and design review consistently since beginning to implement its Phase II permit, and will continue to increase staff support in the next fiscal year. In the fall of 2006, the Knox County Stormwater Advisory Board was charged with examining the needs of the County stormwater program and providing recommendations for improvements. The Board’s recommendations are expected in early to mid-2007.

Regarding water quality analysis, the County’s Phase II General Permit does not specifically require ambient water quality monitoring. Although the County collects monitoring information for specific projects in accordance with NPDES Phase II requirements, it does not collect analytical monitoring data to assess the effectiveness of its stormwater program. The City is required under Part V of its NPDES

permit to conduct a wet weather and in-stream ambient monitoring program. The City also conducts in-stream biological sampling and reports quantitative estimates of pollutant loads.

Although ambient water quality monitoring is considered to be outside of the ordinance comparison for “as strict as” drainage standards, Tetra Tech recommends that both the County and the City incorporate such monitoring within the context of their municipal stormwater program performance evaluation processes.

Key Recommendations for the City and County Stormwater Program

Requirements for the County to Meet “As Strict As” Requirement

Based on the analyses performed, Tetra Tech finds that the proposed Stormwater Ordinance drafted by the County meets the requirements of the 2001 Agreement. However, to meet the “as strict as requirement” in implementation of the new ordinance, the County should revise its Draft Design manual to set minimum requirements for the use of RCP and enhance its enforcement and maintenance capability, as stipulated below.

Minimum Requirements for RCP:

The County should revise the Draft Stormwater Design Manual to require RCP in the following three conditions:

1. *Pass through drainage.* This involves instances where stormwater conveyance is not routed through a stormwater BMP, but “passes through” the site onto downstream property. Failure of piping in these cases would cause higher potential impacts on downstream water quality and upstream flooding. RCP would pose less risk of pipe failure.
2. *Outlet and flow control structures from ponds.* Again, this minimizes the potential flooding and water quality impacts.
3. *Locations in City and County Rights-of-Way (ROW).* The City has a current policy requiring the use of RCP in City ROW. If the County adopts a policy to require RCP in the County ROW, in cases where the City annexes portions of the County in the future, it will provide for consistency in policy and will allow the City to inherit infrastructure that is at least as protective as that in its current ROW.

The County has agreed to amend its Draft Manual to require RCP in these three conditions, so its design standards/specifications will be at least as strict as the City’s.

Enforcement and Maintenance Requirements:

In order to strengthen the County’s maintenance and enforcement capabilities, it is recommended that the County add additional staff and ensure effective training. This should include periodic refresher training for all new and/or existing staff to improve construction site and post-construction enforcement, and to gain a better understanding of the stormwater system and its maintenance needs. It is also recommended that the County enhance its data management to track regulatory compliance actions and maintenance activities. If changes such as these are implemented, the County should have the capacity to carry out routine enforcement and maintenance duties. In order to meet the criterion “as strict as,” the County will need to exercise this capacity to issue both warnings and fines, as needed, to bring developments into compliance. This level of enforcement should be reflected in the County’s future tracking of regulatory compliance actions.

Selected Voluntary Recommendations

Tetra Tech has found that both the City and the proposed County Stormwater Ordinances are strong. While differences exist in the underlying approaches to meeting stormwater management criteria, elements of the City program and of the County's proposed program are considered progressive relative to many other municipal stormwater management programs. That being said, there is room for improvement or enhancement of each program. Tetra Tech emphasizes the following voluntary recommendations (Note: for summary purposes these are excerpts from Sections 2-5 of the Ordinance Review Report; see the full Report for a more detailed list of recommendations and explanations):

1. Consider strengthening the exemption threshold for EP&SC and for stormwater management. At minimum, improve the coordination between the City and County on such thresholds, and maintain the "as strict as" parity between programs (City and County).
2. Consider increasing minimum water quality detention time to 48 hours to increase pollutant removal capability (City and County).
3. Actively obtain data on the performance of existing and newer technologies, and update manuals accordingly (City and County).
4. Strongly encourage applicants to attend a pre-design conference before the conceptual plan is submitted to review better site design opportunities and to make clear that stormwater management must be incorporated throughout all phases of development, as well as to answer questions up front about EP&SC and stormwater management requirements (City and County).
5. Require that stormwater management be addressed more fully in the concept plan (County).
6. Continue to add other stormwater treatment BMPs (e.g., bioretention) and design techniques (e.g., disconnecting impervious areas, site fingerprinting) to the menu of options to further reduce stormwater runoff and associated pollutants (City).
7. Consider requiring that all inspections and maintenance activity be documented by the responsible party, be kept onsite, and be made available during inspection (County).
8. On a case-by-case basis, require performance security for installation and maintenance (City and County).
9. Consider allowing more flexibility for stormwater pipe material (except for pipes in City right-of-way, those conveying pass-through drainage, and those serving as outlet and flow control structures for ponds). Also consider allowing more flexibility in the design and use of underground storage (City).
10. Prepare tools to support monitoring, tracking and enforcement, including: a detailed enforcement response/escalation plan, inspector's guidance, a municipal stormwater program effectiveness plan, and a database to track inspection results (City and County).