

EXECUTIVE SUMMARY

A Total Maximum Daily Load (TMDL) is the total pollutant load from point and nonpoint sources that a water body can assimilate while maintaining its designated use (water quality standards). It also includes an appropriate margin of safety and is expressed below:

$$TMDL = \sum WLA + \sum LA + MOS$$

where: WLA – Wasteload allocation for point sources;
LA – Load allocation for nonpoint sources; and
MOS – Margin of safety (implicit or explicit).

The focus of the TMDL is the reduction of pollutant inputs to a level (or “load”) that fully supports the designated use of a given water body. The mechanisms (implementation plan) used to address water quality problems after the TMDL is developed can include a combination of Best Management Practices (BMPs) and/or effluent limits and monitoring required through National Pollutant Discharge Elimination System (NPDES) permits.

Trail Creek has been identified through the 303 (d) listing process as being impaired for the parameter of concern *Escherichia Coli* (*E. coli*). As a result, the Indiana Department of Environmental Management (IDEM) is required to establish a TMDL generating process and implementation procedure that follows the federal guidelines and regulations.

As required by the USEPA, TMDL projects must identify a quantifiable water quality target for each constituent that causes a body of water to appear on the State of Indiana’s 1998 and 2002 303(d) Impaired Waterbodies List (ID#37, 14 digit HUC 04040001070030). The bacterial water quality targets established by the Indiana Water Pollution Control Board (327 IAC 2-1-6 Section 6(d)) for *E. coli* are that concentrations shall not exceed 125 cfu/100 ml as a geometric mean based on not less than five samples equally spaced over a 30-day period nor exceed 235 cfu/100 ml in any one sample in a 30-day period. These water quality standards also include policies regarding the State nondegradation policy applicable to all surface waters of the State (327 IAC 2-1-2). For all waters of the state, existing beneficial uses shall be maintained and protected. No degradation of water quality shall be permitted which would interfere with or become injurious to existing and potential uses.

Potential *E. coli* sources in the Trail Creek watershed originate from both point and nonpoint sources under both dry and wet weather conditions. There are four permitted point sources in the watershed, which include the J.B Gifford Wastewater Treatment Plant (Michigan City), Friendly Acres Mobile Home Park, Autumn Creek Mobile Home Park, and Indian Springs Subdivision. Michigan City does have two combined sewer overflow (CSO) points. However, the City has implemented a *Long Term CSO Control Plan* that includes sewer separation to reduce combined sewers in the District’s service areas. The LTCP has been reviewed by IDEM, and Michigan City is currently in the process of responding to their comments. These point source permits require that effluent disinfection occurs during the recreational season (April to October) and year 2000 Discharge Monitoring Reports (DMR) records indicate that each of these point sources are meeting their permit requirements. Therefore, point sources in the Trail Creek watershed are not considered a significant source of *E. coli*.

Nonpoint sources in the watershed are varied and include: agricultural field drainage and runoff, cattle/steer grazing (both in fields and in the creek), failing septic systems, illicit connections and/or urban storm water runoff. These nonpoint sources are a function of rainfall, land use and soil type, but also operate on a relatively continuous basis as exhibited by the observed consistent high levels of *E. coli* throughout the watershed. These more continuous nonpoint sources may be due to cattle/steer grazing in the creek, failing septic systems in close proximity to the creek and/or direct illicit discharges to the creek.

Linking these point and nonpoint source *E. coli* loads was completed with the Trail Creek watershed model, which describes the *E. coli* cause (loads) and effect (concentrations) relationships in the watershed. These cause and effect relationships occur during both dry and wet weather conditions. Development of the TMDL is defined by continued control of point sources (IDEM permitting) and control of nonpoint sources through storm water management plans, best management plans (BMPs) and local cooperation in controlling these sources with the assistance of State watershed grants.

The Trail Creek Watershed model reasonably reproduced observed creek flow and *E. coli* concentrations given the limitations present in both the flow and *E. coli* databases. Although the models are not rigorously calibrated due to lack of acceptable flow and *E. coli* data, the models can be used to assess current conditions and to develop allocation and implementation strategies for Trail Creek. That is, the GWLF and WASP6 models were developed with the best information available at this time and the development of point source wasteload allocations (WLA) and nonpoint source load allocations (LA) for the Trail Creek *E. coli* TMDL is practical and supported by the available data.

Based on the source assessment and watershed modeling, *E. coli* levels in Trail Creek are present during both dry and wet weather conditions and, therefore, low-flow critical conditions are not necessarily appropriate for developing the TMDL. In order to meet the TMDL target concentrations (125 and 235 cfu/100mL), continued operation of the four point sources in the watershed in accordance with their IDEM NPDES permits (125 cfu/100mL monthly geometric mean and 235 cfu/100mL daily maximum) at their permitted effluent flow will meet the WLA component of the *E. coli* TMDL for Trail Creek. Similarly, nonpoint sources in the watershed will need to meet the TMDL target concentrations (125 and 235 cfu/100mL) in order for Trail Creek to be in compliance with State *E. coli* standards.

The required MOS is incorporated into the TMDL analysis implicitly. TMDL rules allow for an explicit Margin of Safety (MOS) (i.e., expressed in the TMDL as a portion of the allocations) or an implicit MOS (i.e., incorporated through conservative assumptions in the analysis). The implicit MOS was used because the die-off rate of *E. coli* was assigned as zero for the allocation model calculations.

In order to investigate the effectiveness of the allocations in meeting the Trail Creek TMDL, continued monitoring in the watershed for *E. coli* is recommended. The monitoring program should be designed to provide good spatial coverage of the watershed, but also be aimed at obtaining data during dry and wet weather conditions. In addition, storm event monitoring should also be completed to better define nonpoint source loadings in the watershed. For the permitted point sources in the watershed, IDEM NPDES permitting and monitoring requirements will provide the necessary reasonable assurance that these sources are not contributing to violations of State *E. coli* standards. For the nonpoint sources, State storm water regulations

and land application permits should also provide necessary reasonable assurance for these potential types of nonpoint sources. The other nonpoint sources will need to be monitored locally for implementation of BMPs or in providing access to watershed grants to assist in reducing nonpoint sources to meet the LA developed under this TMDL.