Planning and Development Implementation Strategies

The Greater Trinity River Bacteria TMDL I-Plan Project area has experienced rapid population growth resulting in increased land development, which in turn has led to challenges in maintaining waterways as areas for recreation. According to the 2010 US Census, the project area is home to 1.33 million people and given its mostly urban, suburban, and industrial land uses, the aggregate impact of so many people and impervious surfaces has the ability to impact bacteria levels in the waterways. Figure 10 shows land use in the Project area based on 2015 data, Figure 11 shows land cover and Figure 12 shows population density based on 2010 US Census information (NCTCOG, 2012a).

Concerns about population growth, the associated stormwater from development, and the impact on stormwater quality must be addressed as part of reducing bacteria levels. Green infrastructure (GI) uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, GI refers to the patchwork of natural areas that provides habitat, flood protection, lowered bacteria loading, and cleaner water. Brought to the scale of a neighborhood or site, GI refers to stormwater management systems that mimic nature by soaking up and storing water (USEPA, 2012a).

Similar, although not identical to GI, is low impact development (LID). LID is an approach to land development (or redevelopment) that works with nature to manage stormwater as close to its source as possible. LID employs principles, such as preserving and recreating natural landscape features, and minimizing effective imperviousness to create functional and appealing site drainage that treats stormwater as a resource rather than a waste product. There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions. LID has been characterized as a sustainable stormwater practice by the Water Environment Research Foundation and others (USEPA, 2012b).

Another tool for reducing stormwater impact is the *integrated* Stormwater Management (iSWM) Program for Construction and Development, a cooperative initiative through NCTCOG that assists cities and counties to achieve their goals of water quality protection, stream bank protection, and flood mitigation, while also helping communities meet their construction and post-construction obligations under state stormwater permits.

iSWM considers that development and redevelopment by their nature increase the amount of imperviousness in the surrounding environment. This increased imperviousness translates into loss of natural areas, more sources for pollution, such as bacteria, in runoff, and heightened flooding risks. To help mitigate these impacts, more than 60 local governments in the NCTCOG region are cooperating to proactively create sound stormwater management guidance for the region through the iSWM Program (NCTCOG, 2012b).

Figure 1. Land Use in Project Area

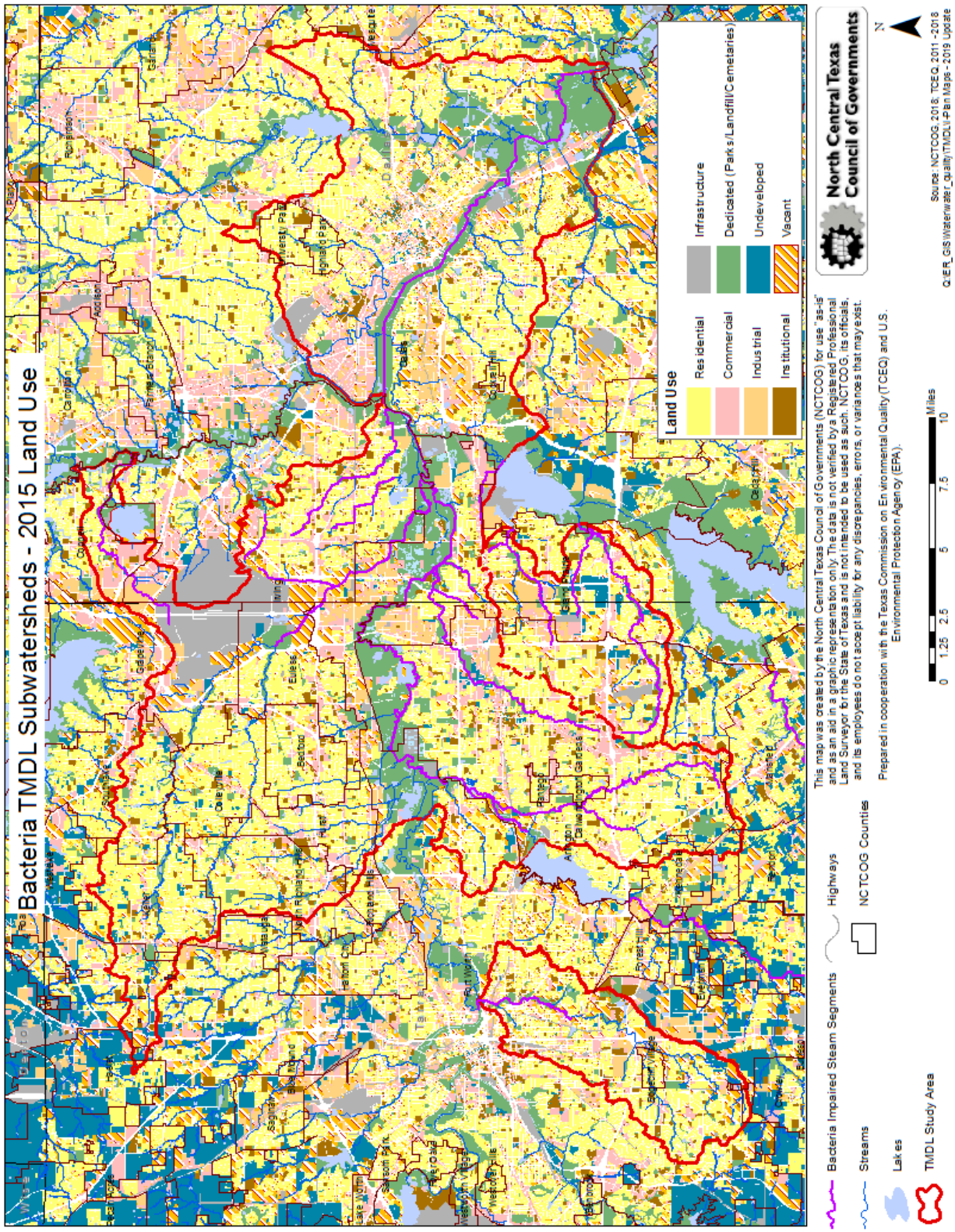


Figure 2. Land Cover in Project Area

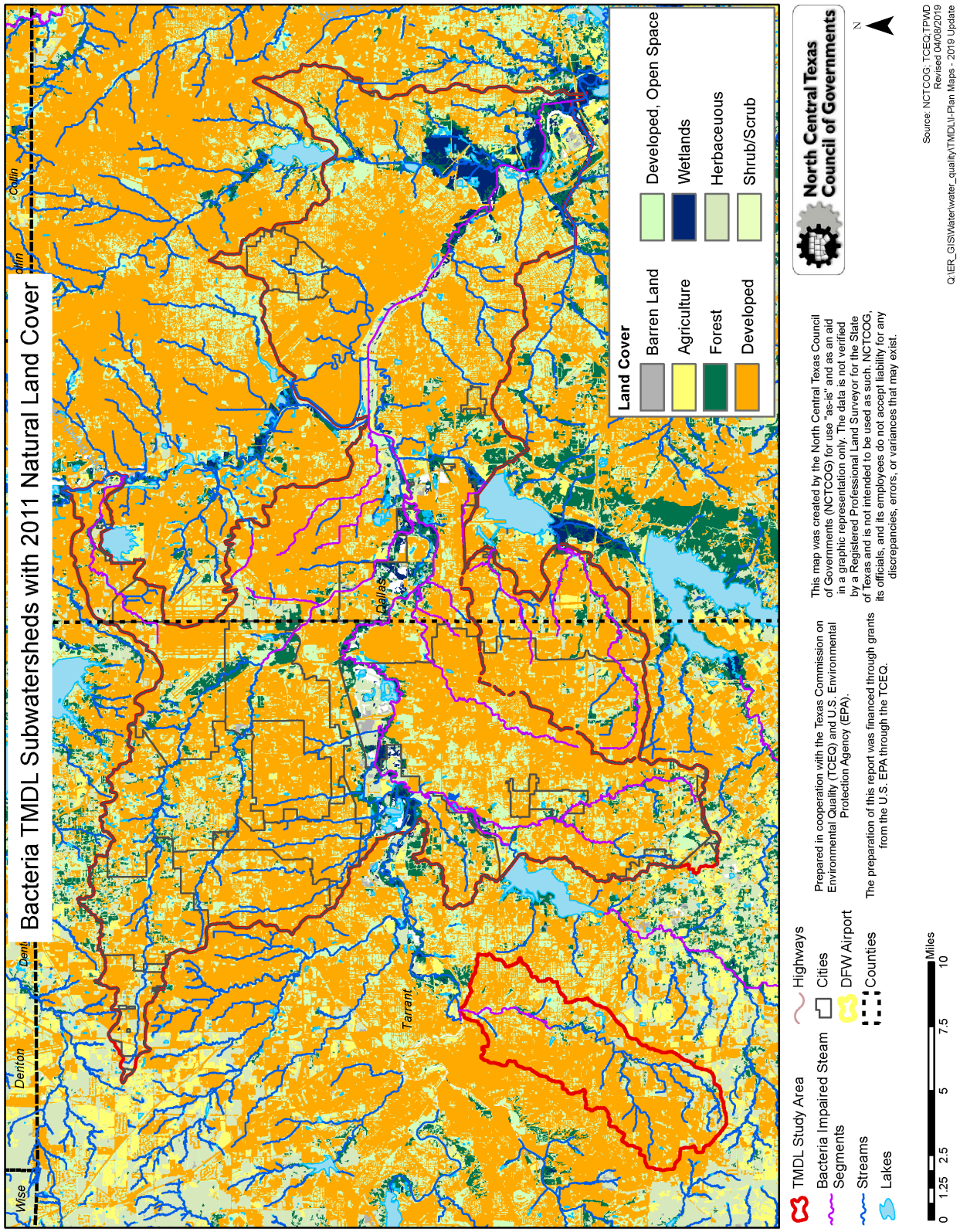
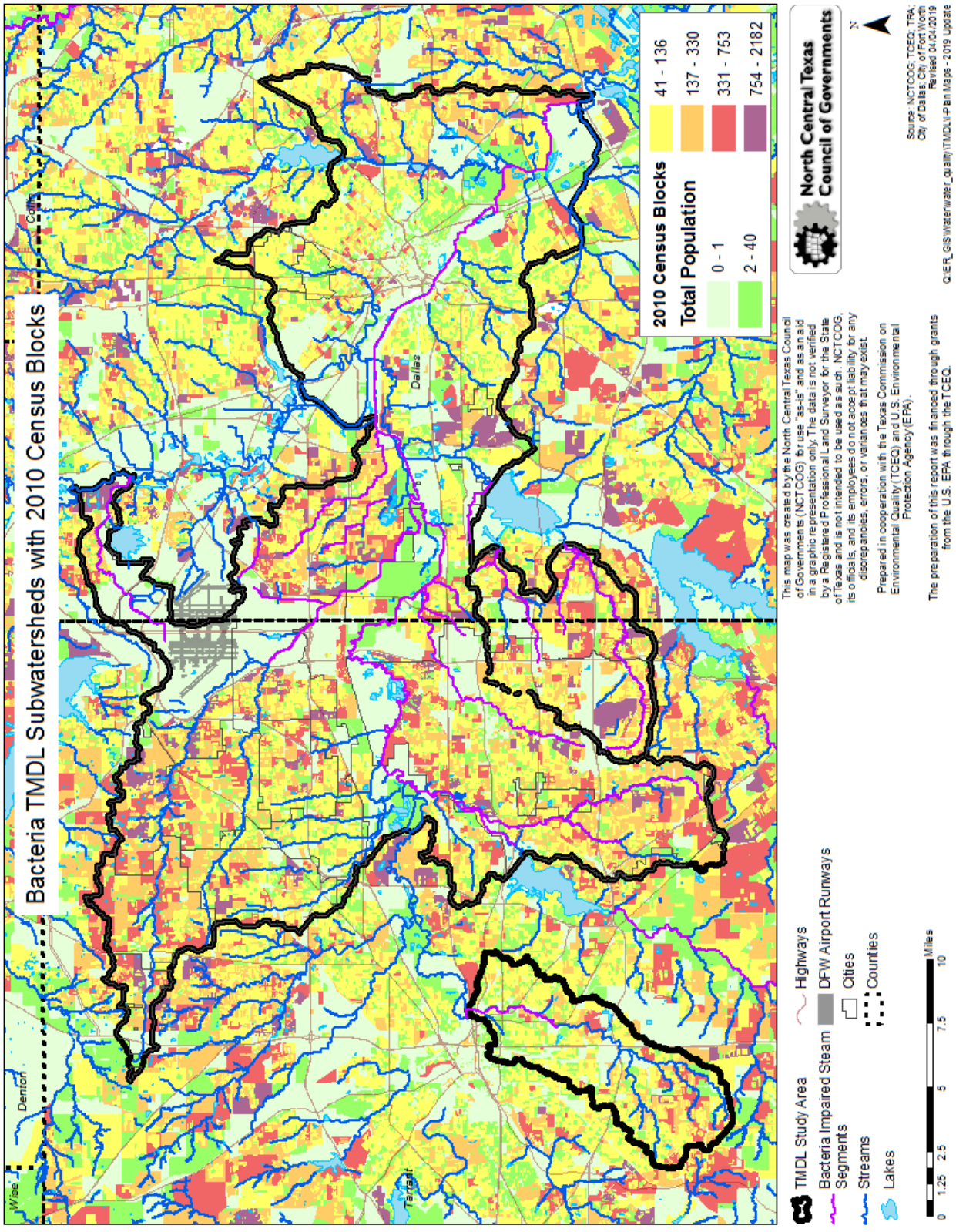


Figure 3. Population Density from 2010 US Census Data



Implementation Strategy 3.0: Adoption of green infrastructure and low impact development standards by municipalities

Stakeholders are committed to expanding the use of GI, LID, and iSWM throughout the Project area. Although none of these practices focuses specifically on bacteria, measures slowing stormwater flow and increasing filtration will reduce bacteria carried by sheet flow into storm drains, creeks, and lakes thereby helping to reduce bacteria loading in the watersheds of the Project area. The Coordination Committee encourages 25 percent of municipalities within bacteria-impaired watersheds to adopt GI and/or LID standards for all sizes of development in their comprehensive plans by 2023 and 50 percent of cities do so by 2038. Implementation strategies for GI and LID are summarized in Table 26.

3.0.1: Reevaluation of development standards based on monitoring data

The lack of applicable data makes it difficult to assess the impact of implementation of practices like LID and GI and programs like iSWM. The current lack of information makes it even more important for stakeholders to do their own internal study of the effectiveness of development standards using stream monitoring data. Municipal stakeholders are encouraged to reevaluate development standards based on monitoring data no less than every five years in conjunction with the MS4 permit cycle.

3.0.2: Municipal ordinance evaluation for water quality impediments

By 2017, 25 percent of municipal stakeholders will evaluate their ordinances for impediments that discourage homeowners and businesses from actions or practices that may improve water quality. Fifty percent of municipalities will do so by 2023. Examples of impediments may include prohibitions on cisterns, rain barrels, or permeable pavement.

3.0.3: Internal policy and procedure integration and improved communication for municipalities

Municipal stakeholders are encouraged to evaluate city departmental structure and internal operations to better integrate policies and practices and improve communication between related departments. Additionally, municipalities are encouraged to evaluate internal practices and procedures for impediments to cooperation among stormwater-related divisions and departments with related goals, such as parks and recreation, public works, planning and development, and environmental management.

Table 1. Implementation Strategy 3.0 Summary — Adoption of GI and LID standards by municipalities

Targeted Source(s)	Construction, development, and redevelopment
Estimated Potential Load Reduction	IS 3.0 – 3.0.3 may result in a 40% reduction in bacteria loading if GI and LID are implemented to the fullest extent possible over the next 25 years

Technical and Financial Assistance Needed	Technical: engineering and/or technical assistance may be necessary to implement changes including the adoption of LID/GI standards, reevaluating development standards based on monitoring data, inclusion of construction BMPs, post construction review, and demonstration projects Financial: loans, grants, local SEPs, and existing funding as appropriate
Education Component	Sample ordinances will be developed as resources are available Outreach to local entities as to the importance of measuring BMP results Sample SOPs for evaluating internal procedures will be developed as resources are available Online resources will include pertinent materials
Schedule of Implementation	25% of municipalities will evaluate their ordinances for impediments that discourage actions or practices that may improve water quality by 2017 with 50% doing so by 2023 25% of municipalities encouraged to adopt LID/GI standards by 2023 with 50% adopting such standards by 2038 Other provisions for sample ordinances, sample SOPs, and online resources to be implemented immediately as resources are available
Interim, Measurable Milestone	Municipalities evaluating their ordinances Municipalities with LID/GI requirements in their ordinances Municipalities measuring BMP results Municipalities using LID/GI in demonstration projects
Progress Indicators	Number of ordinances evaluated Number of ordinances containing LID/GI requirements Results from BMP monitoring available in BMP Library (see IS 8.0) Number of pilot project results available in the BMP Library
Monitoring Component	NCTCOG and the Stormwater technical subcommittee will collect information regarding ordinances and projects

Responsible Entity	Municipalities will evaluate their respective ordinances, adopt LID/GI as feasible, measure BMP results, and make those results available for inclusion in BMP Library Municipalities will adopt LID/GI as feasible, measure BMP results, and make those results available for inclusion in BMP Library NCTCOG and Stormwater technical subcommittee will collect information on ordinances and projects for inclusion in an annual report to Coordination Committee

Implementation Strategy 3.1: Recognition program participation

Recognition programs that provide awards for GI and LID development increase awareness of the benefits of these practices and help promote adoption throughout the Project area. Stakeholders and NCTCOG encourage voluntary participation in existing recognition programs. Several voluntary programs that promote land development and stormwater have been developed or are being developed, including, but not limited to: Celebrating Leadership in Development Excellence, Leadership for Energy & Environmental Design for Neighborhood Development Rating System; International Green Construction Code; and National Green Building Standard. Although these programs do not focus specifically on bacteria reduction, they do contain elements that promote uses of GI and LID that may help reduce bacteria loading. As summarized in Table 27, the Coordination Committee encourages local governments and land developers to promote these programs and similar programs as appropriate.

3.1.1: Local policy and regulation evaluation for impediments for participation

Local governments should analyze their own regulations and programs in an effort to eliminate hurdles to the attainment of the requirements in these programs. For example, zoning density standards, storm sewer connection requirements, and minimum parking and road widths, can limit opportunities for GI.

3.1.2: Promotional efforts for recognition programs

NCTCOG and stakeholders will make an effort to publicize programs and winning projects in order to further educate the general public, elected officials, and private sector businesses about the benefits of LID and GI.

Table 2. Implementation Strategy 3.1 Summary — Recognition program participation

Targeted Source(s)	Construction, development, and redevelopment
Estimated Potential Load Reduction	IS 3.1 – 3.1.2 may result in a 4% reduction over 25 years and is intended to encourage greater use of GI and LID, which should assist in reducing stormwater bacteria loads

Technical and Financial Assistance Needed	Technical: no technical assistance is necessary for this activity Financial: financial assistance through loans, grant and local funding and SEPs
Education Component	NCTCOG and participating stakeholders will promote and encourage participation in voluntary recognition programs that encourage GI/LID Stakeholders will evaluate ordinances, policies, and procedures for impediments for participation in such programs
Schedule of Implementation	As resources are available, the implementation of this activity will begin immediately and will continue for the entire implementation process
Interim, Measurable Milestone	Increased local participation in LID/GI building contests and programs
Progress Indicators	Number of participants Fewer impediments to participation
Monitoring Component	Number of participants and number of programs identified
Responsible Entity	Participating stakeholders and NCTCOG will work to promote participation in voluntary recognition programs for GI/LID as feasible

Implementation Strategy 3.2: Construction sites

Continued population growth in the Greater Trinity River Bacteria TMDL I-Plan Project area creates a demand for new structures and expanded infrastructure. Construction sites for residential, commercial, and linear projects are common throughout the region. Although construction sites are not generally viewed as significant sources of bacteria, they can contribute sediment and nutrients through runoff and erosion and poorly managed portable toilet facilities (as detailed in Implementation Strategy 1.7.2). Bacteria may be found at construction sites in products used for fertilization and landscaping and from improper disposal of on-site sanitary wastes. Bacteria may also attach to sediment. Runoff from construction sites may contain constituents, such as nutrients, solids, fine particles, and other solid material, which could potentially influence bacteria levels in waterways.

When a construction site complies with the TCEQ Construction General Permit (CGP), TXR150000, as well as local stormwater management regulations, sediment and bacteria in runoff can be minimized. Problems arise when construction sites do not have adequate erosion and sediment controls. The Coordination Committee believes construction site regulations are adequate, in that they require sediment be retained on-site to the extent practicable. It is the small number of state or local enforcement staff, faced with an overwhelming number of construction sites at any given time, which accounts for the inadequate enforcement of and, subsequently, limited compliance with the CGP in some areas. Table 28 summarizes the implementation strategies for construction sites.

3.2.1: Construction site inspection programs

As applicable, enforcement at construction sites should be intensified by increasing the percentage of sites inspected. TCEQ, through implementation of Minimum Control Measure (MCM) 4, local governments or other MS4 operators, will evaluate the need for staffing an appropriate construction inspection program. Additional inspectors will be obtained if needed and as resources are available.

3.2.2: Educational materials for contractors, site owners, developers, and MS4 operators

As resources are available, NCTCOG and stakeholders will develop and distribute to MS4s educational material to inform contractors, construction site owners, developers, and MS4 operators of proper construction site practices. These educational materials are intended to encourage conformance with requirements by regulated entities. Educational materials will also have specific components to address contractors, construction site owners, and MS4 operator education. The material will discuss why it is important to prevent sediment from leaving construction sites, outline general regulations to which a construction site must adhere, and provide contact information for reporting suspected violations. Examples of publications that might be used as models are those in the iSWM Program: iSWM Criteria Manual, iSWM Technical Manual, iSWM Tools, and iSWM Program Guidance.

3.2.3: Citizen participation and education efforts

As resources allow, educational materials will also be used to foster active citizen participation in improving water quality through the reporting of construction sites with poor housekeeping and sediment control practices. This public education effort may be combined with efforts described in other sections of the I-Plan to expand homeowner education efforts throughout the region to take advantage of economies of scale. Increasing citizen knowledge may increase the likelihood of stormwater violations being reported and subsequently may increase the number of construction sites being brought into compliance.

3.2.4: Training workshops

As resources are available, NCTCOG will conduct training workshops for contractors, construction site owners, developers, and MS4 operators regarding stormwater management BMPs and encourage them to require training of their crews. Contractors, construction site owners, developers, and MS4 operators are responsible for ensuring compliance. Therefore, it is in their best interest to ensure that construction workers under their supervision are properly trained in the installation and maintenance of erosion and sediment controls. As resources are available, NCTCOG will develop training workshops about existing and emerging construction site BMPs and requirements. The workshops will be designed to help operators communicate requirements to employees. Private construction operations should not be the only target of this activity. Local government departments, municipal districts, and other government entities involved in construction, and their contractors and subcontractors, also must properly install and maintain erosion and sediment controls and educate their personnel. Training local government inspectors is also essential in the effort to improve compliance.

3.2.5: Use of BMPs for infrastructure maintenance

MS4s engaged in infrastructure maintenance should utilize BMPs to reduce discharge that may contain sediment.

3.2.6: Reevaluation of construction site education programs and possible voluntary certification program

The Coordination Committee, through the recommendations of the Stormwater Technical Subcommittee, will evaluate construction site training programs every five years in conjunction with the MS4 permit term for possible inclusion into a voluntary certification program.

Table 3. Implementation Strategy 3.2 Summary — Construction sites

Targeted Source(s)	Construction, development, and redevelopment
Estimated Potential Load Reduction	IS 3.2 – 3.2.6 may result in a 4% reduction in bacteria loading implemented to the fullest extent possible over the next 25 years
Technical and Financial Assistance Needed	Technical: the expertise and assistance of stormwater management professionals will be necessary to develop educational and training materials Financial: salaries for additional inspectors for local communities, and financial support for educational materials and training will be funded through a mixture of state, local, and grant funding
Education Component	Educational materials explaining proper construction site practices will be developed and distributed to contractors, construction site owners, MS4 operators, developers, and citizens Training workshops will be held for contractors, construction site owners and operators, developers, and MS4 operators regarding stormwater management BMPs
Schedule of Implementation	As resources are available, the implementation of these activities will begin immediately and will continue for the entire implementation process At five year intervals efficacy of the strategies will be reevaluated
Interim, Measurable Milestone	Evaluations conducted regarding the need or requirement for staffing an appropriate construction inspection program and subsequent increases in staffing levels as needed Development, distribution, and offering of educational materials and trainings

Progress Indicators	Increases in inspection capacity Number of educational materials distributed and number of groups receiving educational materials Number of trainings offered and number of attendees Number of Strategies reevaluated
Monitoring Component	Annual report on progress indicators to the Coordination Committee from NCTCOG
Responsible Entity	MS4s will evaluate the need or requirement for staffing for appropriate construction inspection programs, increase staffing as needed and as resources are available, and report progress indicators to NCTCOG NCTCOG and stakeholders will develop and distribute educational materials and develop and offer trainings as resources are available NCTCOG will report to Coordination Committee on progress indicators NCTCOG will coordinate a dialogue between the stakeholders and TCEQ targeting opportunities for enhancing the effectiveness of construction site inspections by TCEQ where feasible, through enhanced resources or inspection management strategies