Environmental Consultation for Mobility 2045

Planning & Environment Linkages

North Central Texas Council of Governments
November 8, 2017
Welcome & Introductions

Sandy Wesch, Project Engineer
NCTCOG Metropolitan Planning Area

- 12 counties covering 9,441 square miles
- 7.2 million population in 2017
- 11.2 million population projected for 2045
Metropolitan Planning Organization

- Transportation planning process in metropolitan areas
- Regional Transportation Council – policy board
- NCTCOG Transportation Department – staff
Long-Range Transportation Planning

• Fiscally constrained
• Minimum 20-year planning horizon
• Project prioritization
• Performance-based planning
• Continuing, cooperative, comprehensive
Planning & Environment Linkages

• Environmental, community values
• Early in planning process
• Relationship-building
• Streamlined environmental process
• Needs of the community
• Minimized impacts

www.nctcog.org/pel
Introductions
Mobility 2045 Schedule & Proposed Projects

Kevin Feldt, Program Manager
What Is The Metropolitan Transportation Plan?

Required By Law

- Represents a Blueprint for the Region’s Multimodal Transportation System
- Covers at Least a 20-year Timeframe
- Responds to Goals
- Identifies Policies, Programs, & Projects for Continued Development
- Guides the Expenditure of Federal & State Funds
Regional Perspective

Population
12. Virginia – 8,411,808
13. Washington – 7,288,000
★ DFW – 7,123,170
14. Arizona – 6,931,071
15. Massachusetts – 6,811,779
16. Tennessee – 6,651,194

Area (square miles)
44. Massachusetts – 10,554
45. Vermont – 9,616
★ DFW – 9,441
46. New Hampshire – 9,349
47. New Jersey – 8,722
48. Connecticut – 5,543
49. Delaware – 2,448
50. Rhode Island – 1,545

Source: US Census Bureau July 2016 estimate & NCTCOG DFW Estimate is January 1, 2016

Note:
Lake Erie – 9,910 square miles

Source: US Census Bureau, 2010 census & NCTCOG
Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Employment</th>
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<tbody>
<tr>
<td>1990</td>
<td>4,038,472</td>
<td>2,517,529</td>
</tr>
<tr>
<td>1995</td>
<td>4,530,245</td>
<td>2,826,373</td>
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<tr>
<td>2000</td>
<td>5,228,445</td>
<td>3,431,605</td>
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<tr>
<td>2005</td>
<td>5,768,914</td>
<td>3,646,652</td>
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<tr>
<td>2010</td>
<td>6,444,115</td>
<td>3,957,470</td>
</tr>
<tr>
<td>2015</td>
<td>7,094,057</td>
<td>4,641,364</td>
</tr>
<tr>
<td>2040</td>
<td>10,676,844</td>
<td>6,691,449</td>
</tr>
<tr>
<td>2045</td>
<td>11,246,516</td>
<td>7,024,214</td>
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</table>

Note: Historical figures are total population. Projected figures are household population.
Transportation Funding Basics

System Revenue
- Motor Fuel Taxes
- Vehicle Registration Fees
- Other Federal Sources
- Other State Sources

Facility Revenue
- Tollroads
- Managed Lanes
- Public/Private Partnerships
- Public Transportation Fares

Local Revenue
- Sales or Special Taxes
- Bond Programs
- Impact Fees
- Property Taxes
- Value Capture

Regional Transportation System Revenues
## Prioritization & Expenditures

<table>
<thead>
<tr>
<th>Infrastructure Maintenance</th>
<th>2040</th>
<th>2045¹</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>$37.4</td>
<td>$41.3</td>
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<table>
<thead>
<tr>
<th>Management &amp; Operations</th>
<th>2040</th>
<th>2045¹</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>$7.2</td>
<td>$7.9</td>
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</table>

<table>
<thead>
<tr>
<th>Growth, Development, &amp; Land Use Strategies</th>
<th>2040</th>
<th>2045¹</th>
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<tr>
<td></td>
<td>$3.6</td>
<td>$3.9</td>
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</table>

<table>
<thead>
<tr>
<th>Rail &amp; Bus</th>
<th>2040</th>
<th>2045¹</th>
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<tbody>
<tr>
<td></td>
<td>$27.2</td>
<td>$30.0</td>
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<table>
<thead>
<tr>
<th>Managed Lanes</th>
<th>2040</th>
<th>2045¹</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$43.4</td>
<td>$47.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freeways/Tollways &amp; Arterials</th>
<th>2040</th>
<th>2045¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$43.4</td>
<td>$47.9</td>
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</tbody>
</table>

**Total Expenditures**

<table>
<thead>
<tr>
<th>Total Expenditures</th>
<th>2040</th>
<th>2045¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>$118.9²</td>
<td></td>
<td>$131.0²</td>
</tr>
</tbody>
</table>

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1 Preliminary estimates to be refined.
2 Actual dollars, in billions. Values may not sum due to independent rounding.
Mobility 2045 Transit Project Status

Projects in Mobility 2045
- No Change from 2040
- Alignment Change from 2040
- Add New Project (Under Evaluation)

Projects to be Removed from Mobility 2045
- Under Construction/Complete
- Removal - Local Decision
- Existing Rail

Dallas CBD

Fort Worth CBD

DRAFT

Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.
Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.
Public meetings held during highlighted months.
Regional Transportation Council plan adoption scheduled for June 14, 2017.

[link to website]
Environmental Policy Review

Sandy Wesch, Project Engineer
Environmental Considerations Policies

**ER3-001:** Promote livable communities by protecting, retaining, restoring/mitigating, or enhancing the region’s built & natural environmental assets during planning & implementation of transportation programs & projects.

**ER3-002:** Work cooperatively with regulatory & conservation partners to develop innovative approaches that meet their conservation priorities & facilitate the delivery of transportation projects.
Environmental Considerations Policies

**ER3-003**: Encourage transportation programs & projects that provide appropriate access to the natural environment to support healthy lifestyles.

**F3-002**: Incorporate sustainability & livability options during the project selection process. Include additional weighting or emphasis as appropriate & consistent with Regional Transportation Council policy objectives including, but not limited to, demand management, air quality, natural environment preservation, social equity, or consideration of transportation options & accessibility to other modes (such as freight, aviation, bicycle, & pedestrian).
Air Quality in Mobility 2045

Lori Clark, Program Manager
Clean Air Act (CAA) Last Amended in 1990

Requires Environmental Protection Agency (EPA) to Set National Ambient Air Quality Standards (NAAQS) for 6 Criteria Pollutants:

- Carbon Monoxide (CO)
- Lead (Pb)
- Nitrogen Oxides (NO\textsubscript{x})
- Ozone (O\textsubscript{3})
- Particulate Matter (PM)
- Sulfur Dioxide (SO\textsubscript{2})

EPA Must Complete a Review of NAAQS Every 5 Years
Air Quality Index based on 2015 NAAQS for Ozone, ≤70 parts per billion (ppb)

Ozone Nonattainment Area & Regulatory Monitors

Legend
- Counties Designated as Nonattainment Under 2008 NAAQS for Ozone
- Recommended County for Nonattainment Under 2015 NAAQS for Ozone
- Metropolitan Planning Area

2014-2016 Design Value (ppb)*
- 0 - 54 ppb
- 55 - 70 ppb
- 71 - 85 ppb

*Air Quality Index based on 2015 NAAQS for Ozone, ≤70 parts per billion (ppb)
Design Value (ppb)

1. Attainment Goal - According to the US EPA National Ambient Air Quality Standards, attainment is reached when, at each monitor, the Design Value (three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentration) is equal to or less than 70 parts per billion (ppb).

- 1997 Standard < 85 ppb (Revoked)
- 2008 Standard ≤ 75 ppb¹ (Attainment Deadline 2017)
- 2015 Revised Standard ≤ 70 ppb (TBD; Marginal Areas by 2022)

As of October 30, 2017

¹Attainment Goal - According to the US EPA National Ambient Air Quality Standards, attainment is reached when, at each monitor, the Design Value (three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentration) is equal to or less than 70 parts per billion (ppb).

^Not a full year of data

Source: NCTCOG TR Dept
Optimum conditions for the formation of ozone include high temperatures & low winds. Sections are not to scale & are for illustrative purposes only.
NONATTAINMENT REQUIREMENTS

New Source Review Permit Program

Potential for Pollution Control Requirements or Operational Restrictions on Companies or Businesses

State Implementation Plan (SIP) Required
• Develop On-Road Mobile Source Emissions Inventories
• Implement Local Voluntary Emissions-Reduction Projects/Programs

Transportation Conformity Required
• Evaluate Emissions of Future Transportation System Against SIP
• Ensure Federal Funding Available for Transportation
2016 DFW CONFORMITY RESULTS

Oxides of Nitrogen (NO$_X$) Emission Results

- Includes Reductions from RTC Initiatives of 2.68 tons/day
- 2017 MVEB$^1$ = 148.36 tons/day

<table>
<thead>
<tr>
<th>Analysis Years</th>
<th>Emissions (tons/day)</th>
</tr>
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<tbody>
<tr>
<td>2017</td>
<td>123.81</td>
</tr>
<tr>
<td>2027</td>
<td>58.94</td>
</tr>
<tr>
<td>2037</td>
<td>44.67</td>
</tr>
<tr>
<td>2040</td>
<td>45.02</td>
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</table>

$^1$Source: Environmental Protection Agency Notice of Adequacy Status of Dallas-Fort Worth, TX Reasonable Further Progress 8-Hour Ozone Motor Vehicle Emission Budgets for Transportation Conformity Purposes; 81 FR 1184, [https://federalregister.gov/a/2016-339](https://federalregister.gov/a/2016-339)
### SEVEN AIR QUALITY EMPHASIS AREAS

<table>
<thead>
<tr>
<th>Strategies Designed for Air Quality</th>
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</thead>
<tbody>
<tr>
<td>High-Emitting Vehicles/Equipment</td>
</tr>
<tr>
<td>Energy &amp; Fuel Use</td>
</tr>
<tr>
<td>Idling</td>
</tr>
<tr>
<td>Vehicle Miles of Travel</td>
</tr>
<tr>
<td>Cold Starts</td>
</tr>
<tr>
<td>Hard Accelerations</td>
</tr>
<tr>
<td>Low Speeds</td>
</tr>
</tbody>
</table>

### Mobility Strategies Include:

- Transportation System Management
- Travel Demand Management
EXISTING AIR QUALITY INITIATIVES

Air Quality Communication Program
Air Quality Demonstration Program

Oversize/Overweight Vehicles Emissions Impact
Idle-Free School Zones

Air Quality Enforcement Program
Air Quality Partnerships & Collaborations

Alternative Fuel Corridors

Air Quality Regional Policies
Air Quality Technology Improvements

~$159.2 Million Awarded Since 2006

Clean Technologies Revolving Loan
Volkswagen Settlement????
Natural Environment Screening in Mobility 2045

Kate Zielke, Senior Transportation Planner
Mobility 2040 Method

NEPAssist
NCTCOG
Regional Ecosystem Framework
Threatened, endangered species; potential impacts, mitigation strategies separate

www.nctcog.org/REF
Goals for Revising Method

Identify...

1. Resources facing greatest potential effects
2. Subwatersheds facing greatest potential effects
3. Agencies for environmental coordination – guiding future MPO work

Integrate...

1. Strategies for minimizing, mitigating
2. Threatened & endangered species (from US Fish & Wildlife Service’s IPaC tool)
Proposed REF Method

REF grid-level data
Restricted to natural environment

<table>
<thead>
<tr>
<th>REF Layer (½ Mile Buffer)</th>
<th>Maximum Score</th>
<th>Mean Score</th>
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<tbody>
<tr>
<td>Diversity</td>
<td>5</td>
<td>1.33</td>
</tr>
<tr>
<td>Flood Zones</td>
<td>5</td>
<td>1.80</td>
</tr>
<tr>
<td>Impaired Water Segments</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>Rarity</td>
<td>4</td>
<td>2.24</td>
</tr>
<tr>
<td>Surface Water Density</td>
<td>5</td>
<td>1.40</td>
</tr>
<tr>
<td>Wetlands</td>
<td>3</td>
<td>1.01</td>
</tr>
<tr>
<td>Wildlife Habitat</td>
<td>5</td>
<td>3.31</td>
</tr>
</tbody>
</table>

Ultimately low, medium, high designation
Proposed REF Method

Questions:
Maximum vs. average score?
Buffer size?

Pro:
REF includes data not easily replicated (contiguous size undeveloped area, Shannon land cover diversity, vegetation rarity...)

Con:
Layers that aggregate data limit ability to identify resources affected, agencies with whom to coordinate (Diversity, Wildlife Habitat)
Proposed Multiple Data Source Method

Supplement REF grid-level data with raw data (parks, Ecologically Significant Stream Segments...)

Pro:

Provides ability to tease out potential effects, agencies with whom to consult

Cons:

Actual alignment unknown
Limits ability to identify subwatersheds facing greatest effect
Minimization, Mitigation Strategies

- Loss of habitat
- Fragmentation of habitat
- Erosion
- Sedimentation
- Stormwater runoff, pollutants
- Alteration of hydrological flows
- Removal of wetlands
- Reduced flood storage capacity
- Increased velocities
- Raised flood water levels
- Disturbance of protected species
Natural Environment Screening

Seeking feedback:
Natural Environment Screening method
Minimization, mitigation strategies
Environmental Coordination Goal

**Seeking partnerships to...**

- Create continuity with transportation partners
- Overcome temporal disconnect between planning, construction
Environmental Justice in Mobility 2045

Kate Zielke, Senior Transportation Planner
Environmental Justice in Transportation

• Address any disproportionately high & adverse effect

• Ensure full & fair participation in transportation decision-making

• Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority & low-income populations

www.nctcog.org/ej
### Demographic Profile

<table>
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<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>Total Minority</td>
<td>2,121,346</td>
<td>40.82%</td>
<td>2,988,753</td>
</tr>
<tr>
<td>Low Income</td>
<td>549,051</td>
<td>10.74%</td>
<td>817,184</td>
</tr>
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</table>

*In 2010, the Decennial Census discontinued reporting on low-income populations. This data is now only available through the American Community Survey.
Environmental Justice Policies

**EJ3-001:** Evaluate the benefits & burdens of transportation policies, programs, & plans to prevent disparate impacts & improve the decision-making process, resulting in a more equitable system.

**EJ3-002:** Balance transportation investment across the region to provide equitable improvements.

**PI3-001:** Meet federal & state requirements to ensure all individuals have full & fair access to provide input on the transportation decision-making process.
Environmental Justice Policies

PI3-003: Use strategic outreach & communication efforts to seek out & consider the needs of those traditionally underserved by the transportation planning process.

PI3-005: Provide education to the public & encourage input & engagement from all residents on the transportation system & the transportation decision-making process.
EJ-Related Initiatives

• **Technical support for partners, including Environmental Justice Index**
• MTP EJ analysis
• Tracking demographic trends
• Project prioritization
• Access North Texas
• Regional Toll Analysis
• Education/outreach for air quality programs
• Infrastructure to reduce diesel idling
MTP EJ Analysis

• Number of jobs accessible by auto
• Number of jobs accessible by transit
• Number of jobs accessible within biking/walking distance
• Percent of lane miles congested
• Average time to travel 20 miles
• Percent of population within 30 minutes of university or shopping
• Percent of population within 15 minutes of hospital
Sustainable Planning in Denton Greenbelt

Kate Zielke, Senior Transportation Planner
## Identifying Transportation Need

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<tr>
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<tbody>
<tr>
<td>Denton</td>
<td>432,976</td>
<td>662,614</td>
<td>1,241,681</td>
<td>87.39%</td>
</tr>
<tr>
<td>Collin</td>
<td>491,675</td>
<td>782,341</td>
<td>1,560,421</td>
<td>99.46%</td>
</tr>
<tr>
<td>Dallas</td>
<td>2,218,899</td>
<td>2,368,139</td>
<td>3,357,469</td>
<td>41.78%</td>
</tr>
<tr>
<td>Tarrant</td>
<td>1,446,219</td>
<td>1,809,034</td>
<td>3,094,649</td>
<td>71.07%</td>
</tr>
<tr>
<td>Region</td>
<td>5,197,317</td>
<td>6,417,724</td>
<td>10,676,844</td>
<td>66.36%</td>
</tr>
</tbody>
</table>
Identified Need for Roadway
PEL Feasibility Study

Plans for feasibility study:

- Assess transportation needs
- Identify transportation solutions
- Preliminary-level review of the affected environment
- Incorporate sustainability & environmental stewardship best practices recommended by Federal Highway Administration sustainability tool, INVEST

www.sustainablehighways.org/
FHWA INVEST Tool

The INVEST tool is used to address the economic, social, & environmental sustainability of transportation projects.

Goals:

• Reduce impacts to natural environment
• Increase social & economic benefits
Stakeholder Engagement

• Stakeholder meetings to identify sustainability & environmental stewardship needs in the Denton Greenbelt

• Representatives from:
  ▪ City of Dallas
  ▪ City of Denton
  ▪ Cross Timbers Equestrian Trails Association
  ▪ Greenbelt Alliance
  ▪ Lake Ray Roberts Equestrian Trails Association
  ▪ Texas Parks & Wildlife Department
  ▪ Upper Trinity Regional Water District
  ▪ US Army Corps of Engineers
  ▪ Venable Ranch

• Seeking transportation stakeholders
Quantifying the Benefits of Environmental Stewardship

Amanda Long-Rodriguez, Transportation Planner
Mitigation of Environmental Impacts

• To avoid, minimize, rectify, reduce, or compensate for the environmental impact
• Necessary as transportation projects can have a negative impact on the environment
• Often seen as a cost
• Benefits are not easily captured
  ▪ Public goods
  ▪ e.g., Trees
Environmental Benefits

- Reduce Stormwater Runoff
- Improve Air Quality
- Wildlife Habitat
- Aesthetic Value
- Reduce Heat Island Effect
Quantifying the Benefits of Environmental Stewardship Tool

• What is it
  A decision-making tool that identifies the benefits & return on investment that result from engaging in non-regulatory mitigation activities

• Purpose
  ▪ Assist political subdivisions in reducing the burden that transportation-related infrastructure places on the environment.
  ▪ Help political subdivisions gain benefits from non-regulatory mitigation
Quantifying the Benefits of Environmental Stewardship Tool

Decision Making Tool will identify Transportation impacts three Environmental Systems:

- **Open Space/Natural Area**
  - Environmental Impacts
  - Mitigation Activities
  - Ecosystem Services

- **Stormwater/Water Pollution**
  - Environmental Impacts
  - Mitigation Activities
  - Ecosystem Services

- **Non-Jurisdictional Waters**
  - Environmental Impacts
  - Mitigation Activities
  - Ecosystem Services
Information on Value of Ecosystem Services

Seeking Committee Members

• Consultant Selection Committee
  ▪ Reviewing & selecting qualified proposals
  ▪ Must be public entities

• Project Review Committee
  ▪ Assist NCTCOG staff with guidance & technical review of the selected firm
  ▪ Can be any entity with expertise in the three environmental systems
Environmental Stewardship Program

Nathan Drozd, Senior Transportation Planner
# RTC-Approved Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Funding</th>
<th>Category</th>
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<tbody>
<tr>
<td><strong>Eastern Subregion</strong></td>
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<tr>
<td>Southwest Water Gardens</td>
<td>$350,000</td>
<td>Engineering</td>
</tr>
<tr>
<td>NeighborWoods</td>
<td>$300,000</td>
<td>Trees</td>
</tr>
<tr>
<td><strong>Western Subregion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lancaster/Hemphill-Lamar</td>
<td>$200,000</td>
<td>Trees</td>
</tr>
<tr>
<td>Lake Worth Mitigation (now Zoo Creek Project)</td>
<td>$200,000</td>
<td>Engineering</td>
</tr>
<tr>
<td><strong>Regional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education Campaign</td>
<td>$100,000</td>
<td>Education</td>
</tr>
<tr>
<td>GIS-Based Tree Tracker</td>
<td>$100,000</td>
<td>Software</td>
</tr>
</tbody>
</table>
Proposed Dallas Water Gardens

- Preliminary design
- Old Trinity River Channel
- Wetlands & wetland treatments
- Flood control, water quality, public space
- Public access to wetlands, aquatic features, boardwalk
Zoo Creek Project

• Bacteria & sediment reduction program
• Zoo Creek-Clear Fork Trinity River oxbow area
• Engineering design possibilities
  ▪ Sedimentation, trash fore-bay
  ▪ Dredging oxbow
  ▪ Hydraulic infrastructure to manage flows
• In-situ natural treatment, outdoor education, recreation
Education Campaign

• Mitigation focus
• Workshop for developers, builders – minimizing impacts to streams, wetlands
• Webinar for mitigation bankers – seeking transportation partners

www.nctcog.org/trans/environmentalstewardship/
Follow-Up to Mitigation Assessment

Kate Zielke, Senior Transportation Planner
Wetland & Stream Mitigation Assessment

- Completed 2016
- Supply of Compensatory Mitigation Credits
- Demand for Compensatory Mitigation Credits
  Mobility 2040 Estimates
- Potential Mitigation Sites
- Recommendations & Action – Environmental Stewardship Program Education Campaign

Perennial In-Channel Stream Credits
Estimated Availability

Legend
- Sub-basin (HUC8)
- Ecoregions

Number of credits
- 0
- 413.82
- 1,050.30

This map does not differentiate between primary, secondary, and tertiary service areas. Perennial in-channel stream credits are those generated by work on channel condition, in-stream condition, and hydrologic condition. Available credits are those that have been released but not yet withdrawn. The numbers on this map do not account for pre-sales of credits that have not been recorded in RIBITS. Data were acquired from the RIBITS database and are current as of August 28, 2017.

August 2017 Update

August 29, 2017
Stream Credits Purchased

Average purchase per permit: 115.4 credits

Data source: USACE Regulatory In-lieu Fee & Bank Information Tracking System
## Recommendations & Action

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Action</th>
<th>Timing</th>
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<tbody>
<tr>
<td>Address supply/demand</td>
<td>Workshop with developers, builders on how to avoid, minimize impacts</td>
<td>Completed – September 2017</td>
</tr>
<tr>
<td></td>
<td><strong>Webinar with mitigation bankers</strong></td>
<td><strong>Tentatively February 2018</strong></td>
</tr>
<tr>
<td>Conduct analysis with each long-range</td>
<td>Planning for Mobility 2045</td>
<td>Plan approval in June 2018</td>
</tr>
<tr>
<td>plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seek mitigation in primary service</td>
<td>Impacted by TxDOT method for acquiring mitigation credits</td>
<td>No current plans to address</td>
</tr>
<tr>
<td>area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Environment & Development Initiatives

Derica Peters, Senior Planner
Tamara Cook, Manager
Environment & Development Department Focus Areas

**Materials Management**
- Regional Landfill Capacity
- Recycling
- Waste to Energy
- Illegal Dumping
- Technical Resources

**Watershed Management**
- Stormwater Management
- Water Quality
- Trinity River Common Vision
- Flood Risk Reduction

**Natural Resources**
- Water Supply
- Energy
- Open Space Planning/Preservation

**Public Works**
- Construction Standards
- Block Grants
- Wastewater Roundtable

**Development Excellence**
- Principles of Development Excellence
- Building Codes
- Technical Tools

[www.nctcog.org/envir/](http://www.nctcog.org/envir/)
Integrated Stormwater Management

*Integrated* system of development, design, and construction strategies to address:

- Water Quality
- Streambank Protection
- Flood Mitigation and Conveyance

- Comprehensive stormwater management design manual developed by NCTCOG and more than 60 participating public entities
- Relevant for private and public development project sites as well as public rights-of-way
- Seventeen local entities now require iSWM for design
- Some form of low impact design and/or post-construction controls is now required in all 50 states by EPA
• Part of a larger urban design initiative
• Provides a “greener” community and improved water quality
• Addresses regulatory program feedback and helps with permit compliance
• Helps with undersized existing drainage systems
• Provides a consistent framework and NCTCOG training opportunities
Integrated Stormwater Management

TriSWM
Available for use by cities, counties, engineers, private developers, contractors and transportation agencies in the planning and design of stormwater management for streets, roads, and highways.

Provides planning and design guidance and a framework for incorporating effective and environmentally sensitive stormwater management practices into the street and roadway project development process and to encourage a greater uniformity in developing plans for stormwater management systems that meet the following goals:

- Provide safe driving conditions
- Minimize downstream flood risk to people and properties
- Minimize downstream bank and channel erosion
- Reduce pollutants in stormwater runoff to protect water quality

Strategies to aid local governments and the private sector to:
- Design roads and highways with stormwater impacts in mind
- Address and mitigate the adverse impacts of development on runoff
- Implement stormwater controls to meet the TriSWM planning and design approach
Integrated Stormwater Management

Certified iSWM Cities
- Denton (Silver)
- Frisco (Silver)
- Kennedale (Silver)
- Grand Prairie (Silver)
- Fort Worth (Silver)

Founding iSWM Communities
- Azle
- Benbrook
- Dallas
- Duncanville
- Fort Worth
- Glenn Heights
- Grand Prairie

Cities considering iSWM Strategies
- Allen
- Arlington
- Bedford
- Burleson
- Cedar Hill
- Coppell
- DeSoto
- Little Elm
- Murphy
- Plano
- Richardson
- Rockwall
- Seagoville
- The Colony
- Wylie
- Others?
# 16-County Watershed Initiative

Developed through partnership with Transportation Department, Environment and Development, Texas Floodplain Management Association, & local county governments.

## Menu of Regionally Recommended Standards in Watershed Management
For New Development Within County Regulated Areas

| 1. Design infrastructure to fully developed conditions with approved land-use maps if data is available | 8. Define written operation and maintenance responsibilities |
| 2. Begin protection at the most upstream end of the watershed above Federal Emergency Management Agency Limit of Detail Study | 9. Size conveyance of street and storm systems adequately to safely convey traffic |
| 3. Maintain unfilled valley storage areas | 10. Create stream buffers and preserve open space; limit clearing and grading |
| 4. Protect against and reduce erosive velocities | 11. Consider regional (on or off stream) detention incentives |
| 5. Match pre-developed site runoffs | 12. Implement Conservation and/or Cluster Development incentives |
| 6. Verify/require adequate downstream conveyance | 13. Encourage low impact development techniques and/or green infrastructure |
| 7. Require freeboard from fully developed (if data is available) and changing watershed conditions |  |
North Central Texas Green Infrastructure Guidebook

• Made in partnership with Transportation Department
• This guide focuses **transportation-relevant** green infrastructure elements:
  1. Energy-efficient light-emitting diode (LED) and renewable-energy lighting
  2. Recycled construction materials in roadways and trails
  3. Cool pavements
  4. Green trail materials
  5. Green stormwater infrastructure techniques such as permeable pavement and bioretention, and trees

www.nctcog.org/greeninfrastructure
North Central Texas Green Infrastructure Guidebook

Developed local, state, and national case studies to examine:

• Long-term cost effectiveness
• Community improvement
• Environmental impacts

Location of Green Infrastructure Case Studies
Sustainable Public Right of Ways (SPROW)

Hosts education forums and site visits for engineering and planning professionals

• Next scheduled for December 4, 2017
• Topics will include:
  ▪ Municipal LED Retrofitting, City of Frisco
  ▪ Complete Streets Policy Adoption and Implementation, City of Weatherford
  ▪ Integration of Green Infrastructure in University of Texas Arlington Green at College Park
  ▪ Visiting Various Sites in Dallas
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