Tool for Developing Integrated Strategies for Decontamination and Waste Management

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Waste Management

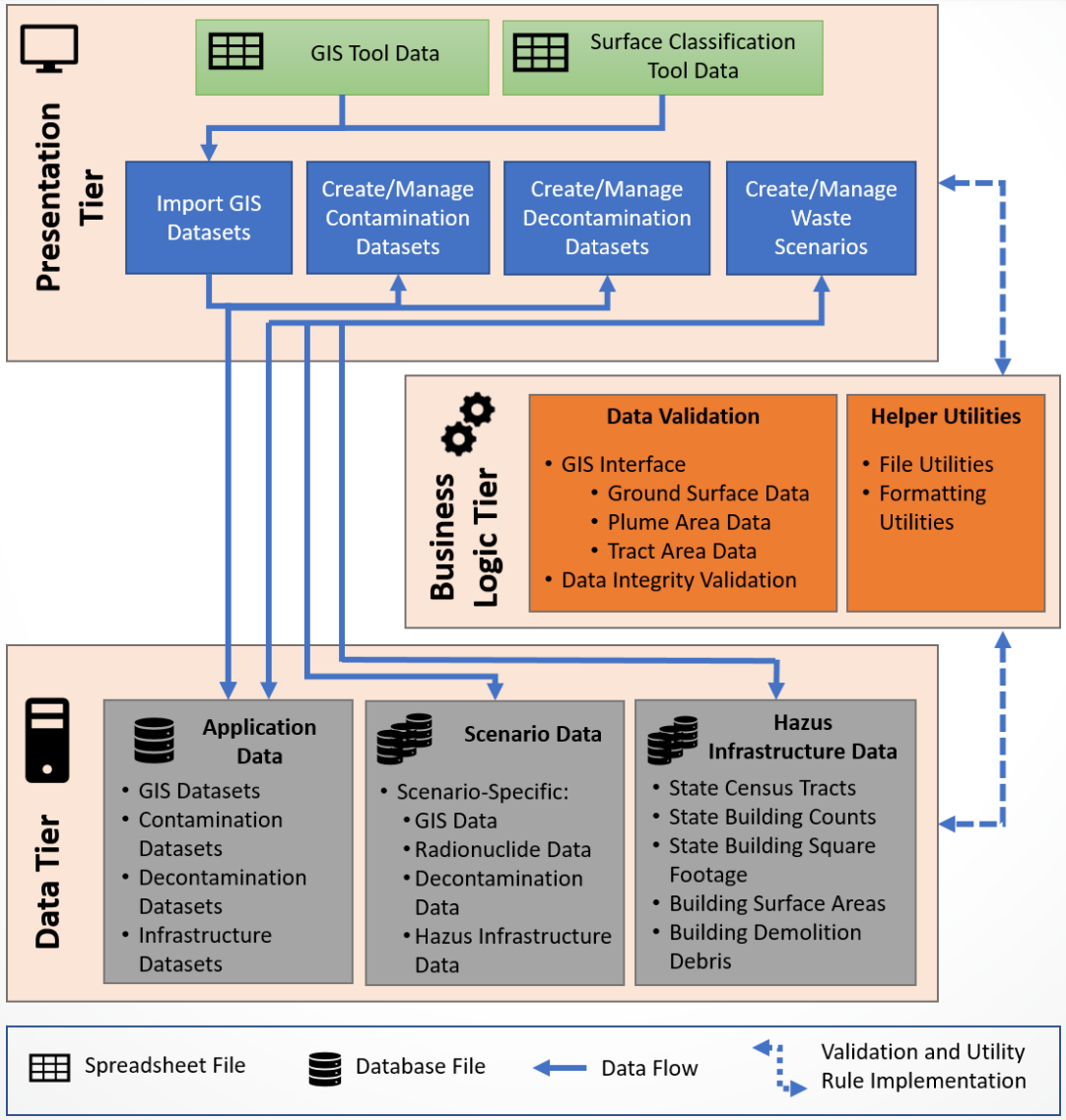
Why is this important?

- Generation Starts at Initiation of Incident
- Need for Pre-Planning
- Decontamination Strategy has Profound Impact on Waste Quantity, Characteristics, and Logistics

WEST: Description

- GIS-based tool that can assist in planning/preparedness activities at all levels of government
- Waste Estimation Support Tool (WEST) facilitates:
  - First-order estimate of waste quantity and activity
  - Help identify potential triage/staging/storage/disposal options
  - Assess impact of decontamination strategies on waste generation
  - Asses impact of waste management strategies on decontamination decisions
  - Identifying starting points for policy discussions

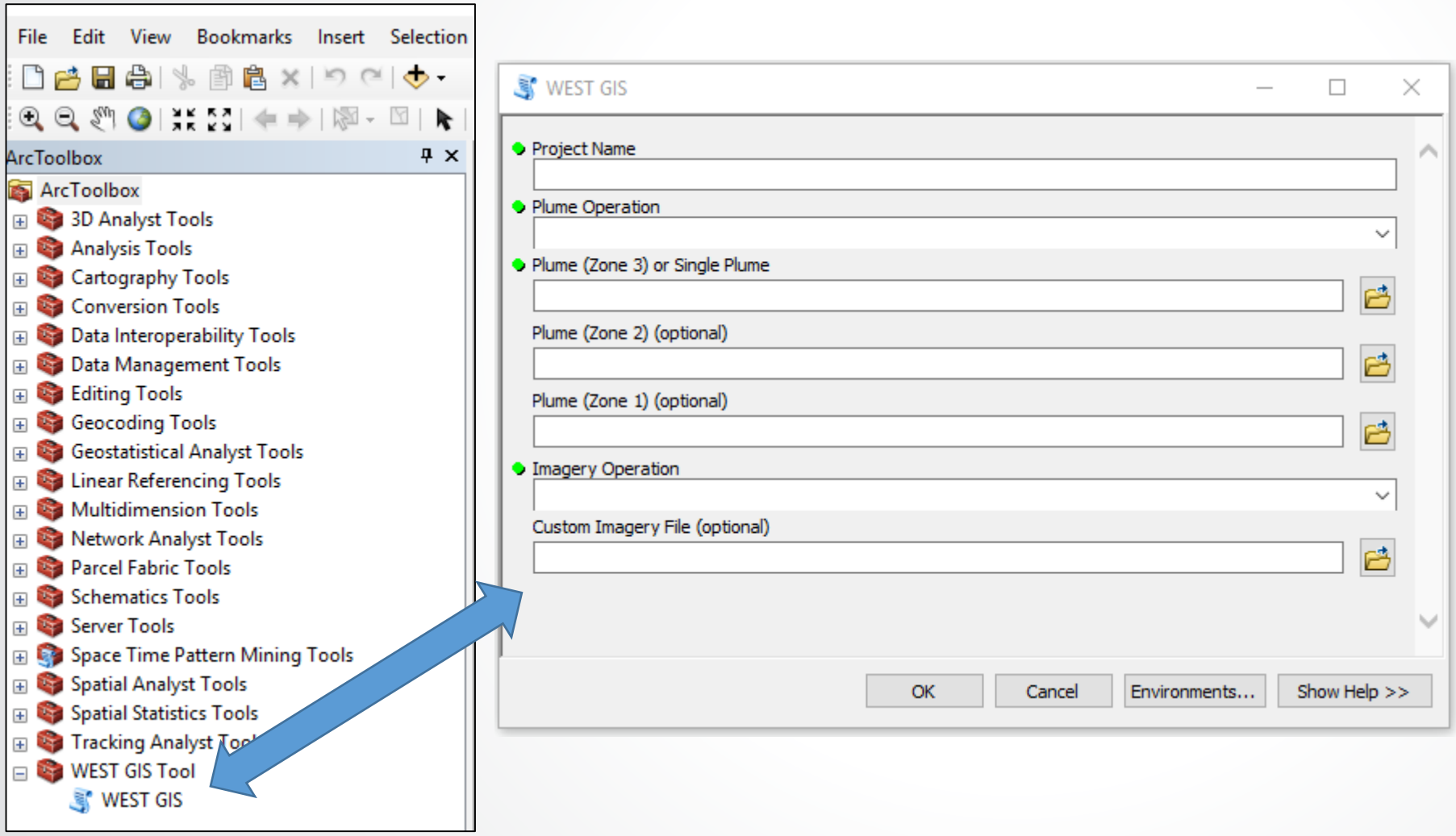
WEST Overall Methodology



WARRP Scenario

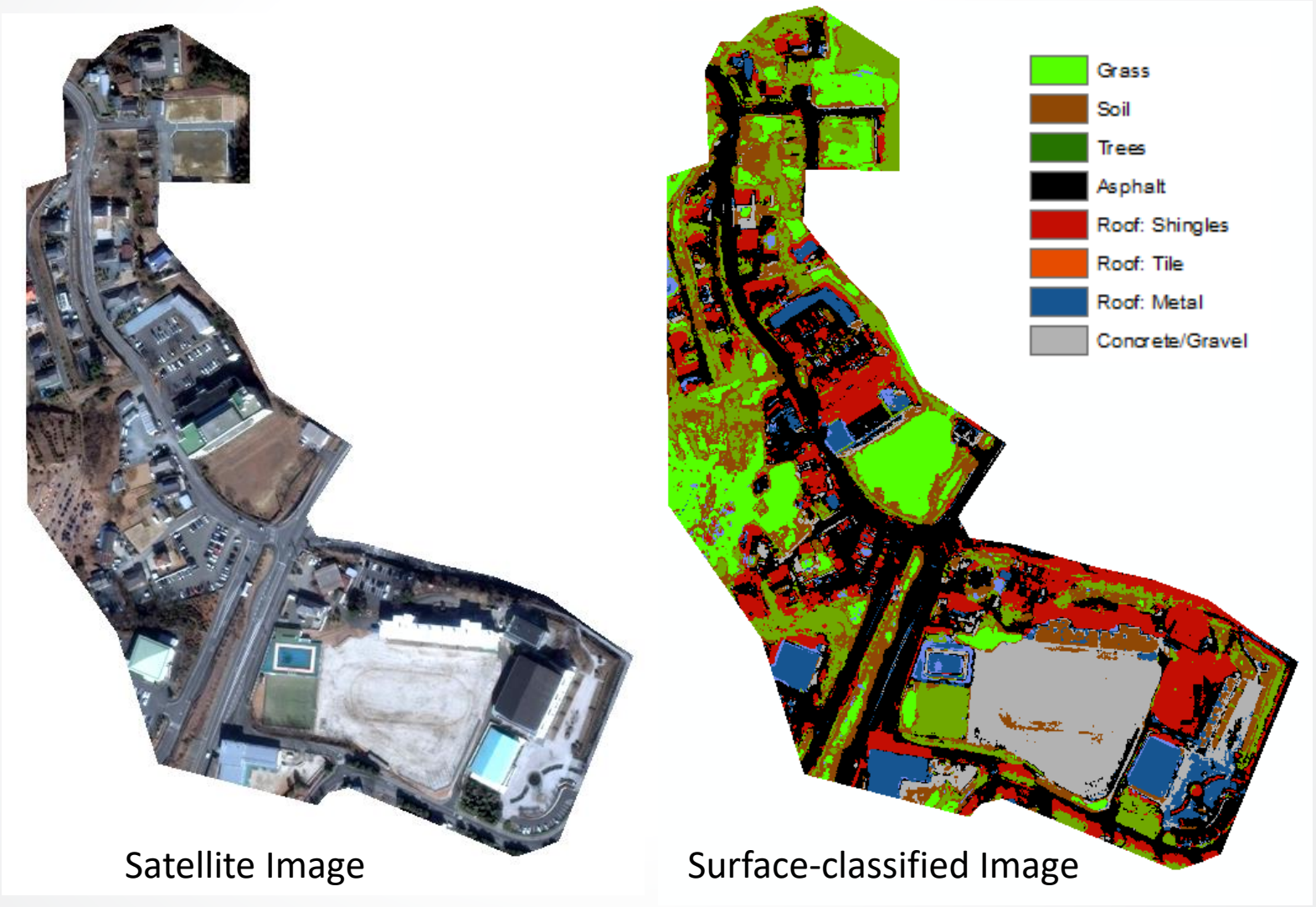
WARRP Movie

GIS Module



- GIS module functions as an ArcGIS add-in
- Point and click – little GIS expertise required
- Image analysis method built in
- Ability to launch Waste Estimator directly from ArcGIS
- Generates necessary files to import into WEST Calculation Module

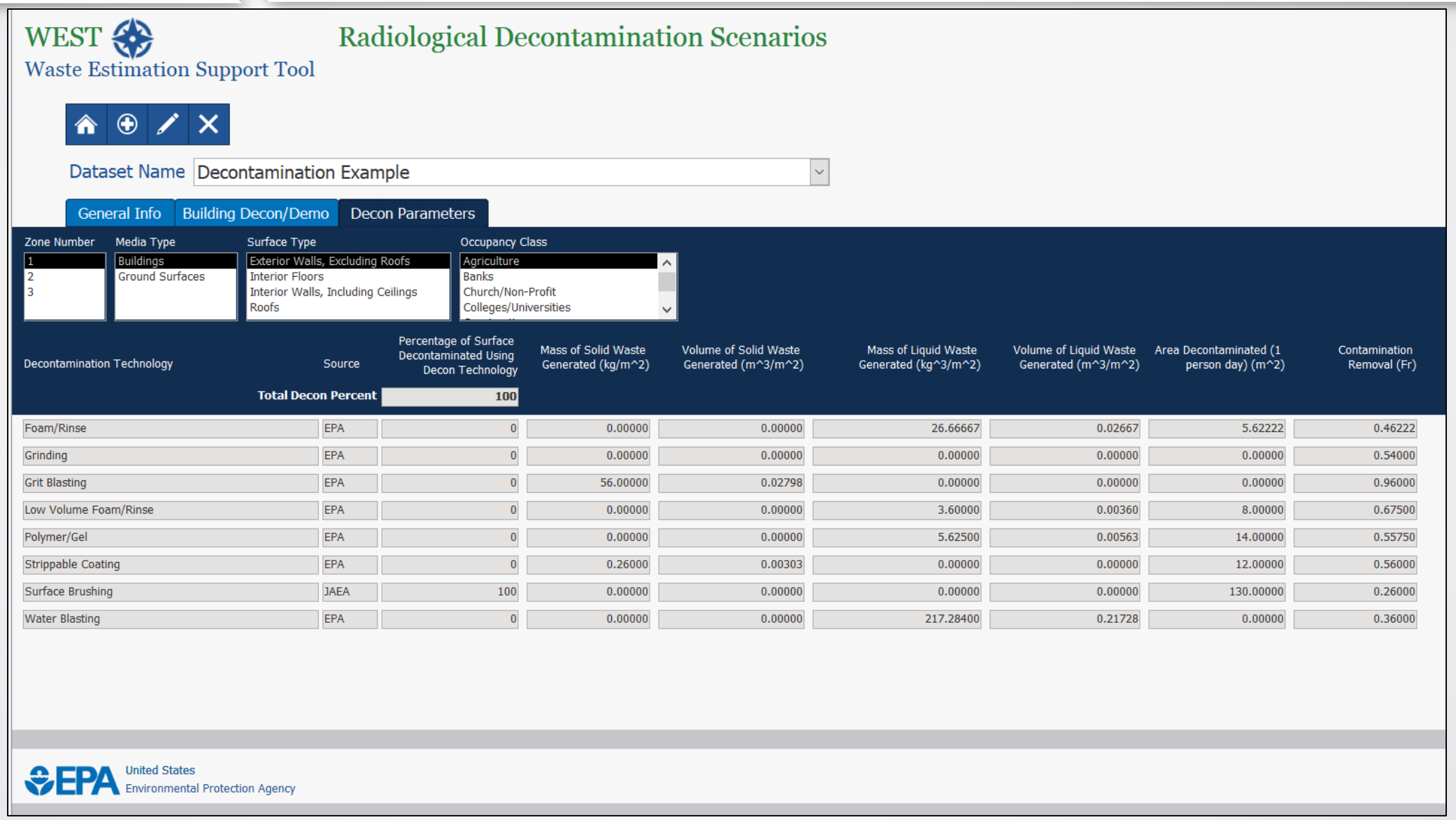
GIS Module: Surface Classification



Satellite Image

Surface-classified Image

Calculation Module: Building Decon



WEST
Waste Estimation Support Tool

Radiological Decontamination Scenarios

Dataset Name: Decontamination Example

General Info | Building Decon/Demo | Decon Parameters

Zone Number: 1, 2, 3

Media Type: Buildings, Ground Surfaces

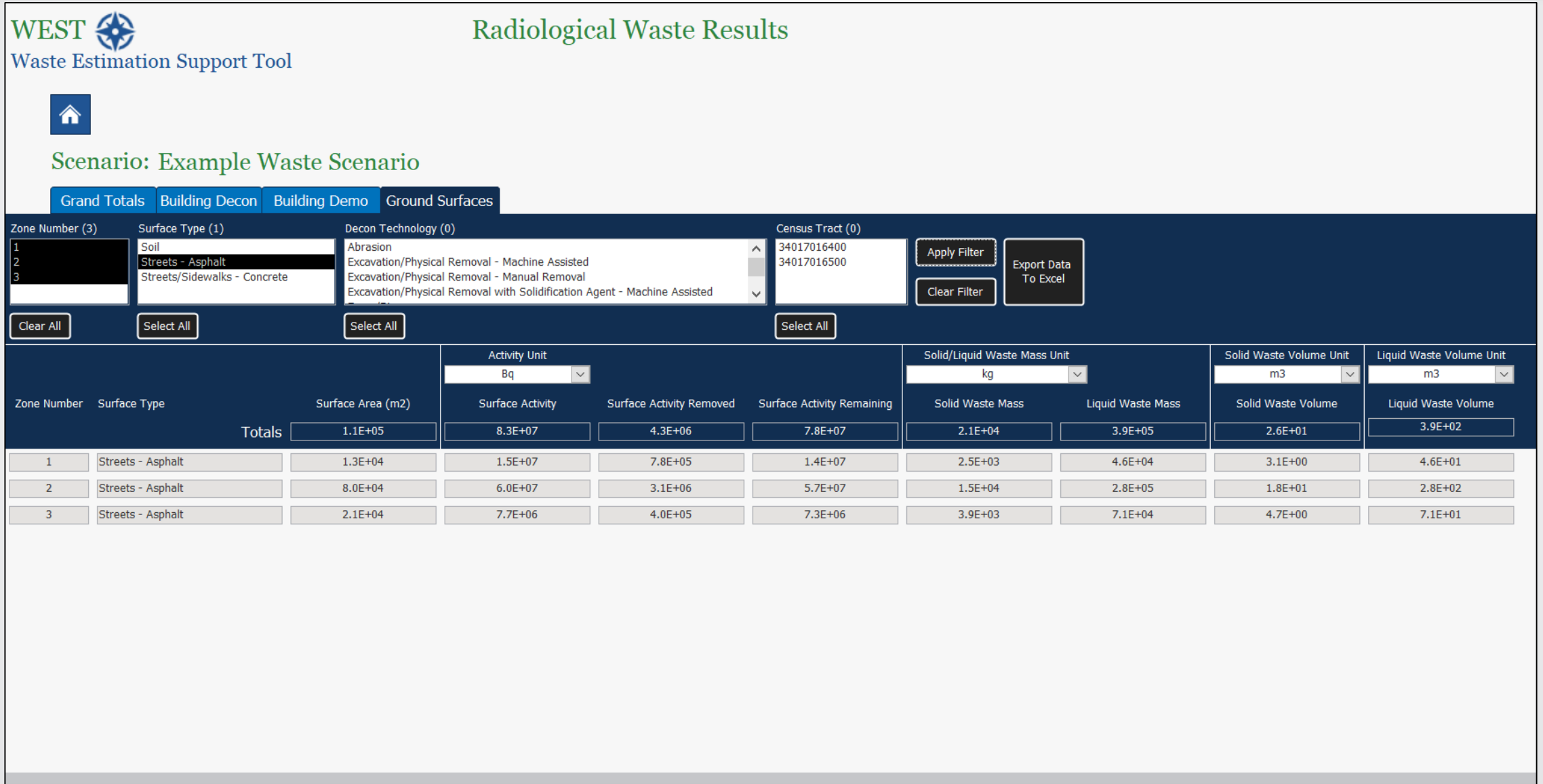
Surface Type: Exterior Walls, Excluding Roofs; Interior Floors; Interior Walls, Including Ceilings; Roofs

Occupancy Class: Agriculture; Banks; Church/Non-Profit; Colleges/Universities

Decontamination Technology	Source	Percentage of Surface Decontaminated Using Decon Technology	Mass of Solid Waste Generated (kg/m^2)	Volume of Solid Waste Generated (m^3/m^2)	Mass of Liquid Waste Generated (kg^3/m^2)	Volume of Liquid Waste Generated (m^3/m^2)	Area Decontaminated (1 person day) (m^2)	Contamination Removal (Fr)
Total Decon Percent		**100**						
Foam/Rinse	EPA	0	0.00000	0.00000	26.66667	0.02667	5.62222	0.46222
Grinding	EPA	0	0.00000	0.00000	0.00000	0.00000	0.00000	0.54000
Grit Blasting	EPA	0	56.00000	0.02798	0.00000	0.00000	0.00000	0.96000
Low Volume Foam/Rinse	EPA	0	0.00000	0.00000	3.60000	0.00360	8.00000	0.67500
Polymer/Gel	EPA	0	0.00000	0.00000	5.62500	0.00563	14.00000	0.55750
Strippable Coating	EPA	0	0.26000	0.00303	0.00000	0.00000	12.00000	0.56000
Surface Brushing	JAEA	100	0.00000	0.00000	0.00000	0.00000	130.00000	0.26000
Water Blasting	EPA	0	0.00000	0.00000	217.28400	0.21728	0.00000	0.36000

EPA United States Environmental Protection Agency

Calculation Module Outdoor Area Decon



WEST
Waste Estimation Support Tool

Radiological Waste Results

Scenario: Example Waste Scenario

Grand Totals | Building Decon | Building Demo | Ground Surfaces

Zone Number (3): 1, 2, 3 — Clear All

Surface Type (1): Soil, Streets - Asphalt, Streets/Sidewalks - Concrete — Select All

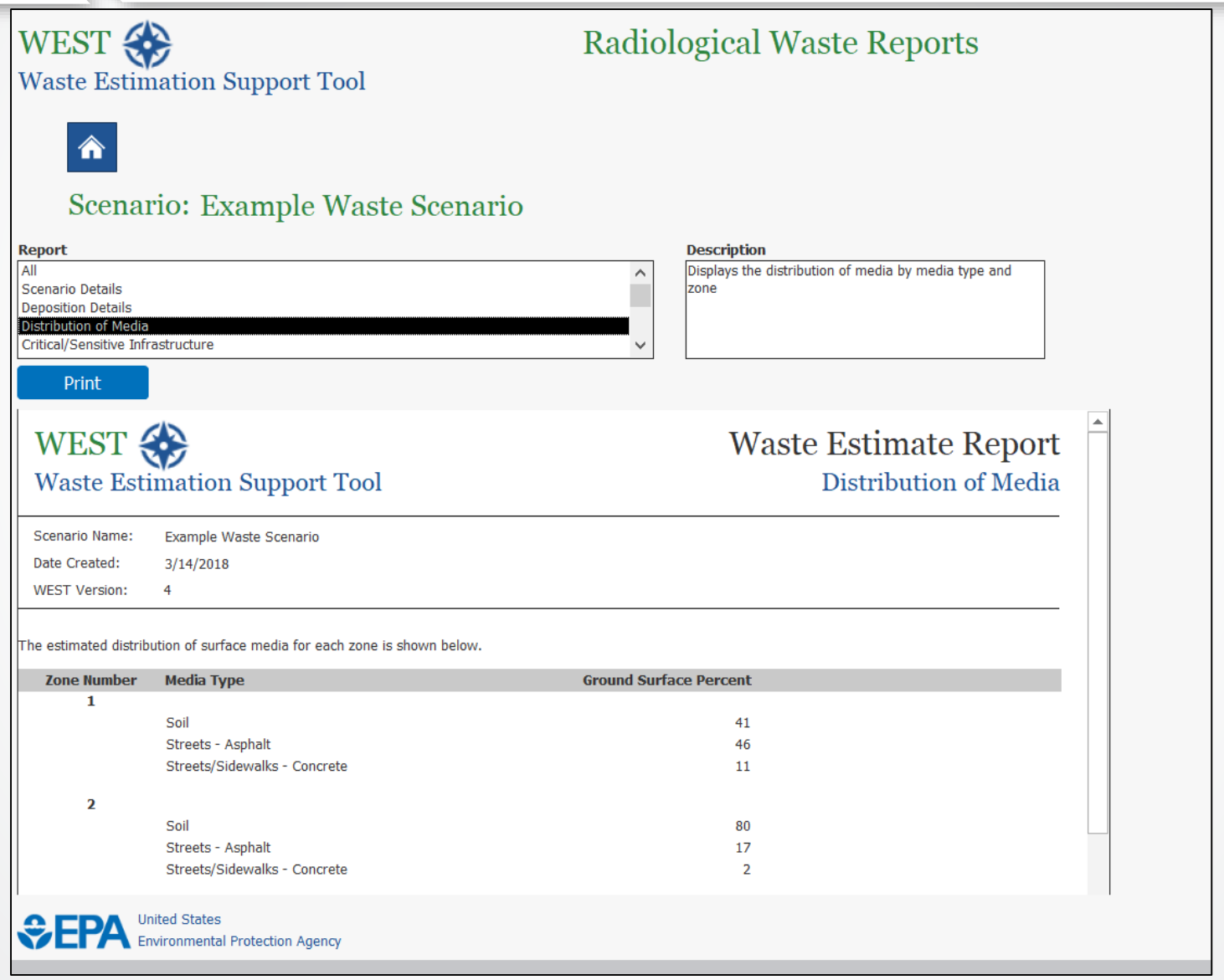
Decon Technology (0): Abrasion, Excavation/Physical Removal - Machine Assisted, Excavation/Physical Removal - Manual Removal, Excavation/Physical Removal with Solidification Agent - Machine Assisted — Select All

Census Tract (0): 34017016400, 34017016500 — Select All

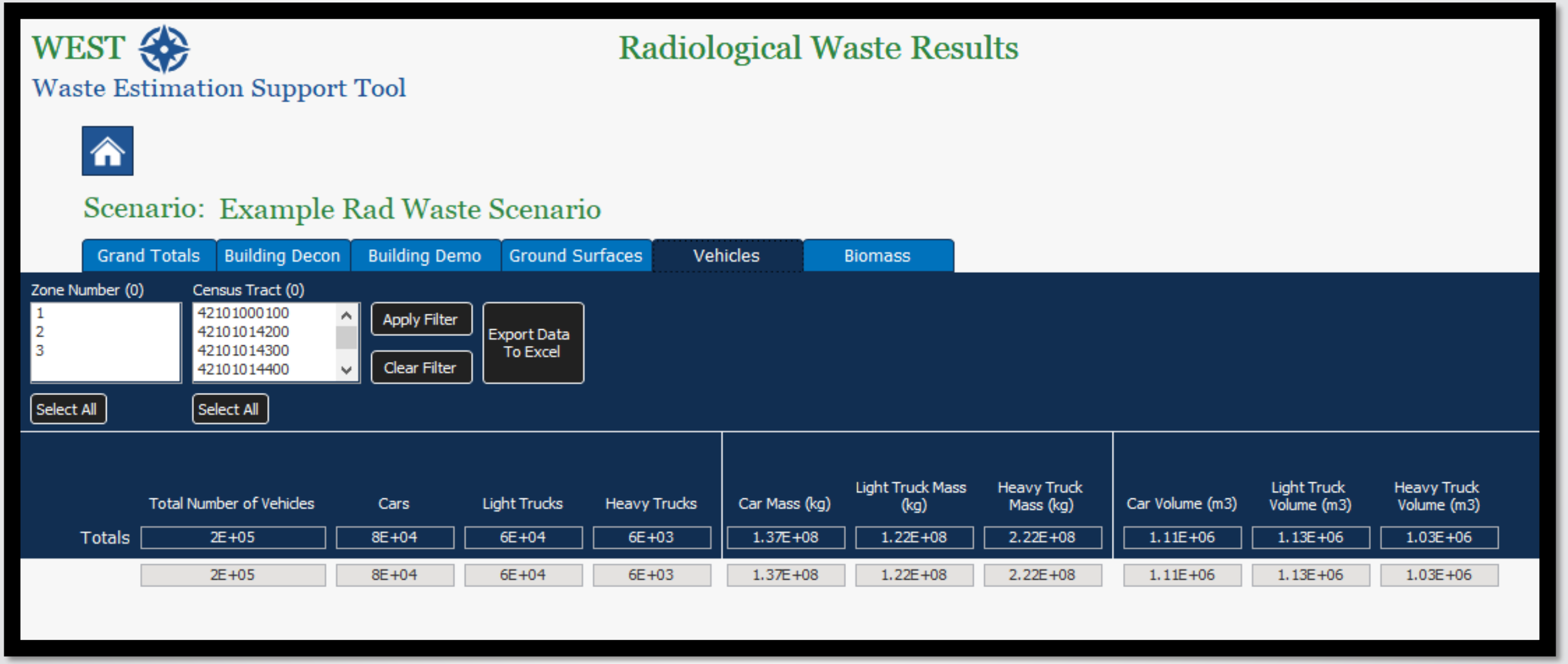
Apply Filter | Clear Filter | Export Data To Excel

			Activity Unit: Bq			Solid/Liquid Waste Mass Unit: kg		Solid Waste Volume Unit: m3	Liquid Waste Volume Unit: m3
Zone Number	Surface Type	Surface Area (m2)	Surface Activity	Surface Activity Removed	Surface Activity Remaining	Solid Waste Mass	Liquid Waste Mass	Solid Waste Volume	Liquid Waste Volume
Totals		1.1E+05	8.3E+07	4.3E+06	7.8E+07	2.1E+04	3.9E+05	2.6E+01	3.9E+02
1	Streets - Asphalt	1.3E+04	1.5E+07	7.8E+05	1.4E+07	2.5E+03	4.6E+04	3.1E+00	4.6E+01
2	Streets - Asphalt	8.0E+04	6.0E+07	3.1E+06	5.7E+07	1.5E+04	2.8E+05	1.8E+01	2.8E+02
3	Streets - Asphalt	2.1E+04	7.7E+06	4.0E+05	7.3E+06	3.9E+03	7.1E+04	4.7E+00	7.1E+01

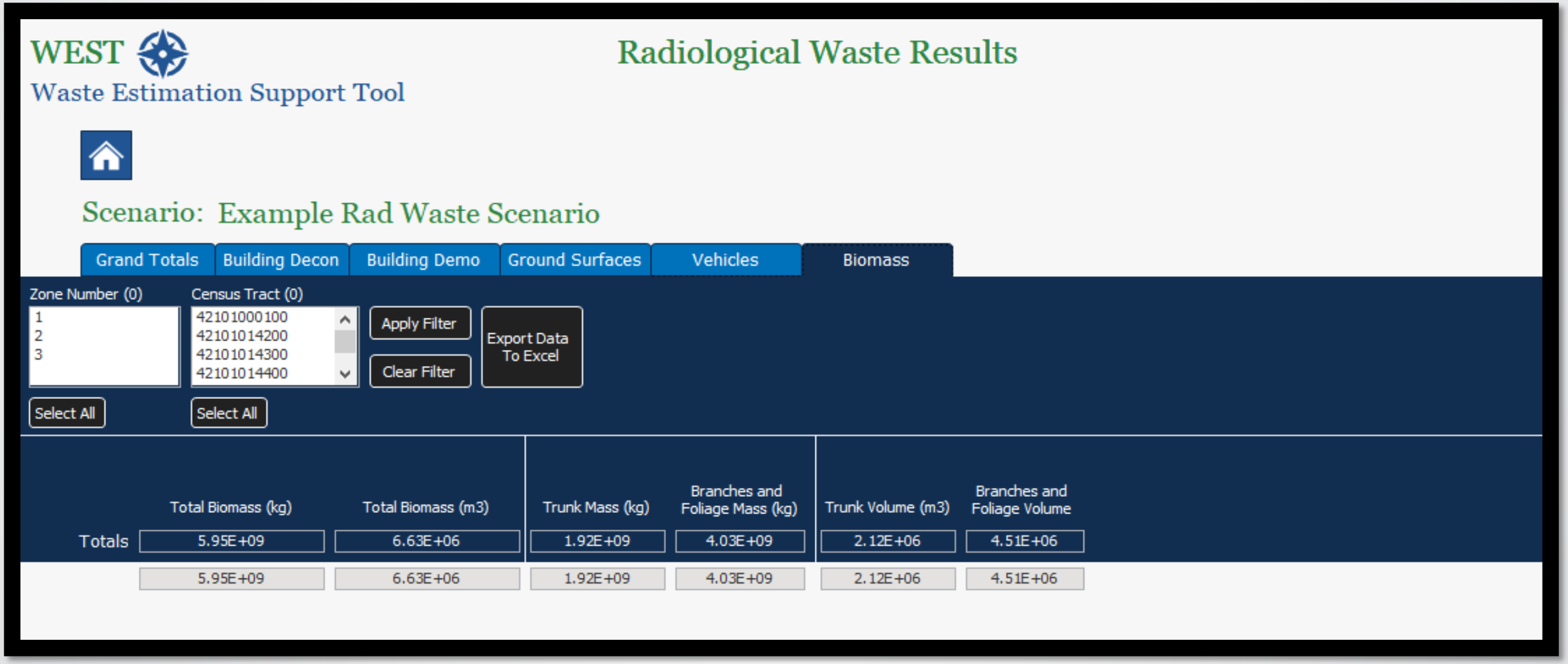
Calculation Module: Reporting



New Enhancements: Vehicles

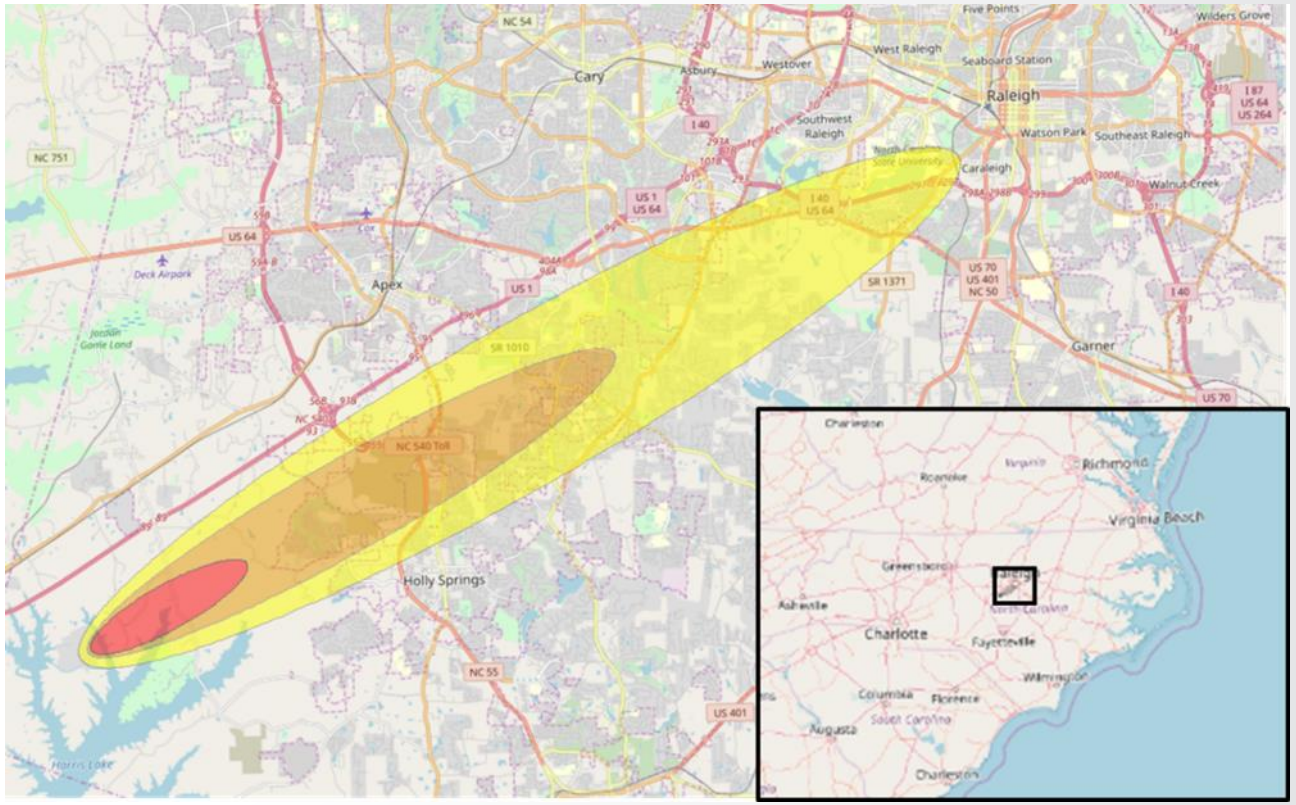


New Enhancements: Vegetation



Example Case Study

- A case study was conducted using EPA's waste managment tools
- Goal was to model the impacts of decon strategy on the waste stream and supporting processes
- Assumed a hypothetical incident at the Shearon Harris Nuclear Power Plant located in New Hill, NC
- Cesium 137 (Cs-137) was selected as the principal source of contamination



Example Decontamination Approaches

- Two separate decontamination approaches considered:
  - Decon Strategy 1: primarily dry decontamination technologies
  - Decon Strategy 2: combination of wet and dry decontamination technologies

Decon Technology	Buildings				Ground Surfaces		
	Exterior Walls, Excluding Roofs	Interior Floors	Interior Walls, Including Ceilings	Roofs	Soil	Streets - Asphalt	Streets/ Sidewalks – Concrete
Low Volume Foam/Rinse	W						
Water Blasting						W	W
Polymer/Gel							
Brushing/Pressure Washing				W			
Grinding				D			
Manual Removal							
Machine Assisted Removal							
Abrasion							
Surface Brushing	D						D
Soil Inversion					D		
Road Sweeper						D	

D - Greater emphasis for strategy 1

W - Greater emphasis for strategy 2

- Equal emphasis for both strategies

Example Results

- Decontamination Strategy 2 generated significantly more aqueous waste than Decontamination Strategy 1
- This estimate did not consider cost, time, or decon efficacy

Decon Strategy 1 (dry)

Zone Number	Solid Waste Volume (yd^3)	Aqueous Waste Volume (gal)
1	2.15E+05	2.42E+06
2	9.79E+05	1.58E+07
3	1.13E+06	2.41E+06
Total	2.33E+06	2.07E+07

Decon Strategy 2 (wet)

Zone Number	Solid Waste Volume (yd^3)	Aqueous Waste Volume (gal)
1	2.15E+05	3.74E+07
2	9.79E+05	1.35E+08
3	1.13E+06	3.60E+08
Total	2.33E+06	5.33E+08

Conclusion

- Waste management is a key component of the response and recovery process
- The inability to effectively manage waste can greatly increase costs and delay reoccupancy of remediated sites
- Homeland Security Research Program (HSRP) uses its capabilities/expertise to develop data and decision making tools that meet the waste management needs of its EPA stakeholders
- Develop tools for systematically evaluating waste management issues with the purpose of optimizing decisions with consideration to large-scale recovery efforts

Conclusion Cont.

- Minor deviations in decontamination strategy can have significant impacts on the overall waste stream
- Pre-planning efforts are important and should consider waste staging/storage limitations
  - Integrate waste staging and storage selection into routine planning (before an incident occurs)
  - Minor differences in the decontamination strategy can significantly impact the logistics of waste

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Questions?

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