



Choosing Smart Locations: A GIS Tool for Better Facility Siting

New Partners for Smart Growth

February 4, 2017

GSA Business Context

375+ million square feet for 1 million workers

8,700 buildings in **2,000+** communities

482 historic buildings with 80+ NHLs

Annual buildings budget of **\$10 Billion**

Courthouses, border stations, IRS offices...

EPA Office of Sustainable Communities

Helps communities pursue smart growth strategies through:

- Grants and technical assistance
- Partnerships
- Research and tool development



Overview

- EPA's Smart Location Database
- Smart Location Calculator overview
- SLC application
- Q&A



Why model VMT?

- **Location of federal/state facilities impacts local communities:**
 - **Development and sustainability goals**
 - **Land conservation**
 - **Access to employment and services**
 - **Congestion, pollution, fuel consumption**
 - **Infrastructure costs/impacts**
- **National modelling can support more informed planning & better understanding of impacts**
- **Promote location efficient site decisions**

Introduction to the Smart Location Database



- Density
- Diversity
- Design of Street Network
- Destination Accessibility
- Distance to Transit



Introduction to the Smart Location Database

- **EPA's Smart Location Database (SLD)**
 - Nationwide geographic data resource including more than 90 attributes summarizing characteristics such as diversity of land use, neighborhood design, destination accessibility, employment, and demographics.
 - Data sources include American Community Survey, NAVTEQ streets, Longitudinal Employment Household Dataset
 - Find more information about the SLD, including interactive mapping, data downloads and user guide at <http://www2.epa.gov/smartgrowth/smart-location-mapping#SLD>

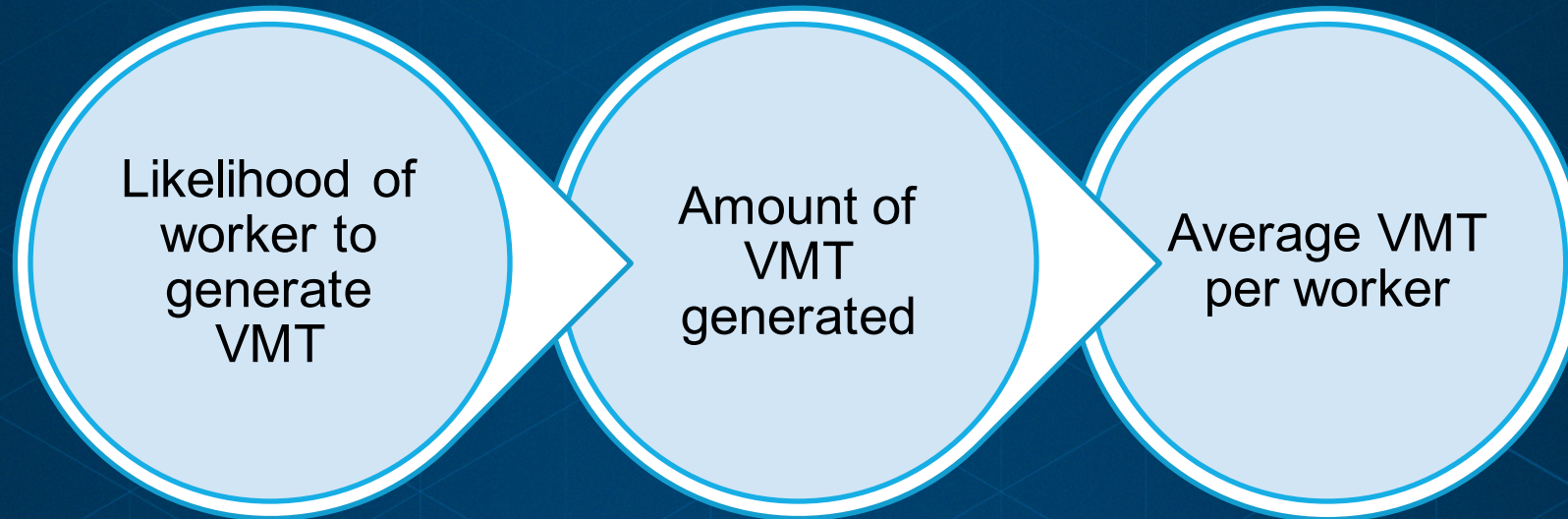
Background to the Smart Location Calculator

- Much like energy efficiency, location efficiency reduces resource demands while fostering a healthier, more sustainable built environment and providing equitable access to government jobs and services.
- Location-efficient commercial facilities are generally:
 - Accessible via multiple transportation options, including public transit and active transportation;
 - Centrally-located within their “commute shed” or region so as to maximize accessibility and minimize travel distances for employees and other users; and
 - Integrated within a mixed-use environment that offers easy access to services and destinations.

SLC Research Questions

- **What measures of location efficiency would enable us to compare facility locations relative to each other – ie put numbers to the policy?**
- **How can we fill the gap where there has been little research into the effect of the built environment around workplace locations?**
- **How can we estimate worker vehicle miles traveled (VMT) and greenhouse gas emissions (GHG) associated with that travel?**

SLC Model: Modelling Process



SLC Results

- The block group scores are categorized using the following scale:

90-100 = Excellent



80-89 = Very good



70-79 = Good



60-69 = Fair



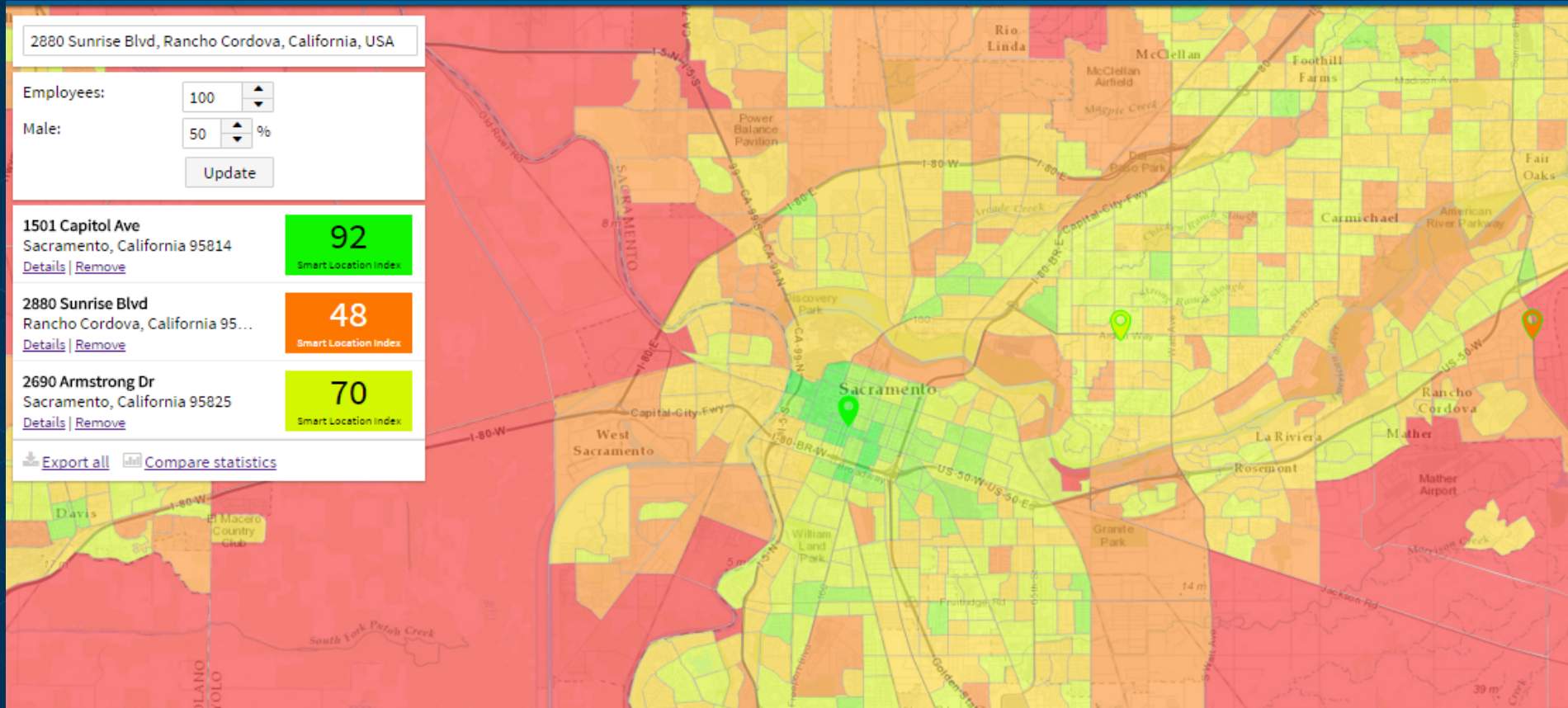
40-59 = Low



<40 = Very low



SLC Demonstration



<https://www.slc.gsa.gov/slc>

SLC Demonstration

Smart Location Calculator Measuring the environmental benefits of workplace location efficiency

Smart Growth GSA

Where do you work?

Business address...

Take me to the application

Enter facility address

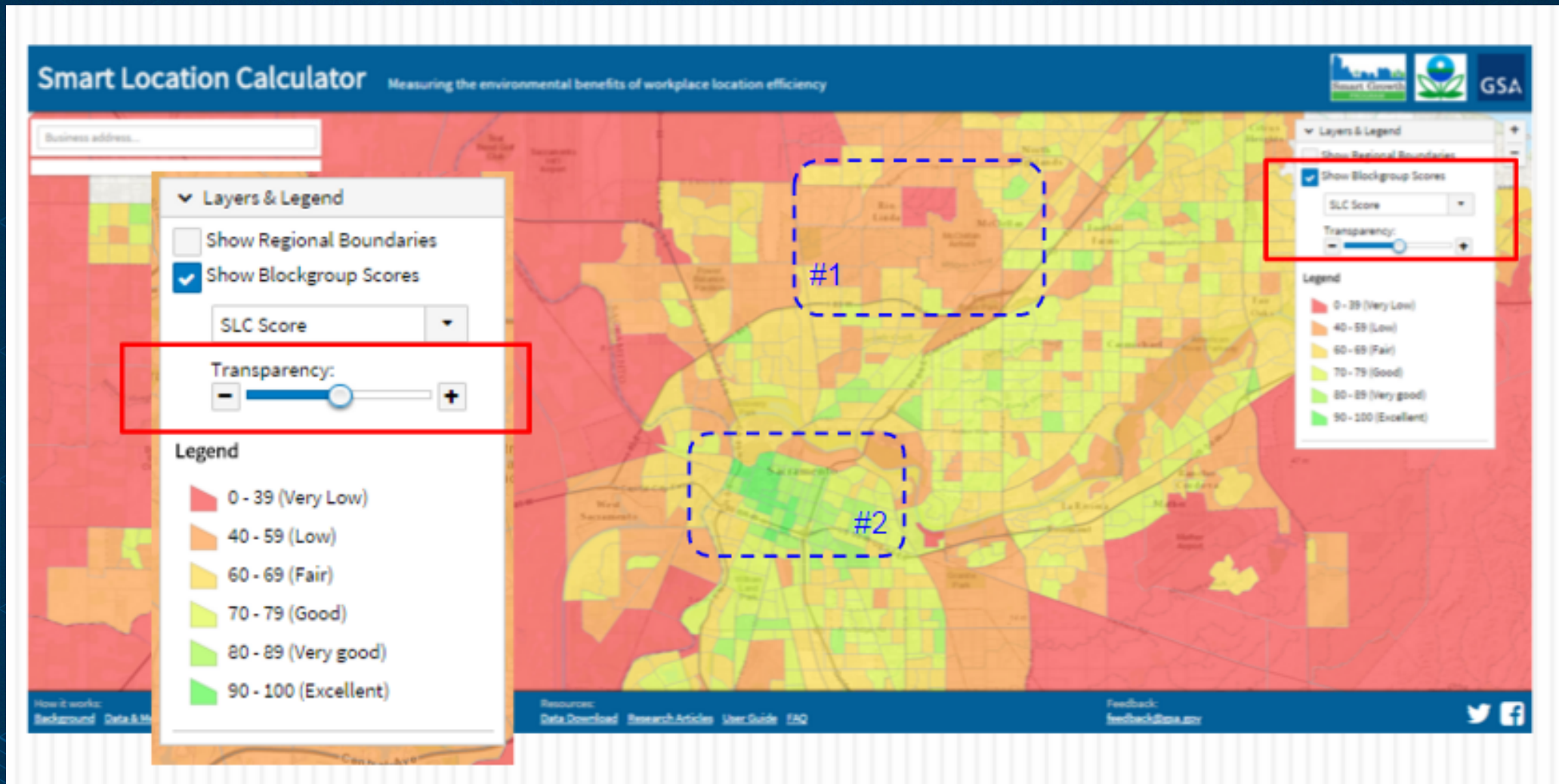
Navigate to the application

How it works: Background Data & Methodology

Resources: Data Download Research Articles User Guide FAQ

Feedback: feedback@gsa.gov

SLC Demonstration



SLC Demonstration

Smart Location Calculator Measuring the environmental benefits of workplace location efficiency

801 I St, Sacramento, California, USA

Employees: 100
Male: 50 %

801 I St, Sacramento, Ca
93 Smart Location Index

Distance to nearest transit stop: 0.05 miles
Distance to rail transit: 0.08 miles

801 I St, Sacramento, California 95814
93 Smart Location Index | **100** Block Group SU

Distance to nearest transit stop: 0.05 miles
Distance to rail transit: 0.08 miles

Use average block group distance to transit values
 Existed in 2010
 Occupied in 2010

Re-calculate Score

Layers & Legend
 Show Regional Boundaries
 Show Blockgroup Scores
No legend

Download | Research Articles | User Guide | FAQ

Feedback: feedback@gsa.gov

SLC Demonstration

Smart Location Calculator

Measuring the environmental benefits of workplace location efficiency

4011 Berrendo Dr, Sacramento, California, USA

4011 Berrendo Dr, Sacramento, California, USA

Employees:

100



Male:

50



%

Update

801 I St
Sacramento, California 95814

93

Smart Location Index


[Details](#) | [Remove](#)

4011 Berrendo Dr
Sacramento, California 95864

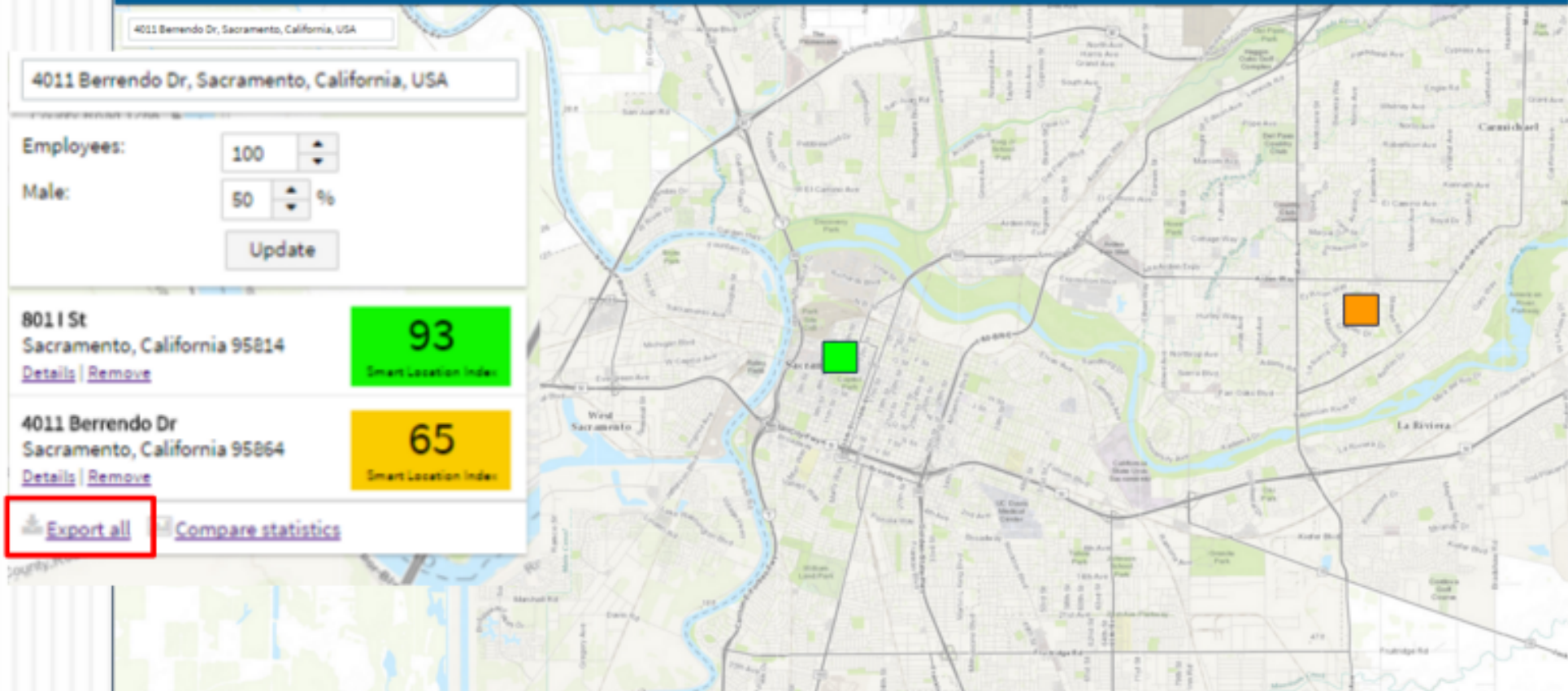
65

Smart Location Index

[Details](#) | [Remove](#)

 [Export all](#)

[Compare statistics](#)



SLC Demonstration

Smart Location Calculator

801 I St, Sacramento, California, USA

Employees: 100
Male: 50 %
[Update](#)

3832 Winters St
Sacramento, California 95838
64 Smart Location Index
[Details](#) [Remove](#)

[Export all](#) [Hide Compare statistics](#)

How it works: [Background](#) [Data & Methodology](#)

Resources: [Data Download](#) [Research Articles](#) [User Guide](#) [FAQ](#)

Feedback: slc@gsa.gov

Smart Growth PROGRAM GSA

Layers & Legend
 Show Regional Boundaries
 Show Blockgroup Scores
No legend

VMT Emissions Access to transit Low wage access Mode Split

Location: 3832 Winters St, Sacramento, California, 95838
Average daily vehicle miles travelled generated by each employee commuting to and working at a given facility (miles per person per day)

Category	Average Daily Vehicle Miles Traveled (VMT)
Metro low	17.5
Metro Avg.	23.4
Metro high	34.6
Block Group	22.3
This location	23.7

Map labels: Alder St, Fall St, High St, Hulth St, Elm St, Fig St, Harris Ave, Balkam St, Willow St, Jane St, Ke St, Mabey St, National, Pines, Pines St, Schutt Way, Roanoke Ave, Arrows St, Conter Way, Grand Ave, Arcade, Winters St, Sacramento Regional Fairgrounds, Haggin Oaks Golf Course.

SLC Block Group vs Facility Scores

- User-entered data
- Distance to transit
- 1/4 mile buffer
 - Tool adjusts for edge effects
 - Variables impacted: residential and employment densities, network variables (links), transit density, access, land use mix

Employees: 100

Male: 57 %

Update

1800 F St NW
Washington, District of Columbia 20006 [Export](#)

85 Smart Location Index [?](#) **75** Block Group SLI [?](#) [More scores](#)

Distance to nearest transit stop: miles

Distance to rail transit: miles

or move pointers on the map

Use average block group distance to transit values

Existed in 2010 [?](#)

Occupied in 2010

Re-calculate Score

SLC Application

- **GSA Application**
 - National Measure (since 2016)
 - Local Portfolio Planning
 - Lease Acquisiton Planning
- **State facilities and strategic planning**
 - California Strategic Growth Council & Dept. of General Services
 - Future state partnerships (RGGI)
- **Rating systems**
 - Use of the SLC to measure community compactness/site sustainability

Testing and Feedback

- Questions
- Use case scenarios
- Enhancements
- Methodology critique

<https://www.slc.gsa.gov/slc>

Email slc@gsa.gov

Smart Location Calculator

--Initial feedback form--

Smart Location Calculator link: <https://www.slc.gsa.gov/slc>

Please send this form to Lori Zeller with the subject line "SLC Feedback" to Zeller.Lori@epa.gov

As you explore the Smart Location Calculator, please jot down any notes or questions you have. We want to know what users are thinking as they use the tool and any questions that arise while using the tool. Below are a few guiding questions (feel free to answer any, all or none), plus additional space at the bottom for miscellaneous comments. Thank you!

- 1) As you view the block group data, what questions do you have about how the data was created?
- 2) As you view the results for a location, what questions do you have about how that score was created?
- 3) What main questions do you have about how the scores were calculated?
- 4) How much detail are you interested in knowing about how the scores were calculated?

Questions

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Appendix

Additional slides follow with more information about the SLC modeling process




SLC Model: Independent Variables

A few example variables and their impact on VMT

- **Density of development in workplace block group**

- Gross residential density  VMT 
- Gross employment density  VMT 

- **Street design characteristics in workplace block group**

- Auto-oriented links per square mile  VMT 
- Pedestrian-oriented links per square mile  VMT 

SLC Model: Commute vs. Non-Commute Travel

Commute Travel	Non-Commute Travel
<p data-bbox="547 519 907 572">Home-Work</p> <p data-bbox="249 596 1200 886">Any trip made between home and work, including all legs of trip (stopping to drop off child, go shopping, go to gym, etc.)</p>	<p data-bbox="1658 519 1992 572">Work-work</p> <p data-bbox="1319 596 2328 886">Any trip starting and ending at a workplace. Includes mid-day lunch trips, business outings, or trips from one workplace to another</p>

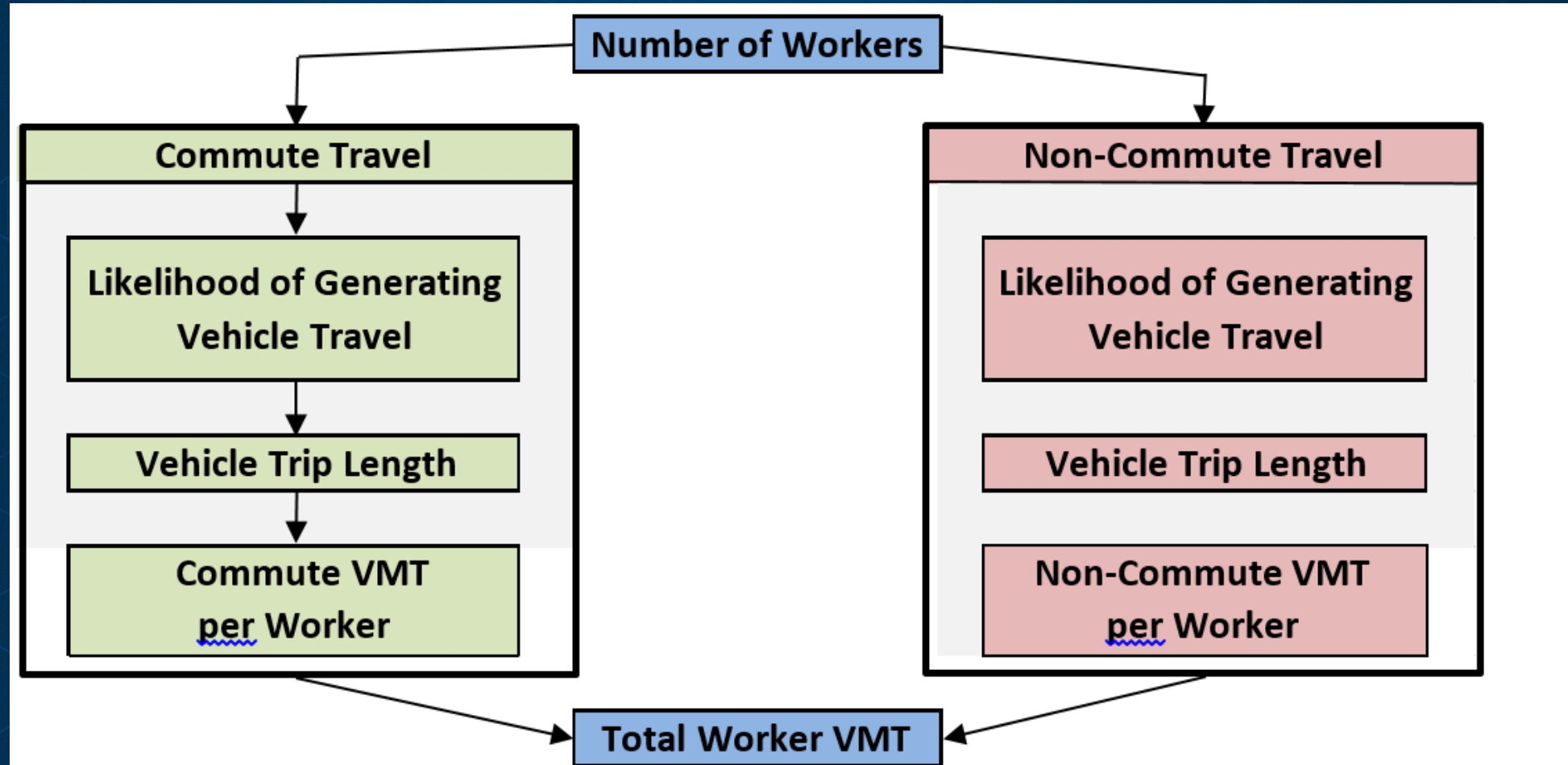
Home-based-other trips were removed from dataset (trips from home to social events, shopping, recreation, etc)

SLC Model: Factors Affecting VMT

	Commute VMT	Non-Commute VMT
Jobs Density	■	■
Housing Density	■	
Employment Mix		■
Job/ Housing Balance	■	
Pedestrian Oriented Network	■	
Transit Proximity		■
Transit Density	■	■
Auto Accessibility for Workers	■	
Transit Accessibility for Workers	■	
Regional Compactness	■	■
Regional Transit Trips per Capita	■	■

** Other factors: income, car ownership, gender, gas price*

SLC Model: Modeling Process



SLC Model: Smart Location Score Calculation

After VMT modeling is complete, each block group is evaluated relative to the other block groups in its region (CBSA or county)

$$\text{Smart Location Score} = 100 * \left(1 - \frac{VMT_{tot} - VMT_{tot_min}}{VMT_{tot_max} - VMT_{tot_min}} \right)$$

where VMT_{tot_min} and VMT_{tot_max} are the minimum and maximum VMT_{tot} scores for the region