U.S. Department of Energy

Portsmouth/Paducah Project Office

PGDP Property Acquisition Study

CAB Presentation

September 21, 2006

Presented by Lindell Ormsbee,

Director; Kentucky Research Consortium for Energy and Environment (KRCEE)

Agenda

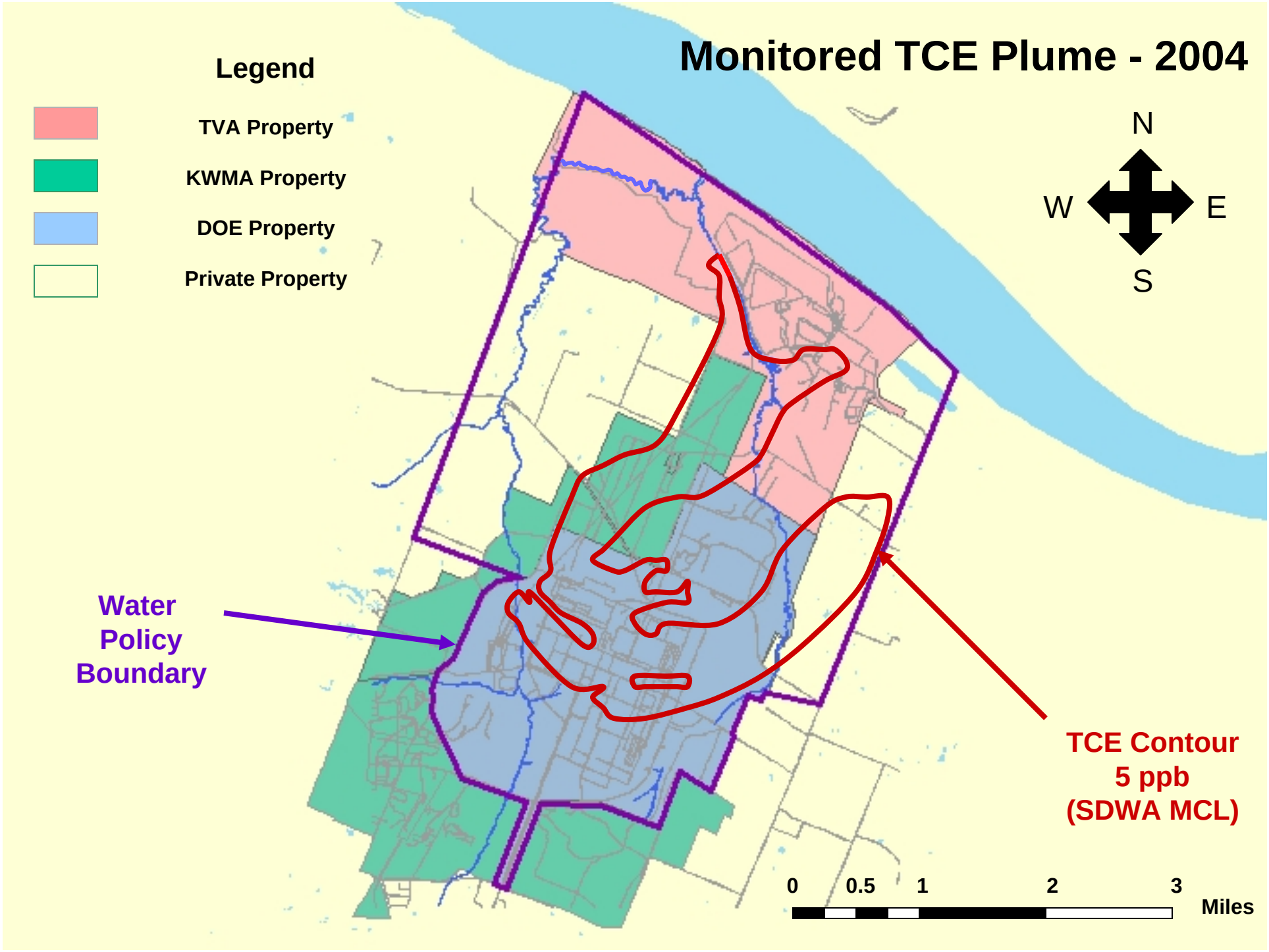
- Project Goals
- Project Task Status
  - Potential Remedial Action Alternative Analysis
  - Fate and Transport Modeling
  - Property Acquisition Potential Options
  - Property Acquisition Potential Costs
  - Economic Analysis
- Project Schedule
  - Public Interaction Support

Project Goals

- **The study is being conducted in accordance with a Congressional Directive to DOE in the 2006 Energy and Water Development Appropriations Act.**

  "Within the funds provided the Department shall undertake a study of the potential purchase of property or options to purchase property that is located above the plume of contaminated groundwater near the facility site. The study shall evaluate the adequate protection of human health and environment from exposure to contaminated groundwater and consider whether such purchase, when taking into account the cost of remediation, long-term surveillance, and maintenance, is in the best interest of taxpayers."

Energy and Water Development Appropriation Bill, 2006 (Senate Report 109-084)


Monitored TCE Plume - 2004
Legend
TVA Property
KWMA Property
DOE Property
Private Property
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Water Policy Boundary
TCE Contour 5 ppb (SDWA MCL)
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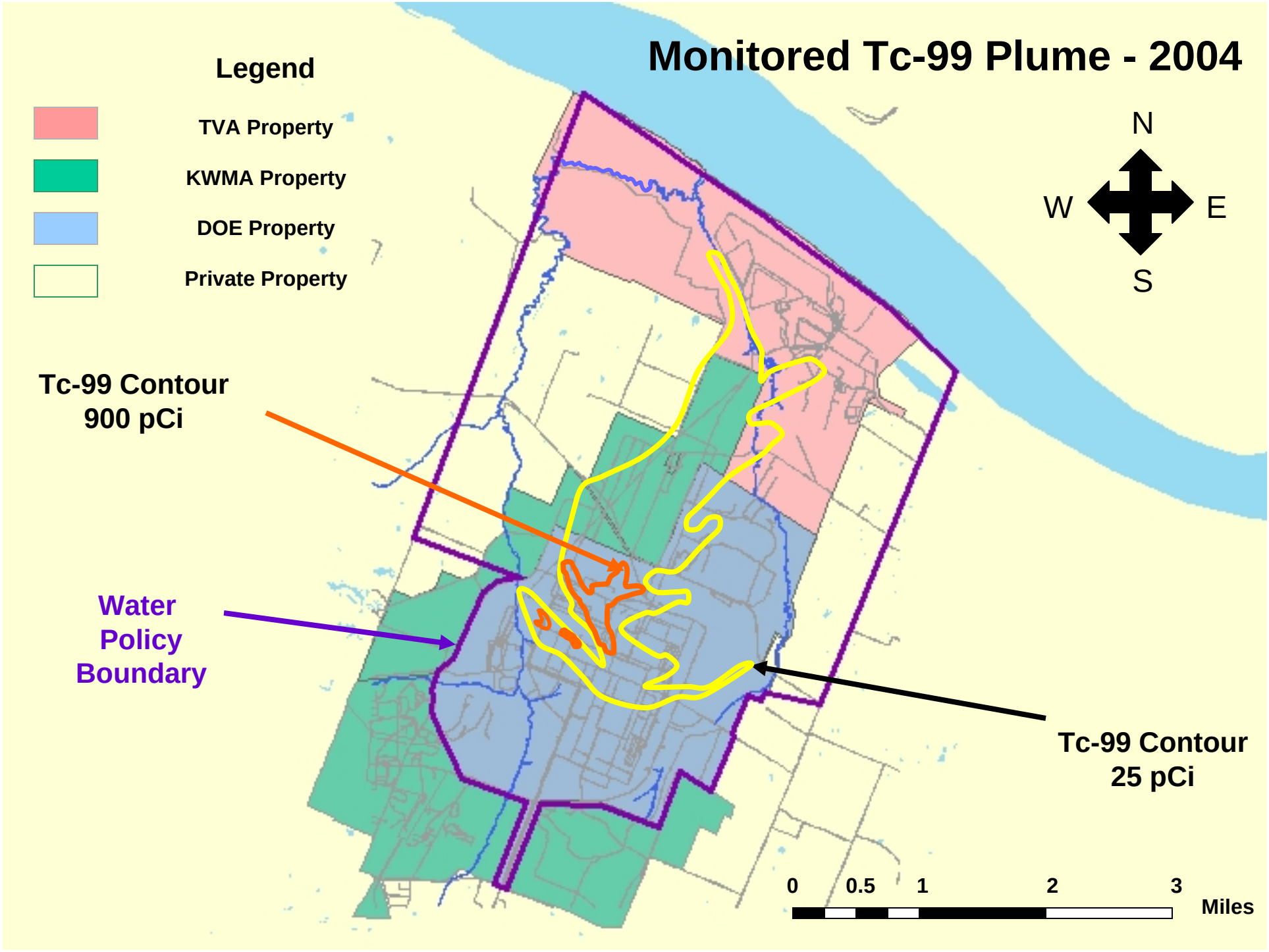
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Tc-99 Contour
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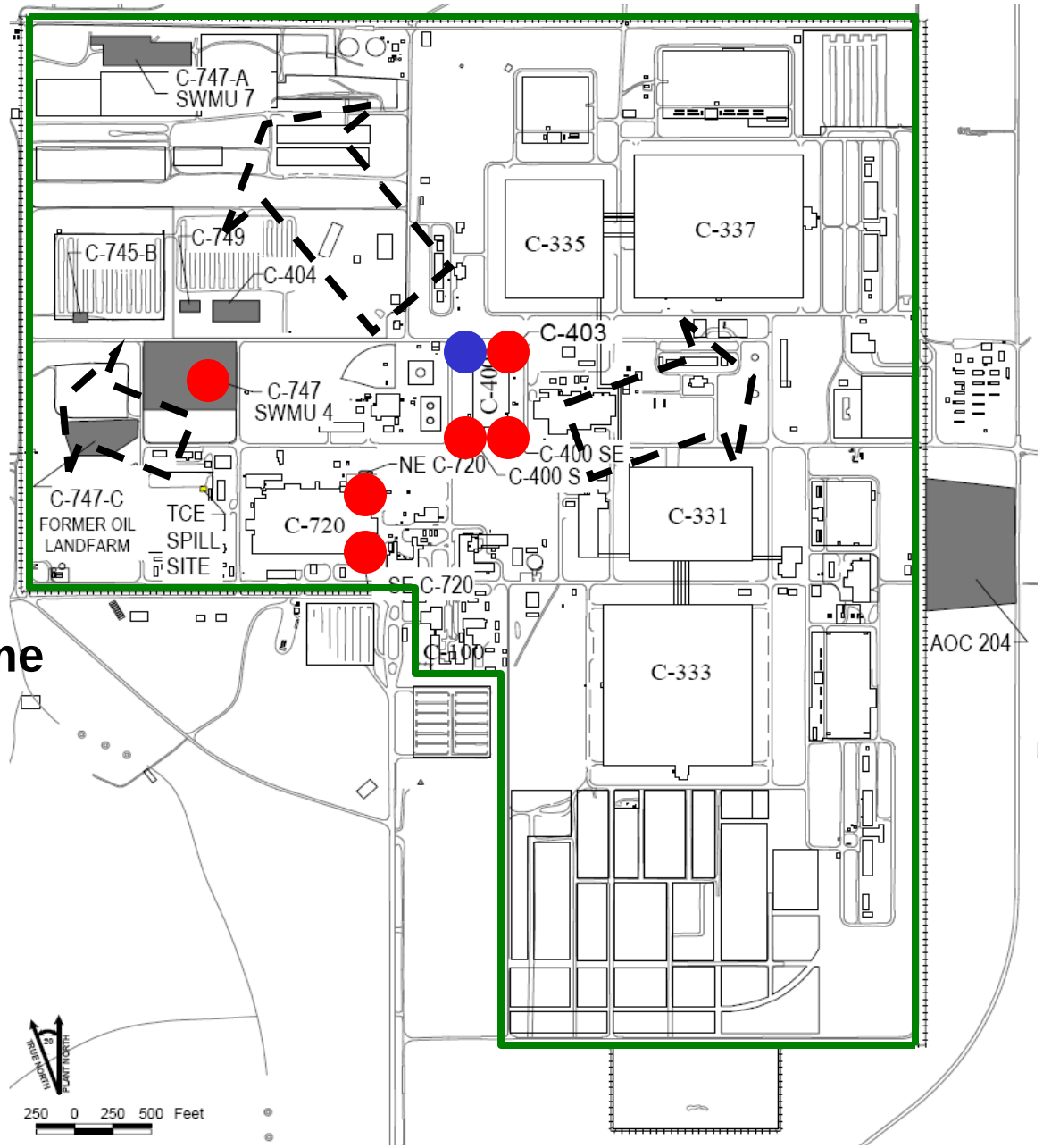
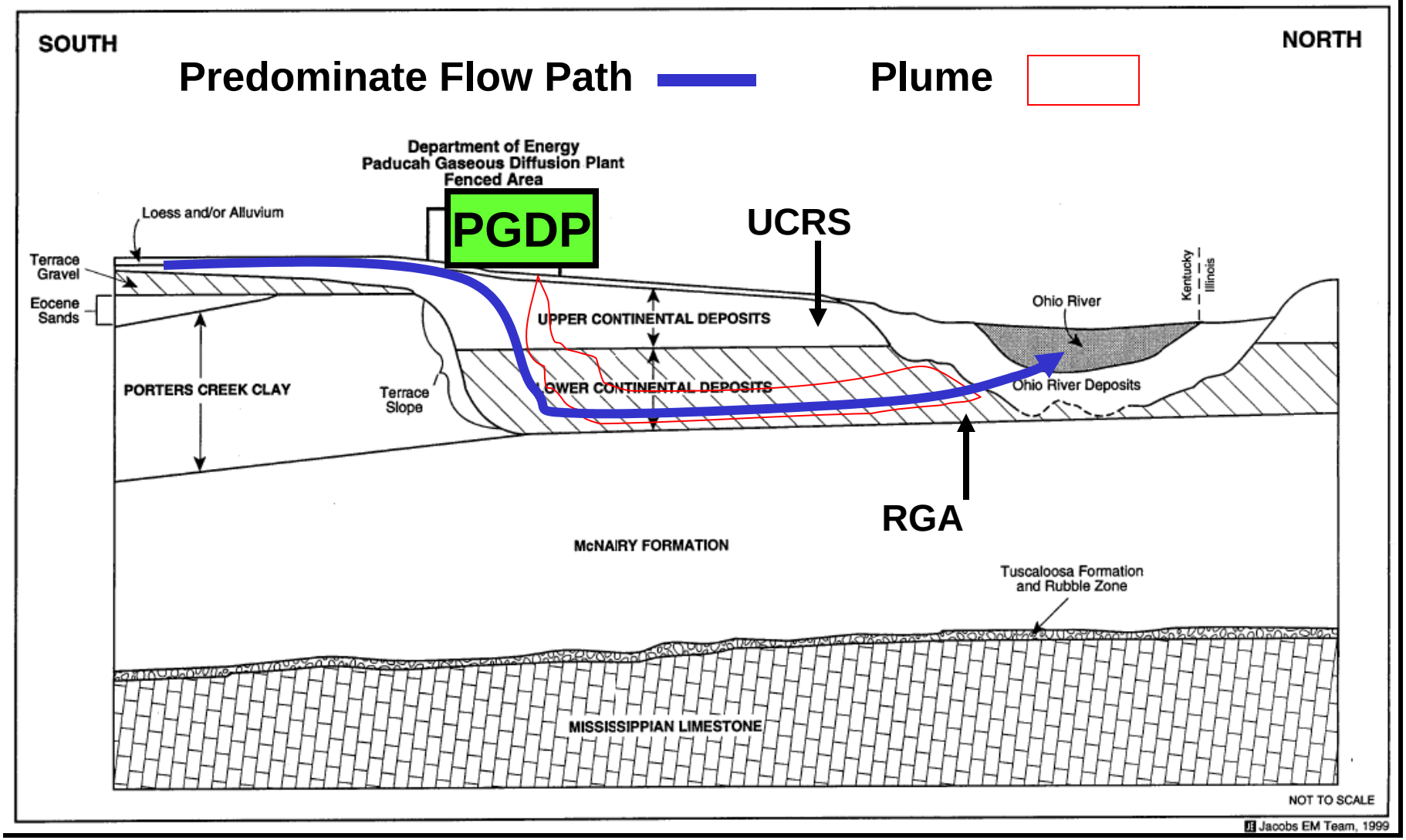
MAP of PGDP with Source Locations

- TCE Source
- Tc99 Source
- Security Fence
- Contaminated Groundwater Plume



Conceptual Site Model



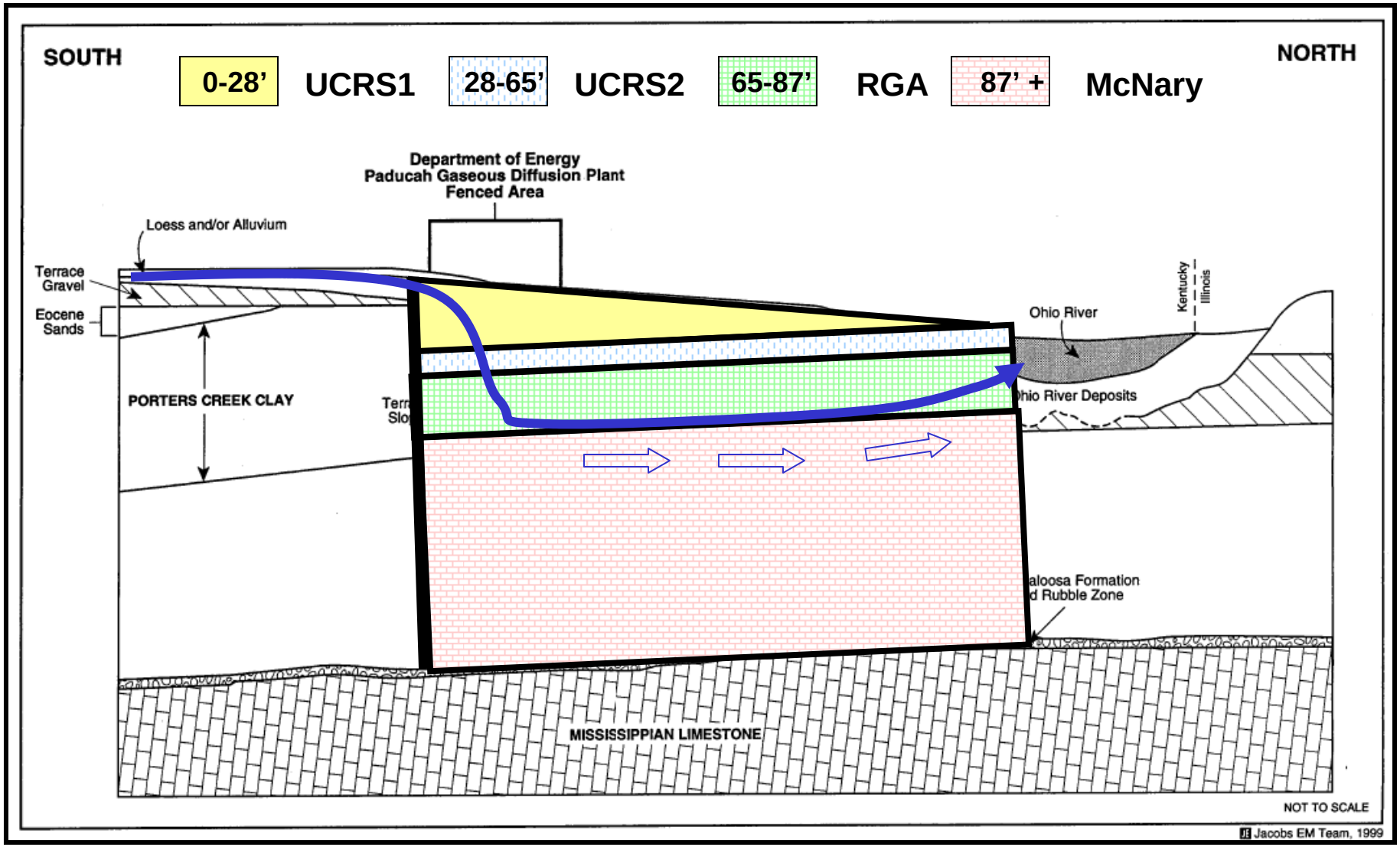
Potential Remedial Action Option Analysis

- Based on remedial action options taken from the most recent groundwater feasibility study (FS)
- Options considered are:
  - No Action
  - Existing Pump and Treat
    - Continuation of existing pump and treat systems
  - Treat UCRS Sources
    - Remove 95% of TCE found in soil down to 45 ft below surface (UCRS)
  - Treat RGA Sources
    - Remove 99% of TCE found in high concentration areas (i.e., DNAPL) in the Regional Gravel Aquifer (RGA)
  - Combination of Treating UCRS and RGA Sources and the Plumes
    - Remove 95% TCE from UCRS and 99% from RGA DNAPL
    - Reduce TCE concentrations in the plumes (on and off DOE property)
- Estimated costs of each remedial action option were developed using information from the FS

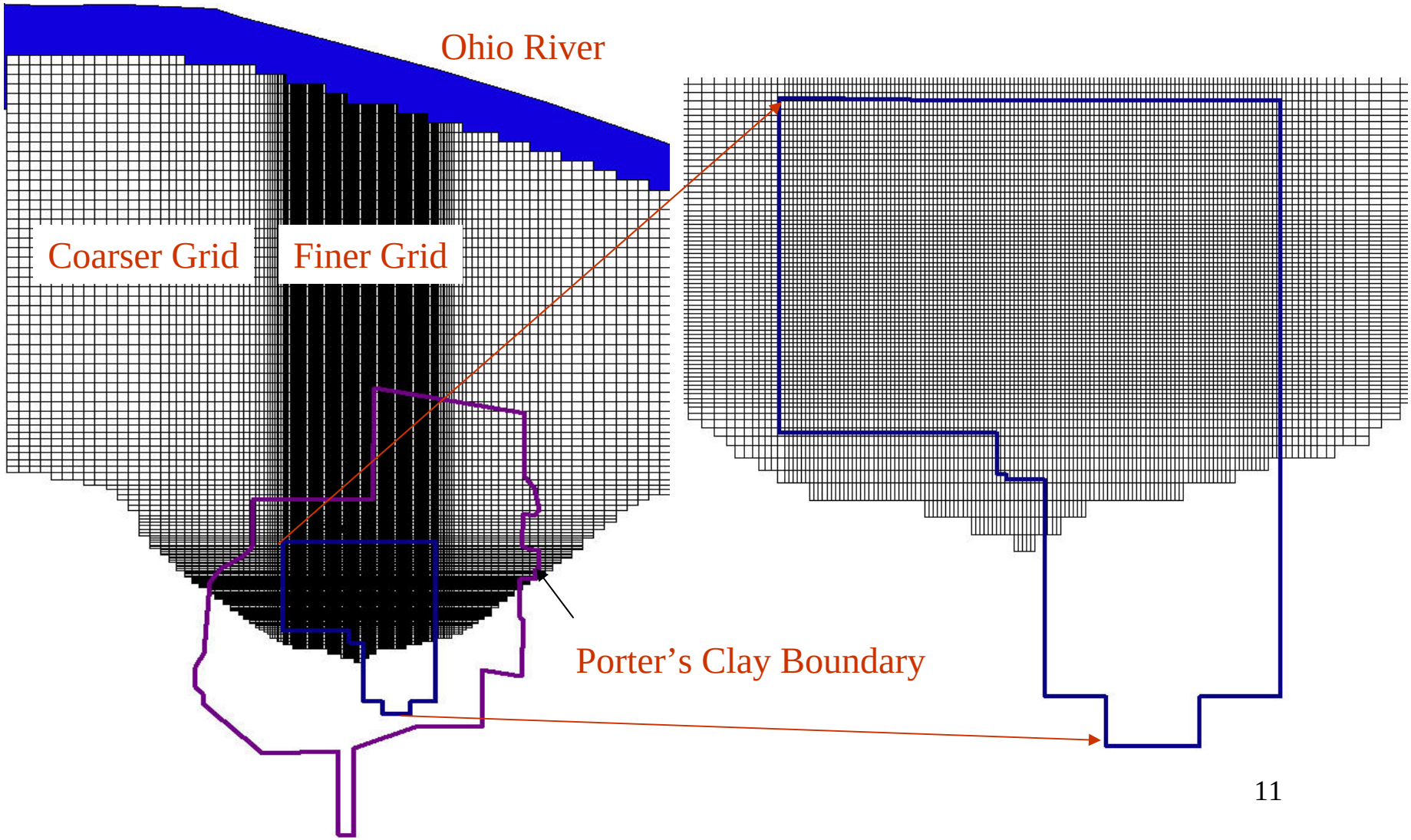
Fate and Transport Modeling

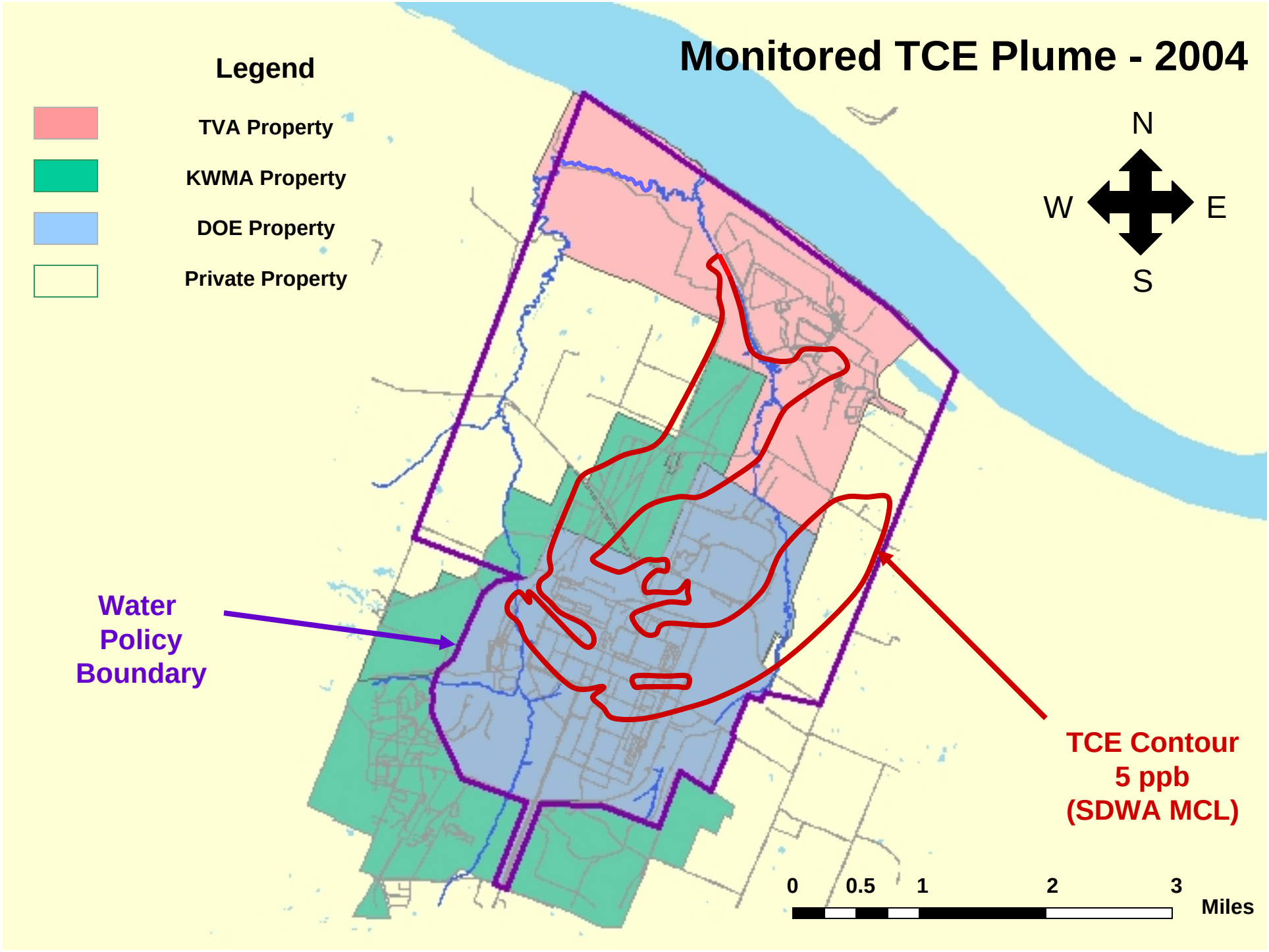
- Each potential remedial action technology was evaluated using the current PGDP-DOE MODFLOW and MODFLOWT Models
- Goals are to determine:
  - Potential extent of plume migration under each remedial action alternative scenario
  - Changes in plume as the potential remedial action alternative reduces TCE concentrations in source areas and plumes
- Model results are based on several assumptions
  - Physical parameters (e.g. attenuation factor)
  - Efficiencies of remedial actions
- 100-year period was modeled
- Uncertainty in model results increase over time
  - Model results beyond 100 years are very uncertain

Conceptual Groundwater Model (MODFLOW and MODFLOWT)



MODFLOW Computational Grid

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Water Policy Boundary
TCE Contour 5 ppb (SDWA MCL)
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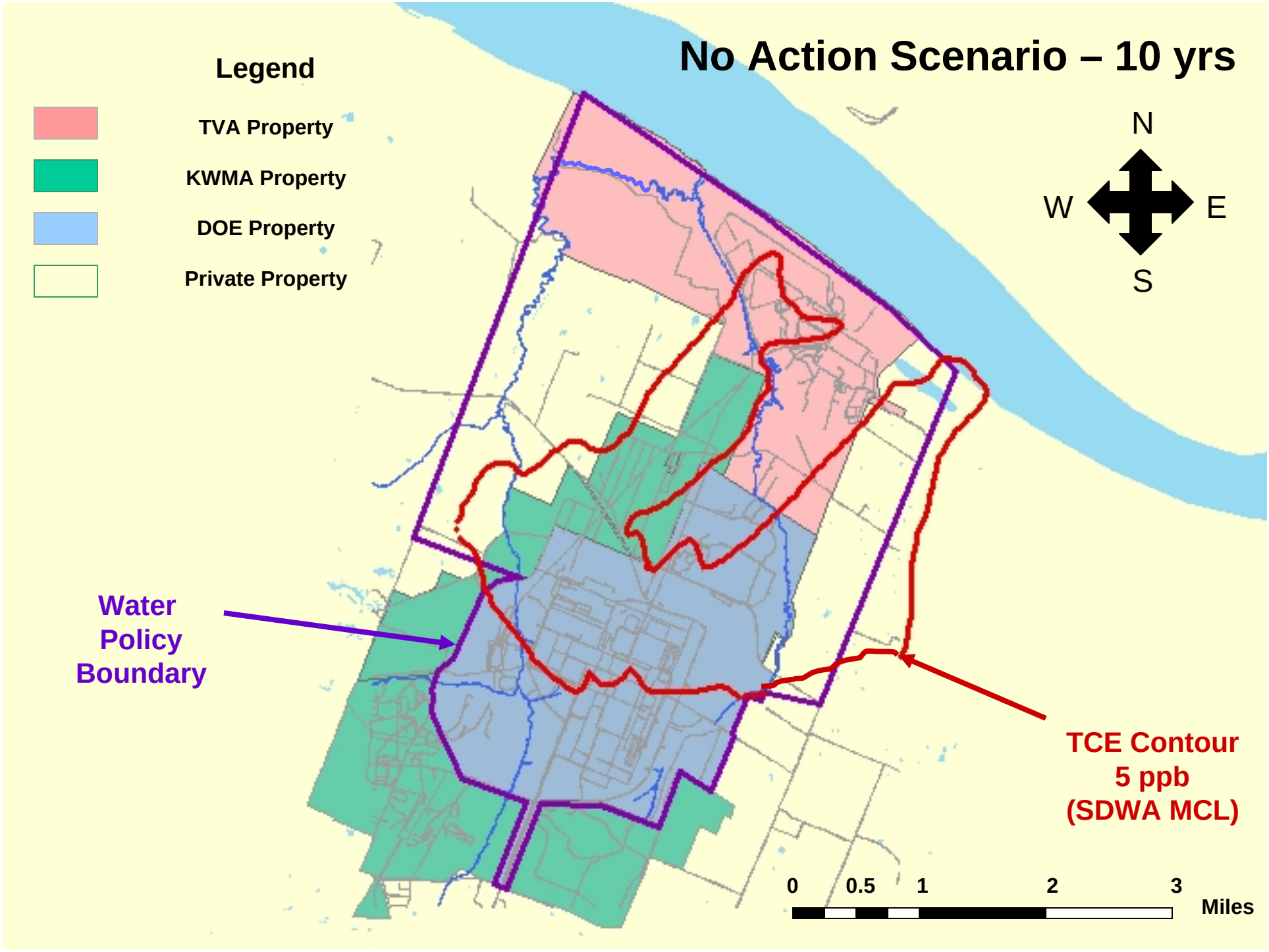
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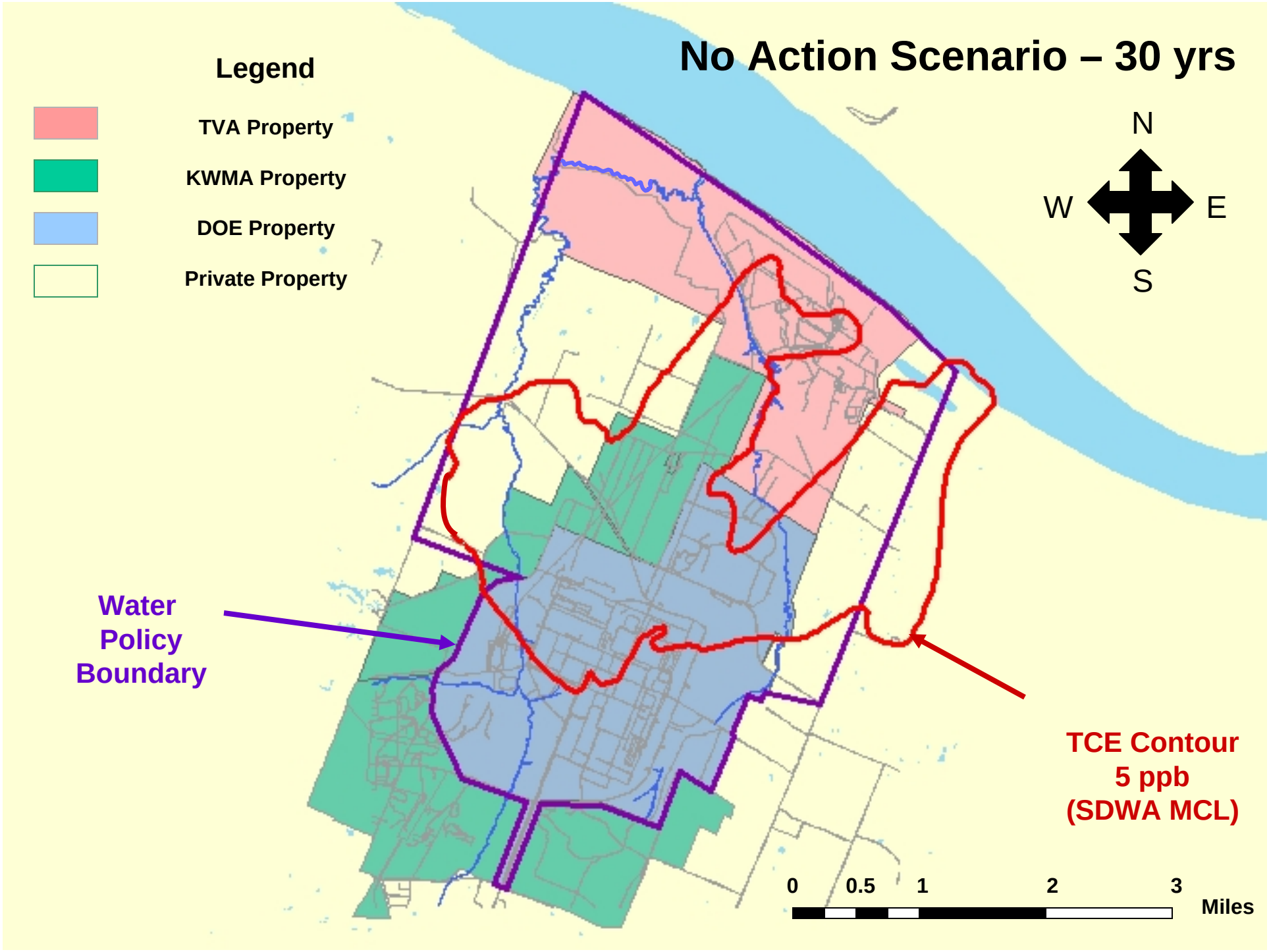
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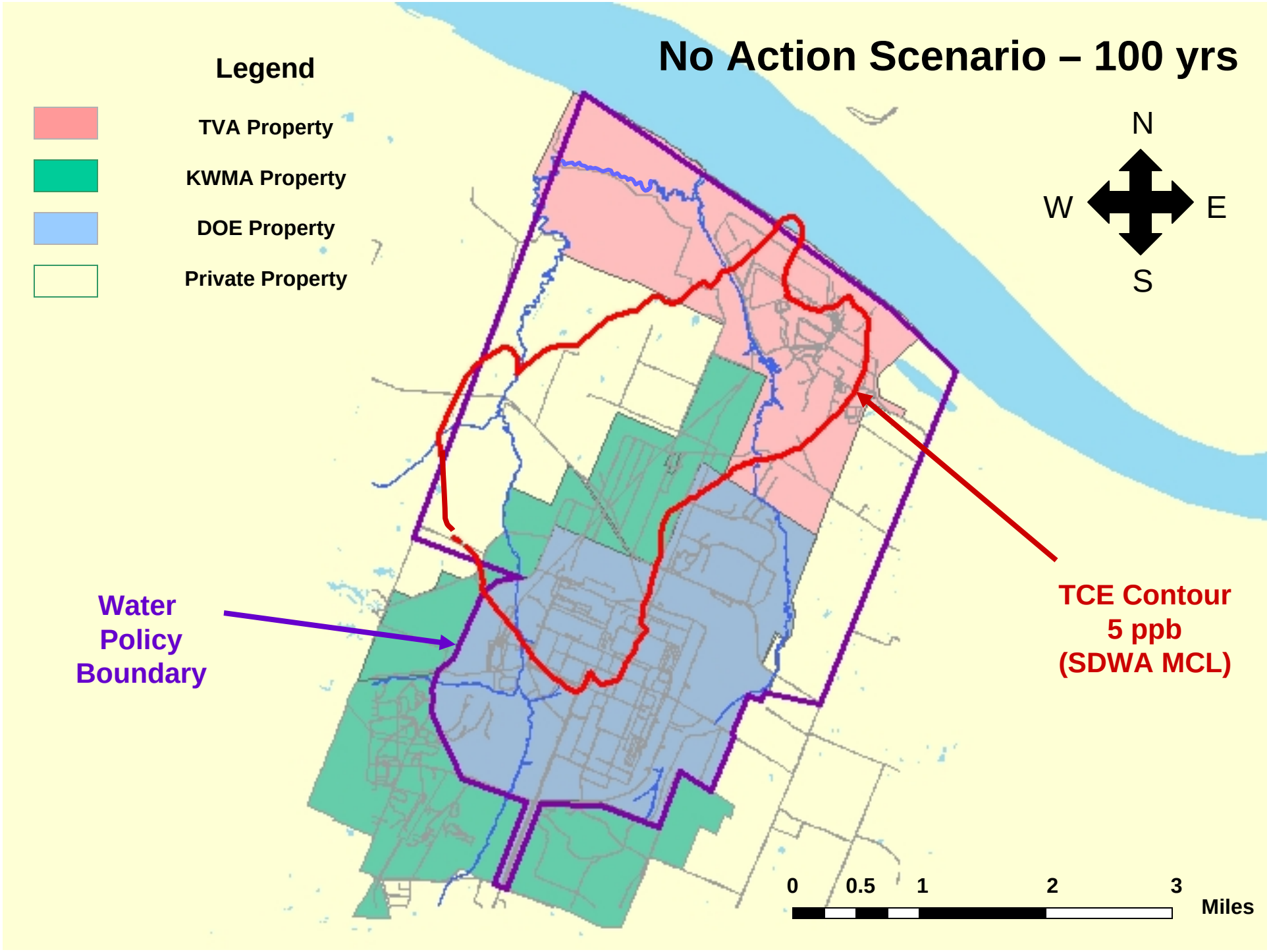
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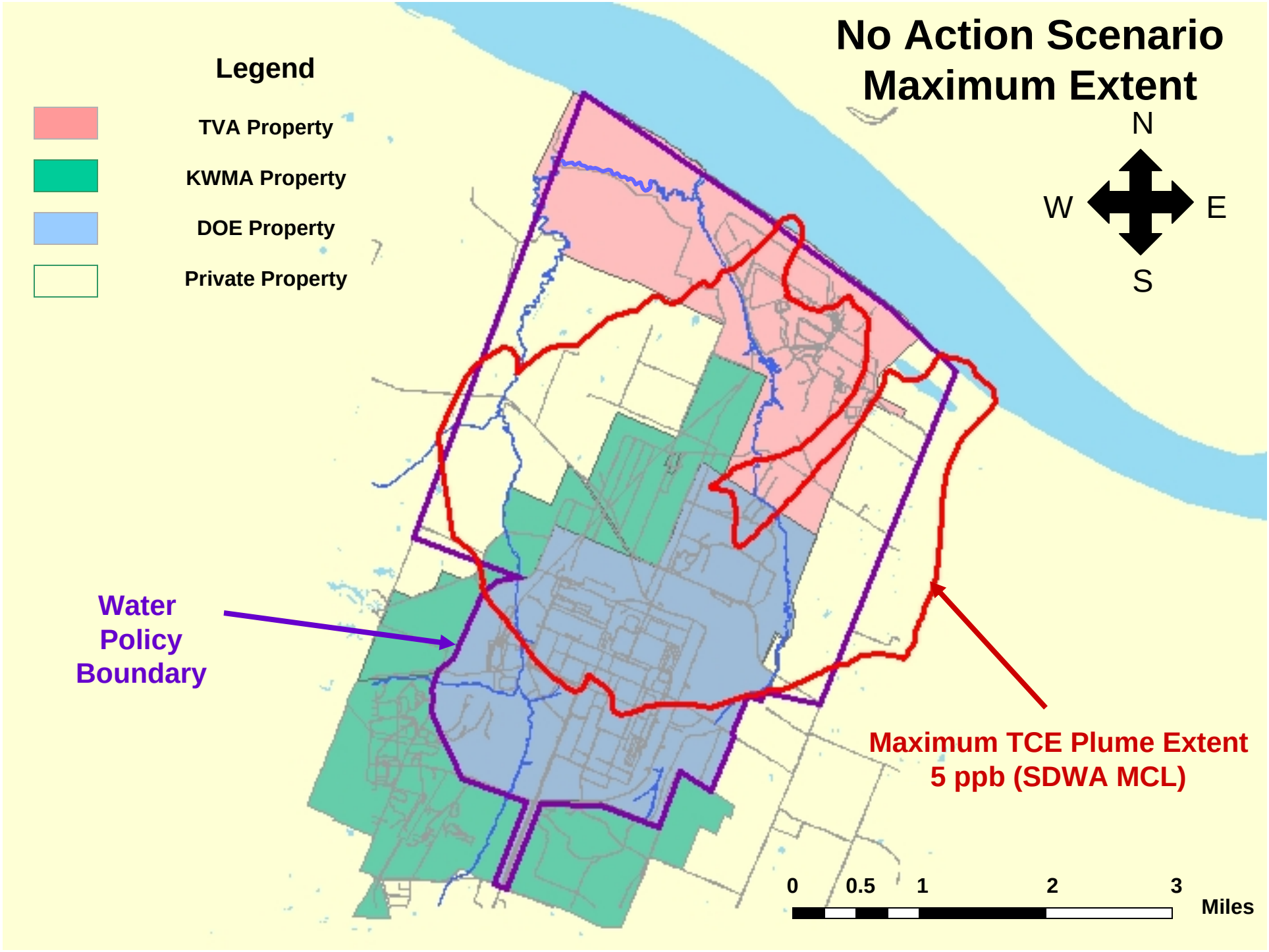
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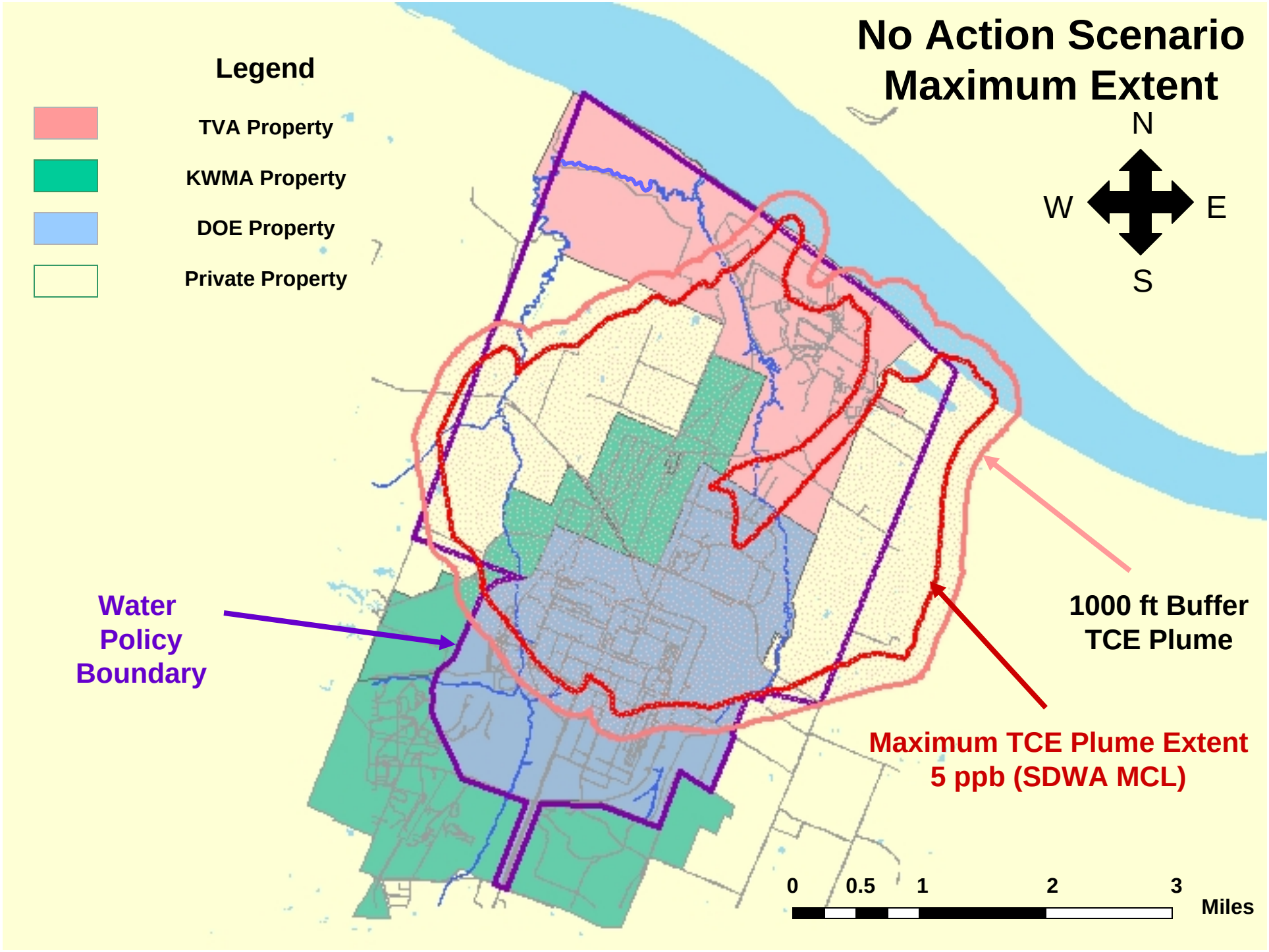
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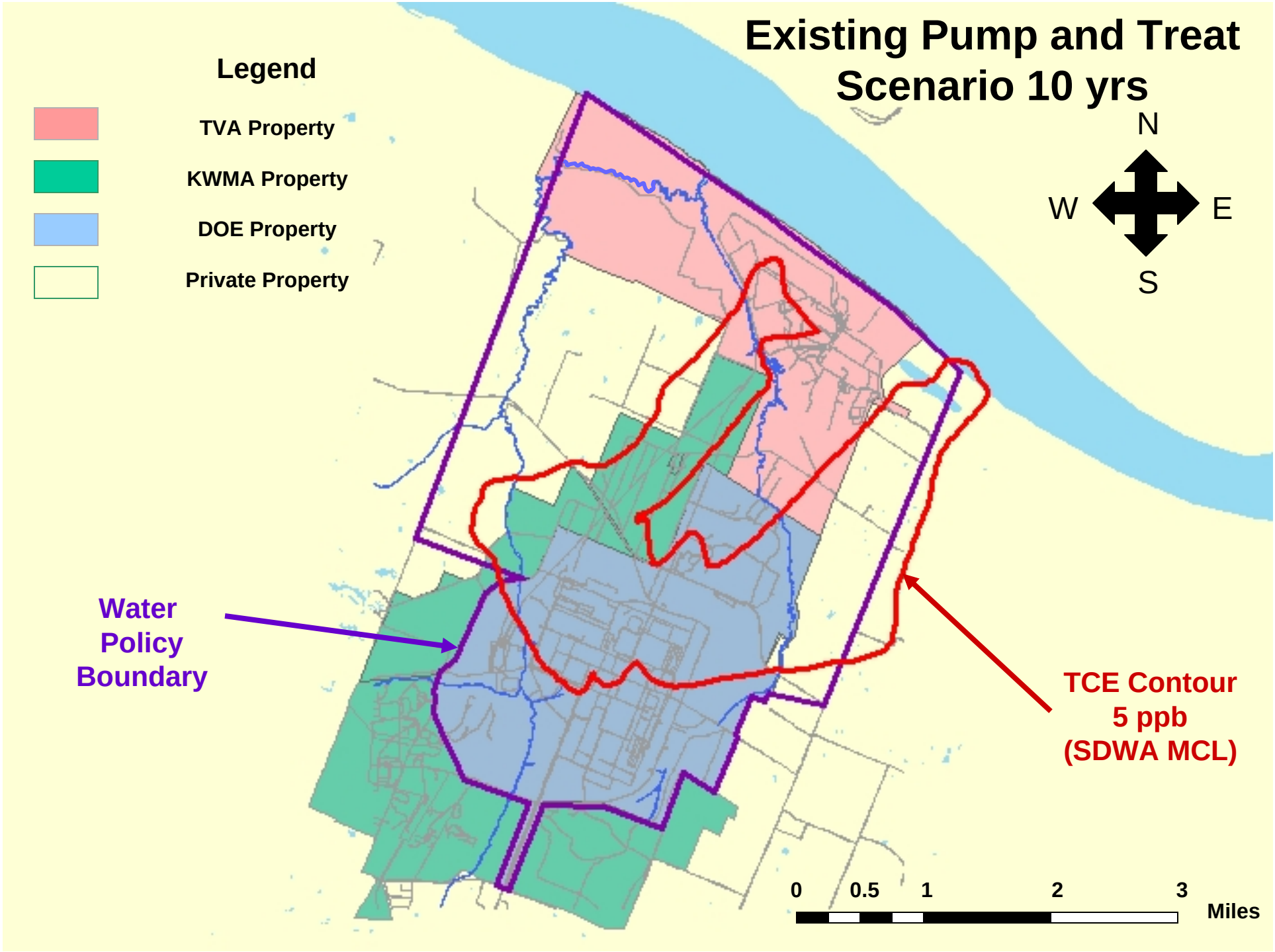
Existing Pump and Treat
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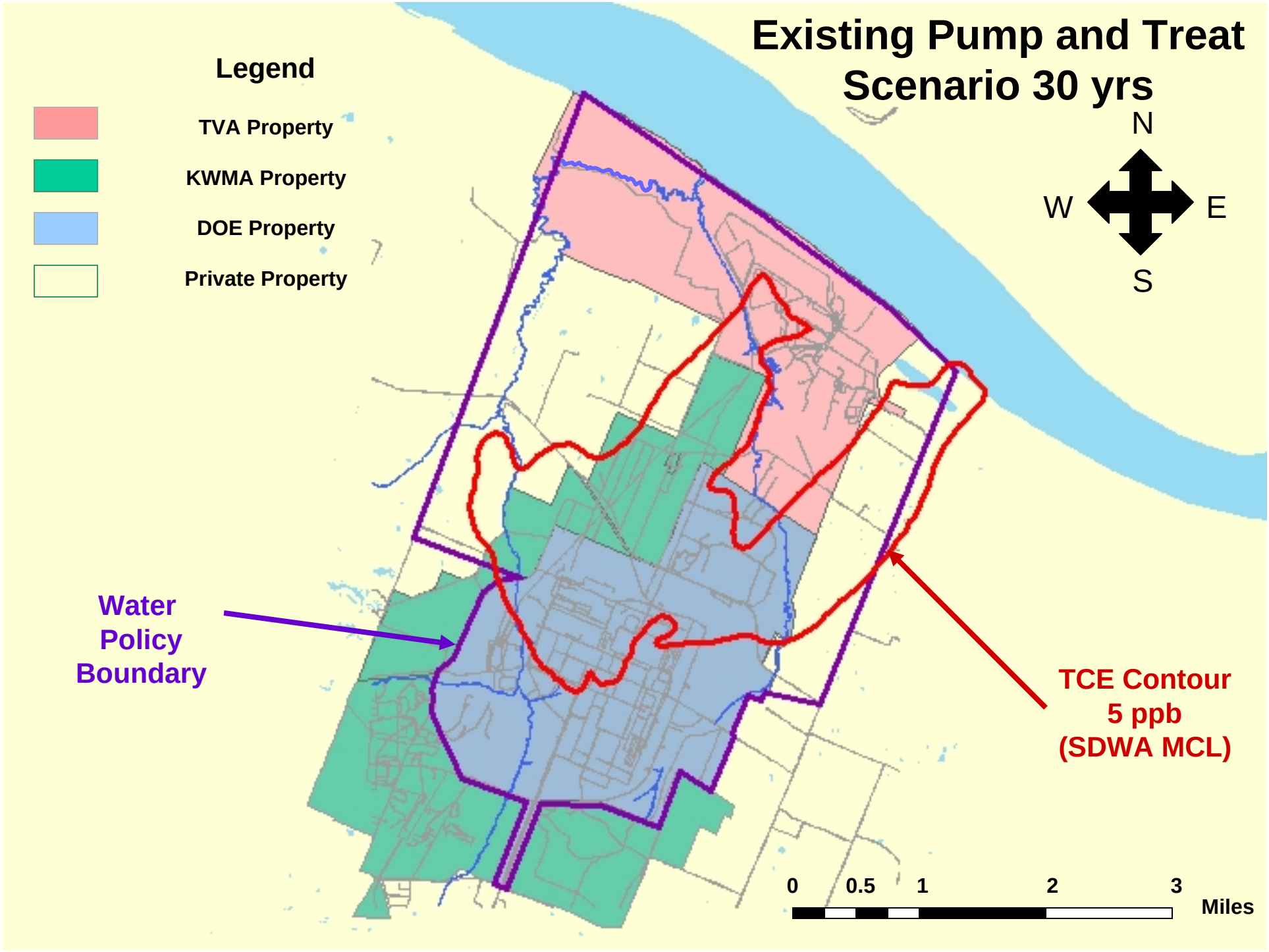
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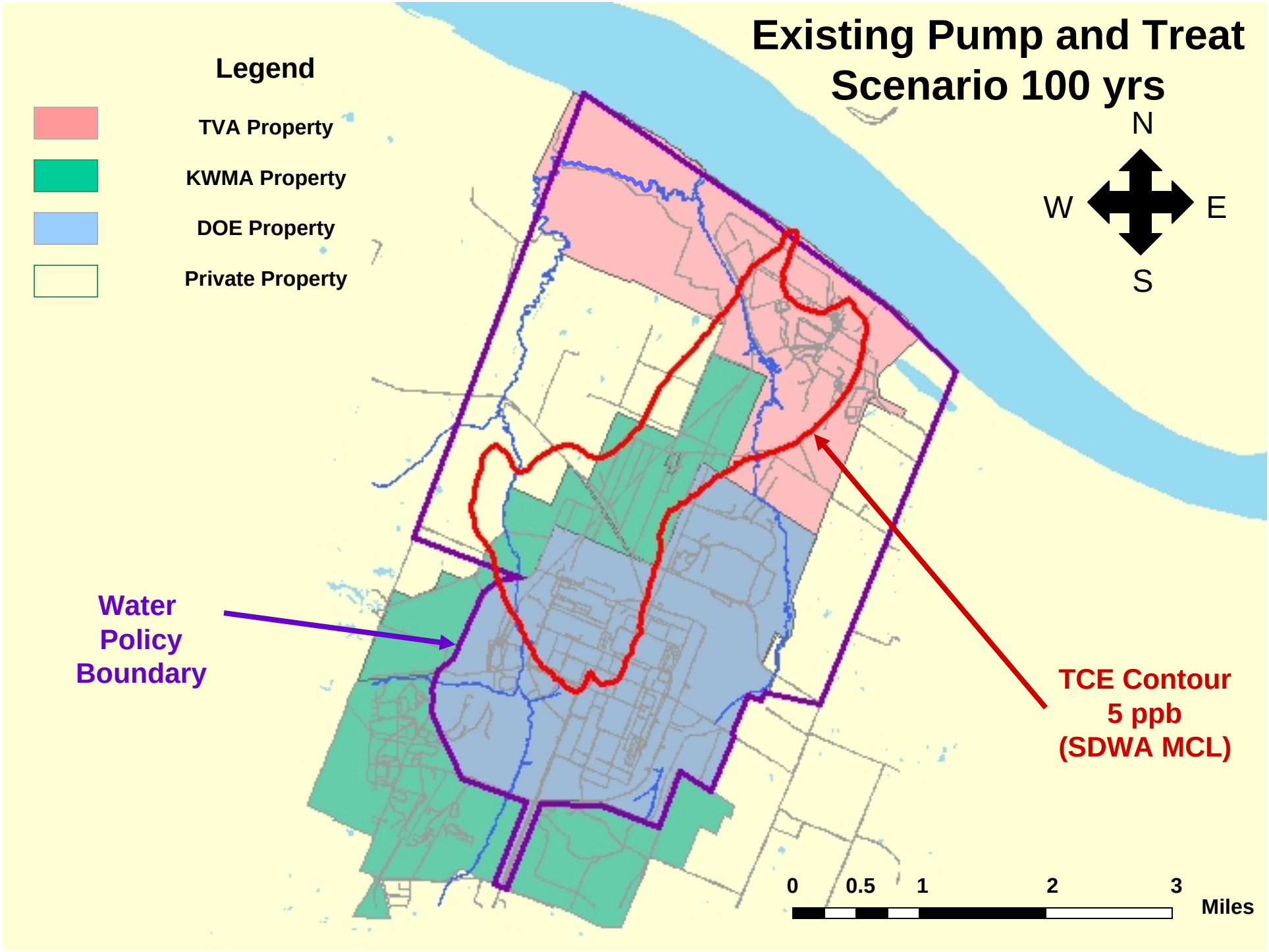
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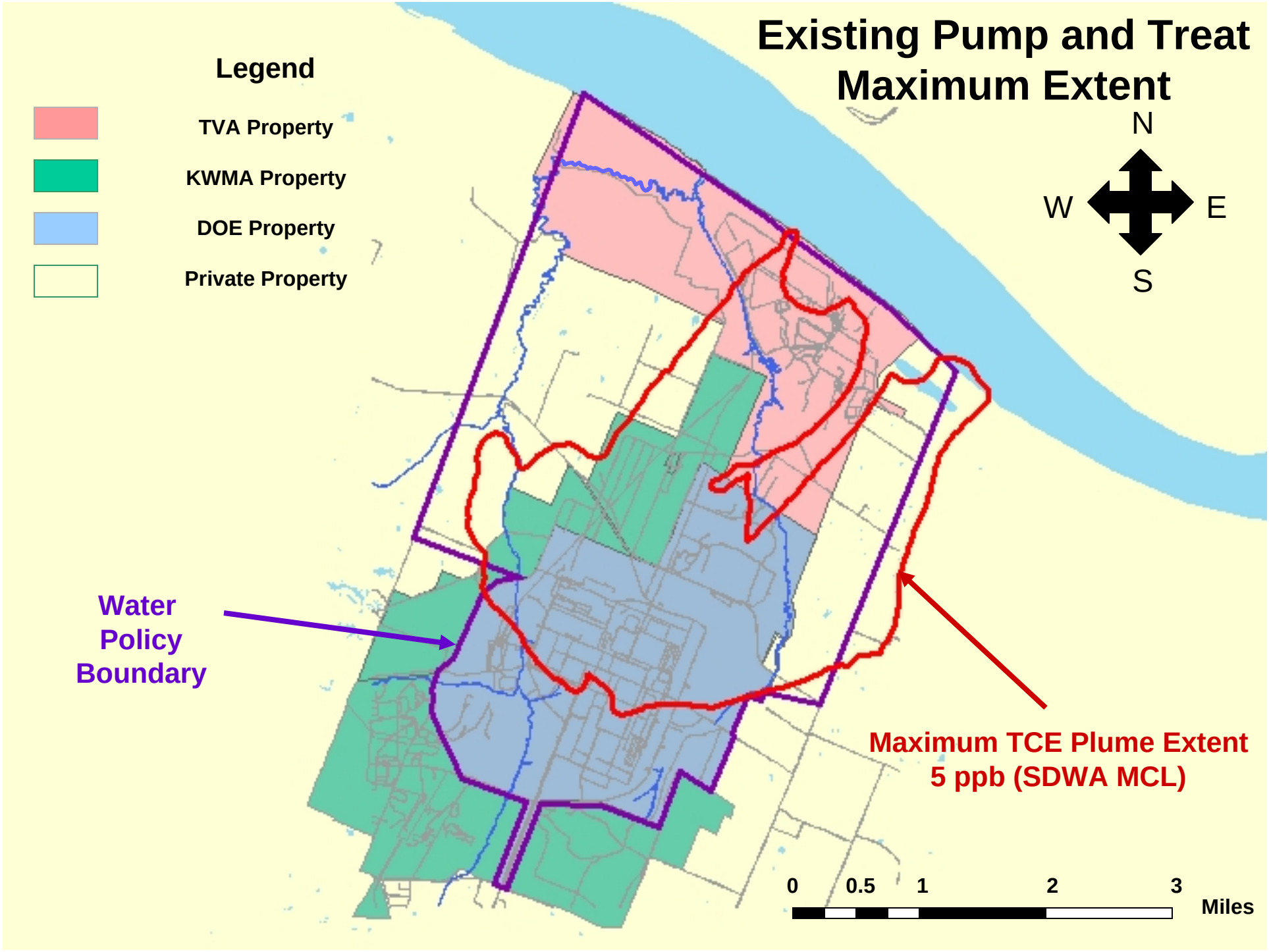
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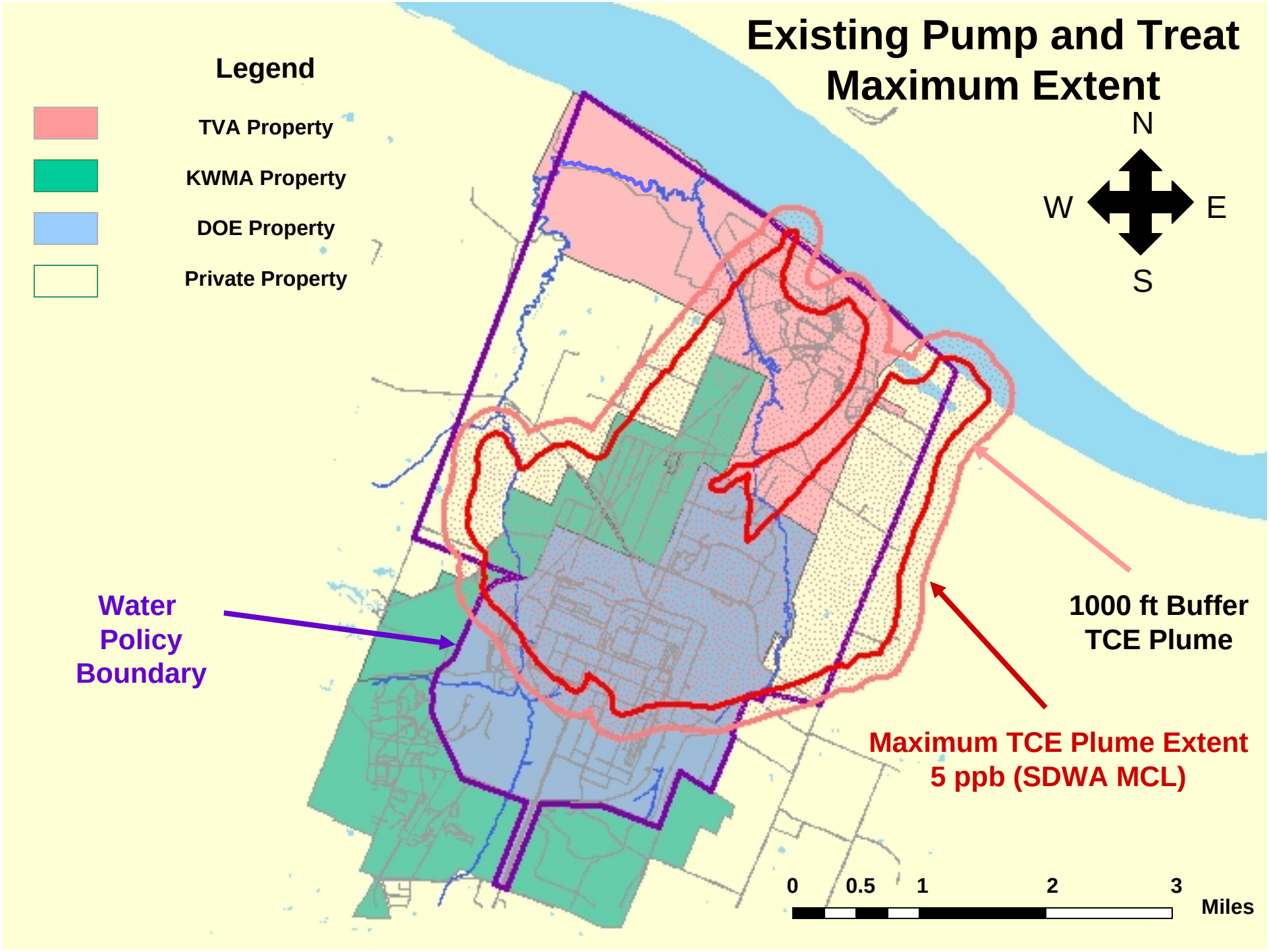
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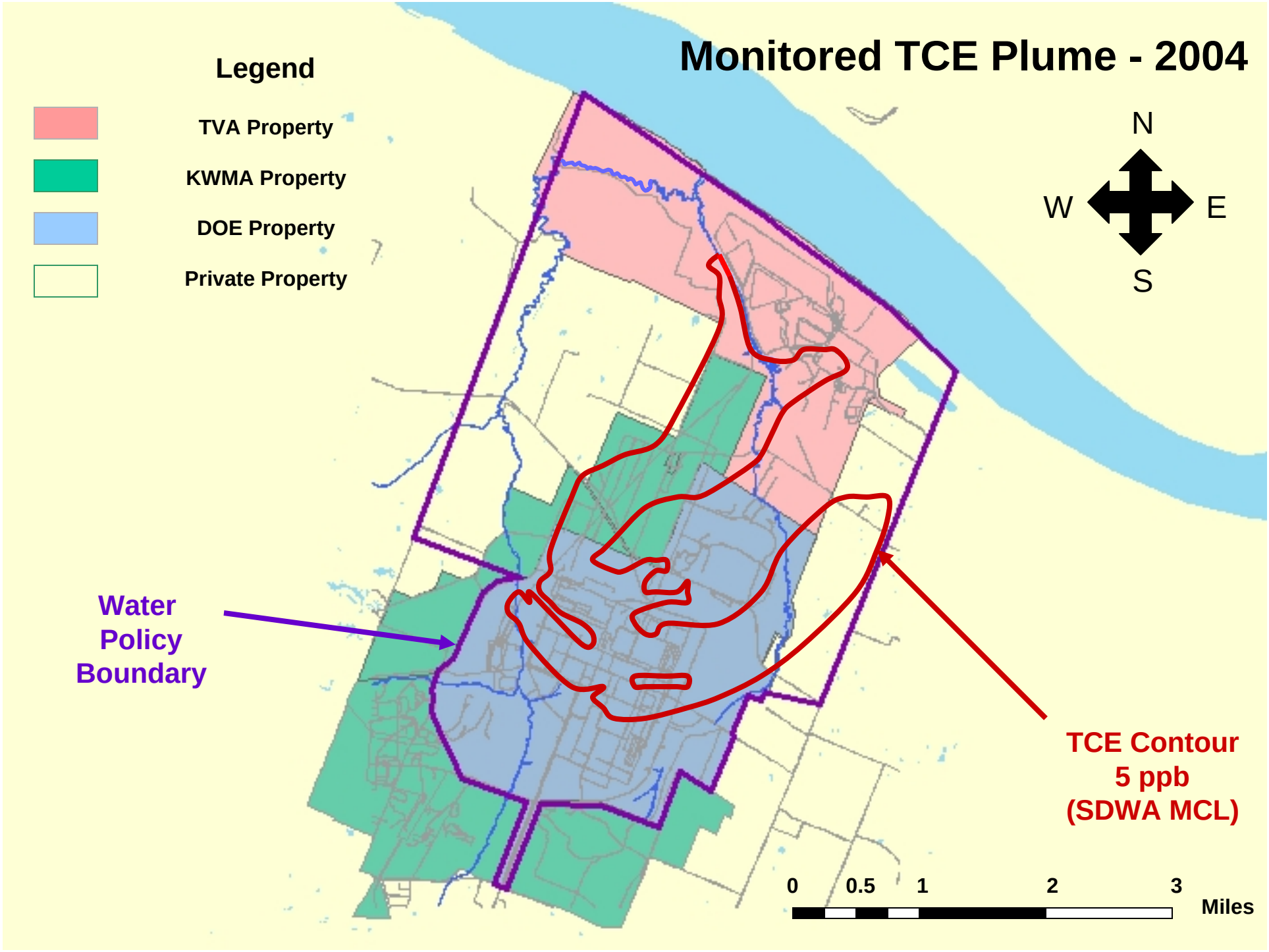
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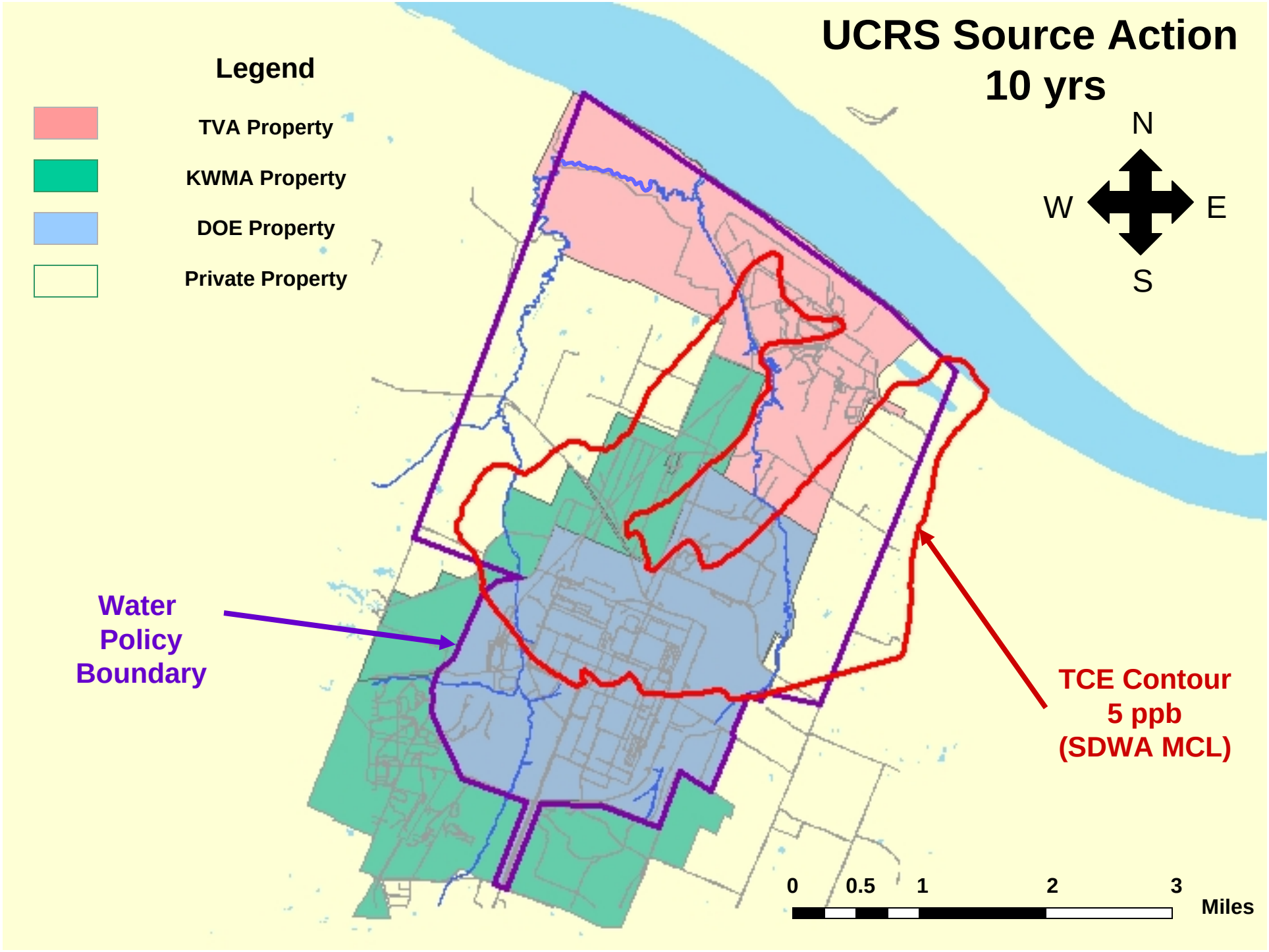
UCRS Source Action
10 yrs
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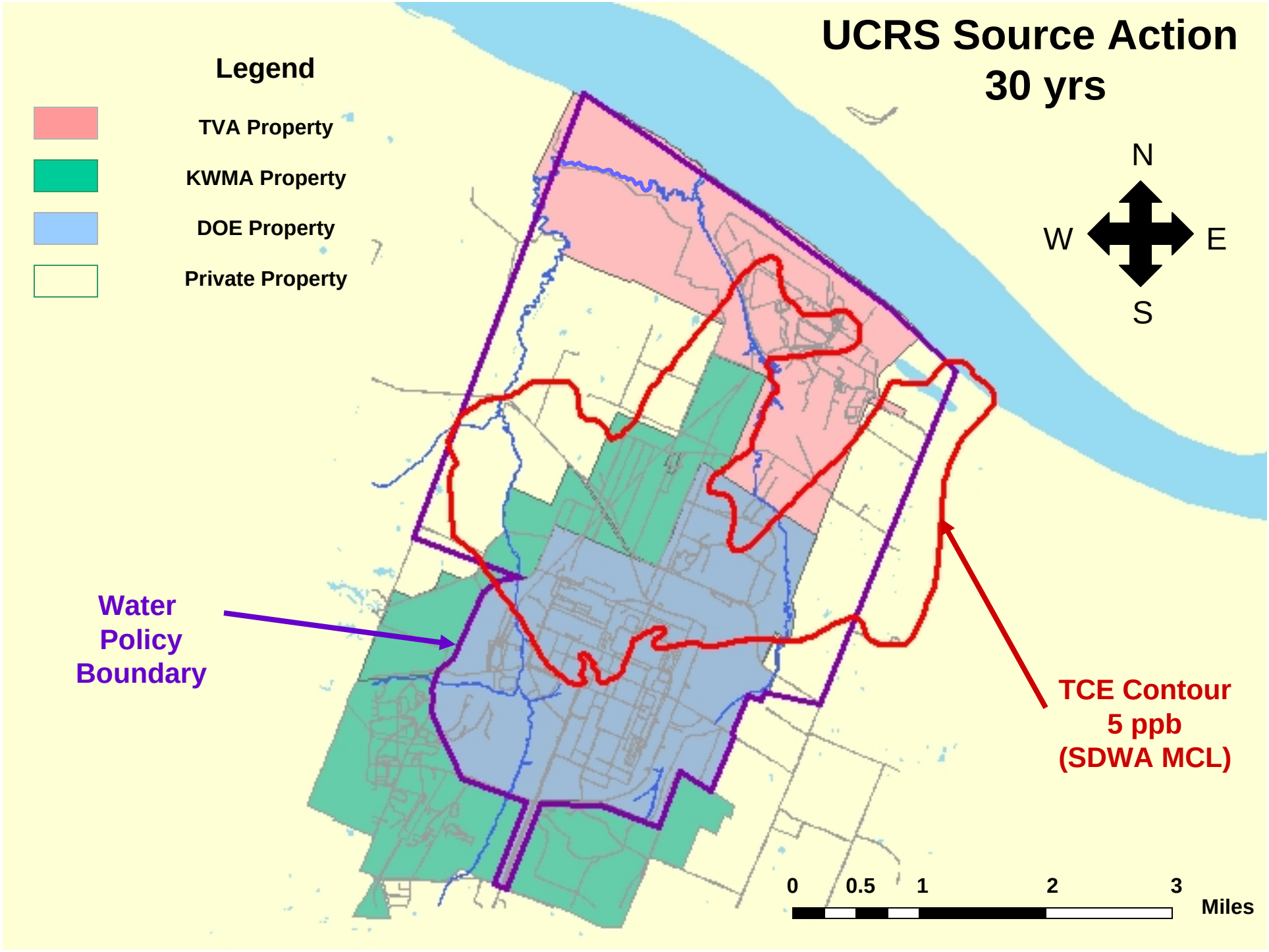
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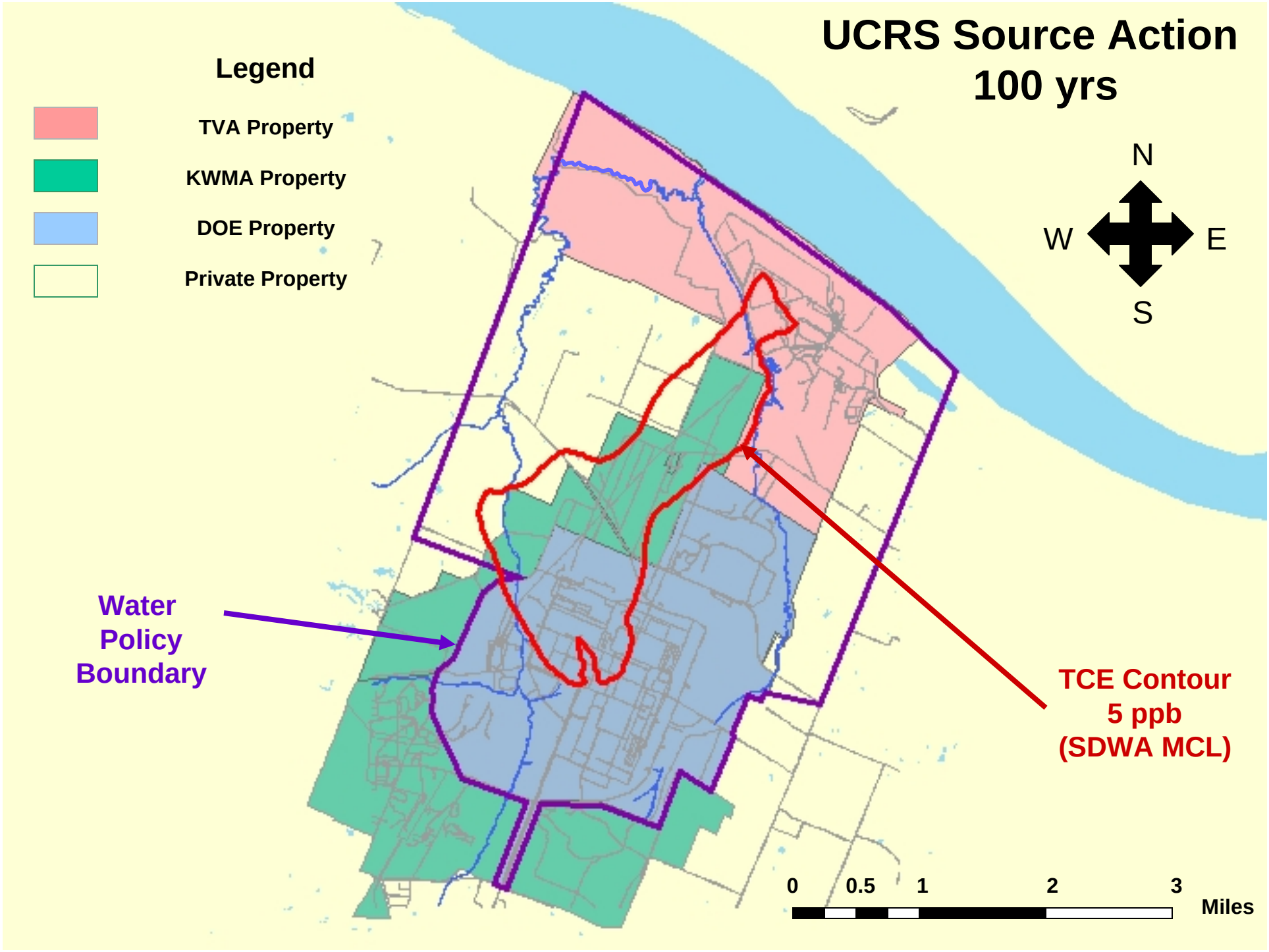
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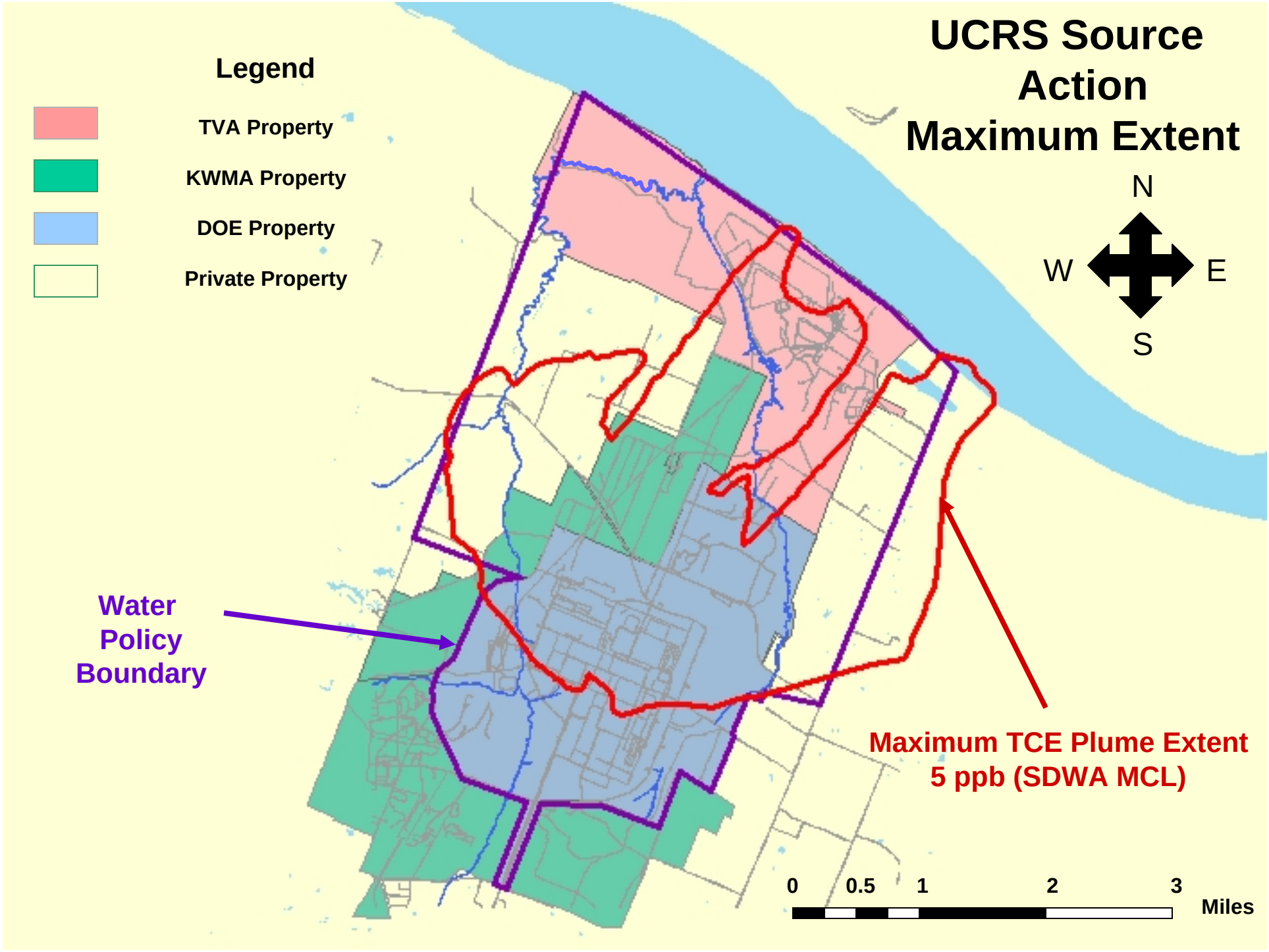
UCRS Source Action Maximum Extent
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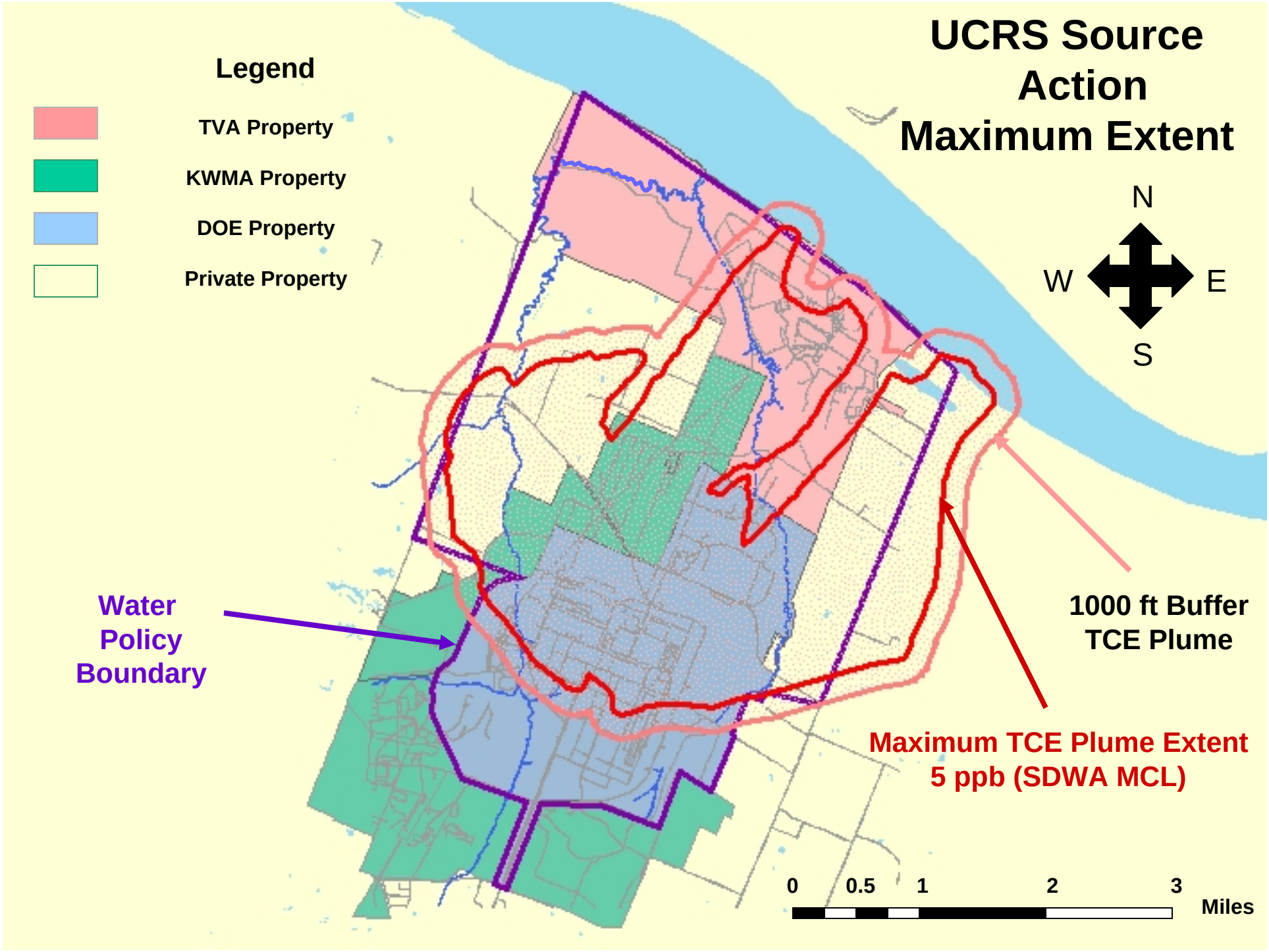
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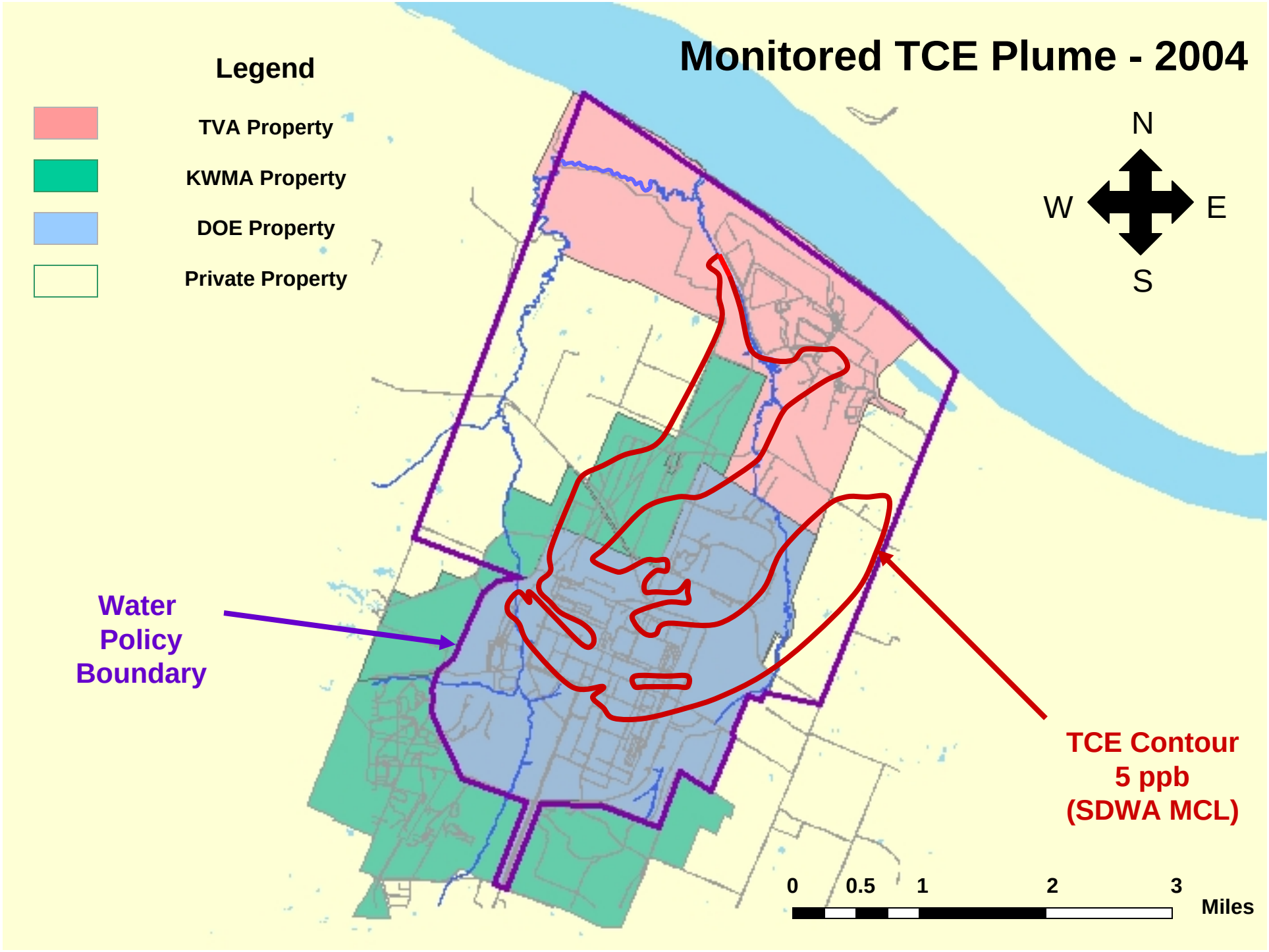
Monitored TCE Plume - 2004
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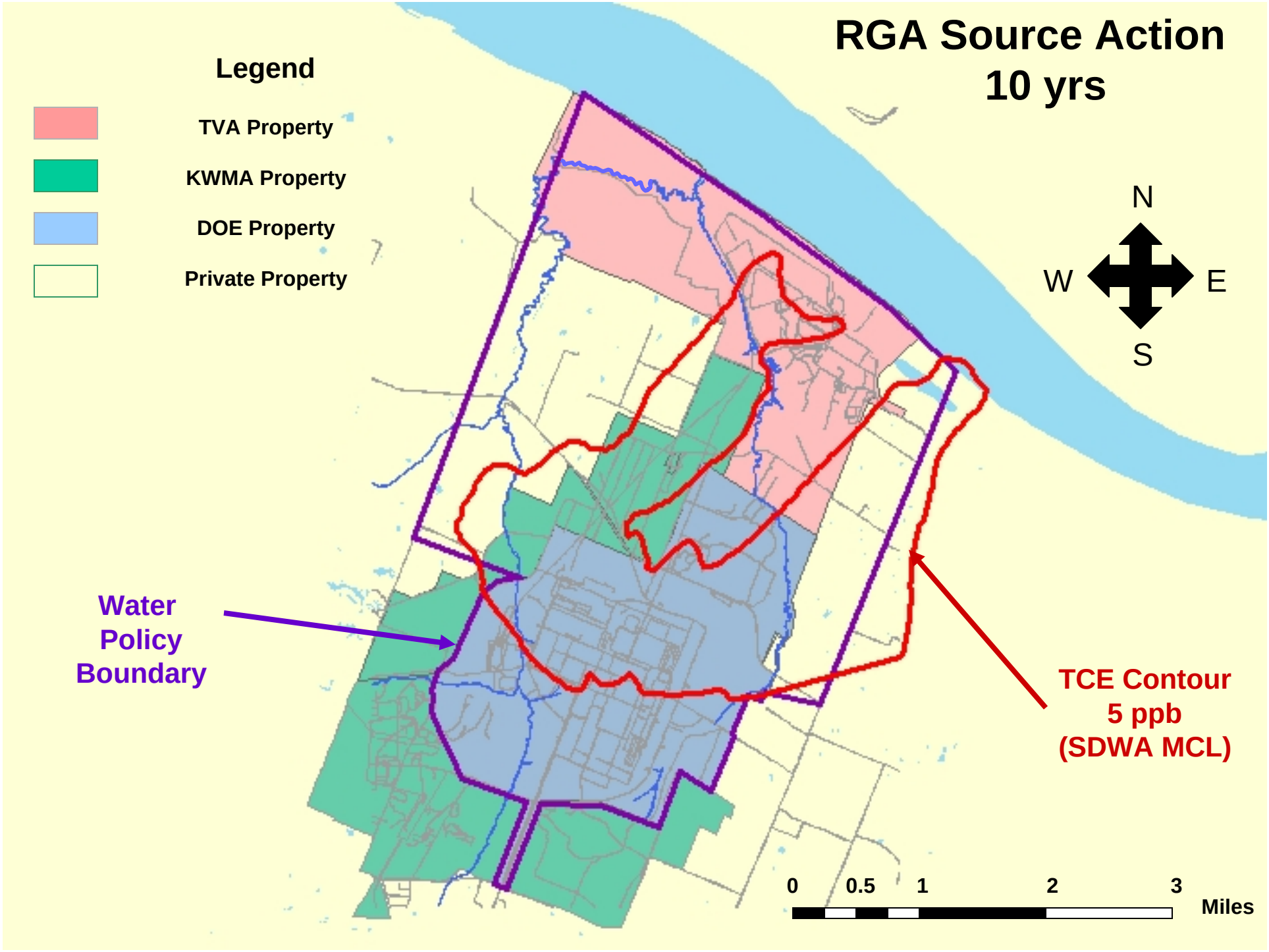
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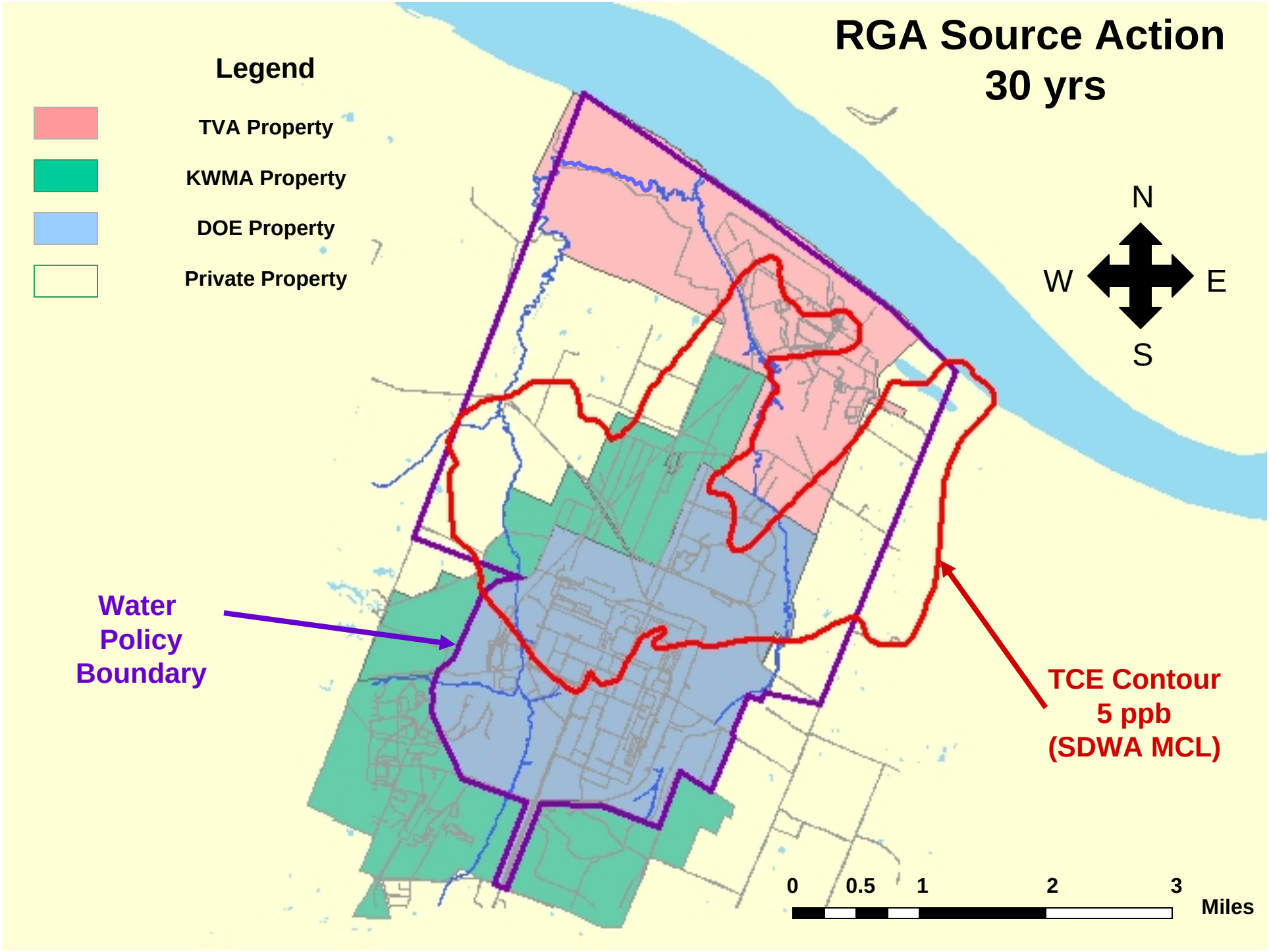
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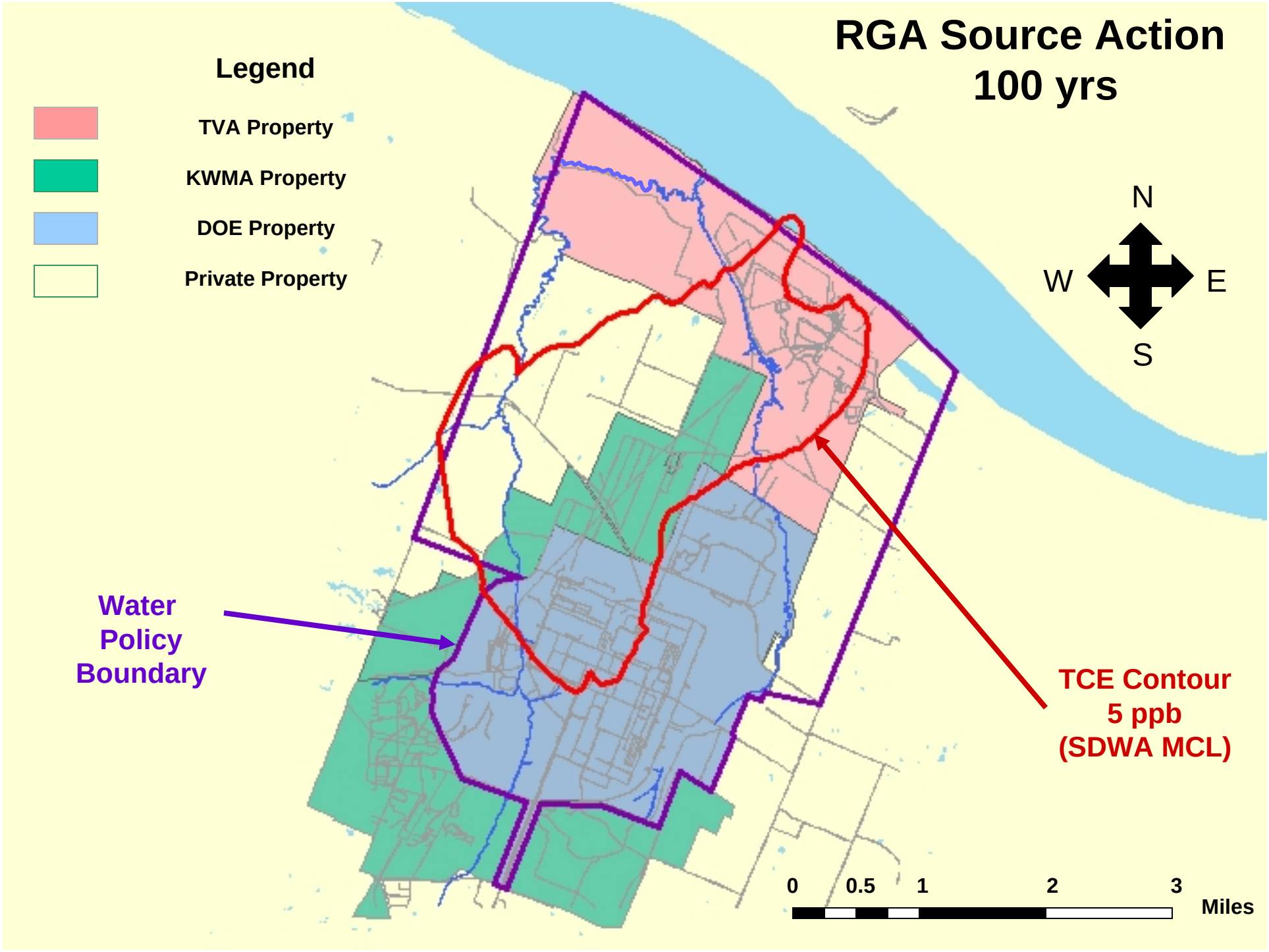
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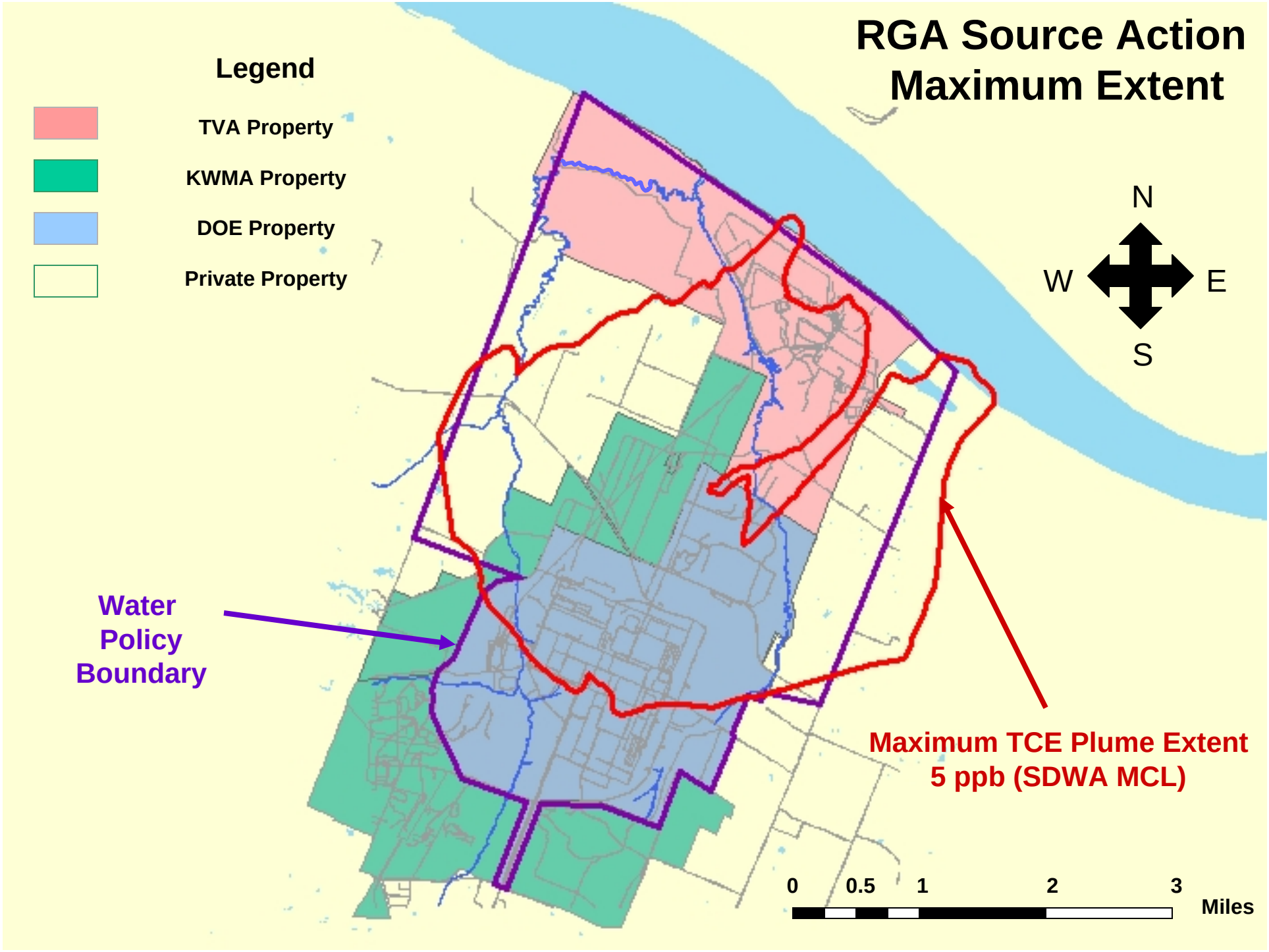
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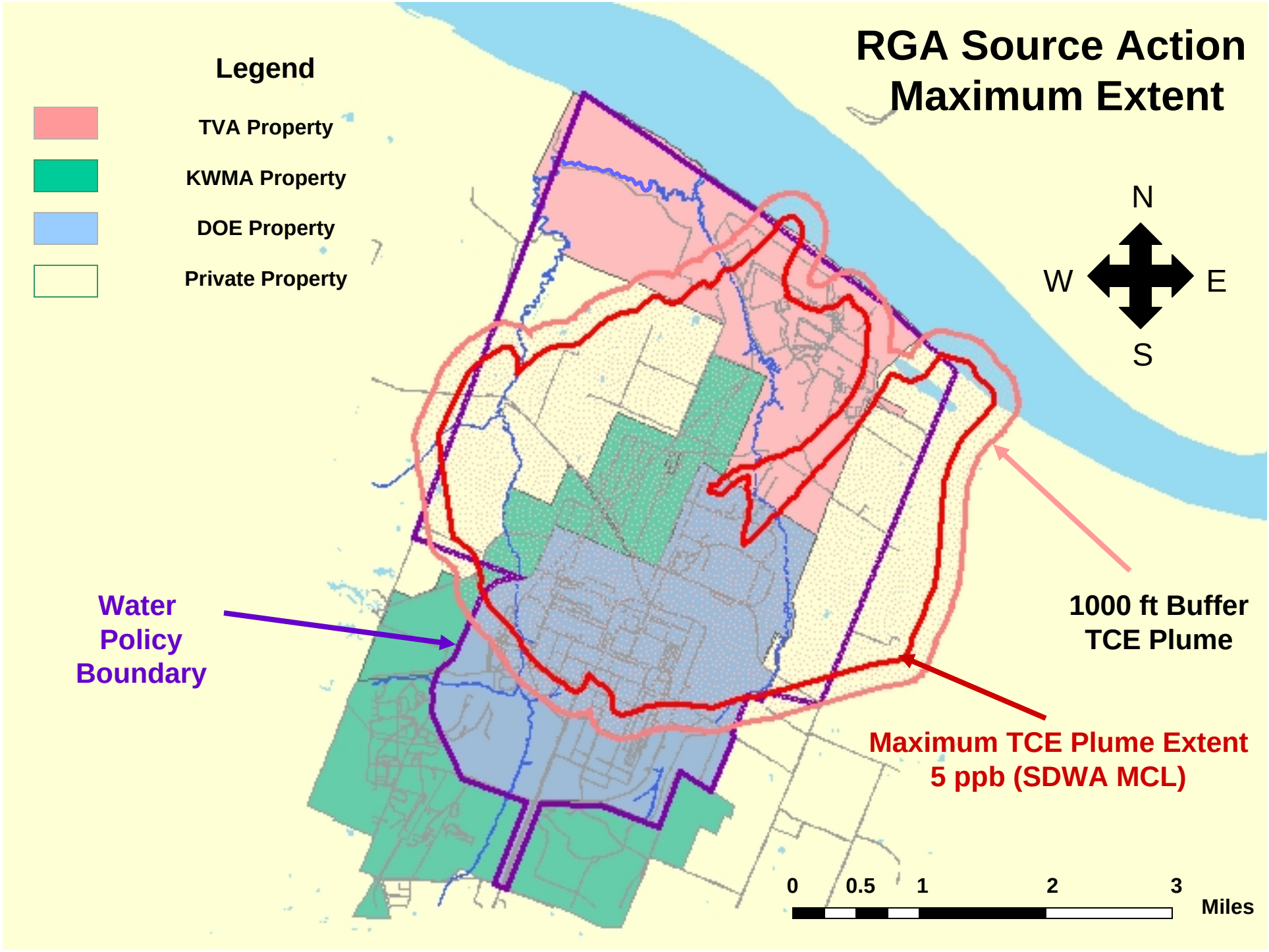
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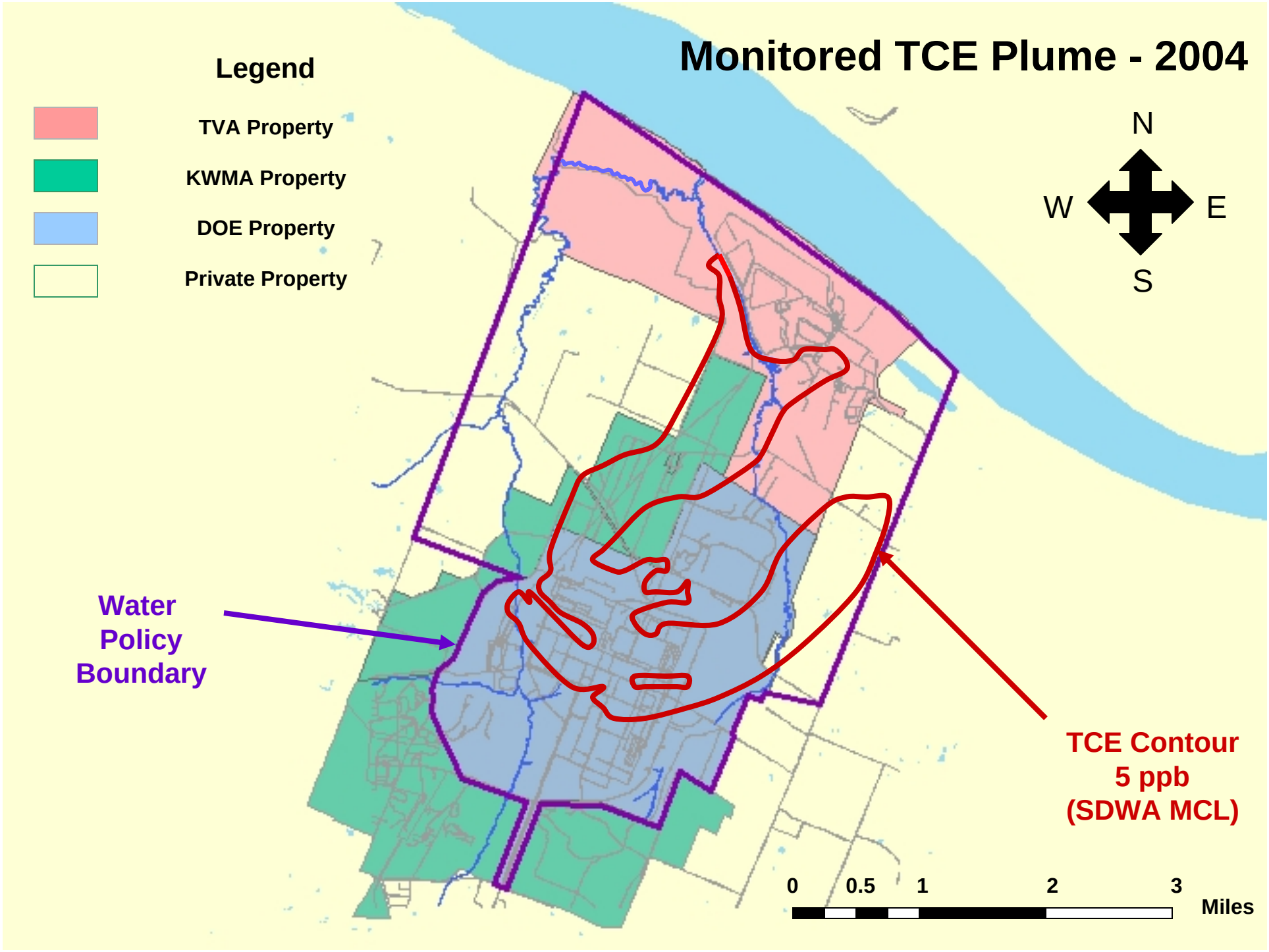
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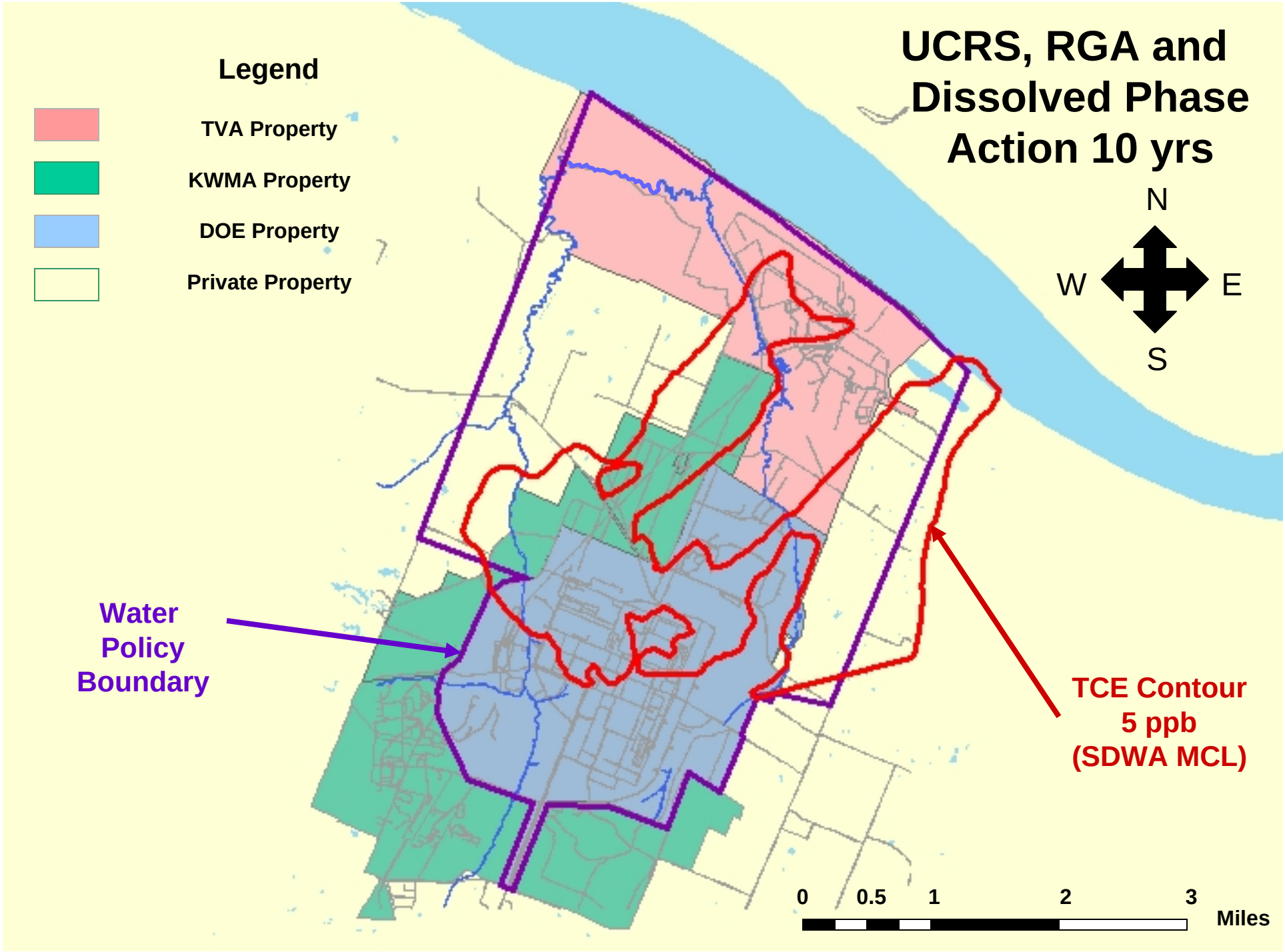
UCRS, RGA and Dissolved Phase Action 10 yrs
Legend
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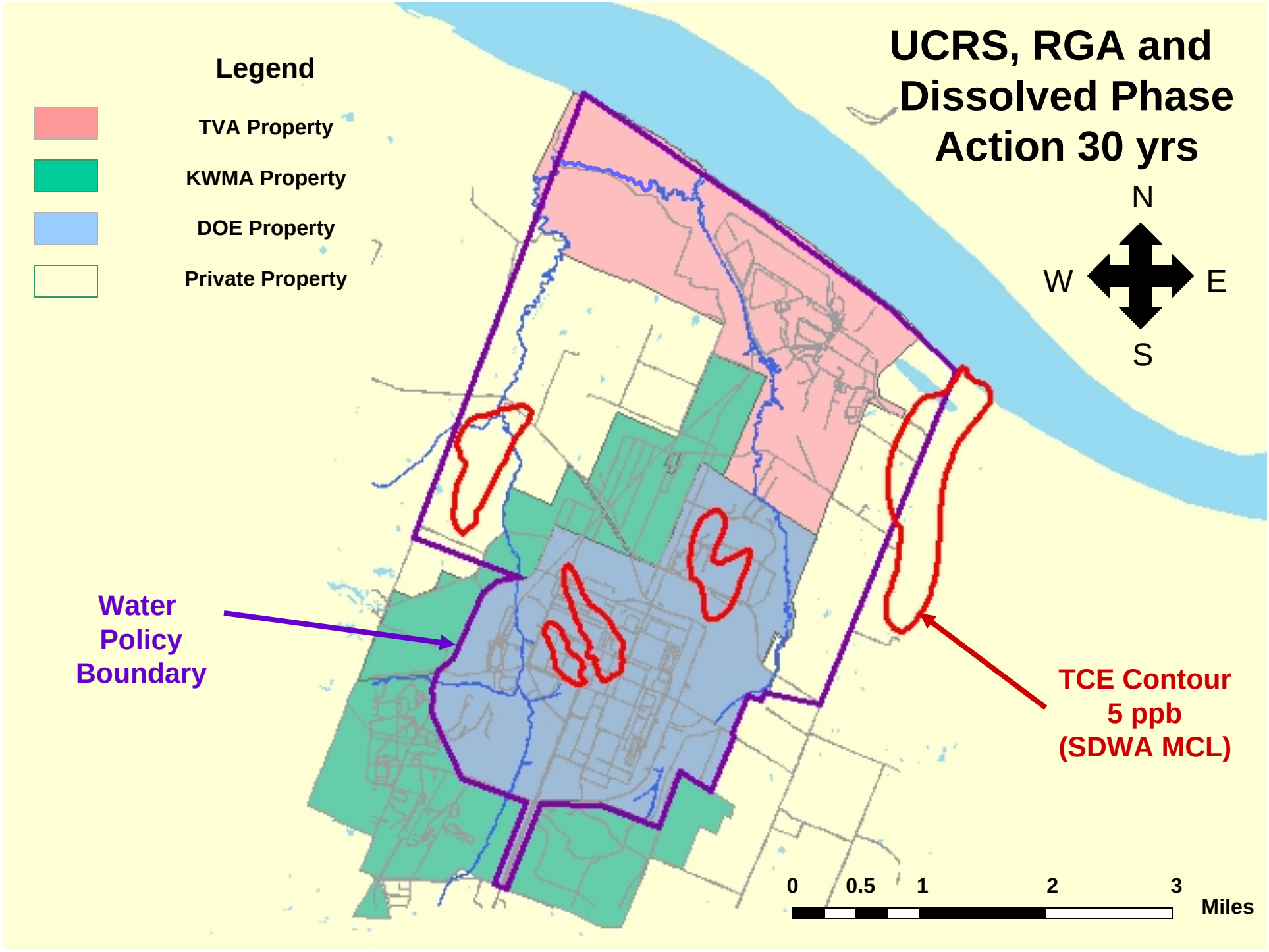
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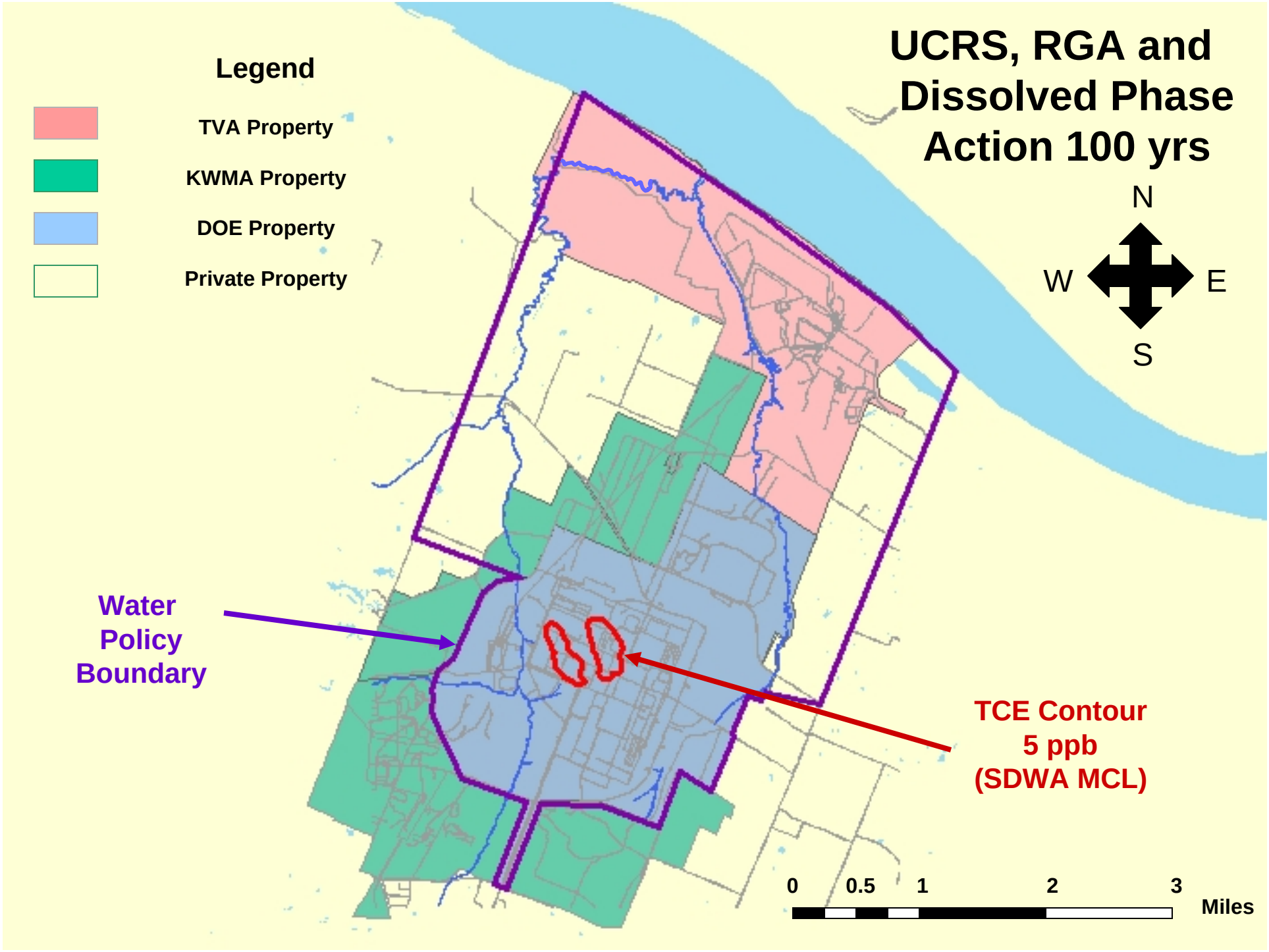
UCRS, RGA and Dissolved Phase Action 100 yrs
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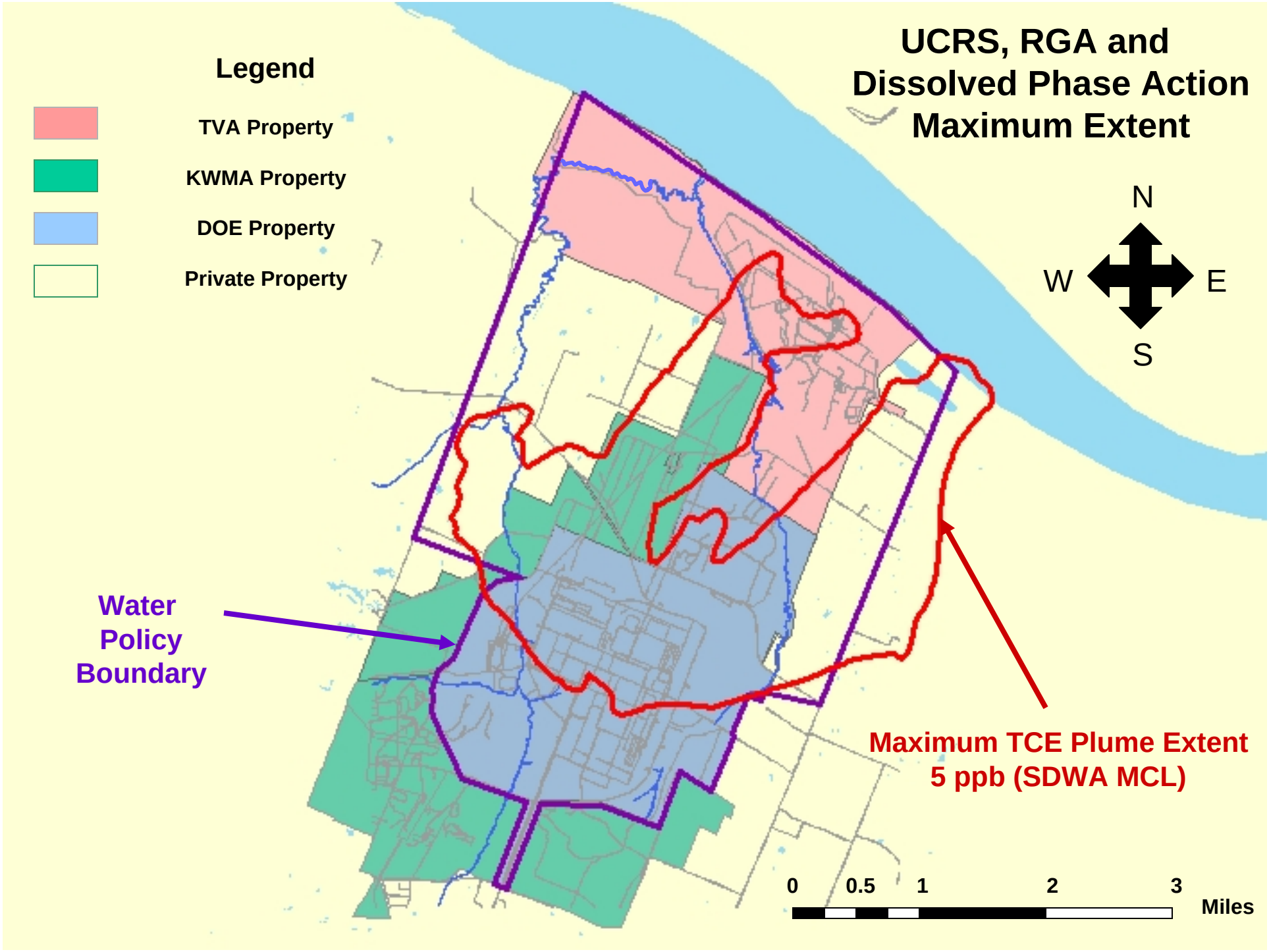
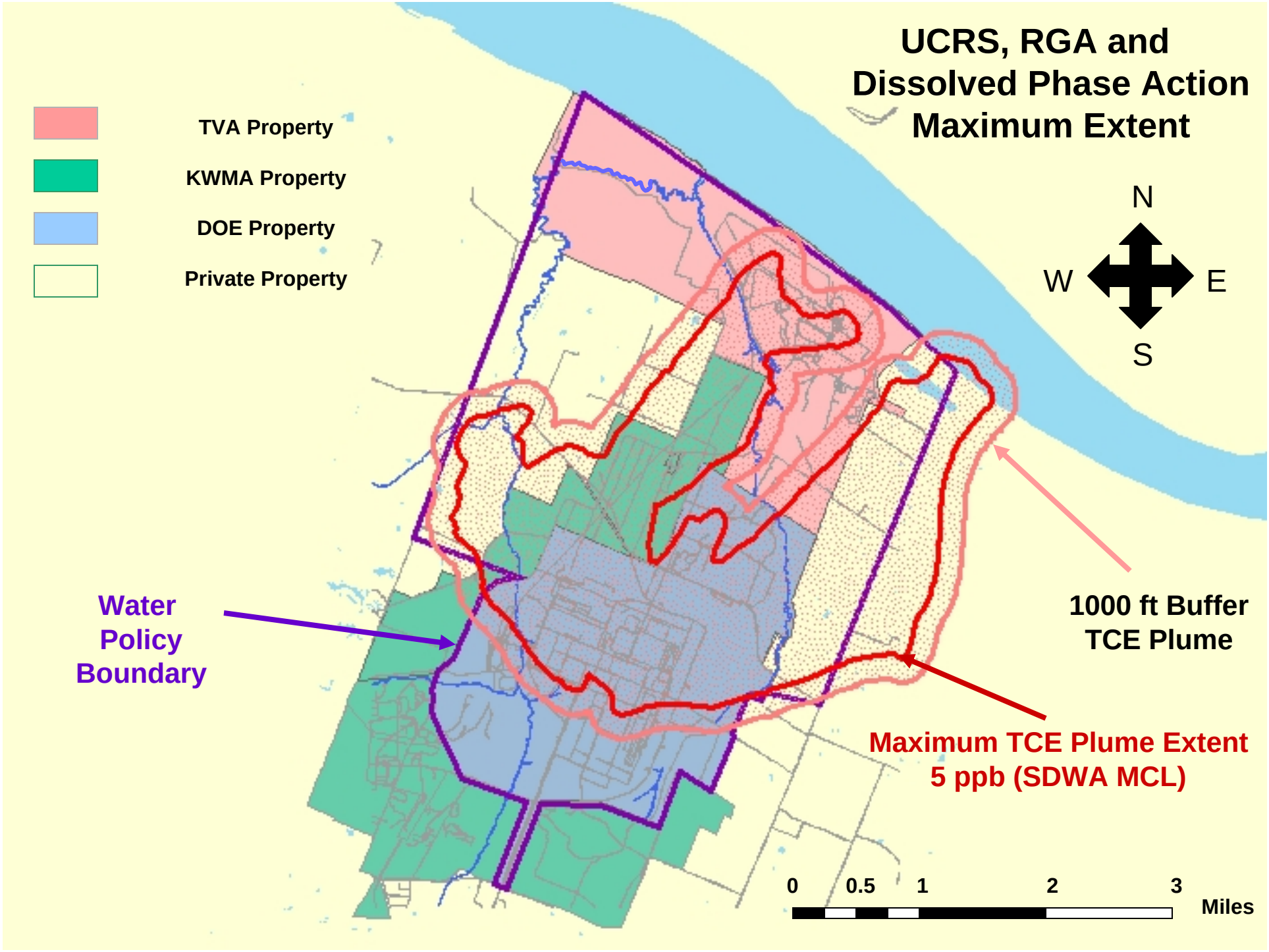

UCRS, RGA and
Dissolved Phase Action
Maximum Extent
Legend
TVA Property
KWMA Property
DOE Property
Private Property
N
W
E
S
Water
Policy
Boundary
Maximum TCE Plume Extent
5 ppb (SDWA MCL)
0
0.5
1
2
3
Miles


UCRS, RGA and
Dissolved Phase Action
Maximum Extent
TVA Property
KWMA Property
DOE Property
Private Property
N
W
E
S
Water
Policy
Boundary
1000 ft Buffer
TCE Plume
Maximum TCE Plume Extent
5 ppb (SDWA MCL)
0
0.5
1
2
3
Miles

Summary of Potentially Impacted Private Properties

- Maximum Extent Without Buffer
  - Approximately 3300 acres for all options
- Maximum Extent With Buffer
  - Approximately 4400 acres for all options

Property Acquisition Potential Options

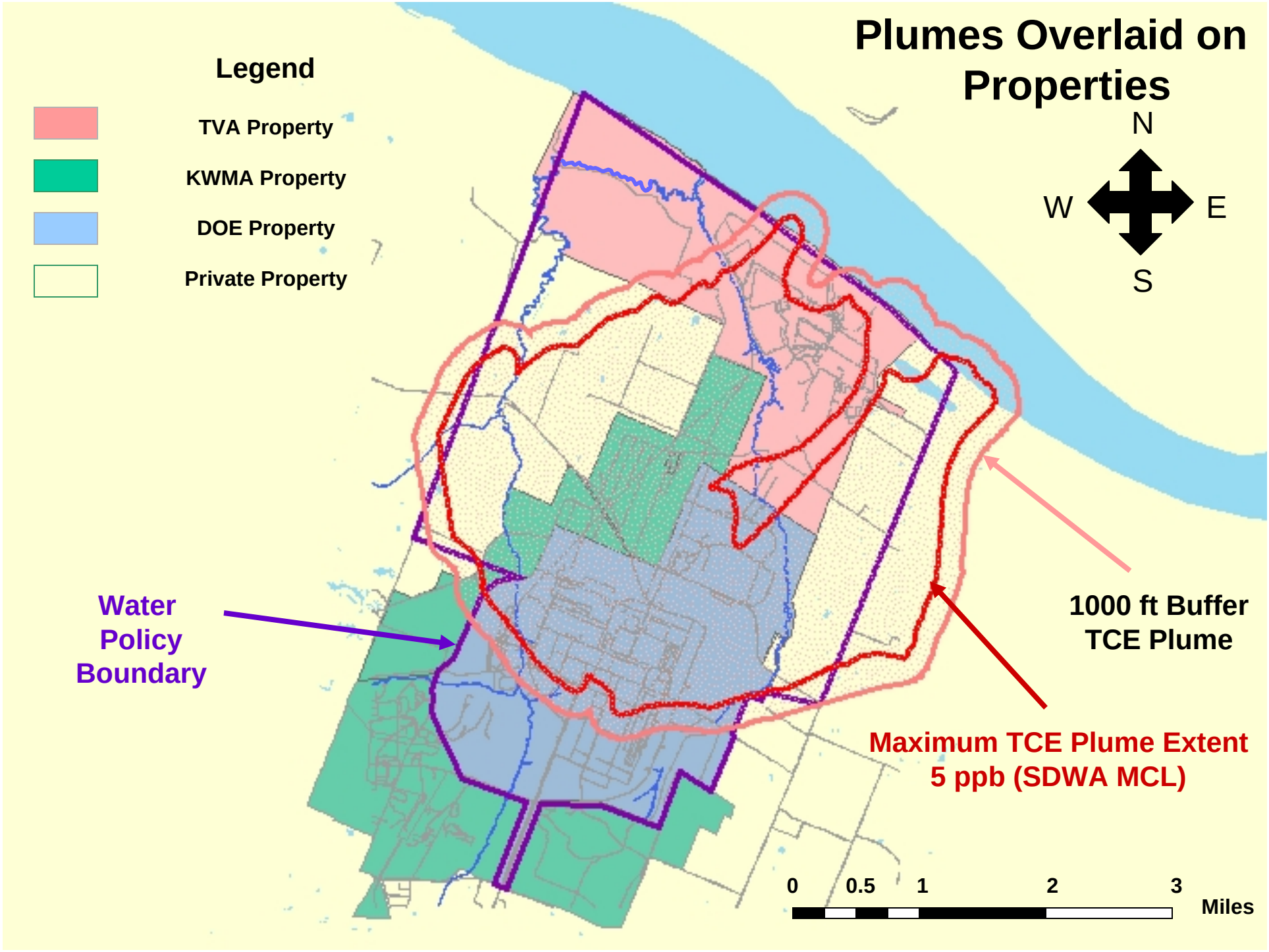
- **Goal is to identify different ways properties or interests in properties might be purchased in Kentucky**
- **Compiled by UK College of Law**
- **Identified ways include:**
  - **Fee simple ownership (Buy property outright)**
  - **Easements (Restrict use of the property) – several types**
    - **Limited scope easements**
      - **Restrict use of groundwater and/or surface water**
      - **Continuation of water policy**
    - **Expanded scope easements**
      - **Limit use of land, including use of groundwater and/or surface water**
      - **Continuation of water policy**

Property Acquisition Potential Costs

- Federal and state properties not considered
- Properties being evaluated as a group (mass appraisal)
- Fair market value estimates obtained using:
  - Assumes willing buyers and sellers
  - Sales of comparable properties in McCracken County
  - Easements based on similar state and federal programs
- Appropriate federal guidelines
  - *Uniform Appraisal Standards for Federal Land Acquisitions*
    - Provides standards for use in appraising properties taken for federal land use
  - Highest value and best use
    - *"The reasonably probable use that produces the highest property value"*

Property Acquisition Potential Costs

- **Detailed Analysis**
  - **Examined five remedial actions**
    - **No Action**
    - **Existing Pump and Treat**
    - **RGA Source Action Only**
    - **UCRS Source Action Only**
    - **UCRS, RGA, and Dissolved Plume Action**
  - **Different property sets based on maximum potential plume extent**
  - **Property costs determined based on:**
    - **Agricultural property**
    - **Rural residential property**


Plumes Overlaid on Properties
Legend
TVA Property
KWMA Property
DOE Property
Private Property
N
W
E
S
Water Policy Boundary
1000 ft Buffer TCE Plume
Maximum TCE Plume Extent 5 ppb (SDWA MCL)
0
0.5
1
2
3
Miles

Potentially Impacted Private Properties with Buffer Zone

		Potentially Impacted Private Properties					
Code	Potential Remedial Action	Total #	Total acres	Ag #	Ag acres	Res #	Res acres
NA	No Action	163	4641	63	4370	100	271
E P&T	Exisiting Pump and Treat	135	3452	50	3214	85	238
UCRS	UCRS Treatment Only	163	4641	63	4370	100	270
RGA	RGA Treatment Only	163	4641	63	4370	100	270
URD	UCRS/RGA & Dissolved Plume Treatment	158	4361	60	4102	98	259

- **Conservative estimates of maximum plume extent**
- **Further evaluation may reduce acreage**
- **Assumes entire impacted property is selected for purchase or easement**

Preliminary Cost Estimate Ranges

- Fee Simple (Existing Value)
  - $19 M to $27 M
- Fee Simple (Development Values)
  - $31 M to $47 M
- Limited Scope Easements
  - $2 M to $ 6 M
- Expanded Scope Easement
  - $9 M to $16 M

Preliminary Remedial Cost Estimates from Groundwater Feasibility Study (D2)

Code	Remedial Action	Remedial Costs ($ Million)	
		Low Range	High Range
NA	No Action	$ -	$ -
EP&T	Pump and Treat	$ 68	$ 68
UCRS	Primary Source Action	$ 28	$ 380
RGA	Secondary Source Action	$ 15	$ 175
UCD	P&S/Dissolved Phase Action	$ 208	$ 853

- No action does not include costs of long-term stewardship

Lower Range of Costs

Lower Range of Costs ($Millions)	Potential Remedial Actions				
Institutional Control Options	NA1	E P&T	UCRS	RGA	PSD
Remediation Cost	$ -	$ 68	$ 28	$ 15	$ 208
S&M Costs	$ 43	$ 36	$ 43	$ 43	$ 28
Fee Simple Purchase (Existing Values)	$ 24	$ 19	$ 24	$ 24	$ 23
Fee Simple Purchase (Development Values)	$ 41	$ 31	$ 41	$ 41	$ 39
Limited Scope Easement	$ 2	$ 2	$ 2	$ 2	$ 2
Expanded Scope Easement	$ 12	$ 9	$ 12	$ 12	$ 11
Water Policy Costs	$ 2	$ 2	$ 2	$ 2	$ 2

- **Remediation costs based on 30-year evaluation period**
- **Easement costs include continuation of the current water policy**

Upper Range of Costs

Upper Range of Costs ($Millions)	Potential Remedial Actions				
Institutional Control Options	NA1	E P&T	UCRS	RGA	PSD
Remediation Cost	$ -	$ 68	$ 380	$ 175	$ 853
S&M Costs	$ 43	$ 36	$ 43	$ 43	$ 28
Fee Simple Purchase (Existing Values)	$ 27	$ 22	$ 27	$ 27	$ 26
Fee Simple Purchase (Development Values)	$ 47	$ 36	$ 47	$ 47	$ 45
Limited Scope Easement	$ 6	$ 4	$ 6	$ 6	$ 5
Expanded Scope Easement	$ 16	$ 12	$ 16	$ 16	$ 15
Water Policy Costs	$ 2	$ 2	$ 2	$ 2	$ 2

- **Remediation costs based on 30-year evaluation period**
- **Easement costs include continuation of the current water policy**

Summary

- Consistent with the Congressional Directive:
  - Identified purchase options
  - Identified maximum extent of the area overlying the plume
  - Developed costs of remedial action options
  - Developed costs of property acquisition options
- Draft report under review
- Any policy decisions would consider additional information:
  - No specific actions being taken
  - No specific policy decisions being made

Revised Schedule/Public Interaction

Item	Date
Draft Report Due	9/15
CAB Presentation #2	9/21
Public Presentation #2	11/14
CAB Presentation #3	11/16
Final Report Due	11/22