RDg...
PLANNING • DESIGN

Walnut Creek Watershed Management Authority

Project Kick Off
March 18, 2015

Agenda

1. Call to Order & Introductions
2. Approval of Agenda
3. Approval of Minutes
4. Treasures Report
5. Schedule
6. TMDL Overview
7. Review of Existing Studies
    a. Municipality
    b. County
    c. SWCD
    d. Tomorrow Plan
8. Review Mapping
    a. Land Use
    b. Flood Plains
    c. Stream Assessments
    d. Greenways
9. Next Steps
    a. Field Assessments
    b. Watershed Inventory
    c. Watershed Assessment
10. Next WMA Meeting
    a. April 9, 8AM – 10 AM Meeting with Iowa Soybean Association at Heartland Co-Op
    b. April 16, 11AM – Executive Committee Meeting
    c. April 29, 8AM – 12:00PM: Strategic Session
        i. Review Watershed Assessment
        ii. Set Goals
        iii. Identify Priorities
11. Adjournment

Schedule & Meeting Purpose

Meeting Purpose

Task 2: Review Existing Studies + Collect Data

- Leverage existing planning studies to identify priority areas (e.g., Raccoon River Watershed Master Plan, The Tomorrow Plan, Capital Crossroads, Clive Master Plan, etc.)
- Review existing data to identify opportunities for water quality improvement, habitat creation, land use synergies, and stream assessments
- Review existing agency plans to identify targeted greenway linkages

Output: The community already has demonstrated its support for a number of plans, including *The Tomorrow Plan*, *Capital Crossroads,* the new Clive Master Plan, etc. Building on these plans will enable the Walnut Creek WMA to garner quick buy-in from residents, and looking at existing data will allow the WMA to expeditiously complete a baseline state of the watershed assessment. This evaluation will provide an invaluable understanding of the watershed as the WMA moves onto the next tasks.

Deliverable: *Baseline State of the Watershed Assessment*

TMDL

Raccoon River TMDL

- Impaired by Nitrate and E.coli
  - Includes Walnut Creek from I-80/35 to Raccoon River
- Nitrate
  - Highest concentrations in APR-MAY-JUN / NOV-DEC
  - Soil Mineralization & Fertilizer: 48-60% of non-point sources
  - Non-point sources are 89% of loading when values are higher than allowed
  - Septic, wildlife make up 0.1% or less
  - Trend is increasing concentrations over time
- E. coli
  - Highest concentrations in MAY-JUN-JULY
  - Highest during higher flows
  - Non-point sources 92% of total loading
  - Values in excess of 10,000 CFU/100mL every month except FEB and DEC
  - Urban areas implement BMPs in lieu of numeric standards

Raccoon River TMDL

(from Raccoon River TMDL)

Table 6-4. List of conservation practices available to reduce nonpoint source loads of nitrate and *E.coli* bacteria and their potential effectiveness.

		Nitrate Load Reduction Effectiveness[1]		*E.coli* Load Reduction Effectiveness[1]	
Conservation Practice	**Description**	**Surface runoff**	**Baseflow or Tile drainage**	**Surface runoff**	**Baseflow or Tile drainage**
Improve Nutrient Use					
Spring application of fertilizers	Change fertilizer application from the fall to spring to reduce N loss and increase fertilizer use efficiency. The closer the application is timed to crop needs, the less N is lost to streams.	+	++	±	±
Reduce fertilizer application rate	Reduce the rate of fertilizer applications below currently applied rate. A variable rate or site-specific fertilizer program could reduce applications on individual fields. Improved methodologies are needed to reliably assess site-specific N recommendations.	+	++	±	±
Change fertilizer application method	Change from conventional anhydrous NH3 application to innovative subsurface injection methods to minimize volatilization and reduce leaching.	++	- to +	±	±
Use nitrification inhibitors	Use of controlled or slow-release N fertilizers to slow conversion of fall-applied fertilizer to nitrate.	+	+	±	±
Manure management	Manage the application of manure to cropped fields according to the nutrient application rates of nitrogen or phosphorus. Manure should not be applied at rates that exceed the soil infiltration rate or during wet periods of runoff.	+	+	++	+
Adopt comprehensive farm nutrient management plan	Follow the guidance of NRCS Conservation Practice Standard 590 to manage the amount, source, placement, form and timing of the application of plant nutrients and soil amendments.	+	+	+	+
In-field Management					
Adopt conservation tillage	Utilize no-till or mulch-till practices on crop ground.	+	-	+	±
Contour planting and terracing	Plant crops in rows parallel to land surface topographic contours or install terraces to shorten the slope lengths of hillsides in order to reduce overland runoff.	+	-	+	±
Use cover crops	Plant cover crops of legumes, cereals, or grasses in fields during non-crop periods to reduce nitrate leaching during vulnerable fall and spring periods.	+	++	±	±

Raccoon River TMDL

(from Raccoon River TMDL)

Table 6-4. ...continued

Diversification of cropping systems and rotations	Include perennial legume or nonlegume crops in rotation with corn and soybeans to decrease water yield due to longer growing season. Perennial crops receive less fertilizer and tillage than annual cropping systems.	+	++	±	±
Retire lands through CRP	Convert vulnerable crop lands to perennial grass through Conservation Reserve Program.	++	++	±	±
Exclude livestock from streams	Manage pastures to exclude livestock access to streams. Install alternative watering systems if needed.	+	±	++	±
Establish rotational grazing systems	Establish fenced paddock system and rotate livestock grazing around pasture to reduce pasture degradation and manure buildup.	+	±	++	±
Incorporate manure into subsoil	Use techniques to incorporate manure into subsoil rather than spreading or applying manure to land surface.	+	± or -	++	± or -
Control feedlot runoff	Utilize run-on control (divert clean water away) and install berms, detention basins or other control structures to capture runoff and settle solids from feedlot runoff events.	+	± or -	++	± or -
Manage manure storage	Manage manure storage or modify manure storage structures to safely contain the manure until conditions are appropriate for field applications.	+	±	++	±
Use alternative tile drainage system design and management	Decrease drainage intensity using shallower tile depth or wider spacing to reduce subsurface flow and nitrate loss. Use controlled drainage when site conditions permit.	±	++	±	±
Install denitrification bioreactors	Use organic materials (corn stalks, wood chips, sawdust, etc.) as organic amendments to encourage denitrification during treatment of tile drain effluent or interception of subsurface drainage through a wall or trench.	±	++	±	±
Utilize in-field conservation buffers	Install conservation buffers, including field borders, filter strips, contour buffer strips, grass waterways, windbreaks hedgerows and other practices, to reduce surface water runoff and sediment erosion.	+	±	+	±
Off-site Management					
Plant riparian buffers	Riparian buffers of forest and herbaceous cover planted along stream corridors reduce pollutant transport to streams with surface runoff through combined processes of deposition, infiltration and dilution. Stream buffers may reduce groundwater nitrate concentrations but flows from tile drainage may bypass the buffer.	++	+ or ±	+	±
Install wetlands	Strategically site wetlands in the landscape to capture and remove nitrate from surface and subsurface water sources. For greatest reductions, wetlands should be placed in locations with highest nitrate concentrations. Utilize USDA programs (CREP) to install wetlands that intercept flows from large tile drainage systems.	+	++	±	±

[1]Ranking criteria: ++ = very effective, + = effective, ± = no effect, - = negative effect

TMDL - Implementation Strategies

- Reduce ammonia fertilizer application rate
- Remove cattle from streams
- Remove human waste from the watershed
- Convert row crop on C slopes (>5%) or greater to CRP grassland
- Convert row crop on floodplain alluvial soils to CRP grassland
- Strategically locate wetlands near tile outlets for nitrate removal
- Implement Urban stormwater BMPs
- Manure management

TMDL - Monitoring Thoughts

- Need data for model calibration and to compare before/after improvements
- Data limited within Walnut Creek watershed subareas
- Nitrate may be fixed interval of sampling
- E. coli may be fixed interval, but also needs event based sampling
- The smaller the watershed, the greater probability of monitoring success
- Divide into target, smaller watershed areas where changes can be measured (2 – 10,000 Ac)

Water Balance Components	Depth (in)
Precipitation	32.74
Surface Runoff	3.49
Baseflow	4.82
Tile Flow	2.13
Evapotranspiration	24.26
Total Streamflow	8.31

Raccoon River Water Balance (from TMDL)

Monitoring Thoughts

- Do not duplicate but add too the following:
  - DMWW
  - ISA
  - USGS
- Monitoring to begin sooner than later.

Existing Studies

Existing Studies - Reviewed

- ***Polk County, Iowa – Multi-jurisdictional Hazard Mitigation Plan, July 2014***
  - This report was developed in response to the Disaster Mitigation Act of 2000, to achieve FEMA eligibility for HazMat Assistance Grant Programs. This document includes initiatives relevant to Walnut Creek Watershed including relevant stormwater management practices and acquisition recommendations to reduce repetitive losses.

Existing Studies - Reviewed

- ***City of Clive - Walnut Creek Watershed Stream Assessment Report, October 2009; Updated July 2014***
  - This report includes the assessment of a 12 mile segment of Walnut Creek with a focus on stream bank stability. The report includes recommendations addressing O&M, site specific projects, and the value of partnerships with neighboring communities and/or the Watershed Management Authority. Goals address upper reaches of the watershed where agriculture dominates and lower reaches that are more urbanized in nature. Ag sector goals relate to debris, tree wash-outs, water quality, seasonal and flash flooding. Urban sector goals call for reductions in negative property and infrastructure impacts, specifics to improve stormwater management, tactics to improve habitat/vegetative health, and increase stream access.

Existing Studies - Reviewed

- ***City of Grimes – Comprehensive Plan, September 2010***
  - This document calls for the City to "protect identified wetlands and address stormwater management issues that can be incorporated into the city's green network." A recommendation to establish a stormwater management utility has since been implemented.

Existing Studies - Reviewed

- ***City of Johnston – Comprehensive Plan Book, December 2010***
  - This document encourages Johnston to consider the findings in its Watershed and Stormwater Management Action Plan. Goals of the comp plan speak to promoting conservation, finding the balance between natural resources protection and future urban development, encouraging sustainable practices in areas with environmental resources, preservation of environmentally sensitive areas, and pollution prevention.

Existing Studies - Reviewed

- ***City of Johnston - Watershed Assessment ; Stormwater Management and Action Plan, December 2009***
  - The upper Northeast reaches of the North Walnut Creek watershed are in the extreme Southwest portions of the City of Johnston. This study notes stream paths in this area have been straightened for agriculture and urban development. The report goals include preventing any increase in pollutants and the stormwater runoff volume due to future development.

Existing Studies - Reviewed

- ***City of Urbandale – Stormwater Report July 2014***
  - This report reflects the City's increasing commitment to stormwater management initiatives and identifies recently completed, new and ongoing projects including channel armoring of North Walnut and Walnut Creeks.

Existing Studies - Reviewed

- ***City of Urbandale – Comprehensive Plan 2003***
  - This document references projected growth West of the interstate (within the Walnut Creek Watershed) and refers often to the City's parks and open space plan but does not directly address watershed issues; however, the City has a series of stormwater management documents relevant to this effort. (See below).
- ***City of Urbandale – Stormwater Report July 2014***
  - This is the most recently available of several Urbandale stormwater reports published since 1999. This report reflects the City's increasing commitment to stormwater management initiatives and identifies recently completed, new and ongoing projects including channel armoring of North Walnut and Walnut Creeks.
- ***Urbandale City Council Lunch & Learn. October 2006***
  - This power point presentation speaks to a goal of detaining the 100 year storm to achieve a five-year storm release rate and demonstrates concerns over streambank erosion reaching private properties.

Existing Studies

- ***Des Moines Water Works – Water Works Park Master Plan, 2014***
  - The Des Moines Water Works Park Foundation has recently been established to assist with funding and implementation of this plan that focuses on overall water quality within Central Iowa through education, recreation and restoration. Projects identified in the plan include enhancement of the source water Gallery (horizontal well) through a series of canals (dubbed "The Circuit") for paddleboarding and education programming; river bank and woodland restoration; improved river access/water trail; paved trail connections and enhancements; and links to Gray's Lake – creating potentially a significant greenway opportunity for Greater Des Moines with potential for expansion.

Existing Studies

- ***City of West Des Moines – 2010 Watershed Assessment***
  - West Des Moines Public Works Department conducted a desktop and field analysis to assist in management of watersheds city-wide to comply with state and federal regulations. Goals include reducing flood, erosion and habitat degradation while increasing water quality.

Existing Studies

- ***City of West Des Moines – Comprehensive Plan 2010***
  - Under an over-arching goal to "maintain and protect the physical and environmental aspects of West Des Moines," this document outlines ten policy-related elements. These include: maintaining pre-development characteristics of water courses in undeveloped areas, improved infiltration and aquifer protection, reducing development impacts in flood prone areas and reclamation planning for extraction industries and landfills.

Existing Studies

- ***Greater Des Moines Partnership, Community Foundation of Greater Des Moines, United Way and Metropolitan Planning Organization – Capital Crossroads [2011] and Continuously Updated***
  - This plan's vision involves ten Capitals, or focus areas, related to quality of life in Central Iowa. It encompasses a fifty mile radius of the State Capitol, which includes the Walnut Creek Watershed. While Capital Crossroads is a wide-ranging vision, its Natural and Physical Capital teams and the associated subcommittees directly address watershed initiatives. Perhaps among the most relevant and current work is the development of a greenways network throughout Central Iowa for the purposes of water quality protection, habitat improvements, flood mitigation, recreation, and overall resident awareness of cultural and natural heritage and outdoor opportunities.

Existing Studies

- ***Metropolitan Planning Organization and Partners - The Tomorrow Plan, November 2013***
  - This Greater Des Moines area plan identifies four key goals and five significant initiatives to help the metro region maintain its status as a "collaborative, vibrant, and dynamic region of lasting value, equity, and diversity." Particularly relevant here is Goal 2 (Improve the region's environmental health and access to the outdoors), its associated strategies (that include the call for the formation of Watershed Management Authorities and regional stormwater efforts) and Initiative 2 – Greenways. TTP calls for building a fully-connected system of natural resource areas by selectively expanding the existing network of parks, conservation areas, open space and trails.

Existing Studies

- ***Nutrient Reduction Strategy***
  - Targeted load reduction for non point sources is 41% of statewide nitrogen and 29% total phosphorus
  - Identified a series of BMPS and their capacity to reduce loads.

	Practice	Comments	% Nitrate-N Reduction*	% Corn Yield Change**
			Average (SD*)	Average (SD*)
Nitrogen Management	Timing	Moving from fall to spring pre-plant application	6 (25)	4 (16)
		Spring pre-plant/sidedress 40-60 split Compared to fall-applied	5 (28)	10 (7)
		Sidedress – Compared to pre-plant application	7 (37)	0 (3)
		Sidedress – Soil test based compared to pre-plant	4 (20)	13 (22)**
	Source	Liquid swine manure compared to spring-applied fertilizer	4 (11)	0 (13)
		Poultry manure compared to spring-applied fertilizer	-3 (20)	-2 (14)
	Nitrogen Application Rate	Nitrogen rate at the MRTN (0.10 N:corn price ratio) compared to current estimated application rate. (ISU Corn Nitrogen Rate Calculator – http://extension.agron.iastate.edu/soilfertility/nrate.aspx can be used to estimate MRTN but this would change Nitrate-N concentration reduction)	10	-1
	Nitrification Inhibitor	Nitrapyrin in fall – Compared to fall-applied without Nitrapyrin	9 (19)	6 (22)
	Cover Crops	Rye	31 (29)	-6 (7)
		Oat	28 (2)	-5 (1)
	Living Mulches	e.g. Kura clover – Nitrate-N reduction from one site	41 (16)	-9 (32)
Land Use	Perennial	Energy Crops – Compared to spring-applied fertilizer	72 (23)	
		Land Retirement (CRP) – Compared to spring-applied fertilizer	85 (9)	
	Extended Rotations	At least 2 years of alfalfa in a 4 or 5 year rotation	42 (12)	7 (7)
	Grazed Pastures	No pertinent information from Iowa – assume similar to CRP	85	
Edge-of-Field	Drainage Water Mgmt.	No impact on concentration	33 (32)	
	Shallow Drainage	No impact on concentration	32 (15)	
	Wetlands	Targeted water quality	52	
	Bioreactors		43 (21)	
	Buffers	Only for water that interacts with the active zone below the buffer. This would only be a fraction of all water that makes it to a stream.	91 (20)	

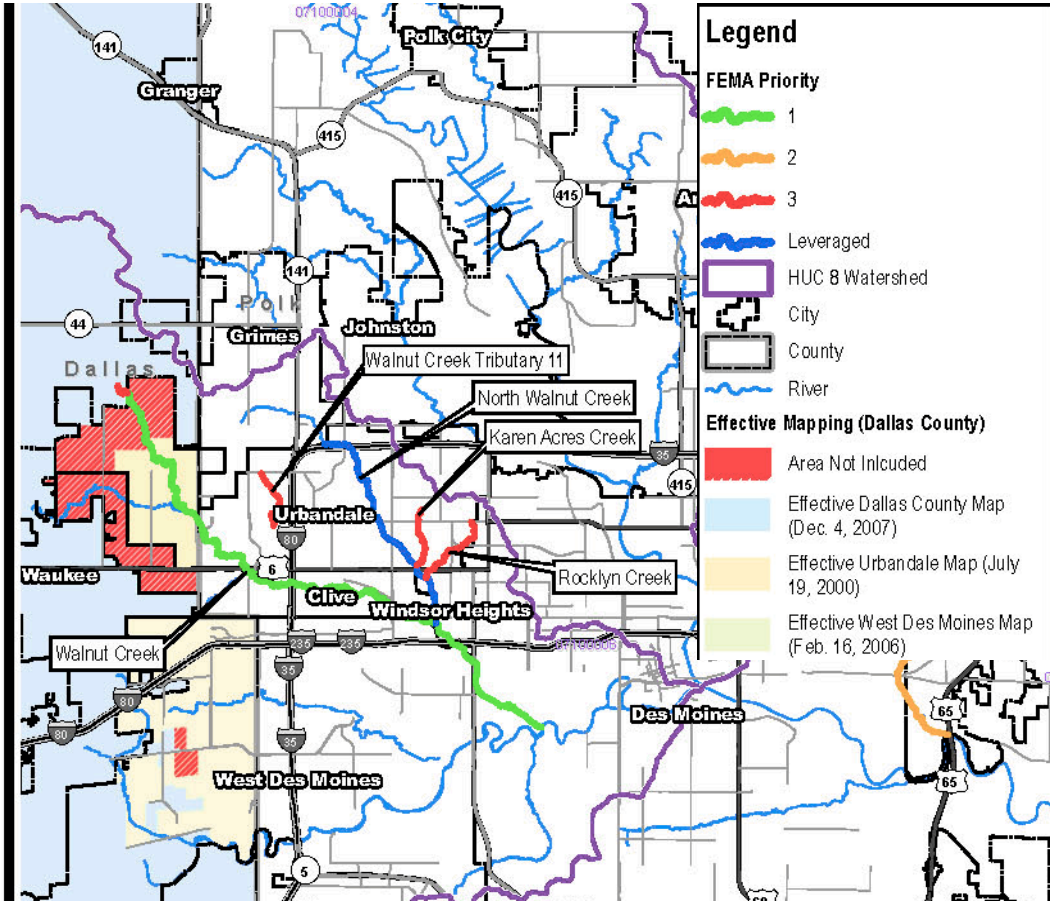
* A positive number is nitrate concentration reload reduction and a negative number is an increase.

	Practice	Comments	% P Load Reduction[a]	% Corn Yield Change[b]
			Average (SD[c])	Average (SD[c])
Phosphorus Management Practices	Phosphorus Application	Applying P based on crop removal – Assuming optimal STP level and P incorporation	0.6[d]	0
		Soil-Test P – No P applied until STP drops to optimum	17[e]	0
	Source of Phosphorus	Liquid swine, dairy, and poultry manure compared to commercial fertilizer – Runoff shortly after application	46 (45)	-1 (13)
		Beef manure compared to commercial fertilizer – Runoff shortly after application	46 (96)	
	Placement of Phosphorus	Broadcast incorporated within 1 week compared to no incorporation, same tillage	36 (27)	0
		With seed or knifed bands compared to surface application, no incorporation	24 (46)	0
	Cover Crops	Winter rye	29 (37	-6 (7)
	Tillage	Conservation till – chisel plowing compared to moldboard plowing	33 (49)	0 (6)
		No till compared to chisel plowing	90 (17)	-6 (8)
Land Use Change	Perennial Vegetation	Energy Crops	34 (34)	
		Land Retirement (CRP)	75	
		Grazed pastures	59 (42)	
Erosion Control and Edge-of-Field Practices	Terraces		77 (19)	
	Buffers		58 (32)	
	Control	Sedimentation basins or ponds	85	

[a] - A positive number is P load reduction and a negative number is increased P load.
[b] - A positive corn yield change is increased yield and a negative number is decreased yield. Practices are not expected to affect soybean yield.
[c] - SD = standard deviation. Large SD relative to the average indicates highly variable results.
[d] - Maximum and average estimated by comparing application of 200 and 125 kg P_2O_5/ha, respectively, to 58 kg P_2O_5/ha (corn-soybean rotation requirements) (Mallarino et al., 2002).
[e] - Maximum and average estimates based on reducing the average STP (Bray-1) of the two highest counties in Iowa and the statewide average STP (Mallarino et al., 2011a), respectively, to an optimum level of 20 ppm (Mallarino et al., 2002). Minimum value assumes soil is at the optimum level.
[f] - P retention in wetlands is highly variable and dependent upon such factors as hydrologic loading and P mass input.

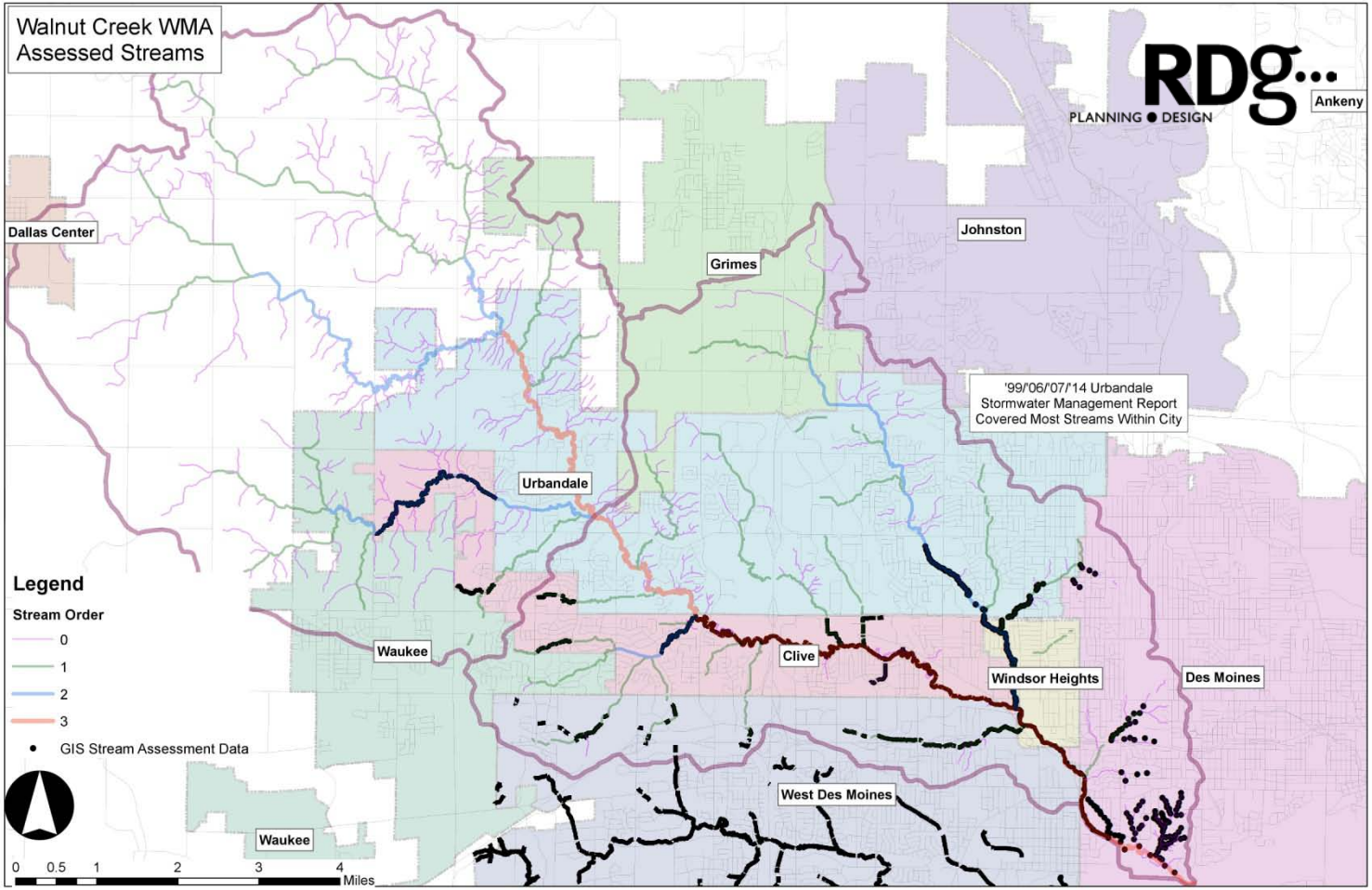
Existing Studies

- ***Polk County Flood Mapping***



Existing Mapping

Existing Mapping



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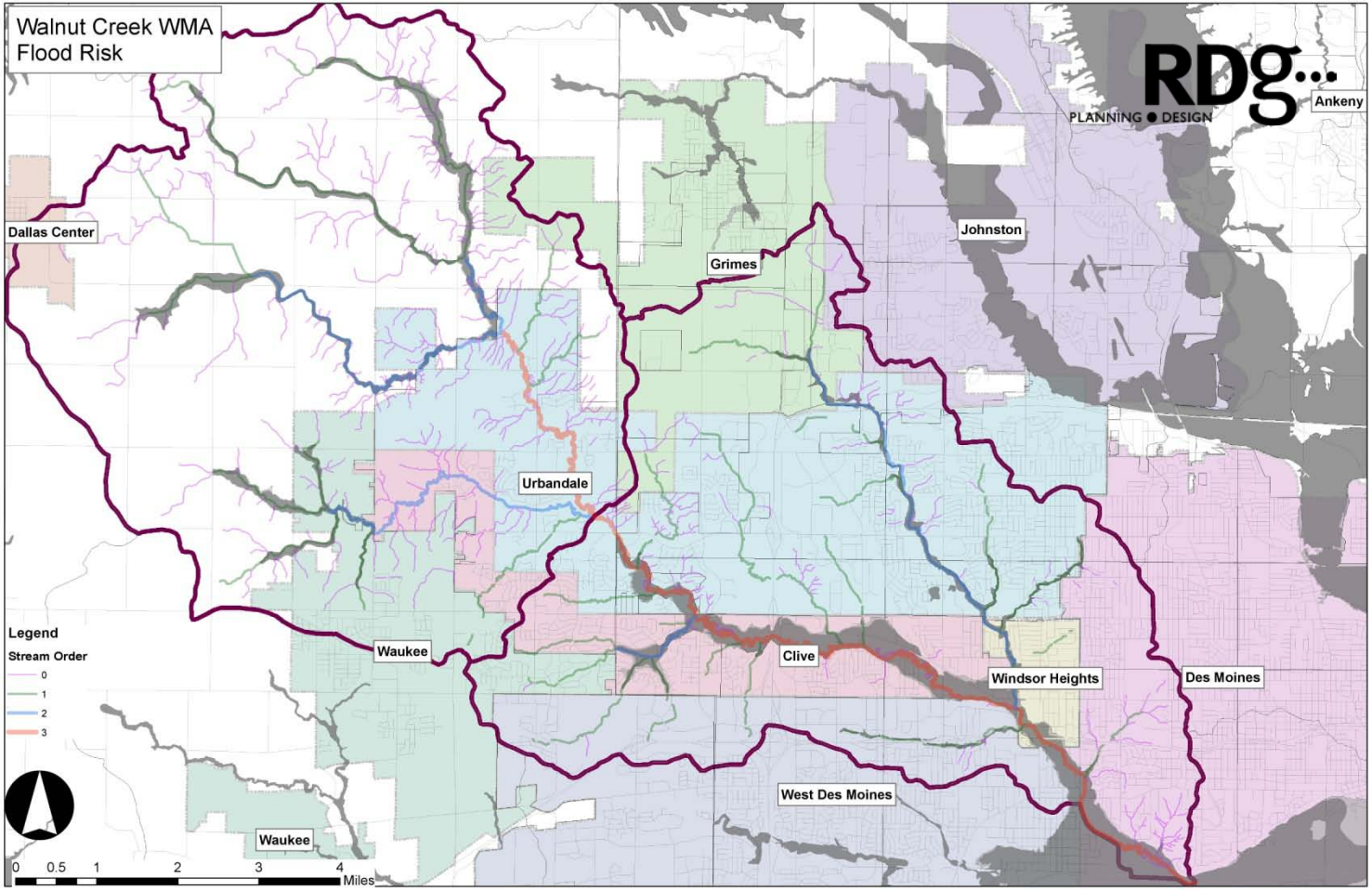

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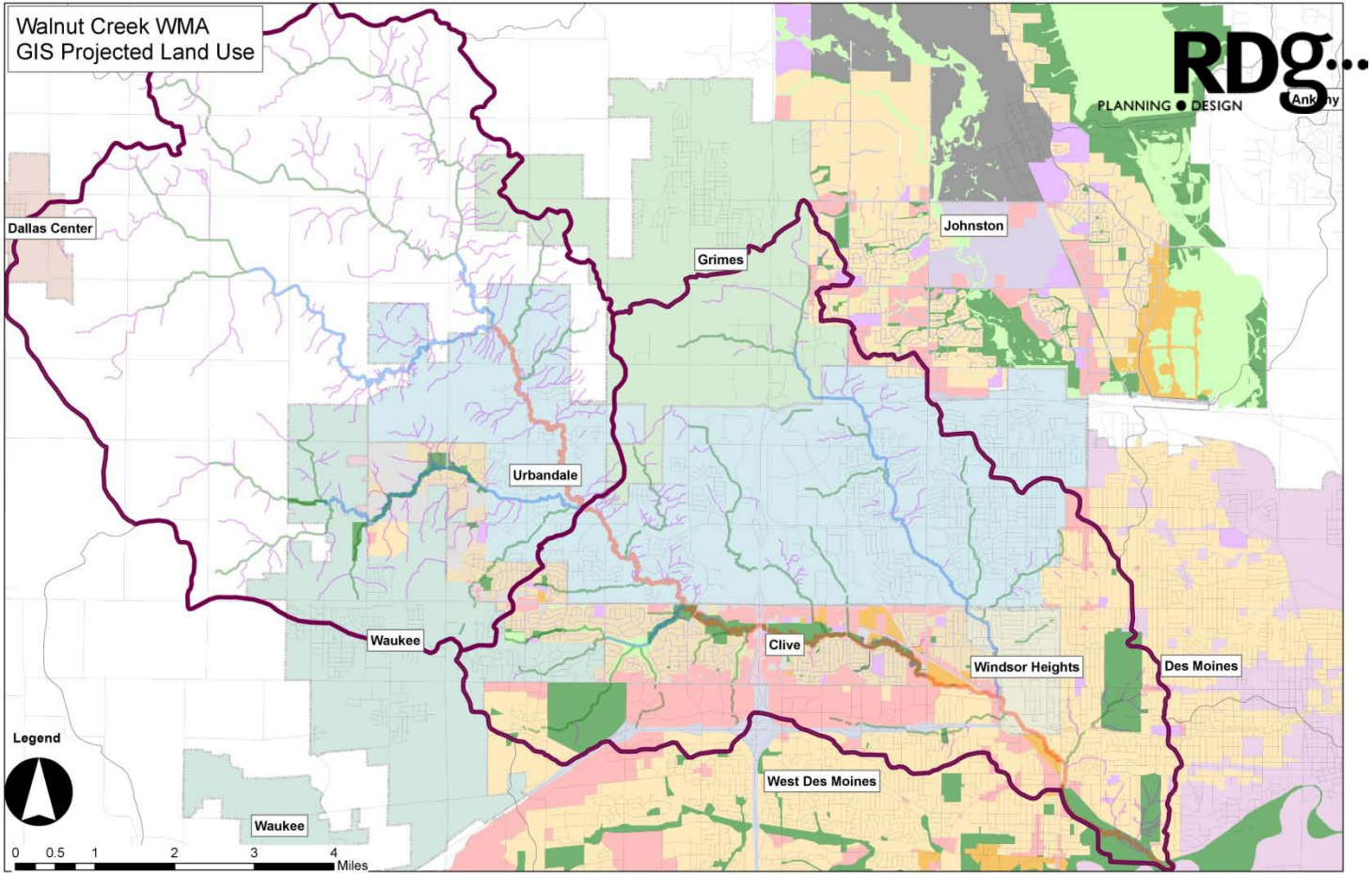

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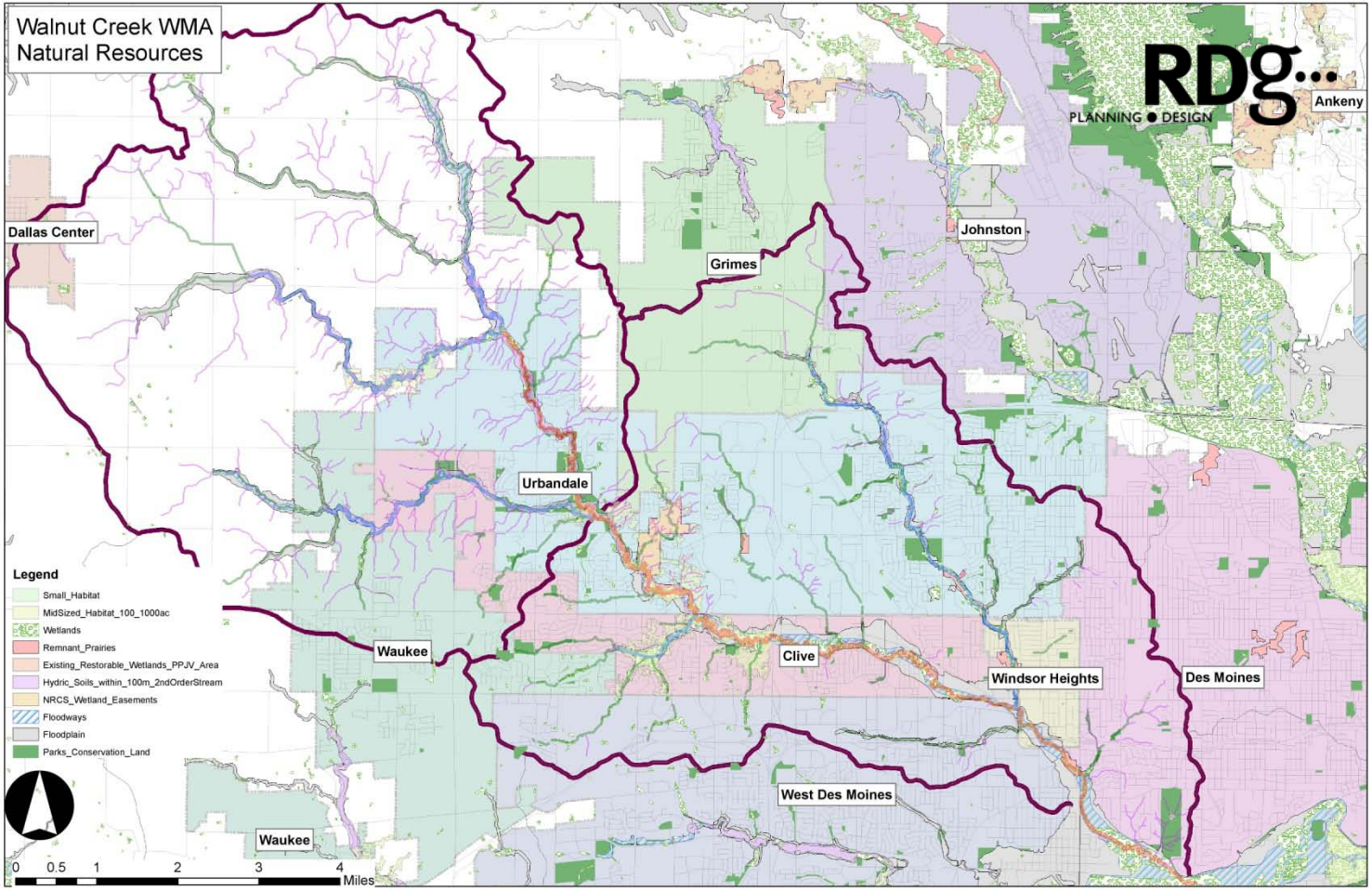

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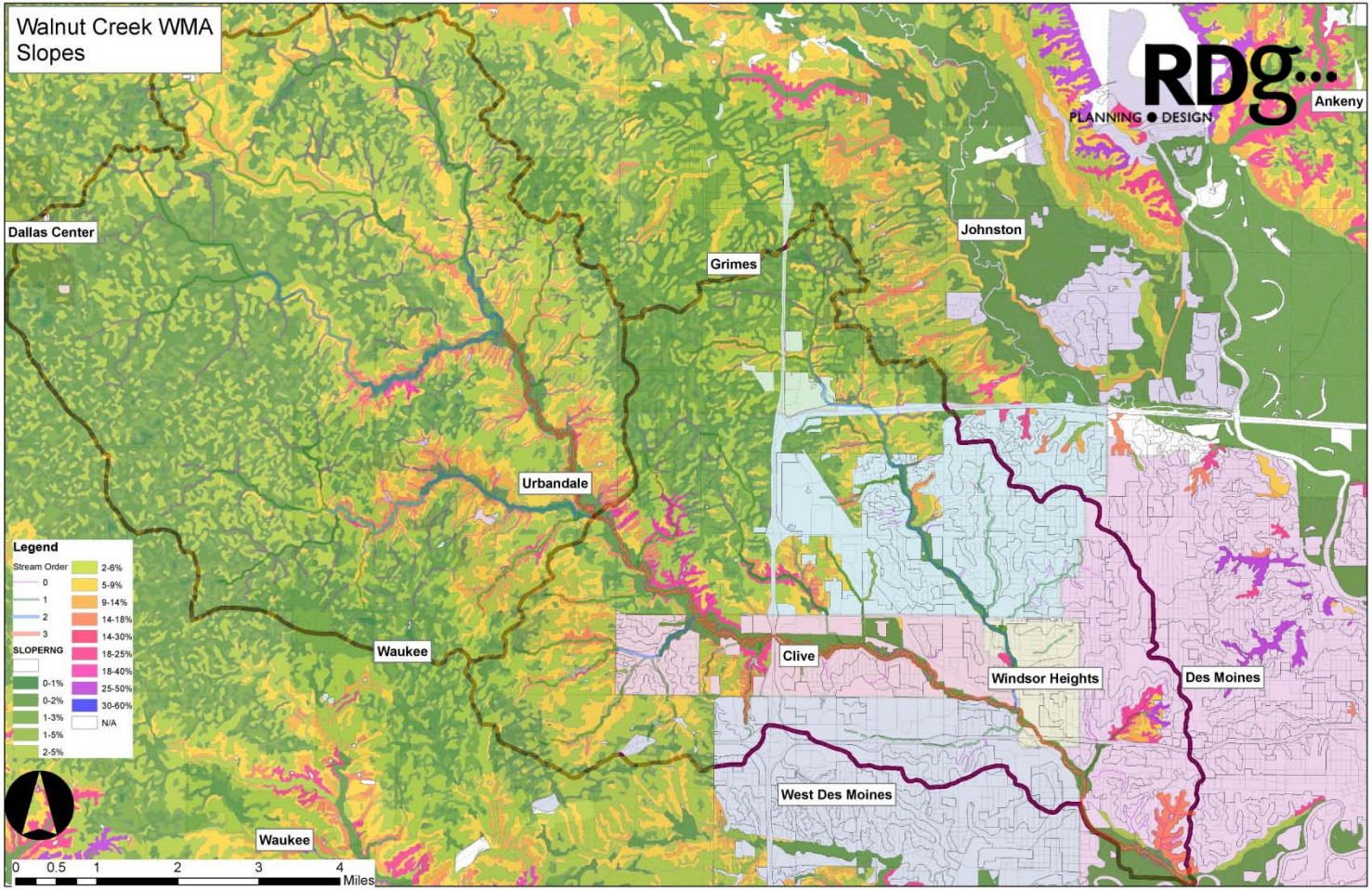

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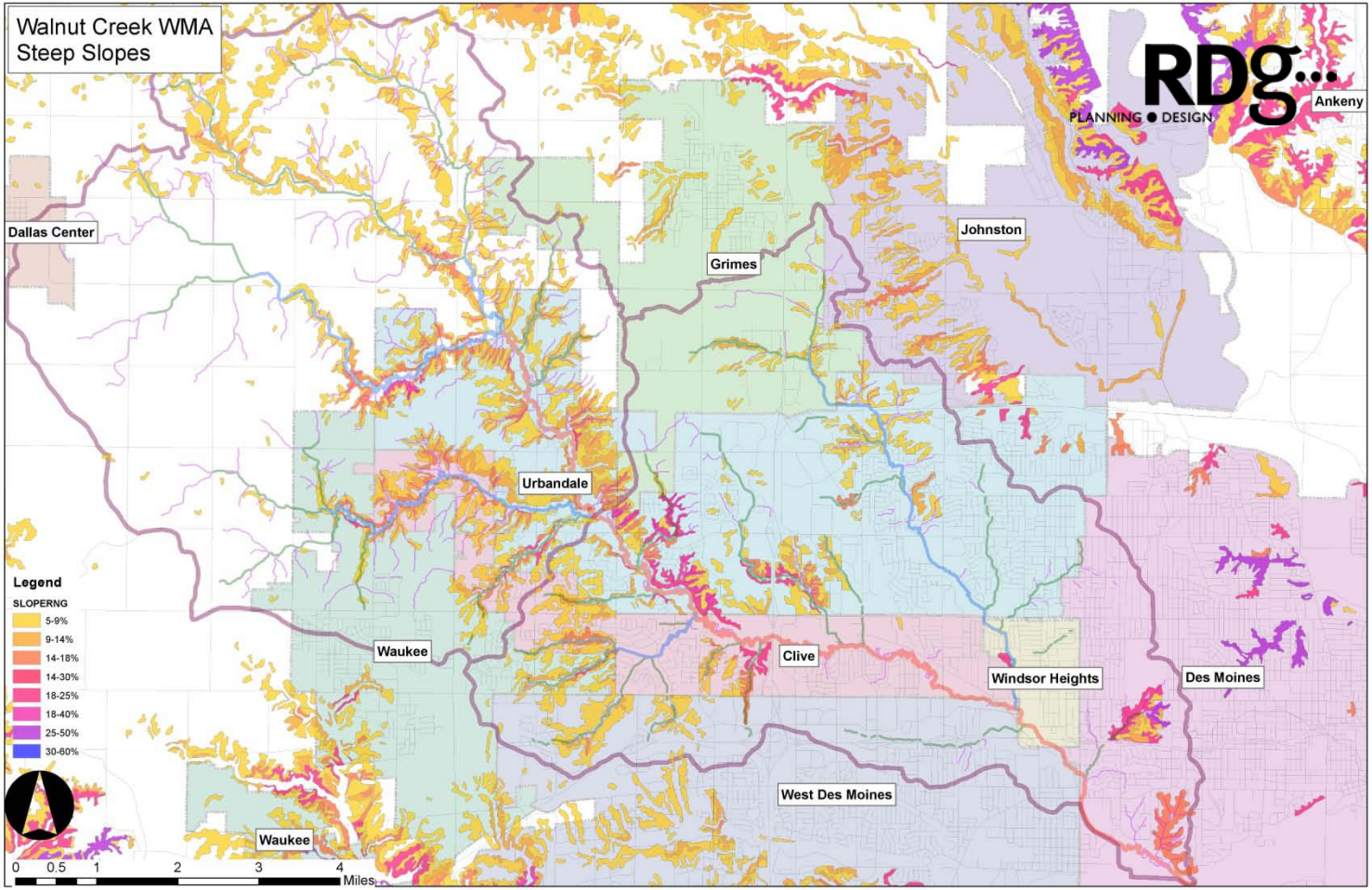

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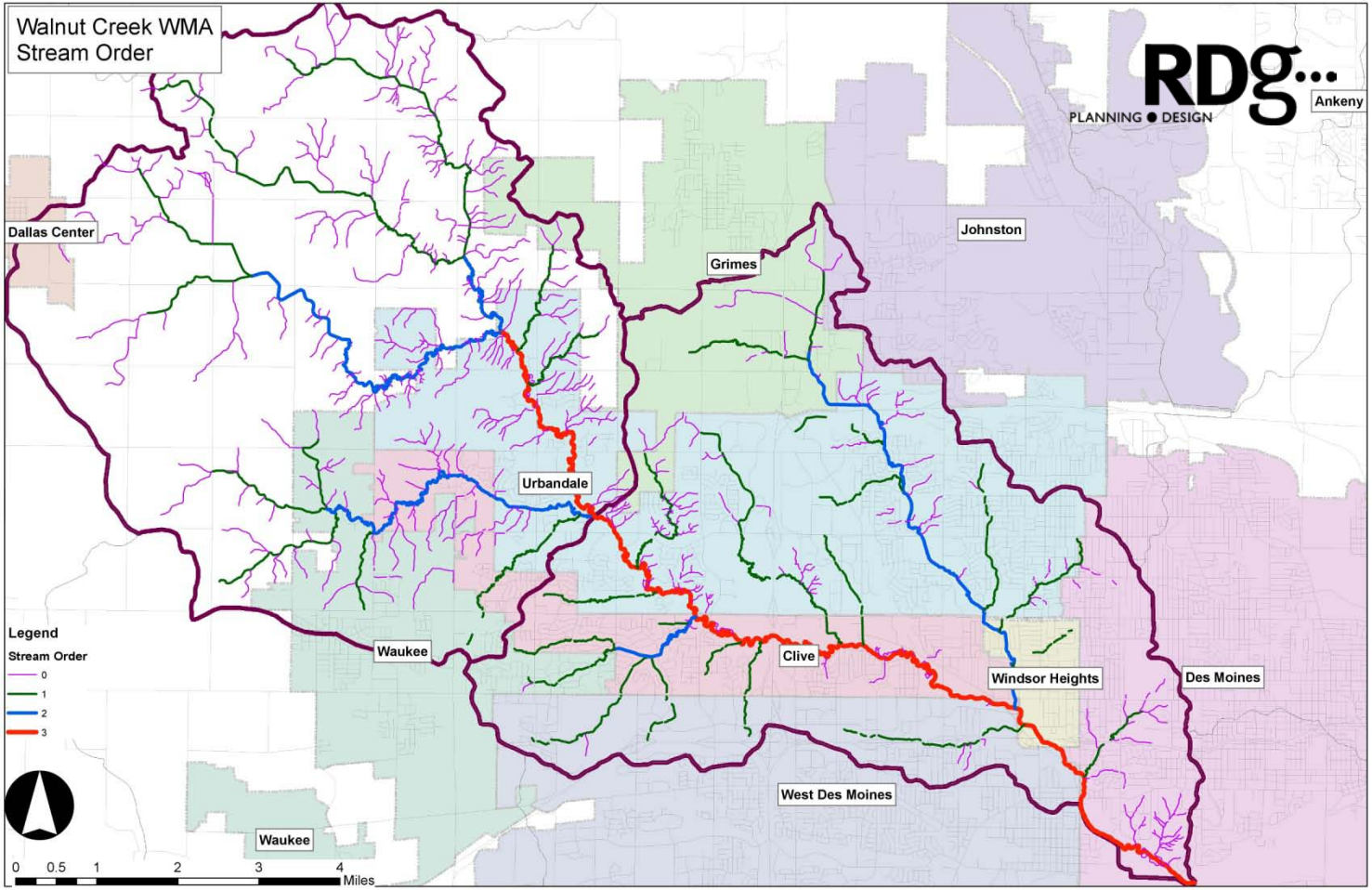

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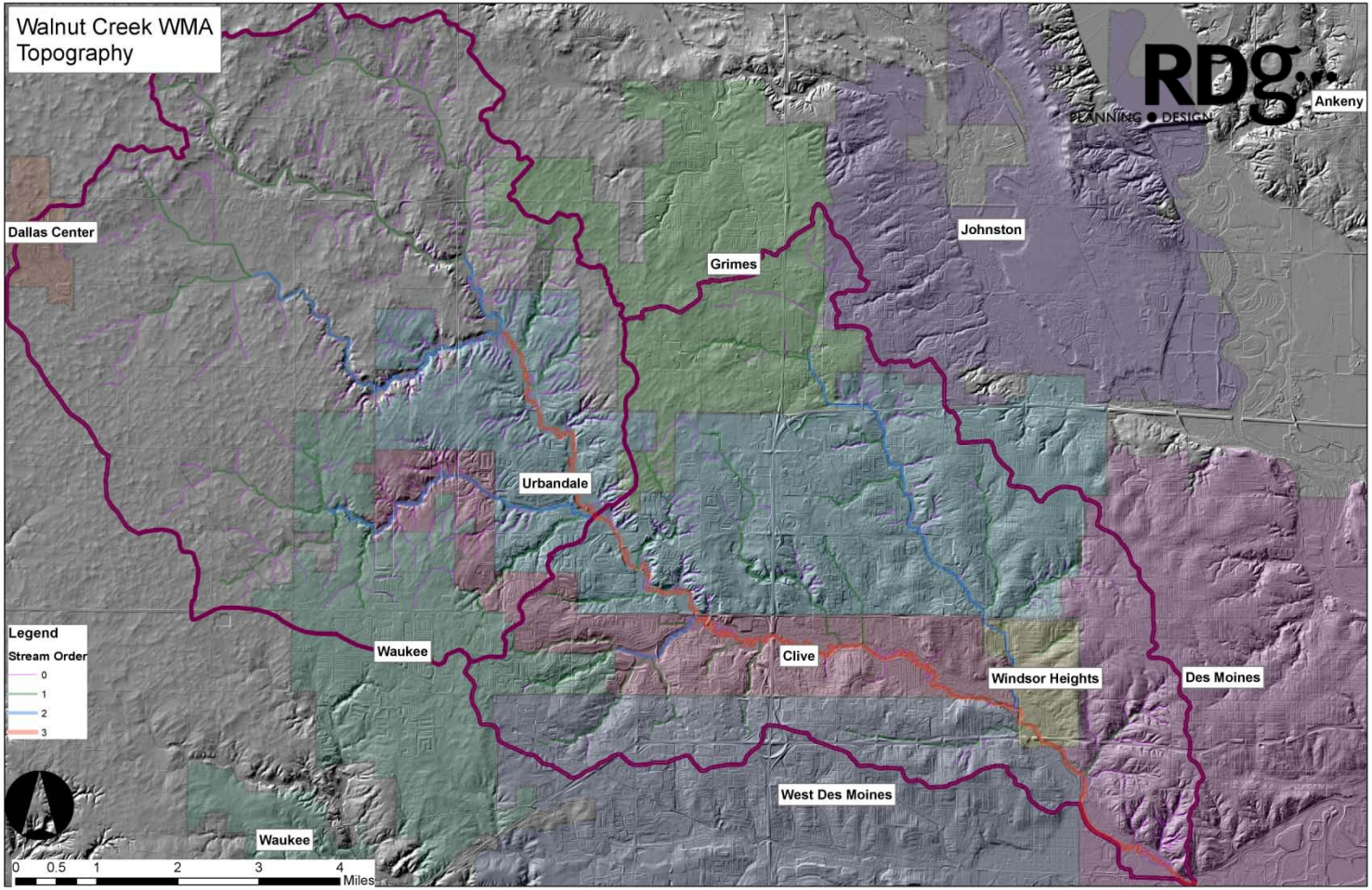

Discussion

Discussion

1. What other documents / studies remain that could have a significant impact?
2. Missing GIS Data that would be helpful – we'll follow up.
3. Discussion
    1. Challenges & opportunities within the communities, counties or districts that should be considered as a part of this plan.
        1. Send to RDG by 4/16

Next Steps

Next Steps

- April 7 - 8, 2015 Field Work / Drone Flights
- April 9, 2015 Iowa Soybean / Agricultural Focus Group (April 9 8:00 – 9:30)
- April 16, 2015 WMA Executive Committee Meeting #1
- April TBD MPO / RDG / WMA presents to councils and boards – process overview.
- April 29, 2015 WMA Authority Member Meeting #2 - 8 am – 12pm
    - Goal Setting & Strategy Meeting
    - ½ Day Facilitated Discussion Meeting
    - Review inventory and preliminary assessment recommendations
- May TBD, 2015 Public Meeting #1

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PLANNING ● DESIGN

Create. Meaning. Together.

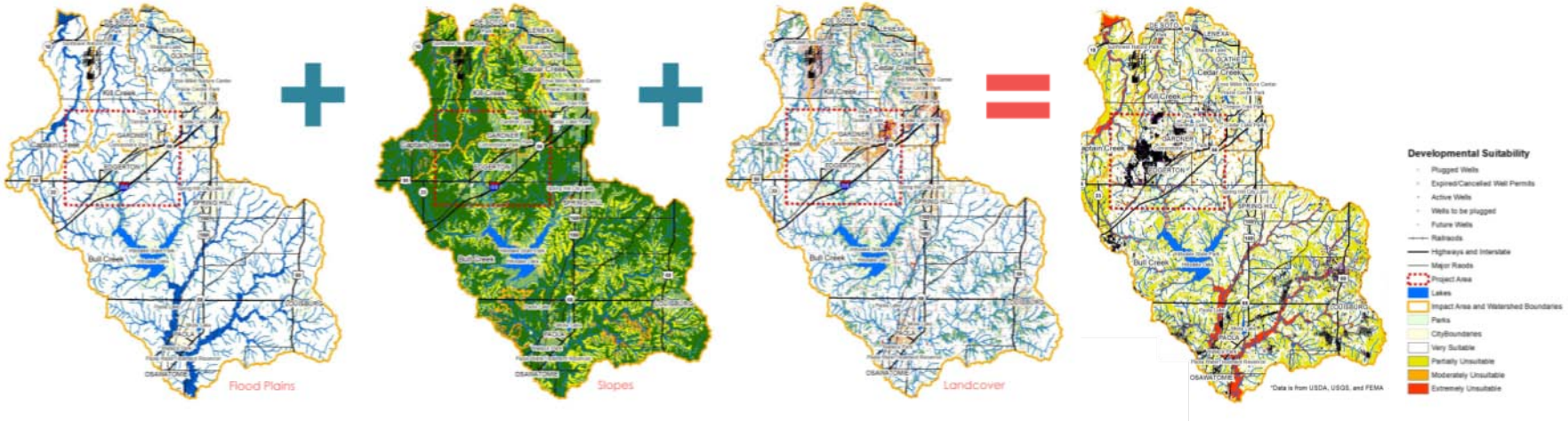
Walnut Creek WMA> Overview

- Timeline – we hope not to just meet the timeline, but we want to get far enough along that this WMA would potentially be able to apply for grants in the Fall of 2015 that we anticipate may again be available.
  - WIRB
  - SRF Forgivable Loans
  - IDALS Grants
  - 319 Funding

	2015												2016					
Obligation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Contract signed with Consultant																		
Task 1: Public Outreach + Input Sessions																		
Task 2: Review Existing Studies + Collect Data																		
Task 3: Watershed Resource Inventory																		
Task 4: Pollutant Loading																		
Task 5: Watershed Action Plan																		
Task 6: Plan Implementation + Monitoring Success																		
Task 7: Education Plan																		
Task 8: Final Watershed Plan																		
Updates to DNR																		

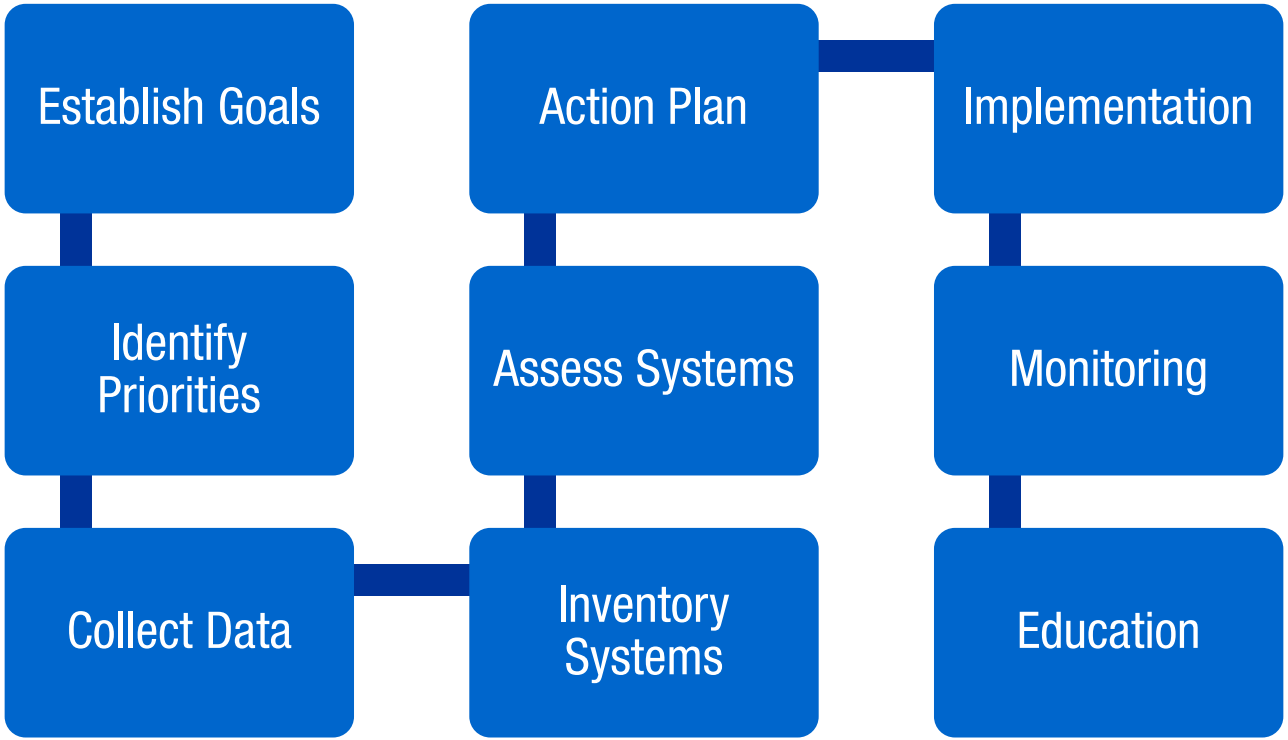
Walnut Creek WMA> Overview

- Systems Approach –scientifically-informed decision-making and strategy development, employing the use of modeling results as well as past monitoring data to make initial recommendations for feedback and refinement.



Walnut Creek WMA> Overview

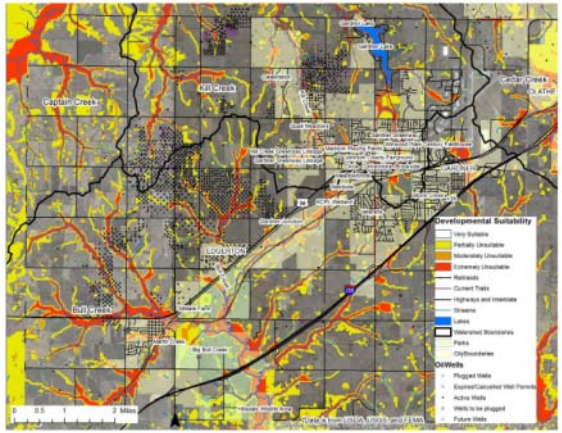
- Systems Approach – Process



Walnut Creek WMA> Overview

- Systems Approach – Process

Developmental Suitability



Flood Plains
25%

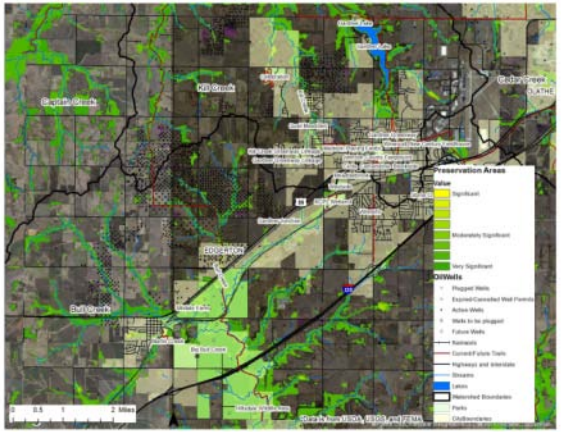
Hyrdrological Soils Group
15%

Wetlands and Streams
25%

Slope
15%

Existing Landcover
20%

Preservation Areas



Flood Plains
20%

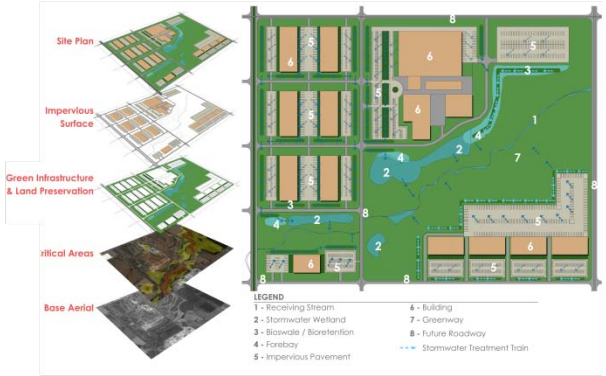
Landcover
16%

Parks and Trails
20%

Hydrological Soils Group (C & D)
12%

Wetlands and Streams
20%

Slopes
12%



Walnut Creek WMA> Overview

- Public Outreach
  - Three tiers of public feedback
  - support from the WMA representatives,
  - their communities,
- Education / Story

Walnut Creek WMA> Overview

- Provided by the WMA
  - Initial Decision Maker / Primary Point Person
  - Public outreach assistance / Face of the project for the WMA
  - Existing Hydrological and Stream Assessment Studies and
  - Municipal Utility Data