Land Use Strategies

What is it?

Land use strategies refer to policies that promote compact, mixed-use development and the efficient use of land. Such policies improve bike, pedestrian, and transit access and can reduce trip lengths and vehicle miles traveled. Examples include:

- **Zoning and land use code changes** that result in increased densities; mixed use development; smaller lots; improved bike, pedestrian, and transit access; and the removal of parking minimums.

- **Infill development and adaptive reuse** programs that support redevelopment and smart growth goals (e.g., tax abatement, developer subsidies, transfer of development rights)

- **Urban growth boundary** (UGB) policies and programs that set minimum densities and limit expansion of the UGB.

- **Transit-oriented development** (TOD) programs that promote residential and commercial centers, corridors, and main streets that are designed to encourage transit use and non-motorized travel options.

- **Siting policies** that require schools, employment centers, and other key destinations to be placed in areas with high quality transit, bicycle, and pedestrian access.

What are the benefits?

- **Mobility**: Reduces congestion and vehicle miles traveled (VMT) by shortening trip distances between key origins and destinations and making sustainable transportation modes more accessible and convenient.

- **Accessibility**: Enhances the number of key destinations accessible in an area by bike, transit, or foot.

- **Environmental Stewardship**: Reduces energy consumption and greenhouse gas emissions per capita by encouraging shifts to smaller lots and more sustainable transportation modes. Also preserves open space and protects biodiversity by preventing urban sprawl and habitat fragmentation.

- **Land Use**: Enhances land values and promotes neighborhood and downtown revitalization.

- **Quality of Life**: Promotes the use of active transportation modes and enhancement of the pedestrian environment.
Where is it being used?

Land use strategies are used in jurisdictions throughout the nation. Examples in Oregon include: 4

- **Transit-Oriented Development Program**, Metro, Portland, OR
- **UGB Expansion Analysis**, City of Eugene, OR
- Parking Standards Code Amendment, City of Medford, OR
- **Adaptive Reuse-Rehab Grant Program**, Oregon City, OR
- **Infill Design Project**, City of Portland, OR

How effective is it?

Research findings suggest that in places where development is compact, land uses are compatible and intermingled, and good transit access and pedestrian interconnections are present, there are average shorter trip lengths, higher transit and non-motorized mode shares, and lower household vehicle trip generation and VMT. 5 These effects are further enhanced by location proximity to the urban core. However, travel behavior shifts will be gradual.

**Land Use Changes**

A careful review of several reports on the relationship between VMT and land use changes (including changes to characteristics such as density, diversity of land uses, urban design, and regional accessibility), resulted in the following conclusions. (For each characteristic, the relationship is isolated from other overlapping characteristics, such that the results are additive in nature.) 6

- For every 1% increase in local density, VMT can be expected to decrease by a corresponding 0.05%.
- For every 1% increase in local diversity (land use mix), VMT can be expected to decrease by a corresponding 0.05%.
- For every 1% increase in local urban design,7 VMT can be expected to decrease by a corresponding 0.03%.

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1. [https://www.oregonmetro.gov/](https://www.oregonmetro.gov/).
2. [https://www.eugene-or.gov/documentcenter/view/17775](https://www.eugene-or.gov/documentcenter/view/17775).
4. In this summary, the best available data on program effectiveness is used. Whenever possible, information is provided for the referenced examples; however, that information is not always available.
7. Local urban design refers to building orientation, landscaping, pedestrian amenities, and other micro features of the urban environment. In the EPA’s Smart Growth Index (SGI) model “density” is represented by residents plus employees divided by land area; “diversity” is represented by a jobs-population balance measure; “design” is represented by a combination of sidewalk completeness,
For every 1% increase in regional accessibility, VMT can be expected to decrease by a corresponding 0.2%.

Because the results for each land use change characteristic may be added, assuming a concurrent and equal 1% increase in local density, diversity, and design (holding aside regional accessibility) the cumulative effect is equivalent to a combined decrease in VMT of about 0.13%. The key indication of this finding is that the location of new compact, mixed use development is important (i.e., regional accessibility plays a factor) and “that dense, mixed-use developments in the middle of nowhere may offer only modest regional travel benefits.” If, however, a concurrent and equal 1% increase in regional accessibility is also assumed, the cumulative effect becomes equivalent to a combined decrease in VMT of 0.33%.

This finding is within the range of other often cited findings regarding the relationship between VMT and density. That is, a doubling of density is often reported to be associated with 15% to 30% less VMT per household. However, these findings use density as a proxy for all other characteristics historically associated with density (e.g., regional location, urban transportation alternatives, and built environment characteristics) and do not necessarily isolate the affects of density alone. Thus, this range of effectiveness would likely only be seen for centrally located and well designed infill development projects.

One advantage of using the isolated effectiveness findings for each land use characteristic is that appropriate policy responses are more easily identified. Note, however, that the results do not consider the importance of enhanced transit service feasibility, which must be calculated separately.

Transit-oriented Development

Traveler response to TOD is influenced by a broad variety of factors, including land use and site design, automobile ownership, relative transit and highway accessibility, parking supply, parking pricing, transit support, and preferences of residents. Additionally, higher densities, greater diversity of land uses, and better design are associated with more transit use and walking and fewer automobile trips per resident and worker. Numerical examples of actual transit ridership gains that can be clearly attributed to TOD implementation are few because of multiple confounding factors. However, the following research results present some good approximations:

- Transit mode shares along the Washington Metro system were found to decrease 7% for every 1,000 feet of distance from a station in the case of housing and by 12% in the case of offices.
- A 2003 California TOD travel characteristics study found that TOD office workers within 1/2 mile of rail transit stations had transit commute shares averaging 19% compared to 5% region-wide. For

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residents, the statewide average transit share for TODs within 1/2 mile of the station was 27% compared to 7% for residences between 1/2 mile and 3 miles of the station.

- Taken together with shifts in other modes, the apparent effect of TOD development on auto use of TOD residents ranged from an indiscernibly small reduction on average across surveyed California residential sites to an 18% drop in auto use found in an 8-site Portland survey.

### Environmental Effects

According to the OSTI Greenhouse Gas Toolkit, combined land use and transportation strategies could result in a 0.2% to 2.1% reduction in total transportation sector baseline greenhouse gas (GHG) emissions in 2030. Additionally, aggressive/maximum deployment could result in a 2.7% to 4.4% reduction in 2050.\(^\text{14}\) While the majority of transportation sector GHG emission reductions from combined land use and transportation strategies would be derived from VMT reduction, an exact 1:1 ratio cannot be assumed for this program due to carbon dioxide (CO\(_2\)) impacts related to cold starts and lower vehicle operating speeds within compact areas. For this reason, a conservative ratio of GHG reduction equal to nine tenths VMT reduction is recommended.\(^\text{15}\)

### How much does it cost to implement?

Public costs associated with supporting compact, mixed use development are typically lower than those for supporting decentralized development due to the reduction in required public infrastructure (e.g., roads and utilities) and public services (e.g., public schools, fire, police, libraries, community centers).\(^\text{16}\) One study conducted in New Jersey estimated a public capital expenditure savings of 10% over 20 years for a compact statewide land use development scenario compared to a lower density scenario, based on the same assumed growth in population, households, and jobs. Specifically, the study estimated that the compact land use scenario resulted in a 24% reduction in road investments, an 8% reduction in utility costs, and a 3% reduction in school costs. The study also found that land consumption would decrease by 60% (including environmentally sensitive and agricultural lands) and thatmedian housing costs would decrease by 6%.\(^\text{17}\)

Another study based on four decades of literature on fiscal impacts of alternative land development forms concluded that estimated total public capital costs per dwelling unit could be reduced 49% to 63% by choosing a central location, using a mix of housing types, and by allowing contiguous development when compared to low density locations.\(^\text{18,19}\)

### Implementation resources

The following resources may assist local jurisdictions with the implementation of combined land use and transportation strategies:


\(^{19}\) Note: percentages calculated by Mosaic program guide authors are based on original report findings reported in 1987 dollars.
• Tool Kit for Integrating Land Use and Transportation Decision-Making, FHWA
• Smart Growth Implementation Toolkit, Smart Growth America
• TOD-ucation 100 and 200 Report Series, Center for Transit Oriented Development and FTA
• The Infill Design Toolkit, City of Portland
• Planning for Schools and Livable Communities: The Oregon School Siting Handbook, state of Oregon
• Smart Growth: A Guide to Developing and Implementing Greenhouse Gas Reduction Programs, EPA