

# **Designing Sustainable Landscapes: Roads and Railroads**

***A project of the Landscape Ecology Lab,  
Department of Environmental Conservation,  
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*With support from:*

- US Fish and Wildlife Service, North Atlantic-Appalachian Region
- Northeast Climate Adaptation Science Center (USGS)
- University of Massachusetts, Amherst

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*Reference:*

Plunkett EB, McGarigal K, Compton BW, and DeLuca WV, 2020. Designing sustainable landscapes: Roads and railroads. Report to the US Fish and Wildlife Service, Northeast Atlantic-Appalachian Region.

### General description

Roads and railroads are components of the landscape that affect species and ecological systems profoundly. These layers depict where in the landscape there are roads and railroads of various classes.

The vector transportation layers are the basis for the raster layers and are also used for generating crossing locations. Raster roads and railroads are incorporated into DSLand directly and are also the basis for calculating traffic.

### Derivation of this layer

#### Data sources

- Open Street Map (OSM). We used this open-source global map of roads (<http://www.openstreetmap.org>) as our source of linework for roads and railroads.
- The data were downloaded on November 13, 2018 in several formats;
  - For railroads, cycleways, and tunnels we used a direct export of the north America OSM database downloaded from: <http://download.geofabrik.de/north-america-latest.osm.pbf>
  - For roads we used the pre-processed shapefiles downloaded by state or province from <https://download.geofabrik.de> e.g. <https://download.geofabrik.de/north-america/us/connecticut-latest-free.shp.zip> for the state of CT. These reflected the state of the OSM database in late October 2018 as they lag the database slightly.

We used the following **transportation classes** (and associated landcover code in parenthesis):

- **Motorway (1)** - A restricted access major divided highway, normally with 2 or more running lanes plus emergency hard shoulder; U.S. usage is usually “Freeway” or “Expressway.” OSM highway=motorway.
- **Primary road (2)** – A major highway, often linking towns. OSM highway classes: primary, trunk, trunk\_link, primary\_link, and motorway\_link.
- **Secondary road (3)** – Minor highways. OSM highway classes: secondary and secondary\_link.
- **Tertiary road (4)** – Minor connecting roads. OSM highway classes: tertiary and tertiary\_link.
- **Local road (5)** – Minor roads, often residential, but includes a wide variety of roads, including those of unknown class. OSM highway classes: road, living\_street, unclassified, and service.
- **Track (6)**– Small roads, usually unpaved, typically minor residential roads or roads for agricultural or forestry use, often abandoned or gated. OSM highway classes: track,

track\_grade1, track\_grade2, track\_grade3, track\_grade4, and track\_grade5. We ended up dropping tracks from the OSM data and our landcover as we found that the tracks in OSM were mapped inconsistently and the track tag was often erroneously and inconsistently applied to trails.

- **Active train (7)** – Trains that are still used. These are OSM railway classes: rail, funicular, light\_rail, narrow\_gauge, miniature\_railway, and preserved
- **Abandoned train (8)** – These are railroads that are no longer in use but not completely razed. They were based on OSM railway classes: abandoned, and disused as well as highway type: cycleway if “rail” was in the name and it wasn’t preceded by a “t” (“trail” doesn’t qualify). OSM railway type “razed” was not retained.

**Tunnels** – From all of the above we dropped segments that were coded as tunnels based on the OSM tunnel tag as long as the tunnel tag value was not one of the following: “no”, “building\_passage”, “building\_passage”, “building\_passsag”, “building\_pessage”, “cover”, “covered”, “culvert”, or “passage”. The goal was to not include roads and trains that are underground and thus would not impede movement of wildlife along the surface. For instance, long rail tunnels under a mountain don’t fragment the habitat above and vehicle tunnels under a river don’t introduce a barrier to aquatic movement.

### **GIS metadata**

This data product is distributed as a raster GIS file with cell values 1-8 indicating the codes in parenthesis above, or as a shapefile in which case “CLASS” contains the same values and additional fields are present based on the source OSM data. All data are available at McGarigal et al. (2020).

### **Literature Cited**

McGarigal K, Compton BW, Plunkett EB, DeLuca WV, and Grand J. 2020. Designing sustainable landscapes products, including technical documentation and data products. <http://umassdsl.org/>.