

Sample: Logistics, Madrid: report

Project: Sample: Logistics, Madrid

Goal: Describe the project Sample: Logistics, Madrid: run the analyses that tell the most about its data, draw every result, and write a cited report.

Run: a282190f-59a4-4a74-8816-0f88c1c06122 (running, 11 agent run(s))

Generated: 2026-10-18T05:22:18Z, version 1

Model cost: USD 0.0000 over 0 model call(s)

Data used

Data	Kind	Rows	Time span	Summary	Source
Delivery zones	vector, Polygon	10		10 polygon (area) features; 'parcels_per_day' 1,219 to 4,832 (mean 2062); 'households' 26,833 to 106,313 (mean 4.537e+04); named by 'name' (e.g. Barrio Norte, Las Flores, El Molino); total area 56.04 km2; extent -3.7513,40.3850 to -3.6564,40.4486. Areas (Delivery zones) with parcels_per_day to compare and map.	[110]
Depots	vector, Point	3		3 point features; 'vans' 23 to 32 (mean 28.33); 'cargo_bikes' 4 to 14 (mean 8.333); 'dock_doors' 8 to 15 (mean 12.67); named by 'name' (e.g. Depot Norte, Depot Sur, Depot Este); extent -3.7276,40.3903 to -3.6643,40.4387. Point locations of Depots.	[111]
Routes	vector, LineString	36		36 line features; 'vehicle' has 3 values (top: van 23, cargo bike 10, electric van 3); 'distance_km' 9.14 to 35.39 (mean 19.79); 'planned_min' 142 to 378 (mean 237.6); total length 712.7 km; extent -3.7501,40.3857 to -3.6573,40.4480. Lines (Routes) such as routes or networks.	[112]
Delivery stops	vector, Point	2,000	2026-07-27 to 2026-09-19	2,000 point features; dated by 'delivered_at' from 2026-07-27 to 2026-09-19; 'status' has 2 values (top: delivered 1877, failed 123); 'delay_min' -10 to 59 (mean 10.29); 'parcels' 1 to 3 (mean 1.583); extent -3.7499,40.3856 to -3.6567,40.4475. Dated point events by status: where and when Delivery stops happen.	[2]
Parcel lockers	vector, Point	45		45 point features; 'host' has 3 values (top: supermarket 16, metro 15, gas station 14); 'compartments' 40 to 90 (mean 60); 'utilization_pct' 35.3 to 97.3 (mean 60.95); extent -3.7492,40.3915 to -3.6578,40.4475. Point locations of Parcel lockers by host.	[113]
Loading bays	vector, Point	60		60 point features; 'enforced' has 2 values (top: True 43, False 17); 'max_minutes' 15 to 30 (mean 21.83); extent -3.7497,40.3880 to -3.6596,40.4477. Point locations of Loading bays by enforced.	[114]
Roadworks	vector, LineString	12	2026-06-27 to 2026-09-03	12 line features; dated by 'start_date' from 2026-06-27 to 2026-09-03; 'type' has 3 values (top: water main 6, resurfacing 3, metro 3); 'lanes_closed' 1 to 2 (mean 1.333); total length 4.26 km; extent -3.7212,40.3883 to -3.6585,40.4349. Lines (Roadworks) such as routes or networks.	[3]

Data	Kind	Rows	Time span	Summary	Source
Route performance by day	table	1,728	2026-07-27 to 2026-09-19	Table of 1,728 rows and 6 columns without geometry; dated by 'date' from 2026-07-27 to 2026-09-19; 'on_time_pct' 59.4 to 99.7 (mean 85.51); 'avg_delay_min' 0 to 24.5 (mean 8.212); 'failed_stops' 0 to 7 (mean 1.513). A table of Route performance by day without locations.	[4]
Vehicle fleet	table	60		Table of 60 rows and 6 columns without geometry; 'type' has 3 values (top: van 32, electric van 21, cargo bike 7); 'capacity_parcel' 35 to 160 (mean 104.4); 'range_km' 60 to 320 (mean 206.7); 'model_year' 2,017 to 2,026 (mean 2022). A table of Vehicle fleet without locations.	[115]
Operations review	document			1-page md document 'Operations review: August and September 2026'; language en; mentions 5 place(s): Depot Este (2), El Molino (1), 40.41805, -3.70570 (1), Depot Sur (1), La Estacion (1). A document about Depot Este, El Molino, 40.41805, -3.70570.	[116]
Sample: Logistics, Madrid	record				[117]
Emerging hot spots: Delivery stops	layer, Polygon	88			[118]
Repeat and near repeat classification: Delivery stops	layer, Point	2,000			[119]
Summarize within: Delivery zones	layer, Polygon	10			[120]
Summarize within: Delivery zones	layer, Polygon	10			[121]
Summarize within: Delivery zones	layer, Polygon	10			[122]
Hot spot analysis: Delivery stops	layer, Polygon	254			[123]
Hot spot analysis: Parcel lockers	layer, Polygon	19			[124]
Hot spot analysis: Loading bays	layer, Polygon	19			[125]
Calculate density: Delivery stops	layer, Polygon	1,654			[126]
Calculate density: Parcel lockers	layer, Polygon	99			[127]
Calculate density: Loading bays	layer, Polygon	101			[128]
Find point clusters: Delivery stops	layer, Point	2,000			[129]
Find point clusters: cluster hulls	layer, Polygon	2			[130]
Find point clusters: Parcel lockers	layer, Point	45			[131]
Find point clusters: cluster hulls	layer, Polygon	1			[132]
Find point clusters: Loading bays	layer, Point	60			[133]
Find point clusters: cluster hulls	layer, Polygon	6			[134]

Data	Kind	Rows	Time span	Summary	Source
Find outliers: Delivery zones	layer, Polygon	10			[135]
Areas and lengths: Routes	layer, LineString	36			[136]
Areas and lengths: Roadworks	layer, LineString	12			[137]
Line density: Routes	layer, Polygon	480			[138]

Timeline

Timeline: events per week by dataset

Per week: 13 weeks from 2026-06-22 to 2026-09-14; trend +51.2 per week; first half 472, second half 2,801 (+493.4%)

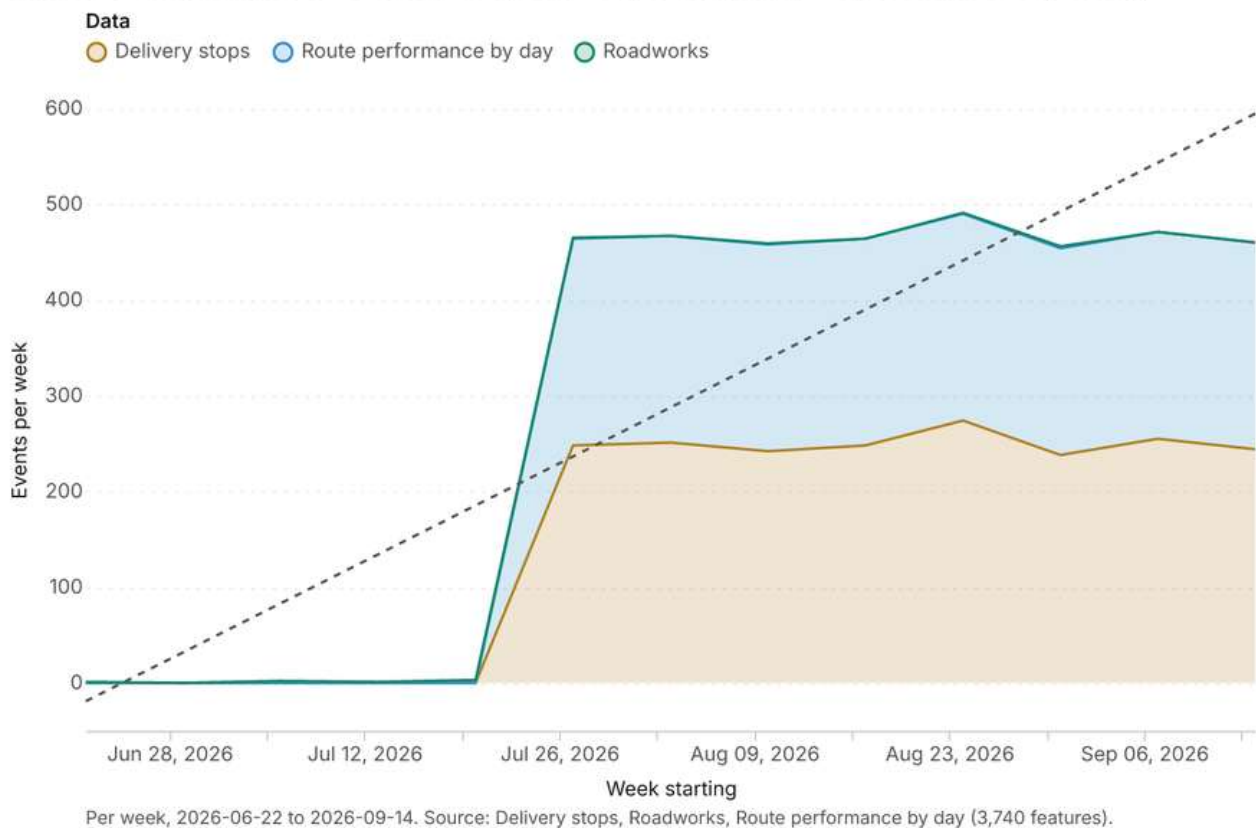


Figure 1. Timeline: events per week by dataset [1]. Per week, 2026-06-22 to 2026-09-14. Source: Delivery stops, Roadworks, Route performance by day (3,740 features). The data is in the appendix.

The timeline counts 3,740 dated events in Delivery stops, Roadworks, Route performance by day per week, from week of 2026-06-22 to week of 2026-09-14 [1][2][3][4]. By dataset: Delivery stops 2,000; Route performance by day 1,728; Roadworks 12 [1]. The trend is +51.2 events per week; the second half of the weeks has 2,801 against 472 in the first (+493.4%) [1]. 1 of the 13 weeks had no events [1]. Change point detection found no shift in the counts [5].

Busiest weeks

- week of 2026-08-24: 491 events [1]
- week of 2026-09-07: 471 events [1]
- week of 2026-08-03: 467 events [1]

Quietest weeks with events

- week of 2026-06-22: 1 event [1]
- week of 2026-07-13: 1 event [1]

- week of 2026-07-06: 2 events [1]

Space time hot spots

What this analysis is. Emerging hot spots: Where hot spots are new, consecutive, intensifying, persistent, diminishing, sporadic, oscillating or historical over time [6]. In ArcGIS it is Emerging Hot Spot Analysis or Create Space Time Cube [6].

Why it was run on this data. Delivery stops carry dates in 'delivered_at': emerging hot spot analysis finds new, intensifying and fading hot spots per week [7].

What it found. Space time hot spots on Delivery stops: Emerging hot spots: 1 layer saved: Emerging hot spots: Delivery stops (88 features) [8][9]. It reported result, count 88; result, elapsed ms 15; result, resolution 8; result, features used 2,000; result, time neighbors 0; billing, cost 0.2 [8].

Result	Value
result, count	88
result, elapsed ms	15
result, resolution	8
result, features used	2,000
result, time neighbors	0
billing, cost	0.2
billing, list price	0.2
billing, upstream cost	0

Findings

Evidenced: Space time hot spots on Delivery stops: Emerging hot spots: 1 layer saved: Emerging hot spots: Delivery stops (88 features) [8][9].

Evidenced: It reported result, count 88; result, elapsed ms 15; result, resolution 8; result, features used 2,000; result, time neighbors 0; billing, cost 0.2 [8].

Tool gp_space_time_hot_spots; parameters {"project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Delivery stops (ba8073d9)"}, "interval": "week", "bin_shape": "h3", "resolution": 8, "time_field": "delivered_at"}

Near repeat

What this analysis is. Repeat and near repeat classification: Classify incidents as originators, repeats (same place) or near repeats within a distance and time window, with a Knox test table [10]. In ArcGIS it is Repeat and Near Repeat Classification or Near Repeat Calculator [10].

Why it was run on this data. Near repeat analysis tests whether Delivery stops close in space also follow each other within 5 days [11].

What it found. Near repeat on Delivery stops: Repeat and near repeat classification: 1 layer saved: Repeat and near repeat classification: Delivery stops (2000 features) [9][12]. It reported result, days 5; result, count 2,000; result, chains 276; result, distance m 200; result, elapsed ms 48; result, pairs linked 1,743 [12].

Result	Value
result, days	5
result, count	2,000
result, chains	276
result, distance m	200
result, elapsed ms	48
result, pairs linked	1,743
billing, cost	0.11

Result	Value
billing, list price	0.11
billing, upstream cost	0

Findings

Evidenced: Near repeat on Delivery stops: Repeat and near repeat classification: 1 layer saved: Repeat and near repeat classification: Delivery stops (2000 features) [9][12].

Evidenced: It reported result, days 5; result, count 2,000; result, chains 276; result, distance m 200; result, elapsed ms 48; result, pairs linked 1,743 [12].

Tool gp_near_repeat; parameters {"days": 5, "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Delivery stops (ba8073d9)"}, "distance_m": 200.0, "time_field": "delivered_at"}

Change point detection

What this analysis is. Change point detection: When did the level, count, trend or variability change [13]? For the whole study area or for every bin [13]. In ArcGIS it is Change Point Detection [13].

Why it was run on this data. Change point detection finds when the weekly count of Delivery stops shifted [14].

What it found. Change point detection on Delivery stops: Change point detection: done; no map output [5][9]. It reported result, n changes 0; result, elapsed ms 4; result, events used 2,000; billing, cost 0.11; billing, list price 0.11; billing, upstream cost 0 [5].

Result	Value
result, n changes	0
result, elapsed ms	4
result, events used	2,000
billing, cost	0.11
billing, list price	0.11
billing, upstream cost	0

Findings

Evidenced: Change point detection on Delivery stops: Change point detection: done; no map output [5][9].

Evidenced: It reported result, n changes 0; result, elapsed ms 4; result, events used 2,000; billing, cost 0.11; billing, list price 0.11; billing, upstream cost 0 [5].

Tool gp_change_point_detection; parameters {"method": "count", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Delivery stops (ba8073d9)"}, "interval": "week", "time_field": "delivered_at"}

Summarize within

What this analysis is. Summarize within: Count and aggregate the features inside each polygon (or bin), proportionally for lines and polygons [15]. In ArcGIS it is Summarize Within or Aggregate Points; in QGIS, native:countpointsinpolygon or native:sumlinelengths [15].

Why it was run on this data. Count Depots inside each feature of Delivery zones; the counts map as a choropleth (natural breaks, sequential colors) [16].

What it found. Summarize within on Depots, Delivery zones: Summarize within: 1 layer saved: Summarize within: Delivery zones (10 features) [17][18][19]. It reported result, count 10; result, elapsed ms 0; billing, cost 0.01028; billing, list price 0.01028; billing, upstream cost 0 [17].

Result	Value
result, count	10
result, elapsed ms	0

Result	Value
billing, cost	0.01028
billing, list price	0.01028
billing, upstream cost	0

Findings

Evidenced: Summarize within on Depots, Delivery zones: Summarize within: 1 layer saved: Summarize within: Delivery zones (10 features) [17][18][19].

Evidenced: It reported result, count 10; result, elapsed ms 0; billing, cost 0.01028; billing, list price 0.01028; billing, upstream cost 0 [17].

Tool gp_summarize_within; parameters {"stats": [{"stat": "sum", "field": "vans"}], "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Depots (84d3272c)", "polygons": {"layer": "Delivery zones (bfcf8b53)"}}

Summarize within

What this analysis is. Summarize within: Count and aggregate the features inside each polygon (or bin), proportionally for lines and polygons [15]. In ArcGIS it is Summarize Within or Aggregate Points; in QGIS, native:countpointsinpolygon or native:sumlinelengths [15].

Why it was run on this data. Count Depots inside each feature of Delivery zones; the counts map as a choropleth (natural breaks, sequential colors) [16].

What it found. Summarize within on Delivery stops, Delivery zones: Summarize within: 1 layer saved: Summarize within: Delivery zones (10 features) [9][19][20]. It reported result, count 10; result, elapsed ms 4; billing, cost 0.05022; billing, list price 0.05022; billing, upstream cost 0 [20].

Result	Value
result, count	10
result, elapsed ms	4
billing, cost	0.05022
billing, list price	0.05022
billing, upstream cost	0

Findings

Evidenced: Summarize within on Delivery stops, Delivery zones: Summarize within: 1 layer saved: Summarize within: Delivery zones (10 features) [9][19][20].

Evidenced: It reported result, count 10; result, elapsed ms 4; billing, cost 0.05022; billing, list price 0.05022; billing, upstream cost 0 [20].

Tool gp_summarize_within; parameters {"stats": [{"stat": "sum", "field": "delay_min"}], "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Delivery stops (ba8073d9)", "group_by": "status", "polygons": {"layer": "Delivery zones (bfcf8b53)"}}

Summarize within

What this analysis is. Summarize within: Count and aggregate the features inside each polygon (or bin), proportionally for lines and polygons [15]. In ArcGIS it is Summarize Within or Aggregate Points; in QGIS, native:countpointsinpolygon or native:sumlinelengths [15].

Why it was run on this data. Count Depots inside each feature of Delivery zones; the counts map as a choropleth (natural breaks, sequential colors) [16].

What it found. Summarize within on Parcel lockers, Delivery zones: Summarize within: 1 layer saved: Summarize within: Delivery zones (10 features) [19][21][22]. It reported result, count 10; result, elapsed ms 0; billing, cost 0.01112; billing, list price 0.01112; billing, upstream cost 0 [21].

Result	Value
result, count	10
result, elapsed ms	0
billing, cost	0.01112
billing, list price	0.01112
billing, upstream cost	0

Findings

Evidenced: Summarize within on Parcel lockers, Delivery zones: Summarize within: 1 layer saved: Summarize within: Delivery zones (10 features) [19][21][22].

Evidenced: It reported result, count 10; result, elapsed ms 0; billing, cost 0.01112; billing, list price 0.01112; billing, upstream cost 0 [21].

Tool gp_summarize_within; parameters {"stats": [{"stat": "sum", "field": "compartments"}], "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Parcel lockers (4e9e11a9)"}, "group_by": "host", "polygons": {"layer": "Delivery zones (bfcf8b53)"}}

Hot spots

What this analysis is. Hot spot analysis: Getis-Ord Gi* hot and cold spots with z-scores, p-values and confidence bins [23]. In ArcGIS it is Find Hot Spots or Hot Spot Analysis (Getis-Ord Gi*); in QGIS, qgis:hotspot (plugin) [23].

Why it was run on this data. 2000 points: Getis-Ord Gi* tests whether the concentrations in Delivery stops are statistically significant [24].

What it found. The hot spot analysis was conducted using the Delivery stops layer [9] and the gp_hot_spots tool [25]. The process produced 254 features and calculated a count of 254 results [25]. For this analysis, 2,000 incidents were utilized, and the resulting cell size was 500 m [25]. The total billing cost for the analysis was 0.09 [25].

Result	Value
result, bins	254
result, count	254
result, elapsed ms	23
result, cell size m	500
result, incidents used	2,000
result, distance band m	500
billing, cost	0.09
billing, list price	0.09
billing, upstream cost	0

Findings

Evidenced: Hot spots on Delivery stops: Hot spot analysis: 1 layer saved: Hot spot analysis: Delivery stops (254 features) [9][25].

Evidenced: It reported result, bins 254; result, count 254; result, elapsed ms 23; result, cell size m 500; result, incidents used 2,000; result, distance band m 500 [25].

Tool gp_hot_spots; parameters {"project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Delivery stops (ba8073d9)"}, "aggregation": "hexagon", "cell_size_m": 500.0, "distance_band_m": 500.0}

Hot spots

What this analysis is. Hot spot analysis: Getis-Ord Gi* hot and cold spots with z-scores, p-values and confidence bins [23]. In ArcGIS it is Find Hot Spots or Hot Spot Analysis (Getis-Ord Gi*); in QGIS, qgis:hotspot (plugin) [23].

Why it was run on this data. 45 points: Getis-Ord Gi* tests whether the concentrations in Parcel lockers are statistically significant [26].

What it found. The hot spot analysis was conducted using the Parcel lockers layer [22]. The analysis produced 1 layer, titled "Hot spot analysis: Parcel lockers (19 features)" [27]. Key results showed the analysis generated 19 bins containing 19 features [27]. The operation took 2 milliseconds to complete, and the resulting cell size and distance band were both 2,000 meters [27].

Result	Value
result, bins	19
result, count	19
result, elapsed ms	2
result, cell size m	2,000
result, incidents used	45
result, distance band m	2,000
billing, cost	0.0509
billing, list price	0.0509
billing, upstream cost	0

Findings

Evidenced: Hot spots on Parcel lockers: Hot spot analysis: 1 layer saved: Hot spot analysis: Parcel lockers (19 features) [22][27].

Evidenced: It reported result, bins 19; result, count 19; result, elapsed ms 2; result, cell size m 2,000; result, incidents used 45; result, distance band m 2,000 [27].

Tool gp_hot_spots; parameters {"project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Parcel lockers (4e9e11a9)"}, "aggregation": "hexagon", "cell_size_m": 2000.0, "distance_band_m": 2000.0}

Hot spots

What this analysis is. Hot spot analysis: Getis-Ord Gi* hot and cold spots with z-scores, p-values and confidence bins [23]. In ArcGIS it is Find Hot Spots or Hot Spot Analysis (Getis-Ord Gi*); in QGIS, qgis:hotspot (plugin) [23].

Why it was run on this data. 60 points: Getis-Ord Gi* tests whether the concentrations in Loading bays are statistically significant [28].

What it found. Hot spots on Loading bays: Hot spot analysis: 1 layer saved: Hot spot analysis: Loading bays (19 features) [29][30]. It reported result, bins 19; result, count 19; result, elapsed ms 2; result, cell size m 2,000; result, incidents used 60; result, distance band m 2,000 [29].

Result	Value
result, bins	19
result, count	19
result, elapsed ms	2
result, cell size m	2,000
result, incidents used	60
result, distance band m	2,000
billing, cost	0.0512
billing, list price	0.0512
billing, upstream cost	0

Findings

Evidenced: Hot spots on Loading bays: Hot spot analysis: 1 layer saved: Hot spot analysis: Loading bays (19 features) [29][30].

Evidenced: It reported result, bins 19; result, count 19; result, elapsed ms 2; result, cell size m 2,000; result, incidents used 60; result, distance band m 2,000 [29].

Tool gp_hot_spots; parameters {"project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Loading bays (16574f8d)"}, "aggregation": "hexagon", "cell_size_m": 2000.0, "distance_band_m": 2000.0}

Calculate density

What this analysis is. Calculate density: Kernel density per square kilometer on a grid [31]. In ArcGIS it is Calculate Density or Kernel Density; in QGIS, native:heatmapkerneldensityestimation [31].

Why it was run on this data. 2000 points in Delivery stops: a density surface shows where they concentrate [32].

What it found. Calculate density on Delivery stops: Calculate density: 1 layer saved: Calculate density: Delivery stops (1654 features) [9][33]. It reported result, count 1,654; result, elapsed ms 74; result, bandwidth m 500; result, cell size m 200; result, excluded null 0; result, max density per km2 396 [33].

Result	Value
result, count	1,654
result, elapsed ms	74
result, bandwidth m	500
result, cell size m	200
result, excluded null	0
result, max density per km2	396
billing, cost	0.09
billing, list price	0.09
billing, upstream cost	0

Findings

Evidenced: Calculate density on Delivery stops: Calculate density: 1 layer saved: Calculate density: Delivery stops (1654 features) [9][33].

Evidenced: It reported result, count 1,654; result, elapsed ms 74; result, bandwidth m 500; result, cell size m 200; result, excluded null 0; result, max density per km2 396 [33].

Tool gp_calculate_density; parameters {"kernel": "quartic", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Delivery stops (ba8073d9)"}, "bandwidth_m": 500.0, "cell_size_m": 200.0}

Calculate density

What this analysis is. Calculate density: Kernel density per square kilometer on a grid [31]. In ArcGIS it is Calculate Density or Kernel Density; in QGIS, native:heatmapkerneldensityestimation [31].

Why it was run on this data. 45 points in Parcel lockers: a density surface shows where they concentrate [34].

What it found. The calculation of density using the `gp\_calculate\_density` tool analyzed the Parcel lockers layer [22] and processed 99 features [35]. The process required an elapsed time of 5 ms [35], identifying a maximum density of 1.381 per km² [35].

Result	Value
result, count	99
result, elapsed ms	5
result, bandwidth m	2,000
result, cell size m	1,000

Result	Value
result, excluded null	0
result, max density per km2	1.381
billing, cost	0.0509
billing, list price	0.0509
billing, upstream cost	0

Findings

Evidenced: Calculate density on Parcel lockers: Calculate density: 1 layer saved: Calculate density: Parcel lockers (99 features) [22][35].

Evidenced: It reported result, count 99; result, elapsed ms 5; result, bandwidth m 2,000; result, cell size m 1,000; result, excluded null 0; result, max density per km2 1.381 [35].

Tool gp_calculate_density; parameters {"kernel": "quartic", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Parcel lockers (4e9e11a9)"}, "bandwidth_m": 2000.0, "cell_size_m": 1000.0}

Calculate density

What this analysis is. Calculate density: Kernel density per square kilometer on a grid [31]. In ArcGIS it is Calculate Density or Kernel Density; in QGIS, native:heatmapkerneldensityestimation [31].

Why it was run on this data. 60 points in Loading bays: a density surface shows where they concentrate [36].

What it found. The density calculation used the Loading bays dataset [30]. This process analyzed 101 features and reported a total bandwidth of 2,000 meters [37]. The maximum density calculated across the layers was 1.929 per km² [37].

Result	Value
result, count	101
result, elapsed ms	5
result, bandwidth m	2,000
result, cell size m	1,000
result, excluded null	0
result, max density per km2	1.929
billing, cost	0.0512
billing, list price	0.0512
billing, upstream cost	0

Findings

Evidenced: Calculate density on Loading bays: Calculate density: 1 layer saved: Calculate density: Loading bays (101 features) [30][37].

Evidenced: It reported result, count 101; result, elapsed ms 5; result, bandwidth m 2,000; result, cell size m 1,000; result, excluded null 0; result, max density per km2 1.929 [37].

Tool gp_calculate_density; parameters {"kernel": "quartic", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Loading bays (16574f8d)"}, "bandwidth_m": 2000.0, "cell_size_m": 1000.0}

Find point clusters

What this analysis is. Find point clusters: Density-based clusters (DBSCAN, HDBSCAN or OPTICS, optionally space-time) with hulls and noise [38]. In ArcGIS it is Find Point Clusters or Density-based Clustering; in QGIS, native:dbscanclustering or native:stdbscanclustering [38].

Why it was run on this data. DBSCAN finds dense groups of Delivery stops and separates noise [39].

What it found. Find point clusters on Delivery stops: Find point clusters: 2 layers saved: Find point clusters: Delivery stops (2000 features); Find point clusters: cluster hulls (2 features) [9][40]. It reported result, count 2,000; result, noise 1,570; result, distance m 200; result, elapsed ms 214; result, min points 20; billing, cost 0.09 [40].

Result	Value
result, count	2,000
result, noise	1,570
result, distance m	200
result, elapsed ms	214
result, min points	20
billing, cost	0.09
billing, list price	0.09
billing, upstream cost	0

Findings

Evidenced: Find point clusters on Delivery stops: Find point clusters: 2 layers saved: Find point clusters: Delivery stops (2000 features); Find point clusters: cluster hulls (2 features) [9][40].

Evidenced: It reported result, count 2,000; result, noise 1,570; result, distance m 200; result, elapsed ms 214; result, min points 20; billing, cost 0.09 [40].

Tool gp_find_point_clusters; parameters {"method": "dbscan", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Delivery stops (ba8073d9)"}, "distance_m": 200.0, "min_points": 20}

Find point clusters

What this analysis is. Find point clusters: Density-based clusters (DBSCAN, HDBSCAN or OPTICS, optionally space-time) with hulls and noise [38]. In ArcGIS it is Find Point Clusters or Density-based Clustering; in QGIS, native:dbscanclustering or native:stdbcanclustering [38].

Why it was run on this data. DBSCAN finds dense groups of Parcel lockers and separates noise [41].

What it found. Find point clusters on Parcel lockers: Find point clusters: 2 layers saved: Find point clusters: Parcel lockers (45 features); Find point clusters: cluster hulls (1 feature) [22][42]. It reported result, count 45; result, noise 1; result, distance m 2,000; result, elapsed ms 2; result, min points 3; billing, cost 0.0509 [42].

Result	Value
result, count	45
result, noise	1
result, distance m	2,000
result, elapsed ms	2
result, min points	3
billing, cost	0.0509
billing, list price	0.0509
billing, upstream cost	0

Findings

Evidenced: Find point clusters on Parcel lockers: Find point clusters: 2 layers saved: Find point clusters: Parcel lockers (45 features); Find point clusters: cluster hulls (1 feature) [22][42].

Evidenced: It reported result, count 45; result, noise 1; result, distance m 2,000; result, elapsed ms 2; result, min points 3; billing, cost 0.0509 [42].

Tool gp_find_point_clusters; parameters {"method": "dbscan", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Parcel lockers (4e9e11a9)"}, "distance_m": 2000.0, "min_points": 3}

Find point clusters

What this analysis is. Find point clusters: Density-based clusters (DBSCAN, HDBSCAN or OPTICS, optionally space-time) with hulls and noise [38]. In ArcGIS it is Find Point Clusters or Density-based Clustering; in QGIS, native:dbscanclustering or native:stdbscanclustering [38].

Why it was run on this data. DBSCAN finds dense groups of Loading bays and separates noise [43].

What it found. Find point clusters on Loading bays: Find point clusters: 2 layers saved: Find point clusters: Loading bays (60 features); Find point clusters: cluster hulls (6 features) [30][44]. It reported result, count 60; result, noise 7; result, distance m 1,000; result, elapsed ms 4; result, min points 3; billing, cost 0.0512 [44].

Result	Value
result, count	60
result, noise	7
result, distance m	1,000
result, elapsed ms	4
result, min points	3
billing, cost	0.0512
billing, list price	0.0512
billing, upstream cost	0

Findings

Evidenced: Find point clusters on Loading bays: Find point clusters: 2 layers saved: Find point clusters: Loading bays (60 features); Find point clusters: cluster hulls (6 features) [30][44].

Evidenced: It reported result, count 60; result, noise 7; result, distance m 1,000; result, elapsed ms 4; result, min points 3; billing, cost 0.0512 [44].

Tool gp_find_point_clusters; parameters {"method": "dbscan", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Loading bays (16574f8d)", "distance_m": 1000.0, "min_points": 3}}

Outliers

What this analysis is. Find outliers: Anselin local Moran's I: HH, LL clusters and HL, LH outliers [45]. In ArcGIS it is Find Outliers or Cluster and Outlier Analysis (Anselin Local Moran's I) [45].

Why it was run on this data. Local Moran's I maps clusters and outliers of 'parcels_per_day' [46].

What it found. Outliers on Delivery zones: Find outliers: 1 layer saved: Find outliers: Delivery zones (10 features) [19][47]. It reported result, count 10; result, elapsed ms 4; result, permutations 199; result, excluded null 0; result, distance band m 2,661; billing, cost 0.0503 [47].

Result	Value
result, count	10
result, elapsed ms	4
result, permutations	199
result, excluded null	0
result, distance band m	2,661
billing, cost	0.0503
billing, list price	0.0503
billing, upstream cost	0

Findings

Evidenced: Outliers on Delivery zones: Find outliers: 1 layer saved: Find outliers: Delivery zones (10 features) [19][47].

Evidenced: It reported result, count 10; result, elapsed ms 4; result, permutations 199; result, excluded null 0; result, distance band m 2,661; billing, cost 0.0503 [47].

Tool gp_outliers; parameters {"field": "parcels_per_day", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Delivery zones (bfcf8b53)"}, "aggregation": "hexagon"}

Spatial autocorrelation

What this analysis is. Spatial autocorrelation: Global Moran's I: is the pattern clustered, dispersed or random [48]. In ArcGIS it is Spatial Autocorrelation (Global Moran's I) [48].

Why it was run on this data. Global Moran's I says whether similar values of 'parcels_per_day' sit next to each other [49].

What it found. Spatial autocorrelation on Delivery zones: Spatial autocorrelation: done; no map output [19][50]. It reported result, n 10; result, p value 0.1412; result, z score 1.471; result, morans i 0.09356; result, variance 0.01935; result, elapsed ms 2 [50].

Result	Value
result, n	10
result, p value	0.1412
result, z score	1.471
result, morans i	0.09356
result, variance	0.01935
result, elapsed ms	2
result, expected i	-0.1111
result, excluded null	0
result, distance band m	2,661
result, p value normality	0.421
result, z score normality	0.8046
result, variance normality	0.06471
billing, cost	0.02
billing, list price	0.02
billing, upstream cost	0

Findings

Evidenced: Spatial autocorrelation on Delivery zones: Spatial autocorrelation: done; no map output [19][50].

Evidenced: It reported result, n 10; result, p value 0.1412; result, z score 1.471; result, morans i 0.09356; result, variance 0.01935; result, elapsed ms 2 [50].

Tool gp_spatial_autocorrelation; parameters {"field": "parcels_per_day", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Delivery zones (bfcf8b53)"}}

Measure

What this analysis is. Areas and lengths: Geodesic area, perimeter and length of each feature [51]. In ArcGIS it is Areas And Lengths or Calculate Geometry; in QGIS, qgis:exportaddgeometrycolumns [51].

Why it was run on this data. Lengths of the 36 lines of Routes (total and per feature) [52].

What it found. Measure on Routes: Areas and lengths: 1 layer saved: Areas and lengths: Routes (36 features) [53][54]. It reported result, count 36; result, elapsed ms 7; billing, cost 0.01; billing, list price 0.01; billing, upstream cost 0 [53].

Result	Value
result, count	36
result, elapsed ms	7
billing, cost	0.01
billing, list price	0.01
billing, upstream cost	0

Findings

Evidenced: Measure on Routes: Areas and lengths: 1 layer saved: Areas and lengths: Routes (36 features) [53][54].

Evidenced: It reported result, count 36; result, elapsed ms 7; billing, cost 0.01; billing, list price 0.01; billing, upstream cost 0 [53].

Tool gp_measure; parameters {"units": "metric", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Routes (93de6e09)"}}

Measure

What this analysis is. Areas and lengths: Geodesic area, perimeter and length of each feature [51]. In ArcGIS it is Areas And Lengths or Calculate Geometry; in QGIS, qgis:exportaddgeometrycolumns [51].

Why it was run on this data. Lengths of the 12 lines of Roadworks (total and per feature) [55].

What it found. The `gp\_measure` tool was utilized with the Roadworks layer as input [57]. The tool saved the areas and lengths for Roadworks, which contained 12 features [56]. The process resulted in a count of 12 features and took 0 elapsed ms [56].

Result	Value
result, count	12
result, elapsed ms	0
billing, cost	0.01
billing, list price	0.01
billing, upstream cost	0

Findings

Evidenced: Measure on Roadworks: Areas and lengths: 1 layer saved: Areas and lengths: Roadworks (12 features) [56][57].

Evidenced: It reported result, count 12; result, elapsed ms 0; billing, cost 0.01; billing, list price 0.01; billing, upstream cost 0 [56].

Tool gp_measure; parameters {"units": "metric", "project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Roadworks (50ecfc27)"}}

Line density

What this analysis is. Line density: Length of lines per unit area around each cell (km per square km), optionally weighted by a field [58]. In ArcGIS it is Line Density; in QGIS, qgis:linedensity [58].

Why it was run on this data. Line density shows where Routes are densest [59].

What it found. Line density on Routes: Line density: 1 layer saved: Line density: Routes (480 features) [54][60]. It reported result, count 480; result, radius m 2,000; result, elapsed ms 69; result, cell size m 500; result, total length km 712.7; result, max density km per km2 20.21 [60].

Result	Value
result, count	480

Result	Value
result, radius m	2,000
result, elapsed ms	69
result, cell size m	500
result, total length km	712.7
result, max density km per km2	20.21
billing, cost	0.05072
billing, list price	0.05072
billing, upstream cost	0

Findings

Evidenced: Line density on Routes: Line density: 1 layer saved: Line density: Routes (480 features) [54][60].

Evidenced: It reported result, count 480; result, radius m 2,000; result, elapsed ms 69; result, cell size m 500; result, total length km 712.7; result, max density km per km2 20.21 [60].

A model draft was discarded because a sentence did not cite a source of this section.

Tool gp_line_density; parameters {"project": "55917da2-e619-41aa-b6a1-e521a75b705c", "features": {"layer": "Routes (93de6e09)"}, "radius_m": 2000.0, "cell_size_m": 500.0}

Maps and charts

The run also made 22 map image(s)

[61][62][63][64][65][66][67][68][69][70][71][72][73][74][75][76][77][78][79][80][81][82] and 27 chart(s)
[83][84][85][86][87][88][89][90][91][92][93][94][95][96][97][98][99][100][101][102][103][104][105][106][107][108][109].

Emerging hot spots: Delivery stops

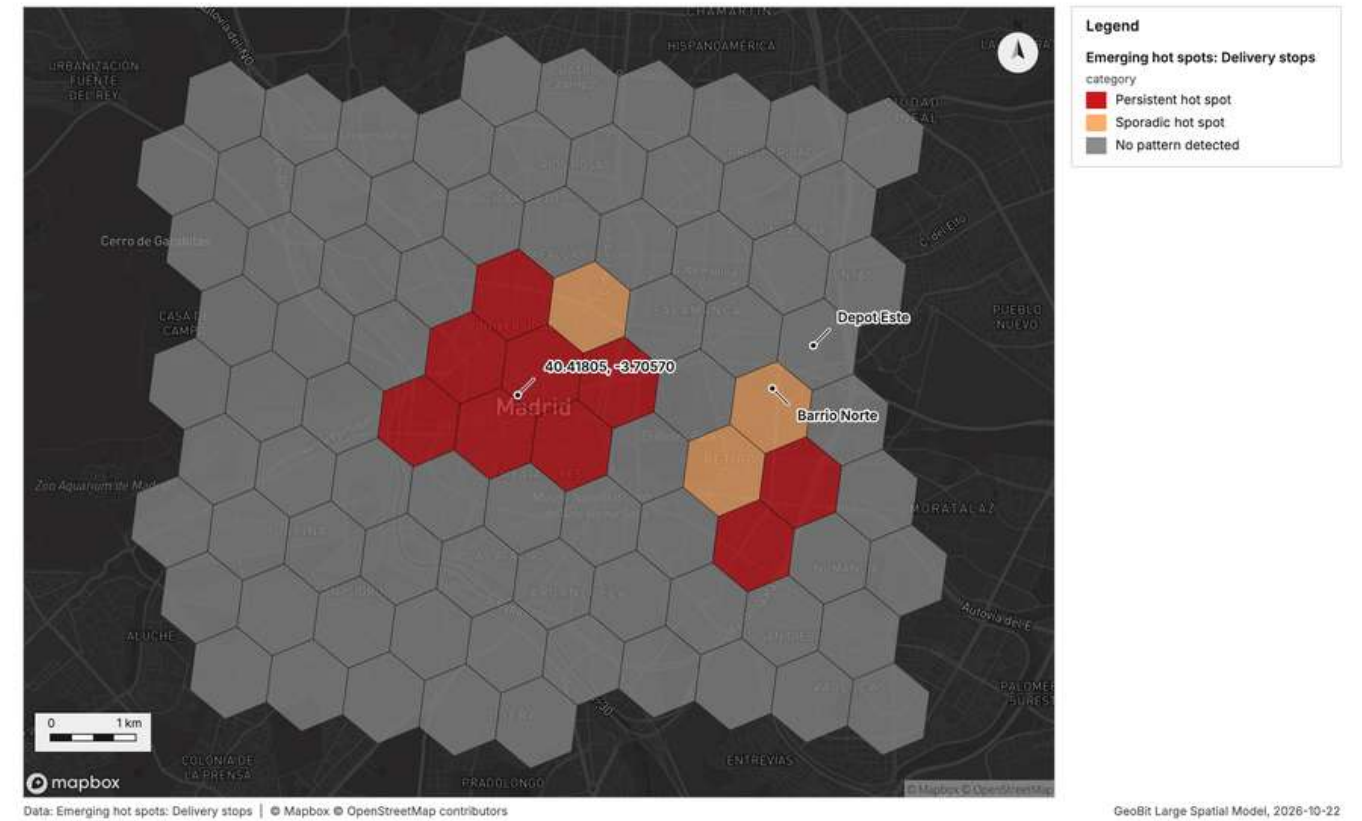


Figure 2. Emerging hot spots: Delivery stops [61]

Repeat and near repeat classification: Delivery stops

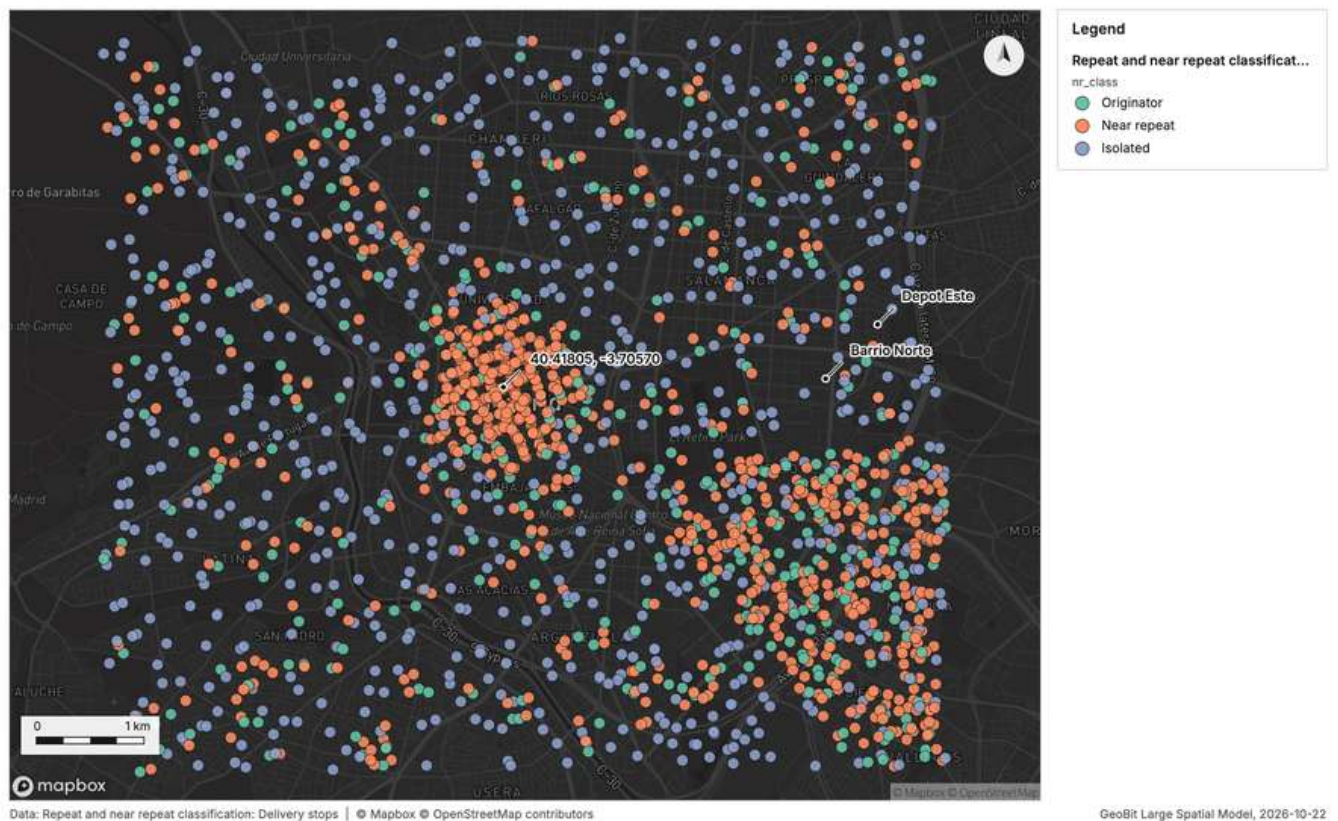


Figure 3. Repeat and near repeat classification: Delivery stops [62]

Summarize within: Delivery zones

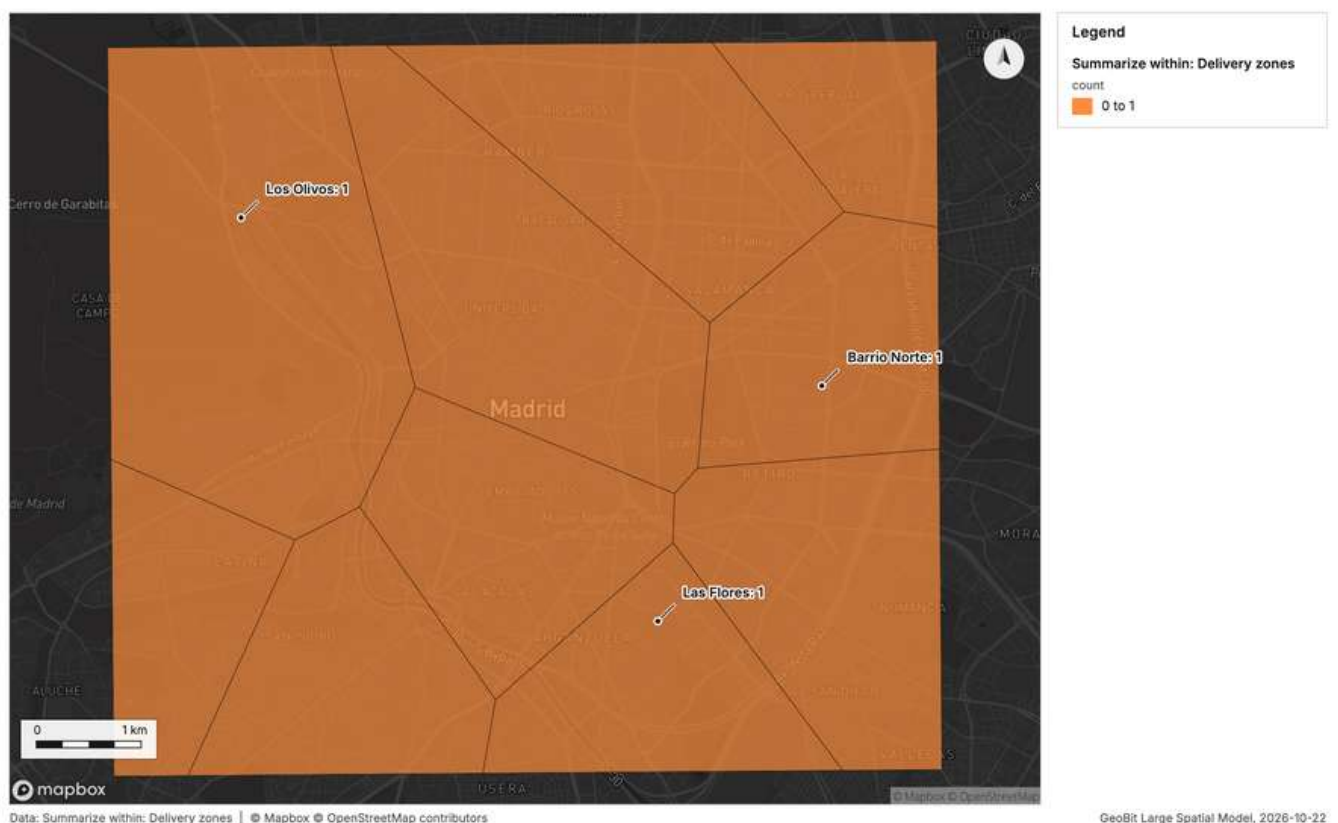


Figure 4. Summarize within: Delivery zones [63]

Summarize within: Delivery zones

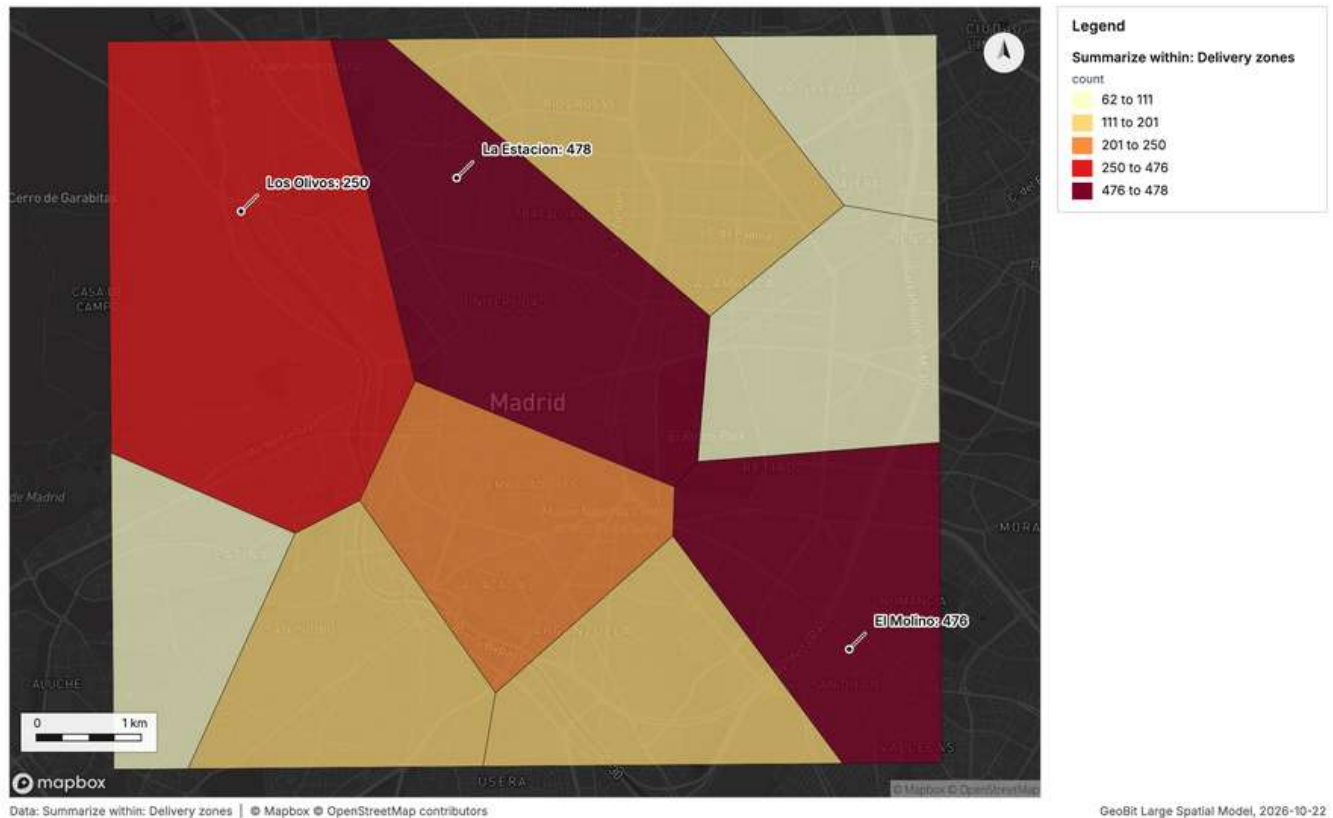


Figure 5. Summarize within: Delivery zones [64]

Summarize within: Delivery zones



Figure 6. Summarize within: Delivery zones [65]

Hot spot analysis: Delivery stops

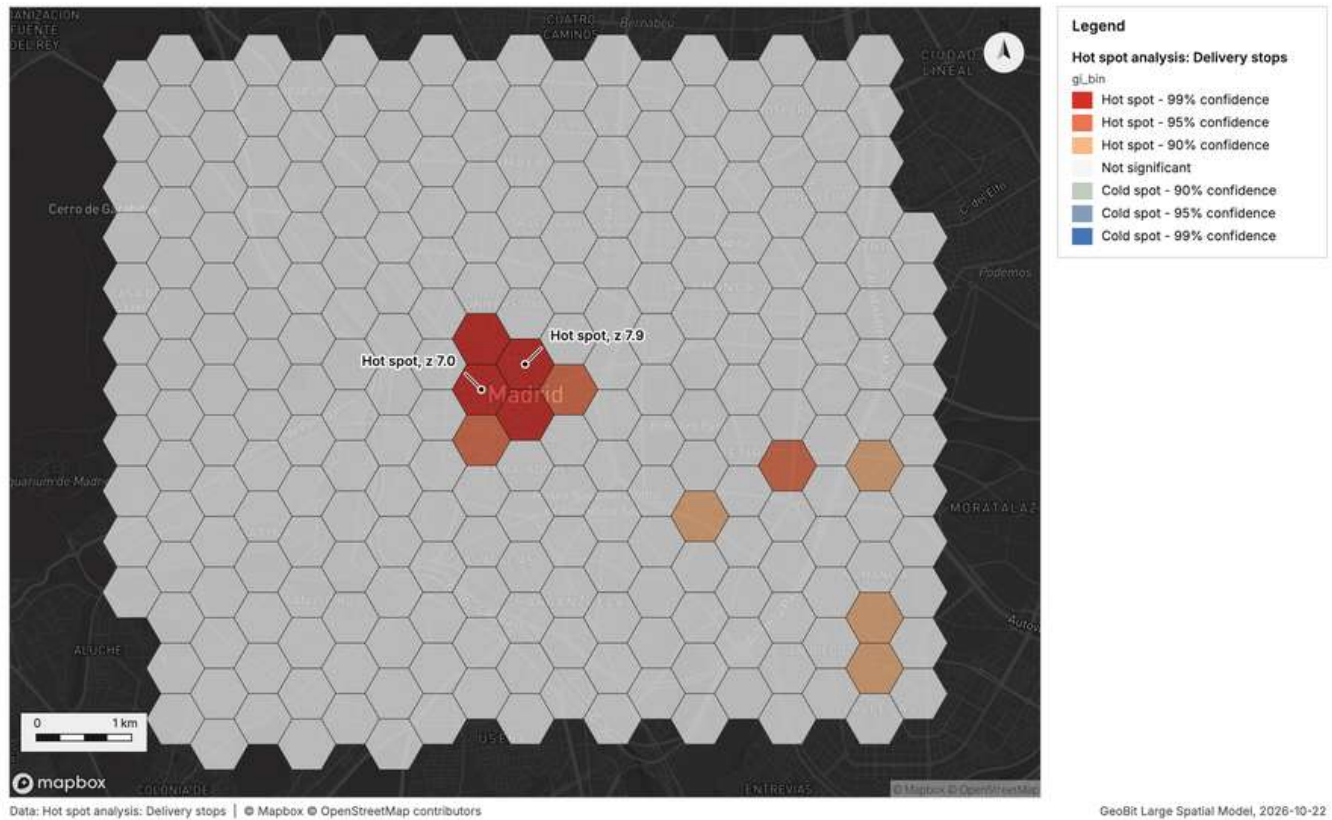


Figure 7. Hot spot analysis: Delivery stops [66]

Hot spot analysis: Parcel lockers



Figure 8. Hot spot analysis: Parcel lockers [67]

Hot spot analysis: Loading bays

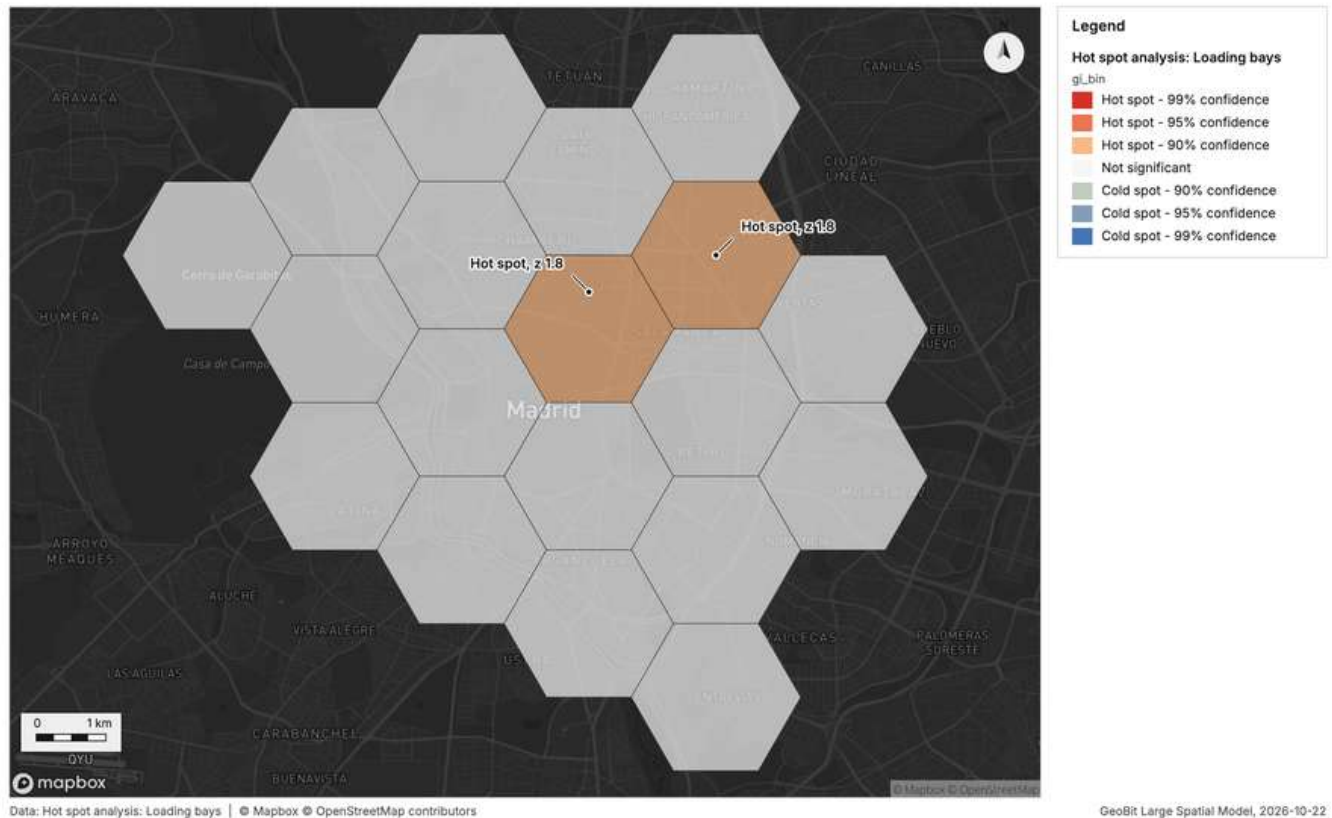


Figure 9. Hot spot analysis: Loading bays [68]

Calculate density: Delivery stops

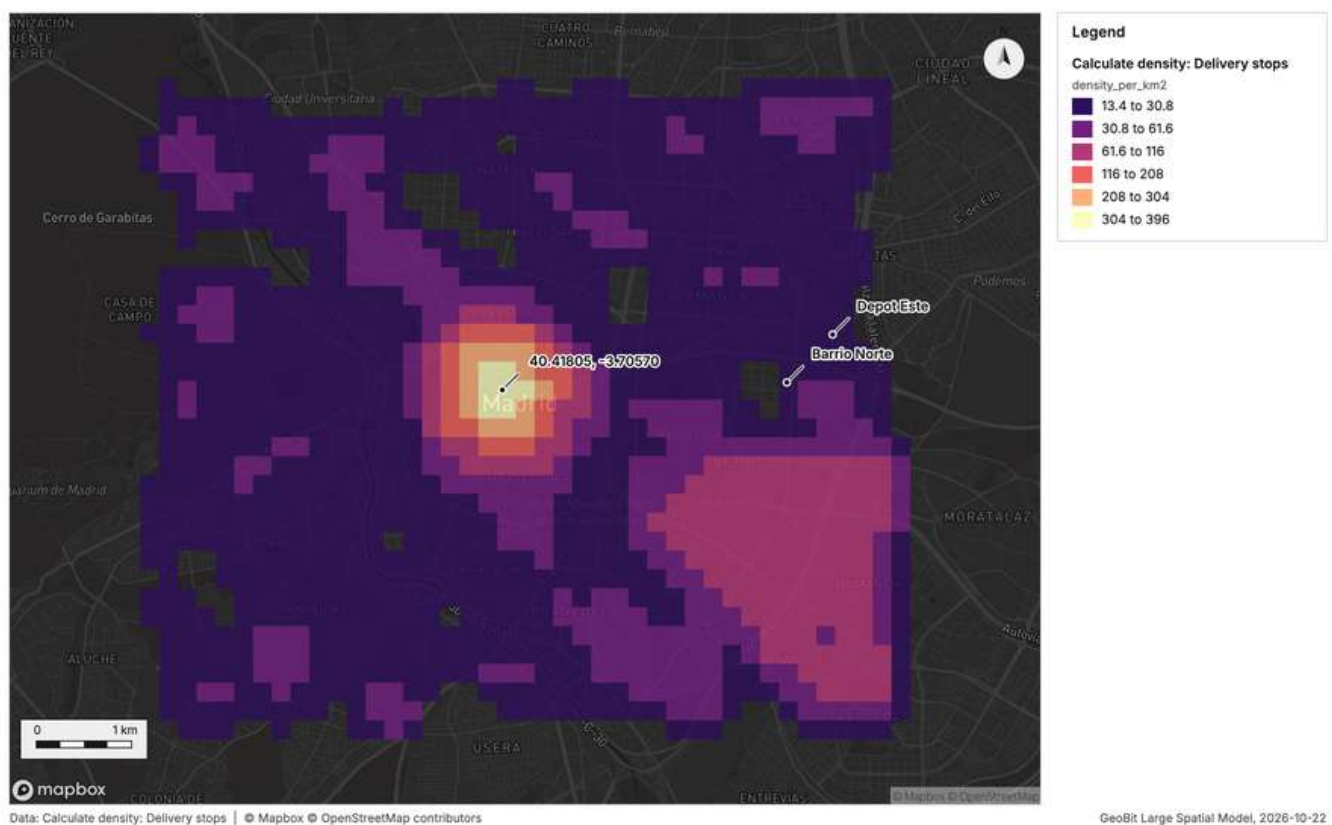


Figure 10. Calculate density: Delivery stops [69]

Calculate density: Parcel lockers



Figure 11. Calculate density: Parcel lockers [70]

Calculate density: Loading bays

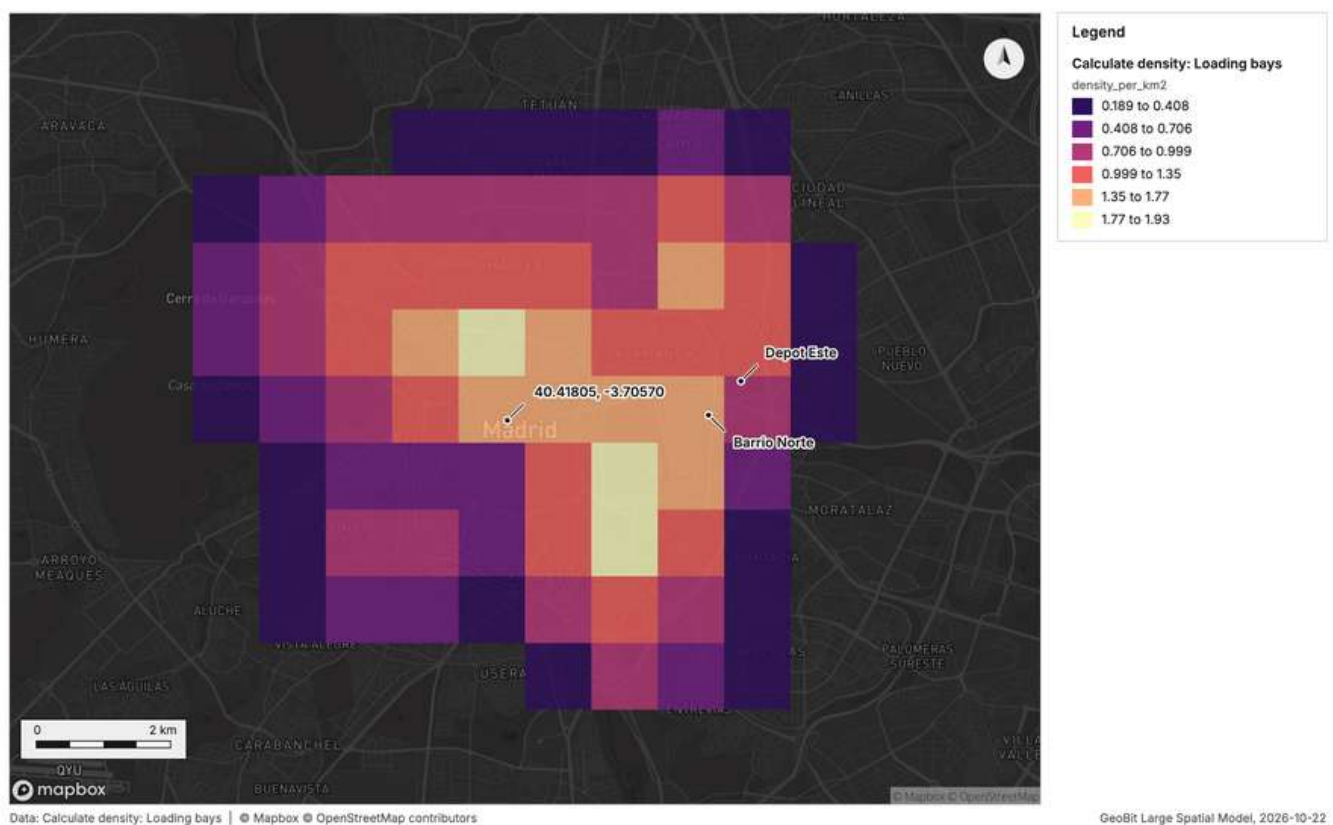


Figure 12. Calculate density: Loading bays [71]

Find point clusters: Delivery stops

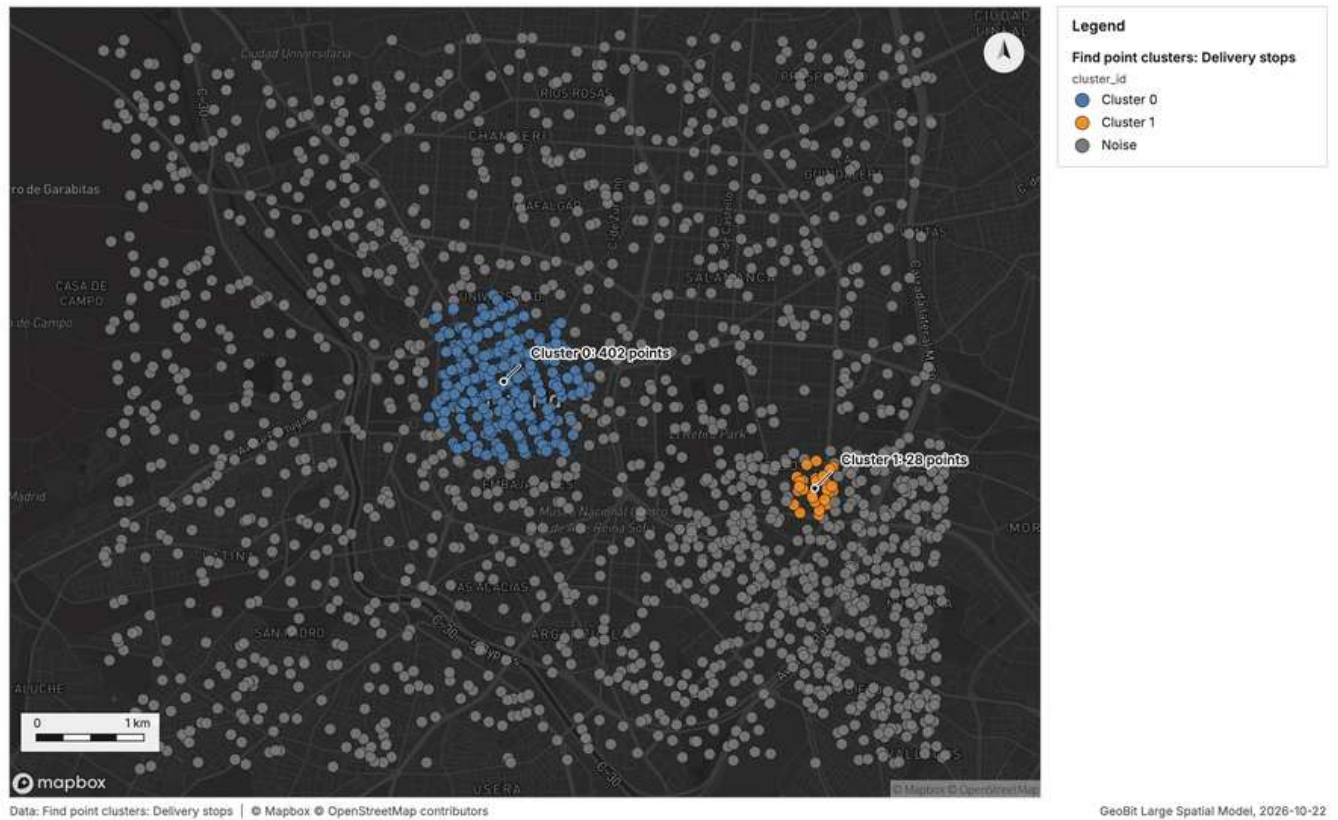


Figure 13. Find point clusters: Delivery stops [72]

Find point clusters: cluster hulls



Figure 14. Find point clusters: cluster hulls [73]

Find point clusters: Parcel lockers

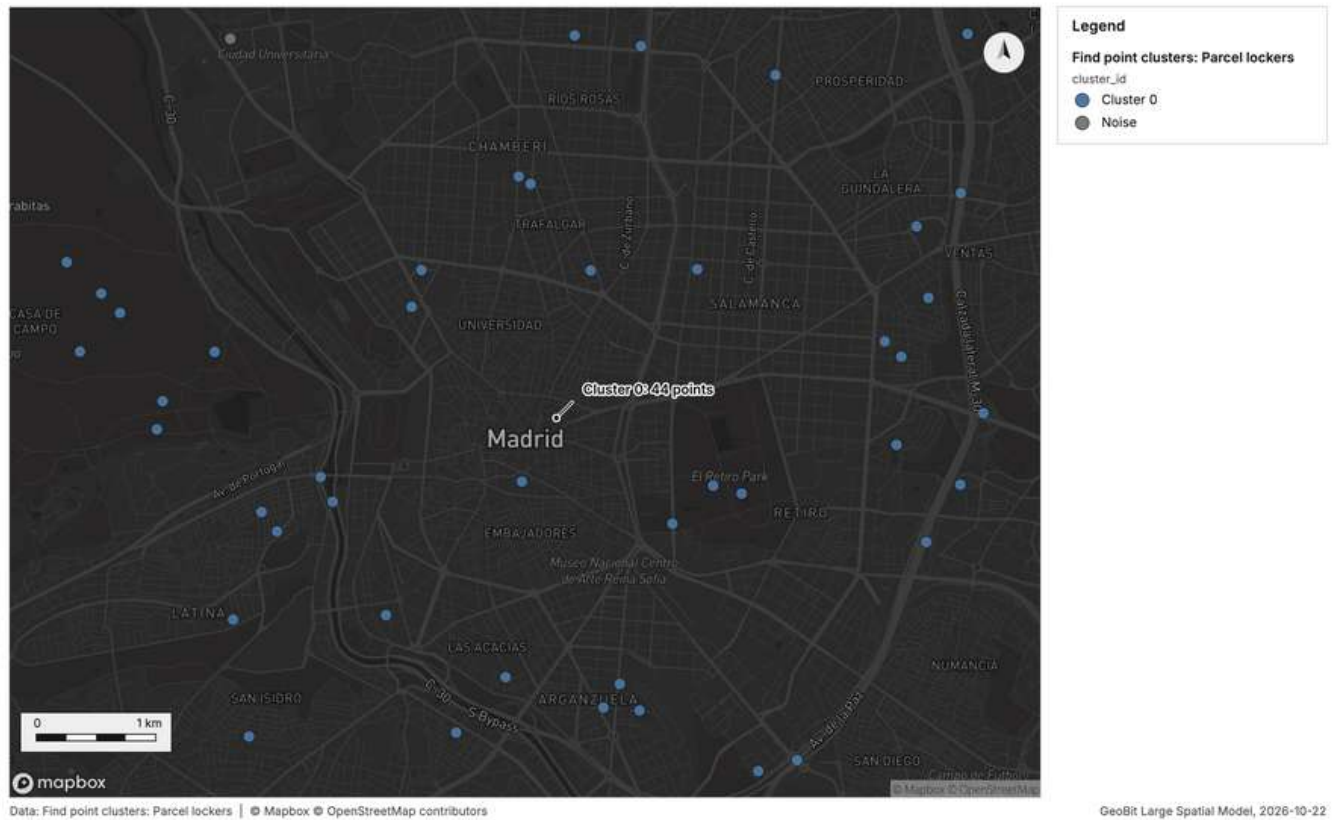


Figure 15. Find point clusters: Parcel lockers [74]

Find point clusters: cluster hulls



Figure 16. Find point clusters: cluster hulls [75]

Find point clusters: Loading bays

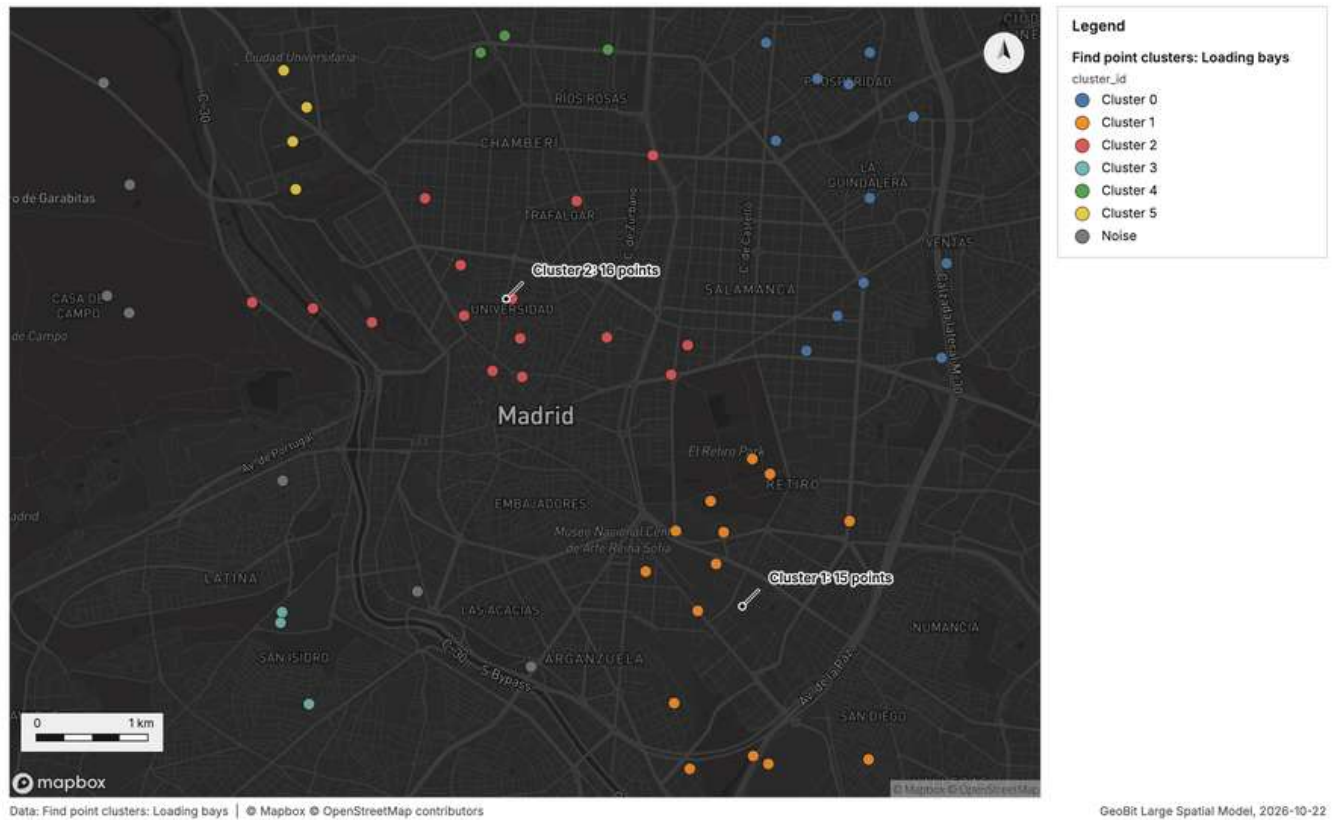


Figure 17. Find point clusters: Loading bays [76]

Find point clusters: cluster hulls

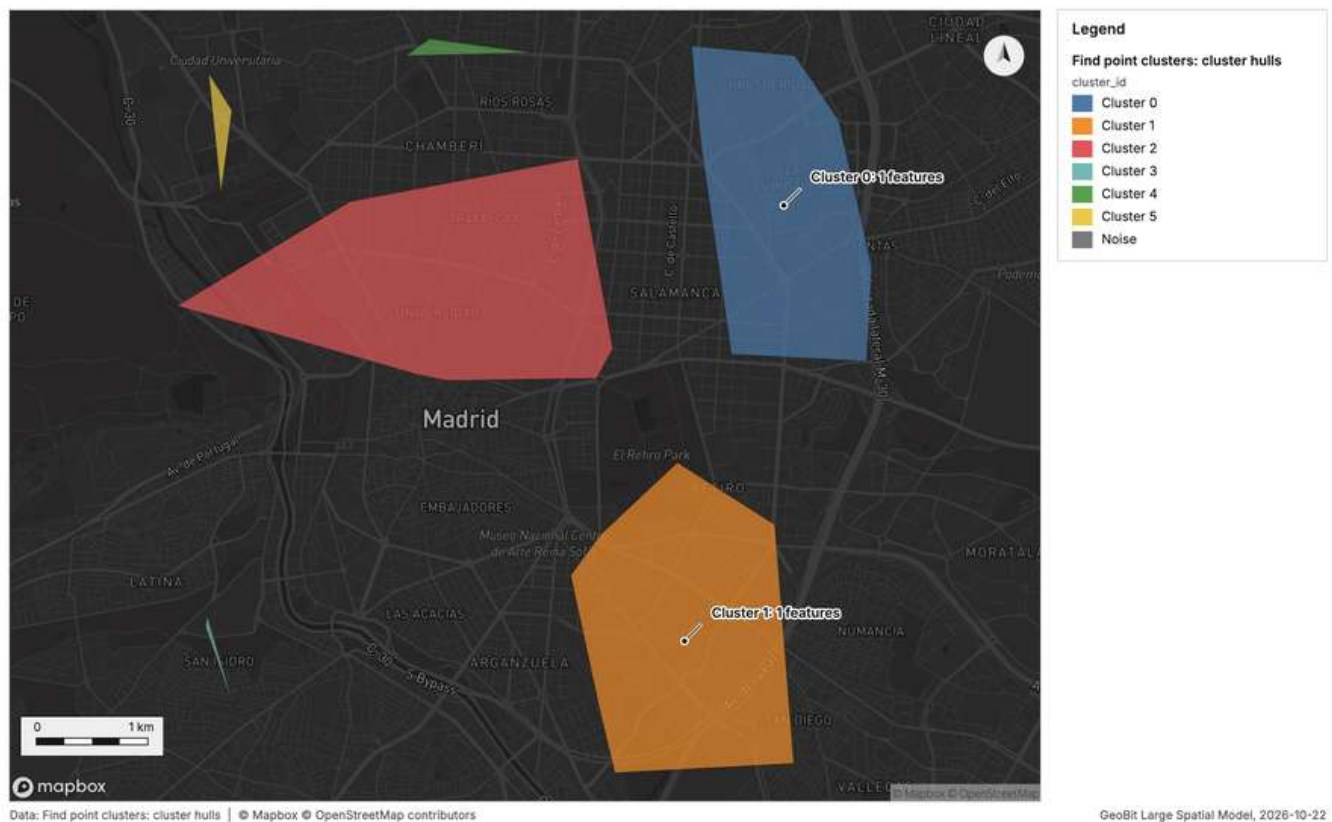


Figure 18. Find point clusters: cluster hulls [77]

Delivery zones by parcels_per_day

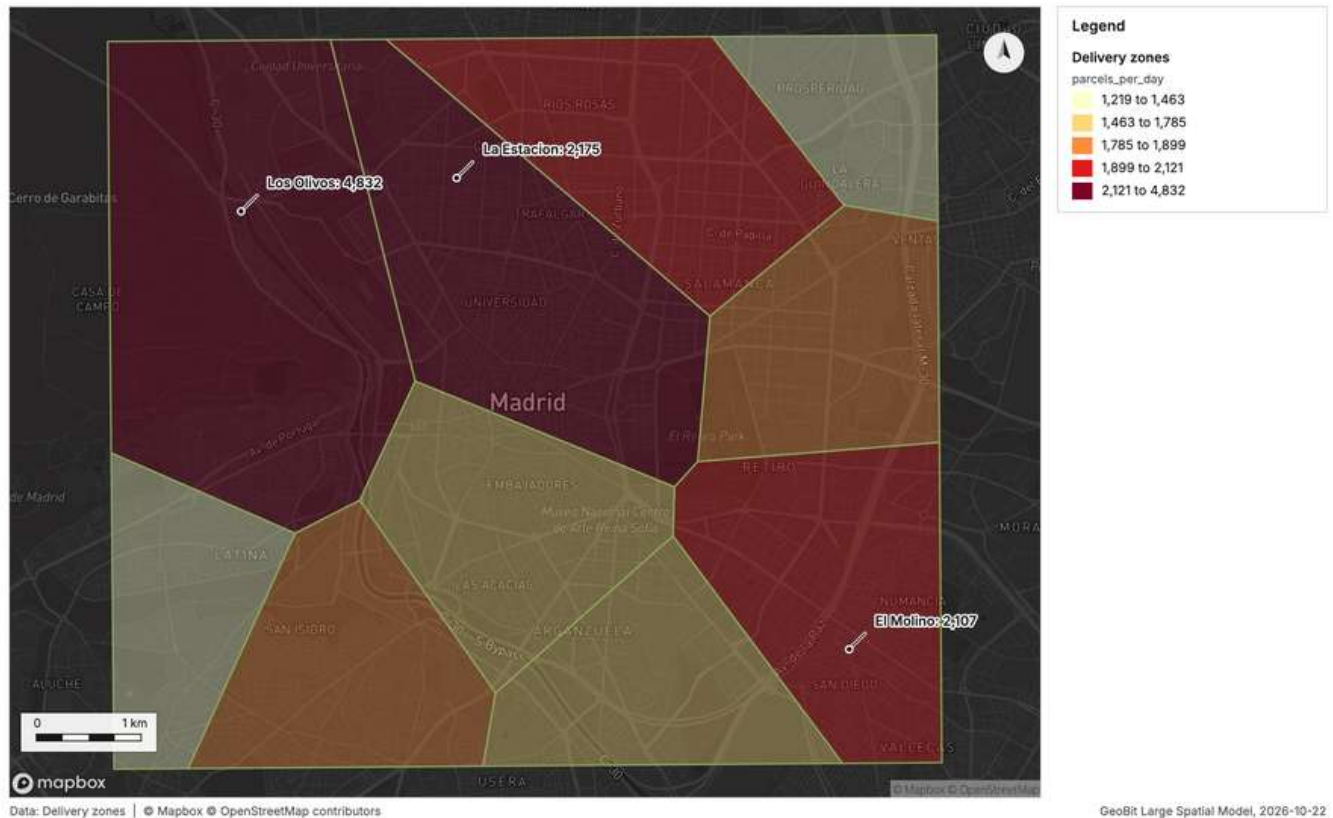


Figure 19. Delivery zones by parcels_per_day [78]

Find outliers: Delivery zones

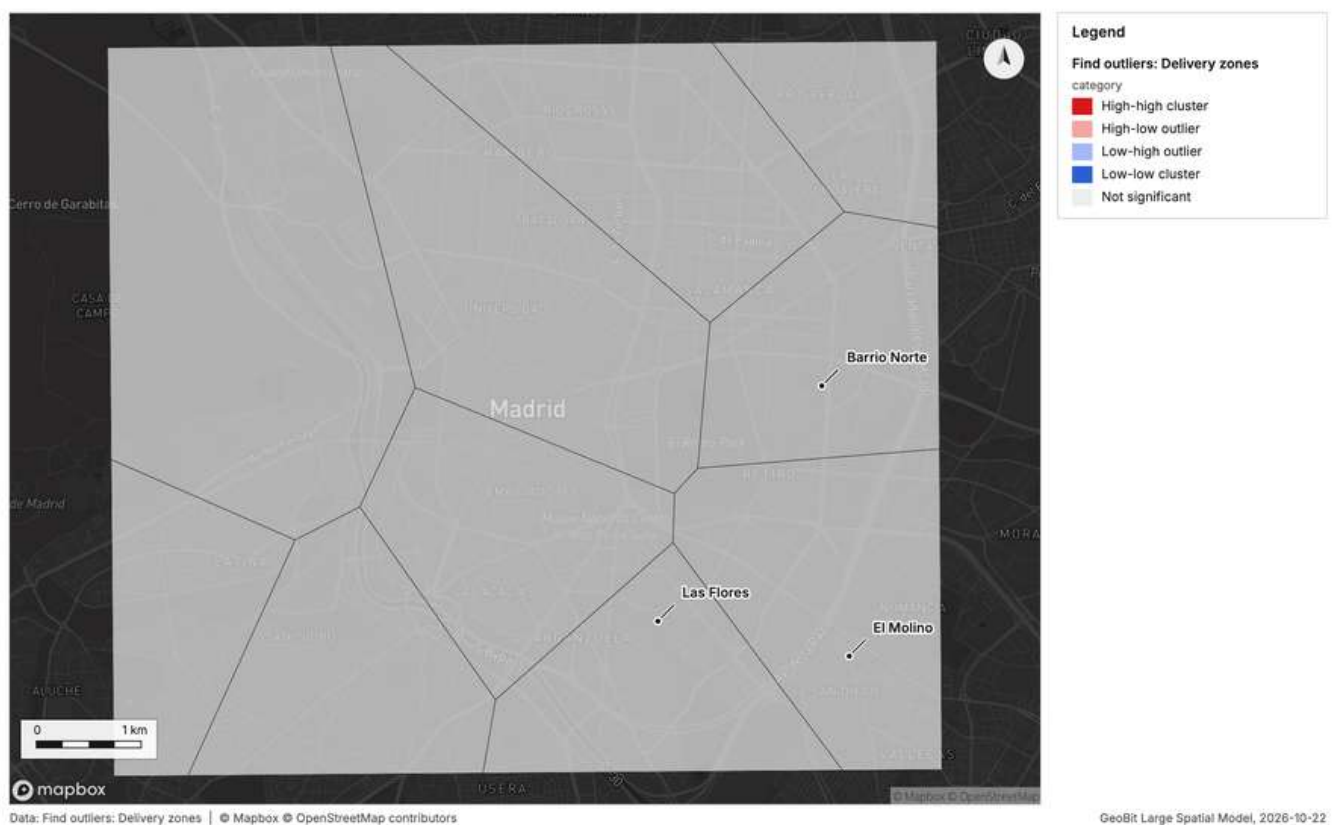


Figure 20. Find outliers: Delivery zones [79]

Areas and lengths: Routes



Figure 21. Areas and lengths: Routes [80]

Areas and lengths: Roadworks



Figure 22. Areas and lengths: Roadworks [81]

Line density: Routes

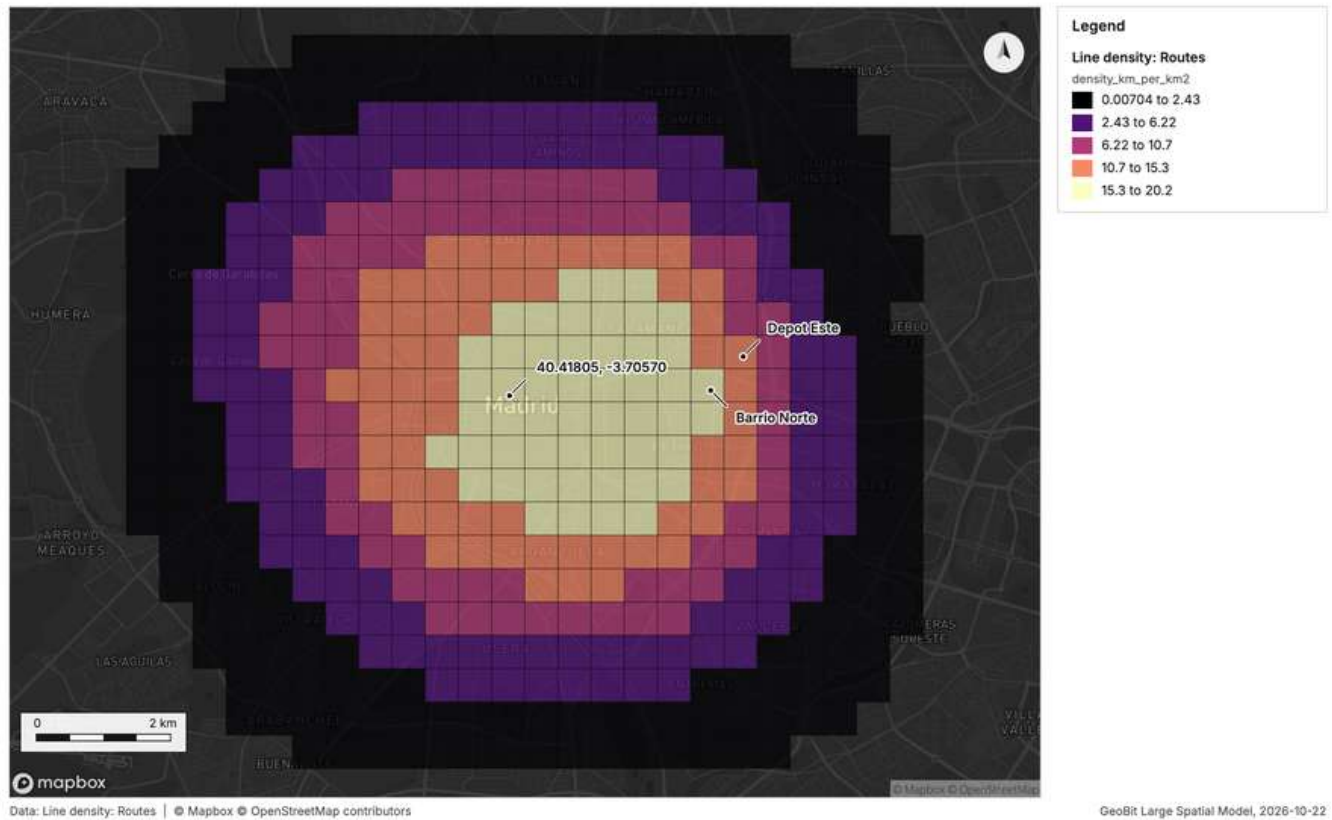


Figure 23. Line density: Routes [82]

What the map shows. The map shows the emerging hot spots for delivery stops, categorizing intensity [61]

Inferred: read from the image by gemma4:e4b, not evidence.

Distribution of parcels_per_day

10 values in 5 bins

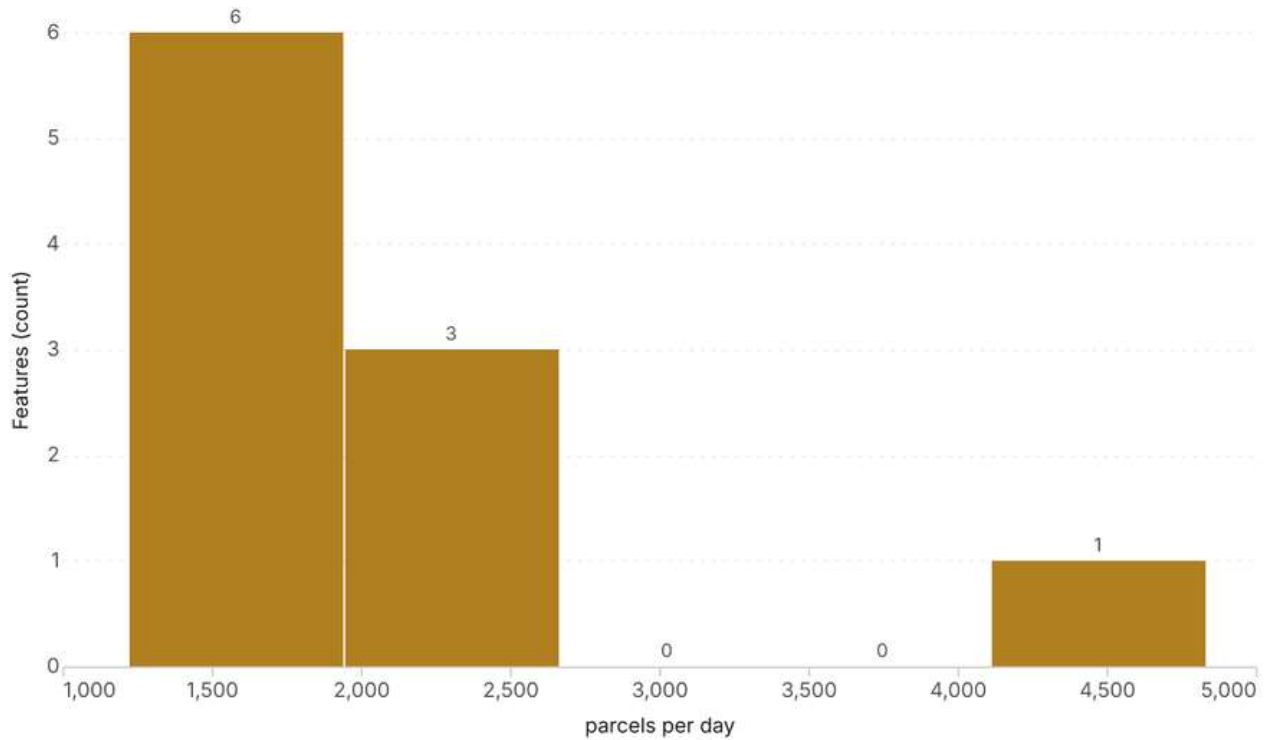


Figure 24. Delivery zones over time (parcels_per_day) [83]. Source: Delivery zones (10 features). The data is in the appendix.

Count per week by start_date and type

Per week: 11 weeks from 2026-06-22 to 2026-08-31; trend +0 per week; first half 7, second half 4 (-42.9%)

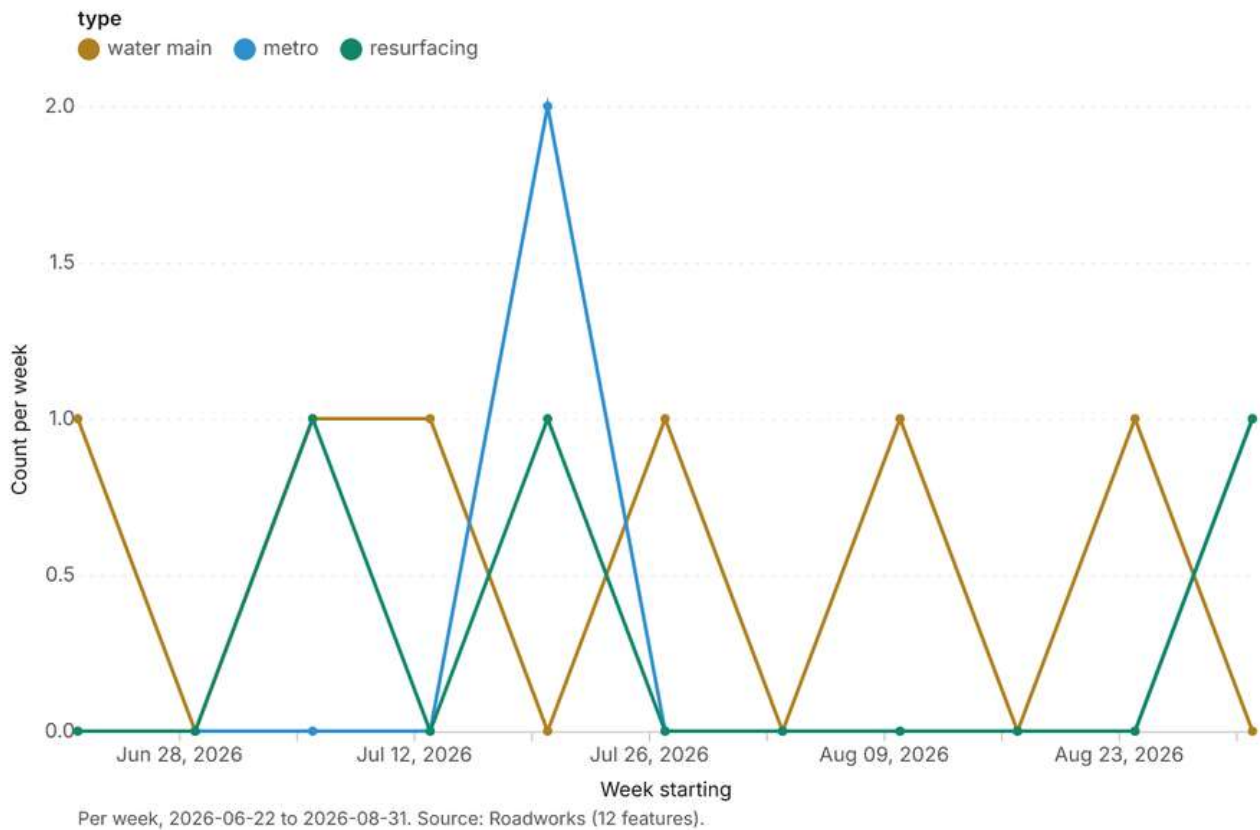
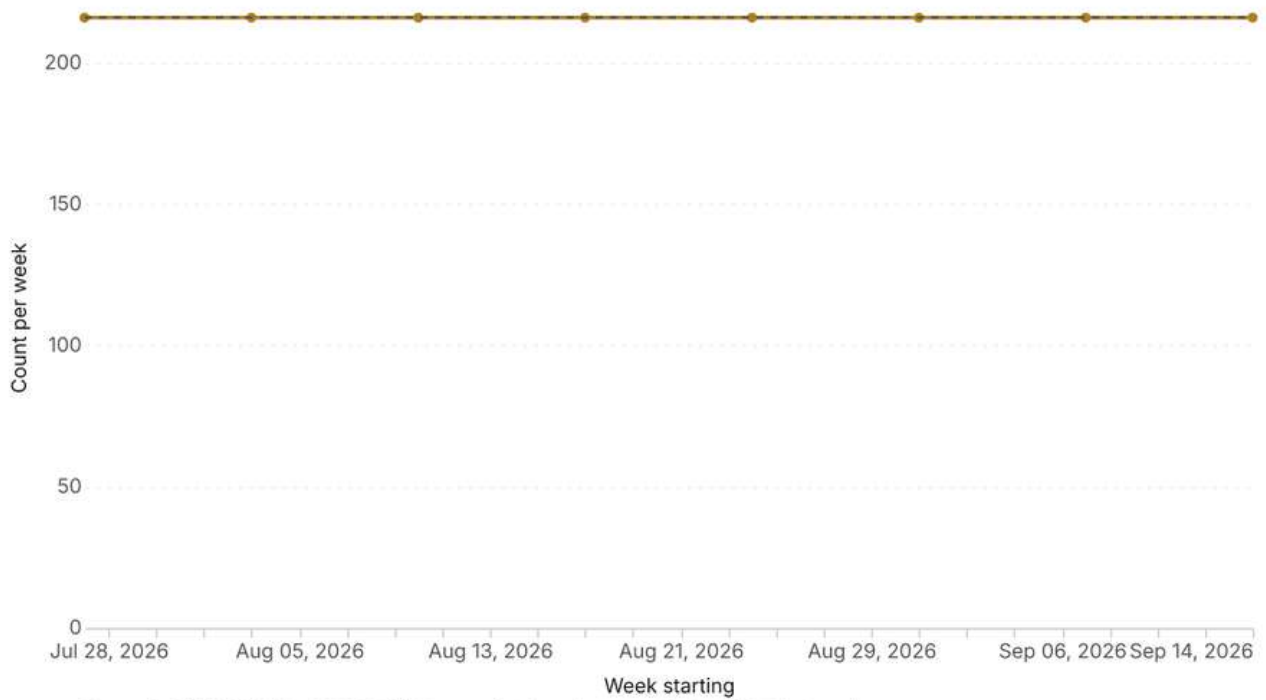


Figure 25. Roadworks over time (start_date) [84]. Per week, 2026-06-22 to 2026-08-31. Source: Roadworks (12 features). The data is in the appendix.

Count per week by date

Per week: 8 weeks from 2026-07-27 to 2026-09-14; trend +0 per week; first half 864, second half 864 (+0.0%)

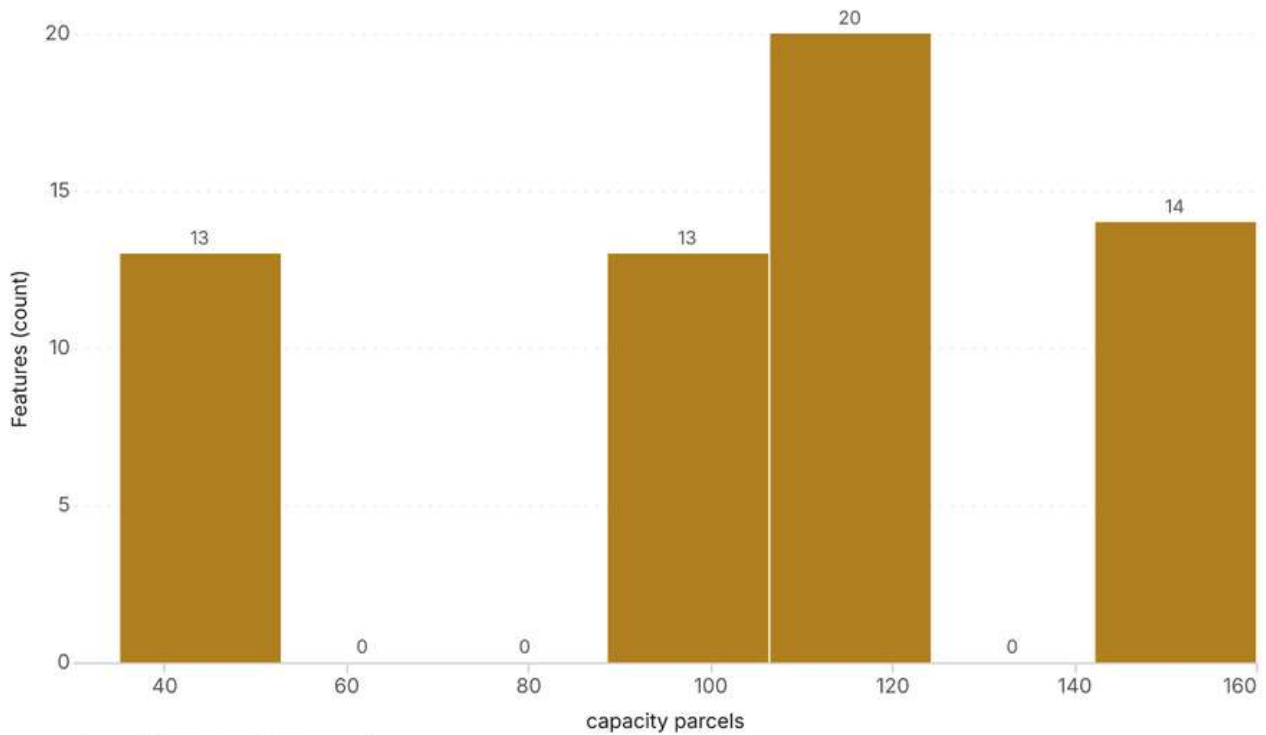


Per week, 2026-07-27 to 2026-09-14. Source: Route performance by day (1,728 features).

Figure 26. Route performance by day over time (date) [85]. Per week, 2026-07-27 to 2026-09-14. Source: Route performance by day (1,728 features). The data is in the appendix.

Distribution of capacity_parcel

60 values in 7 bins

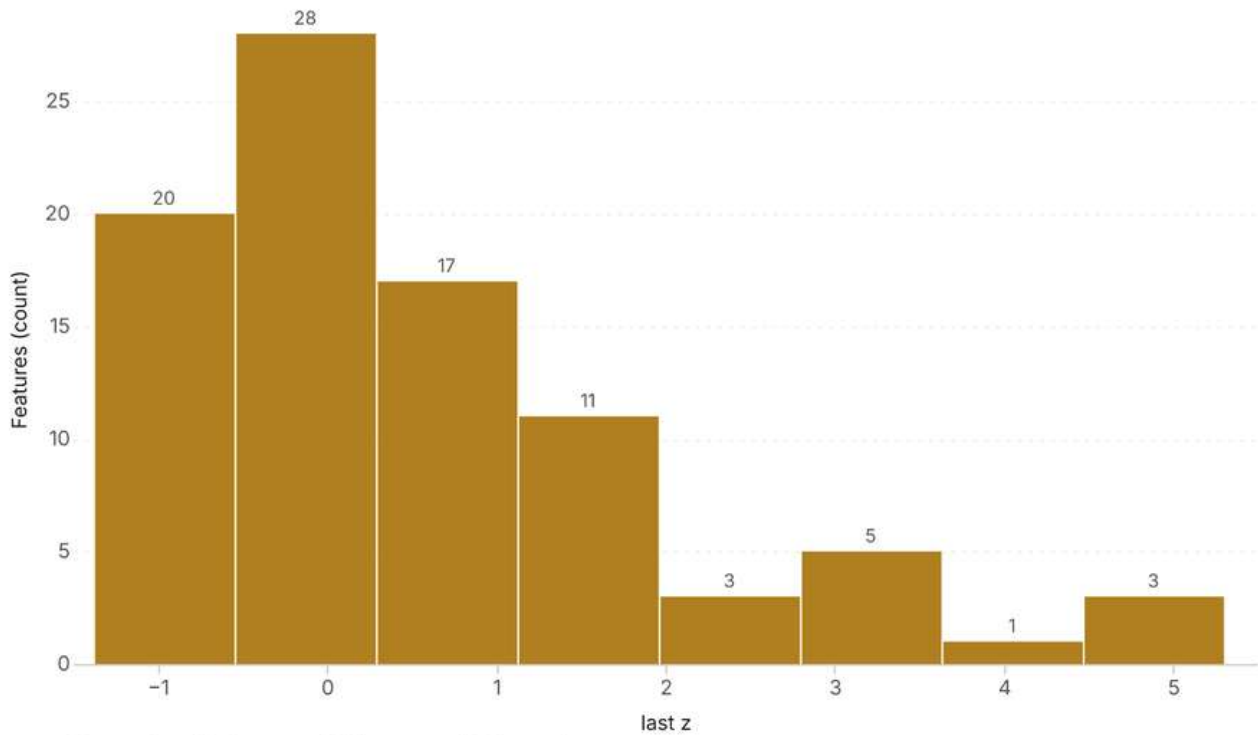


Source: Vehicle fleet (60 features).

Figure 27. Vehicle fleet over time (model_year) [86]. Source: Vehicle fleet (60 features). The data is in the appendix.

Distribution of last_z

88 values in 8 bins

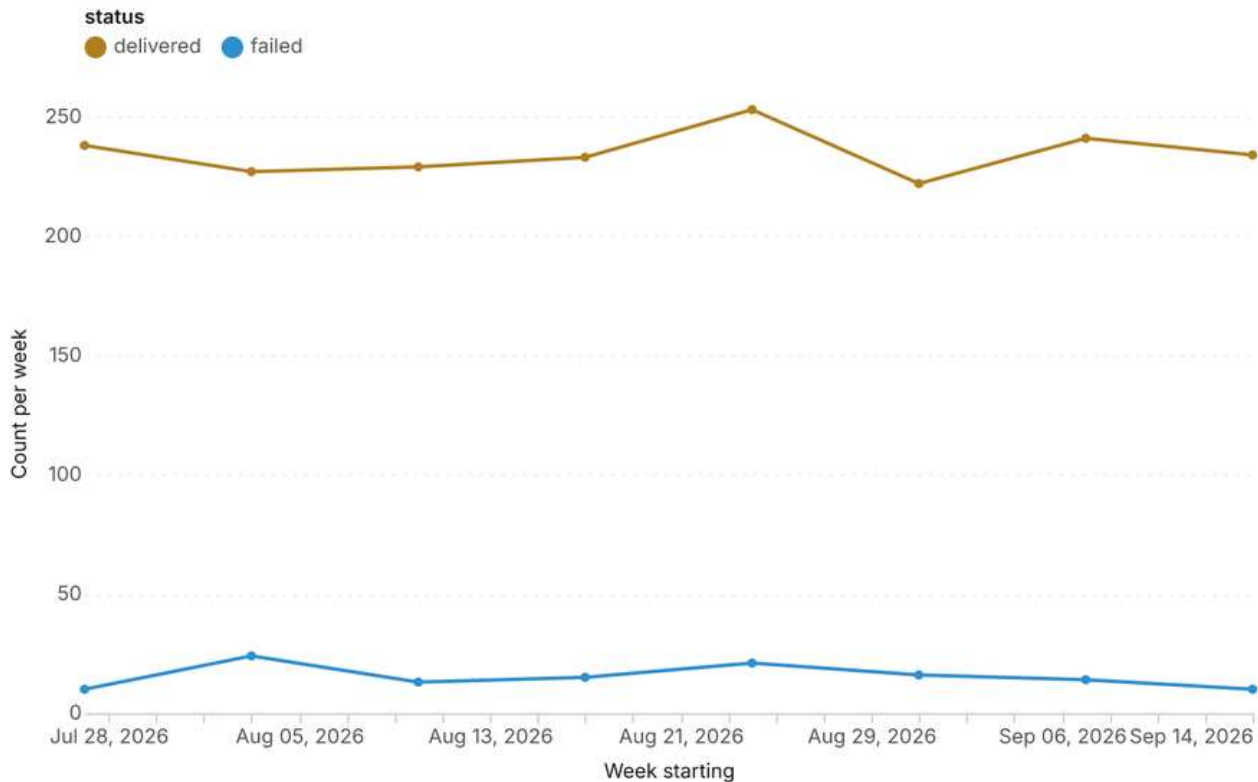


Source: Emerging hot spots: Delivery stops (88 features).

Figure 28. Emerging hot spots: Delivery stops [87]. Source: Emerging hot spots: Delivery stops (88 features). The data is in the appendix.

Count per week by delivered_at and status

Per week: 8 weeks from 2026-07-27 to 2026-09-14; trend +0.0714 per week; first half 989, second half 1,011 (+2.2%)

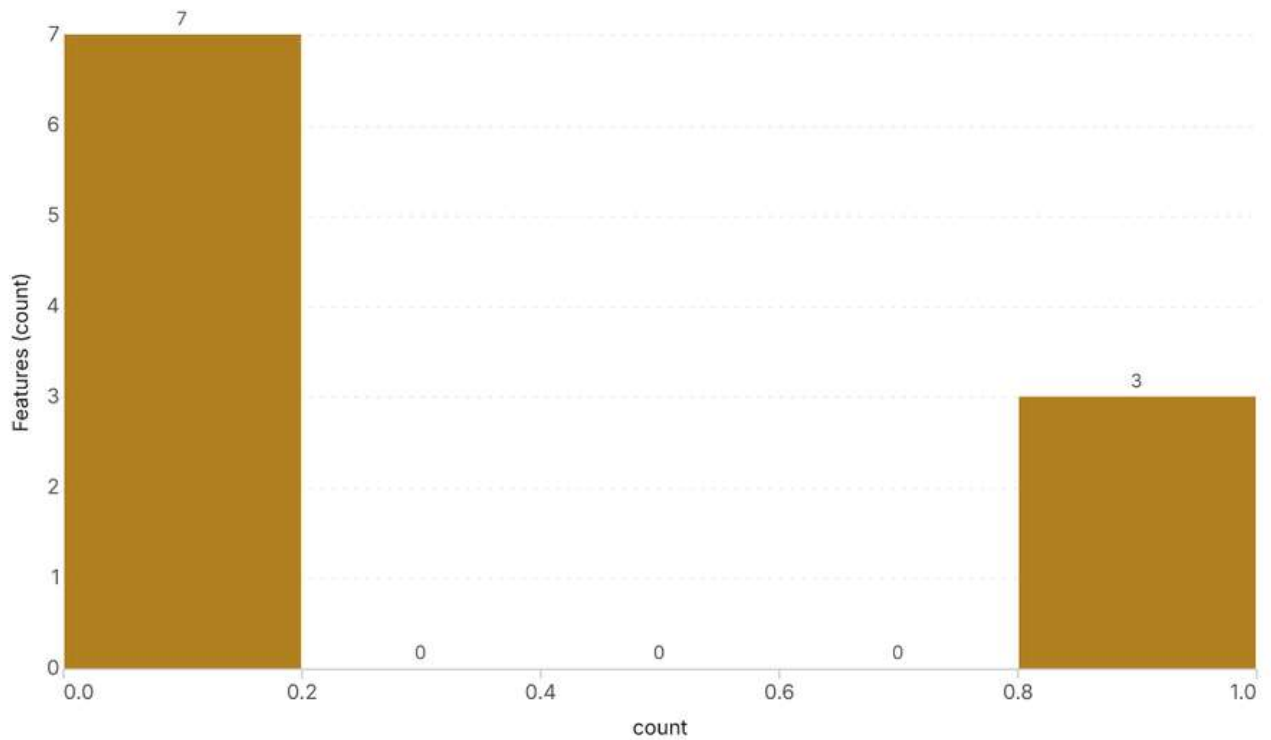


Per week, 2026-07-27 to 2026-09-14. Source: Repeat and near repeat classification: Delivery stops (2,000 features).

Figure 29. Repeat and near repeat classification: Delivery stops [88]. Per week, 2026-07-27 to 2026-09-14. Source: Repeat and near repeat classification: Delivery stops (2,000 features). The data is in the appendix.

Distribution of count

10 values in 5 bins

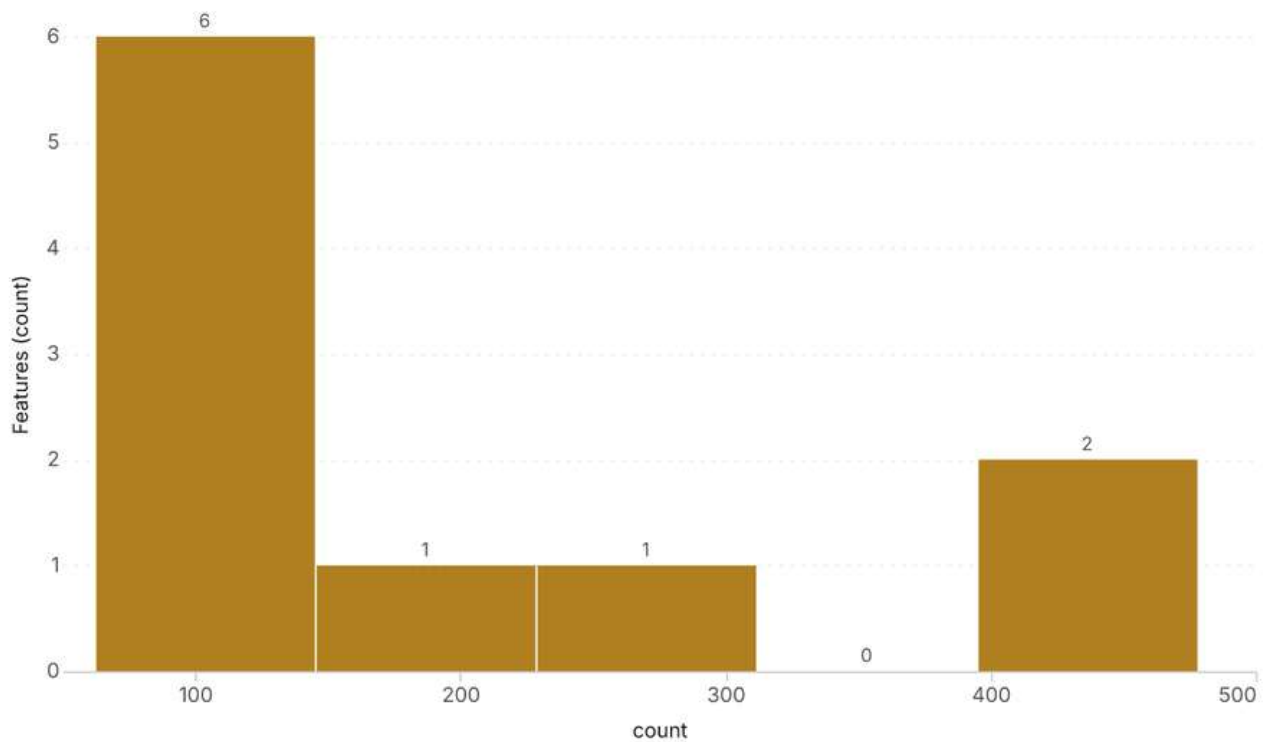


Source: Summarize within: Delivery zones (10 features).

Figure 30. Summarize within: Delivery zones [89]. Source: Summarize within: Delivery zones (10 features). The data is in the appendix.

Distribution of count

10 values in 5 bins

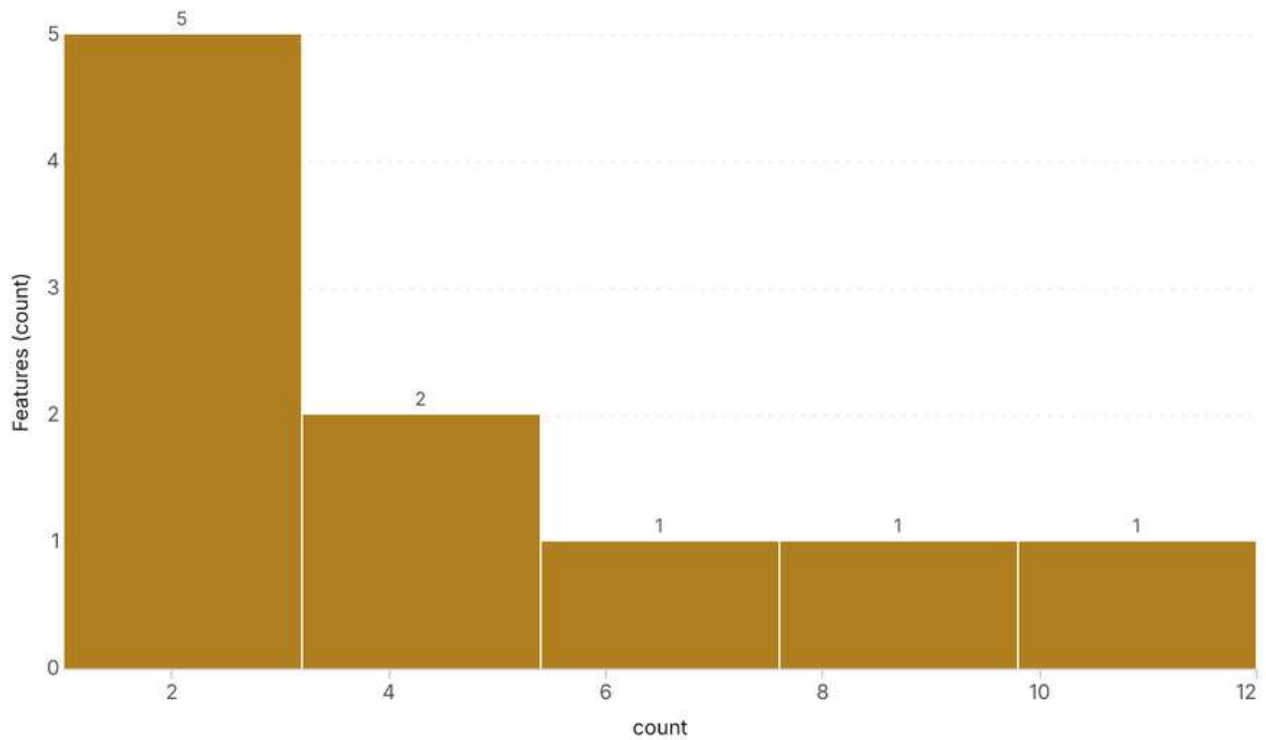


Source: Summarize within: Delivery zones (10 features).

Figure 31. Summarize within: Delivery zones [90]. Source: Summarize within: Delivery zones (10 features). The data is in the appendix.

Distribution of count

10 values in 5 bins

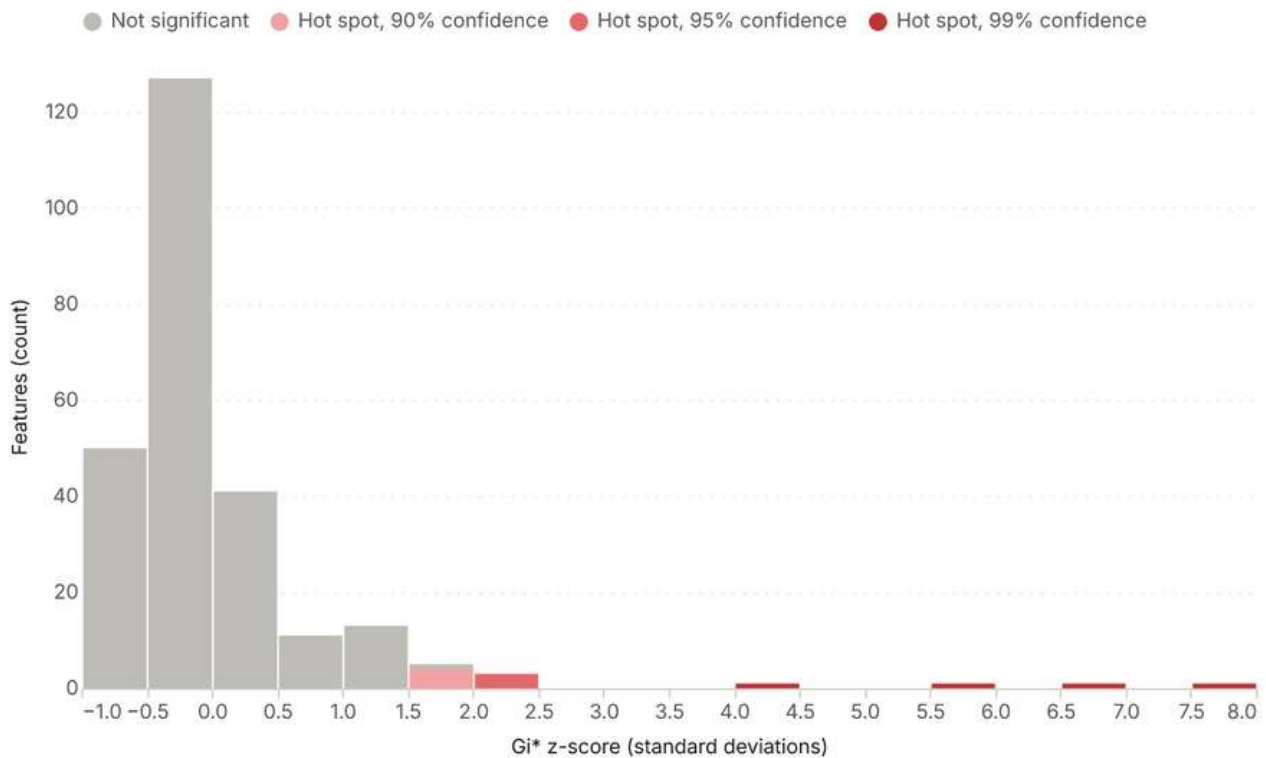


Source: Summarize within: Delivery zones (10 features).

Figure 32. Summarize within: Delivery zones [91]. Source: Summarize within: Delivery zones (10 features). The data is in the appendix.

Gi* z-score distribution

254 features: 11 hot and 0 cold at 90% confidence or more



Source: Hot spot analysis: Delivery stops (254 features).

Figure 33. Hot spot analysis: Delivery stops [92]. Source: Hot spot analysis: Delivery stops (254 features). The data is in the appendix.

Gi* z-score distribution

19 features: 2 hot and 0 cold at 90% confidence or more

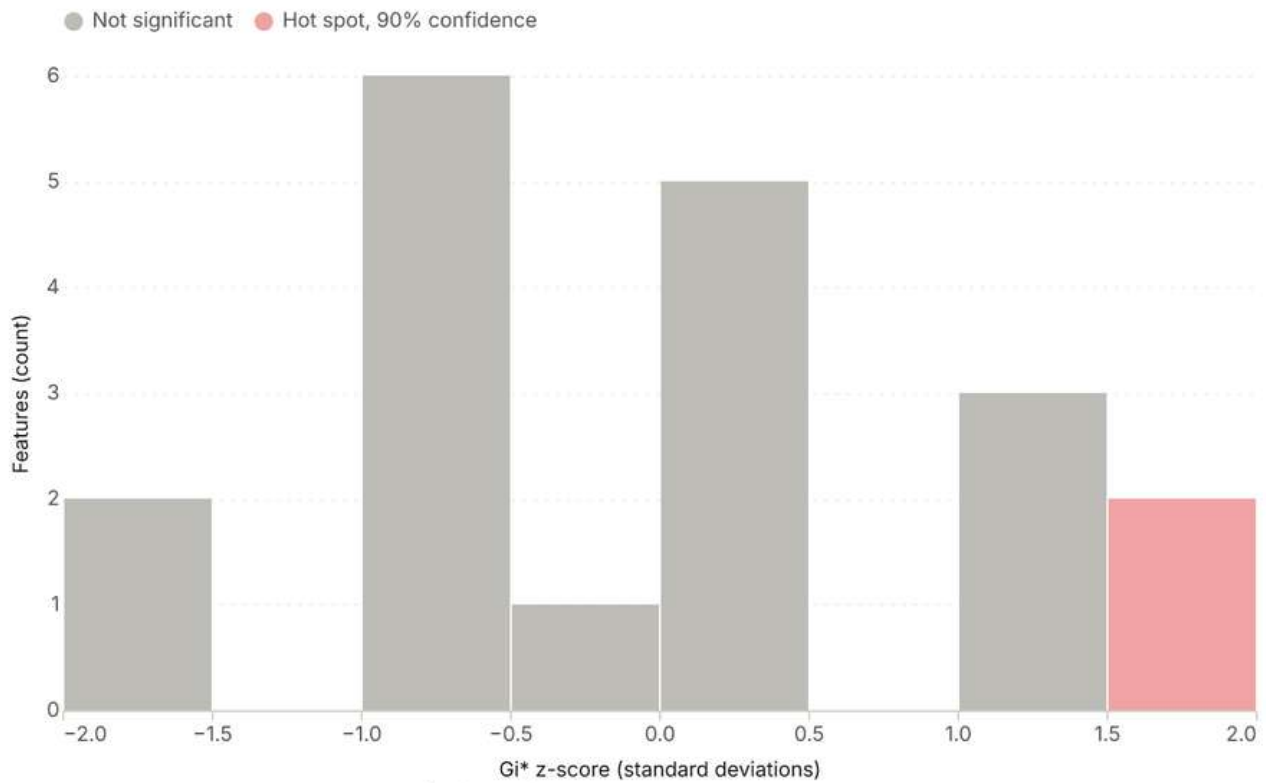


Figure 34. Hot spot analysis: Parcel lockers [93]. Source: Hot spot analysis: Parcel lockers (19 features). The data is in the appendix.

Gi* z-score distribution

19 features: 2 hot and 0 cold at 90% confidence or more

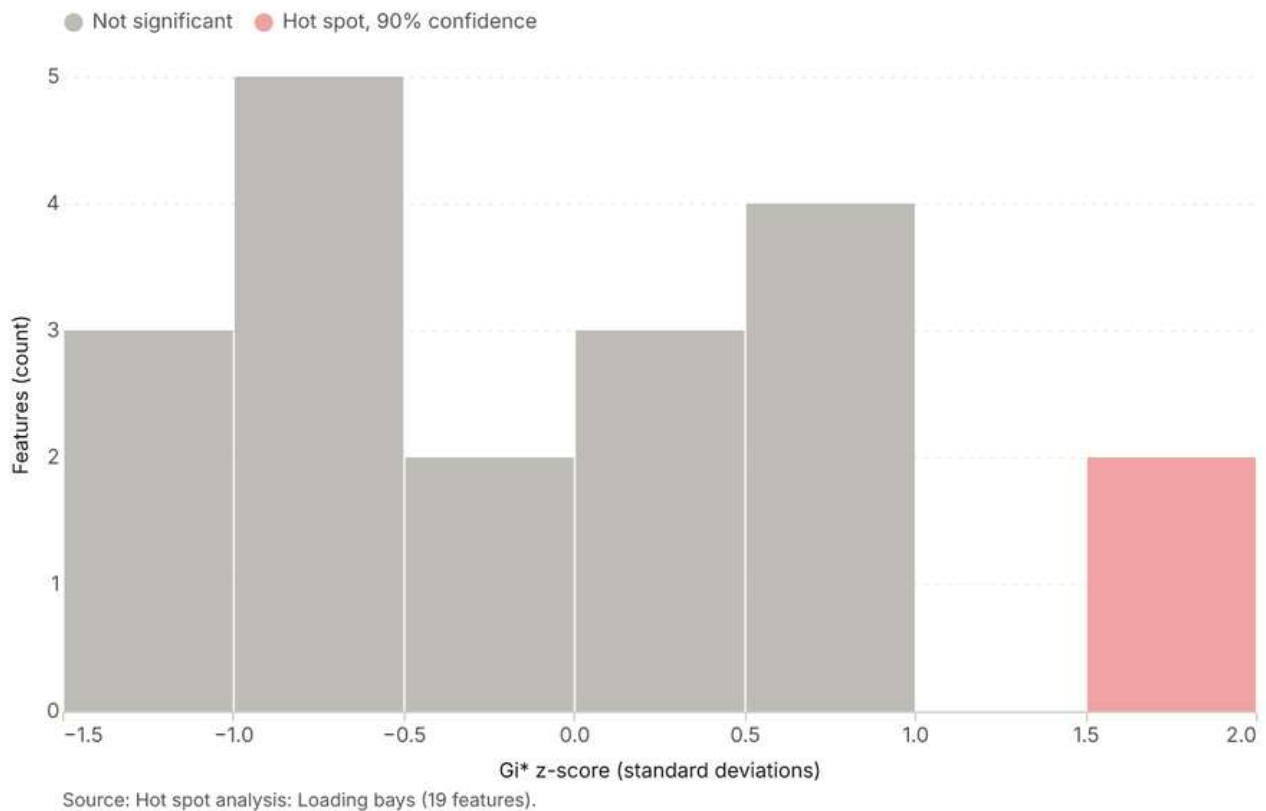


Figure 35. Hot spot analysis: Loading bays [94]. Source: Hot spot analysis: Loading bays (19 features). The data is in the appendix.

Distribution of col

1,654 values in 12 bins

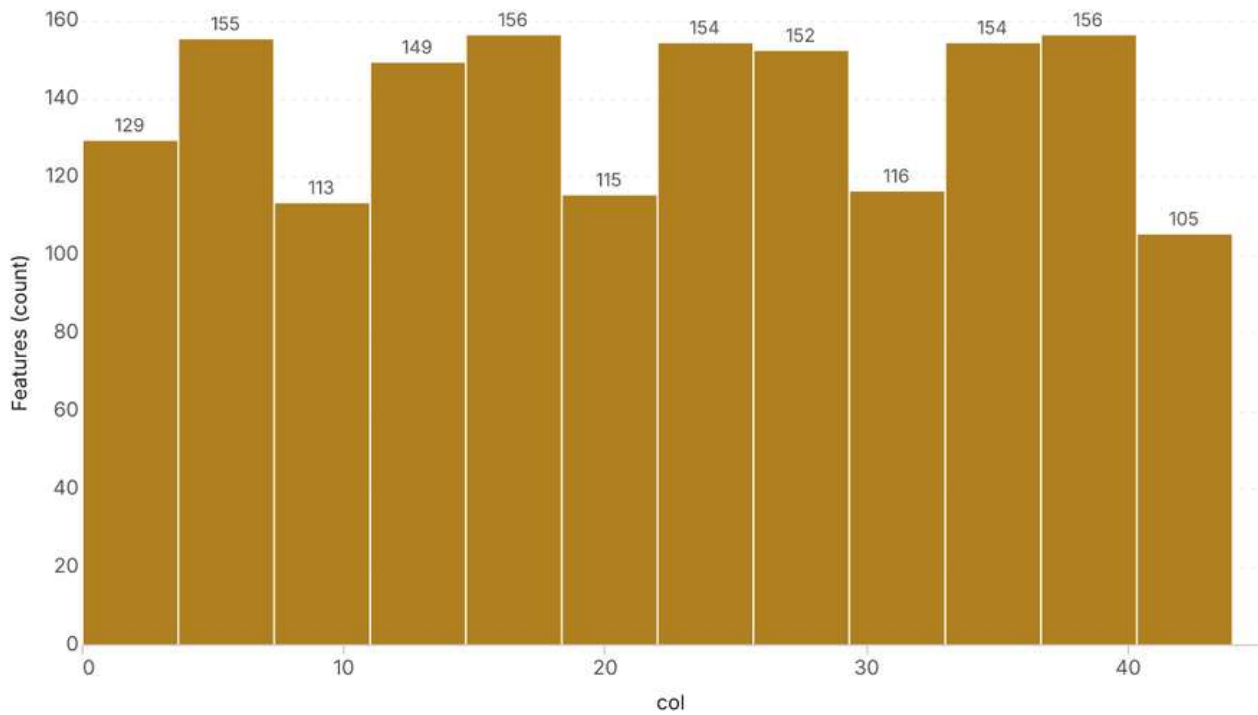


Figure 36. Calculate density: Delivery stops [95]. Source: Calculate density: Delivery stops (1,654 features). The data is in the appendix.

Distribution of density_per_km2

99 values in 8 bins

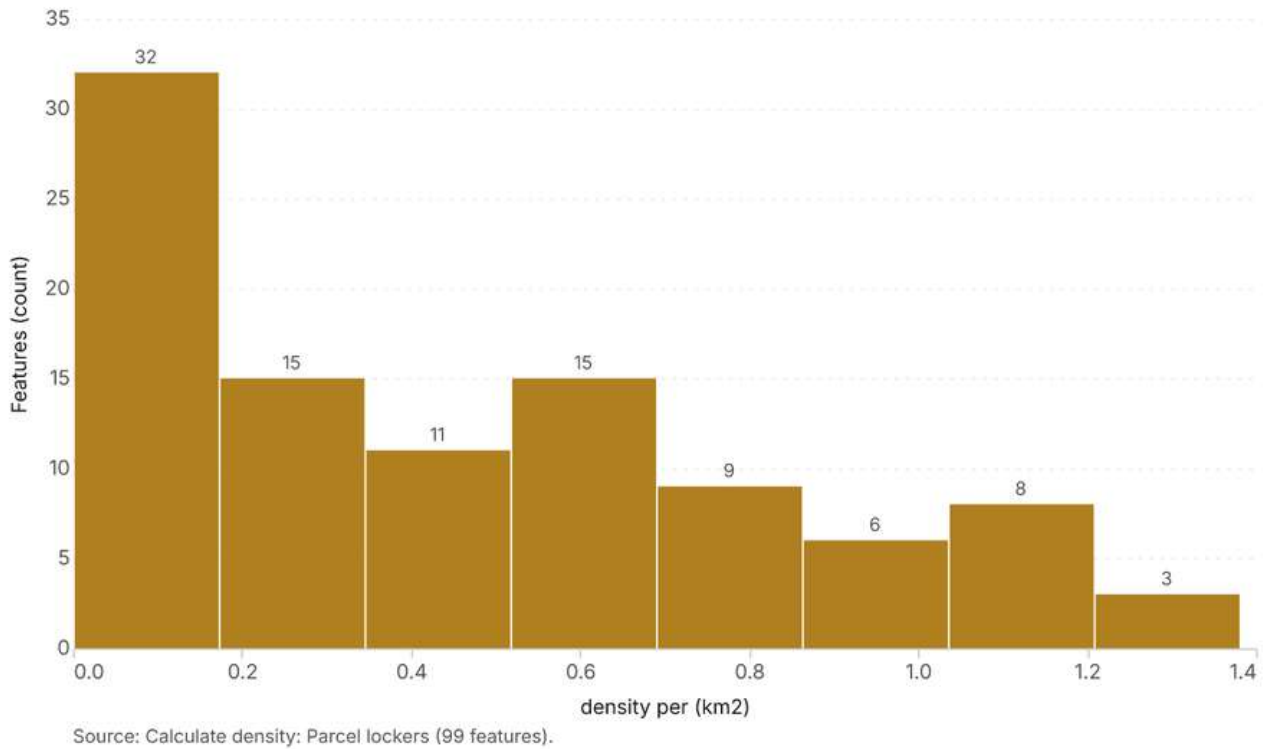
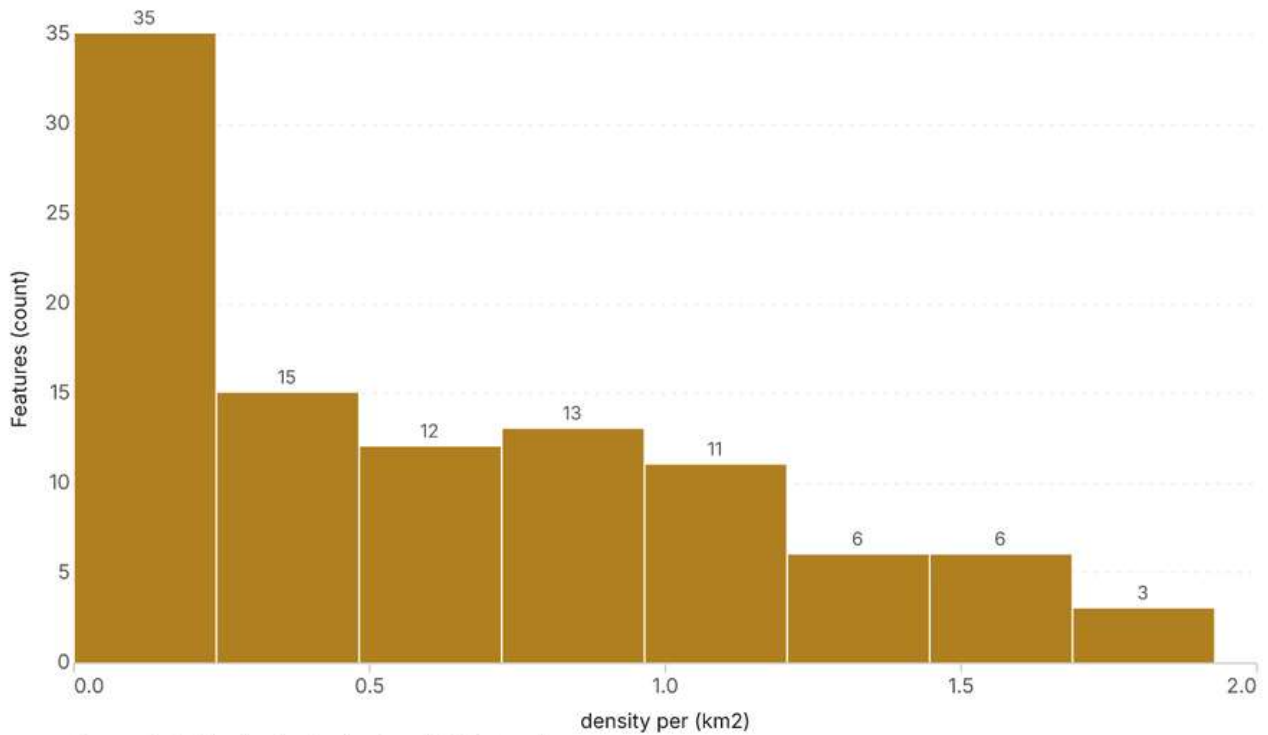


Figure 37. Calculate density: Parcel lockers [96]. Source: Calculate density: Parcel lockers (99 features). The data is in the appendix.

Distribution of density_per_km2

101 values in 8 bins



Source: Calculate density: Loading bays (101 features).

Figure 38. Calculate density: Loading bays [97]. Source: Calculate density: Loading bays (101 features). The data is in the appendix.

Cluster sizes

2 clusters over 2,000 features

cluster	features	share
Noise	1,570	78.5%
0	402	20.1%
1	28	1.4%

Period: 2026-07-27 to 2026-09-19 (delivered_at). Source: Find point clusters: Delivery stops ...

Figure 39. Find point clusters: Delivery stops [98]. Period: 2026-07-27 to 2026-09-19 (delivered_at). Source: Find point clusters: Delivery stops (2,000 features). The data is in the appendix.

Cluster sizes

2 clusters over 2 features

cluster	features	share
0	1	50.0%
1	1	50.0%

Source: Find point clusters: cluster hulls (2 features).

Figure 40. Find point clusters: cluster hulls [99]. Source: Find point clusters: cluster hulls (2 features). The data is in the appendix.

Cluster sizes

1 clusters over 45 features

cluster	features	share
0	44	97.8%
Noise	1	2.2%

Source: Find point clusters: Parcel lockers (45 features).

Figure 41. Find point clusters: Parcel lockers [100]. Source: Find point clusters: Parcel lockers (45 features). The data is in the appendix.

Cluster sizes

1 clusters over 1 features

cluster	features	share
0	1	100.0%

Source: Find point clusters: cluster hulls (1 features).

Figure 42. Find point clusters: cluster hulls [101]. Source: Find point clusters: cluster hulls (1 features). The data is in the appendix.

Cluster sizes

6 clusters over 60 features

cluster	features	share
2	16	26.7%
1	15	25.0%
0	12	20.0%
Noise	7	11.7%
5	4	6.7%
3	3	5.0%
4	3	5.0%

Source: Find point clusters: Loading bays (60 features).

Figure 43. Find point clusters: Loading bays [102]. Source: Find point clusters: Loading bays (60 features). The data is in the appendix.

Cluster sizes

6 clusters over 6 features

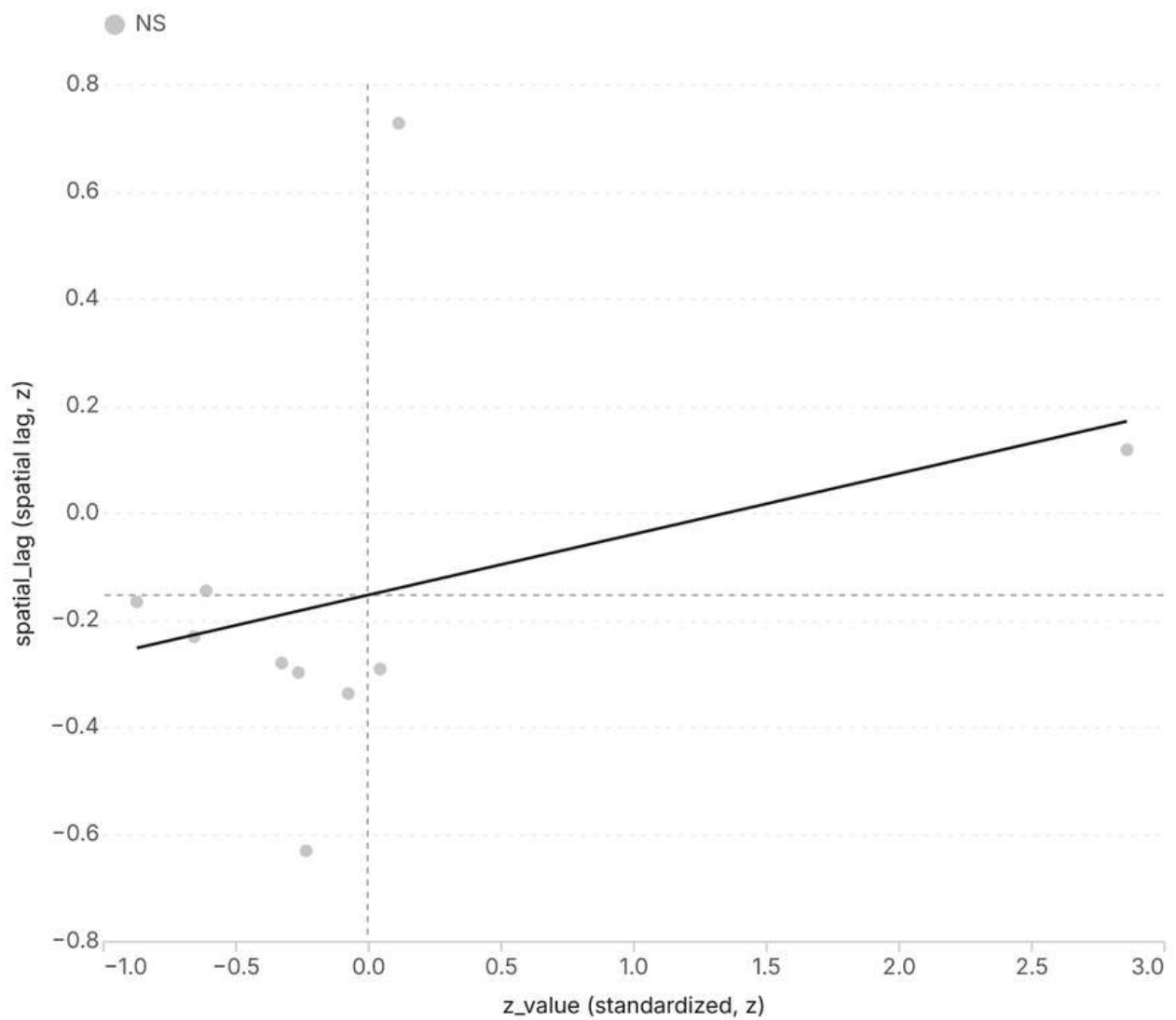
cluster	features	share
0	1	16.7%
1	1	16.7%
2	1	16.7%
3	1	16.7%
4	1	16.7%
5	1	16.7%

Source: Find point clusters: cluster hulls (6 features).

Figure 44. Find point clusters: cluster hulls [103]. Source: Find point clusters: cluster hulls (6 features). The data is in the appendix.

Moran scatter

10 features; slope 0.113 (the Moran's I of these standardized values)



Source: Find outliers: Delivery zones (10 features).

Figure 45. Find outliers: Delivery zones [104]. Source: Find outliers: Delivery zones (10 features). The data is in the appendix.

Distribution of length_m

36 values in 7 bins

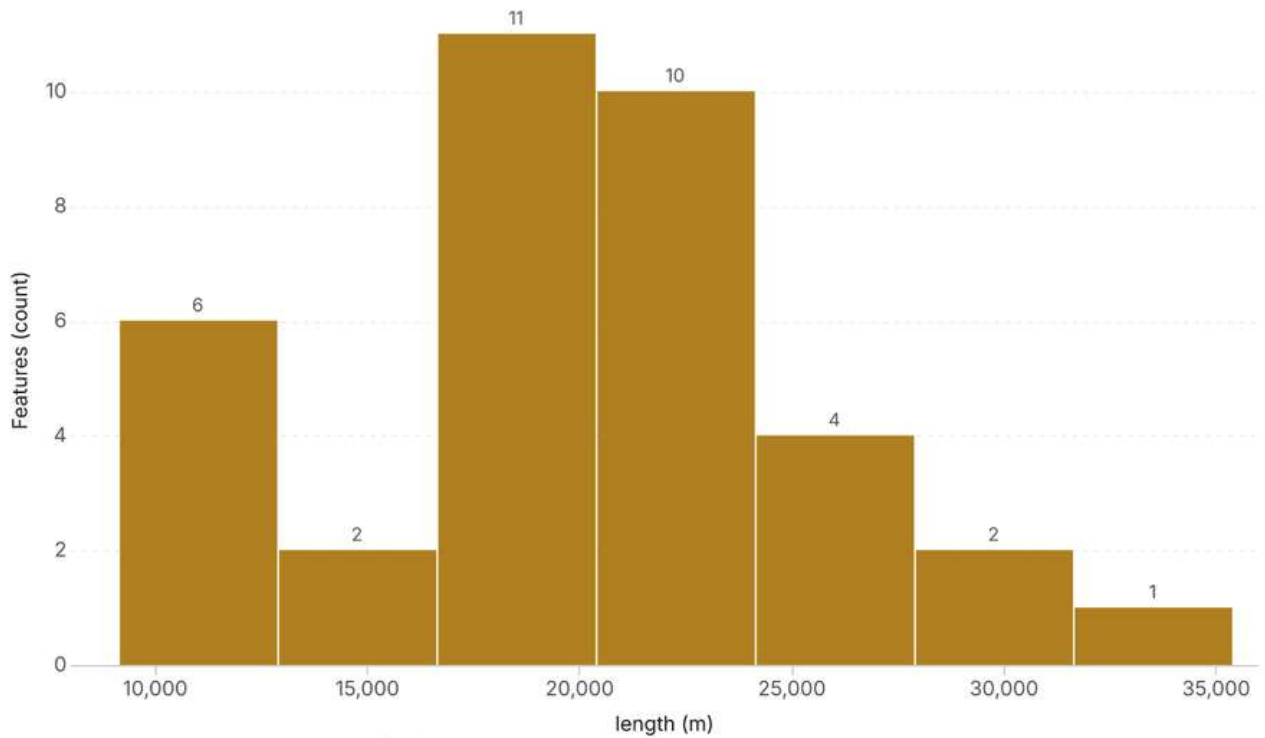


Figure 46. Areas and lengths: Routes [105]. Source: Areas and lengths: Routes (36 features). The data is in the appendix.

Count per week by end_date and type

Per week: 16 weeks from 2026-08-03 to 2026-11-16; trend +0 per week; first half 5, second half 7 (+40.0%)

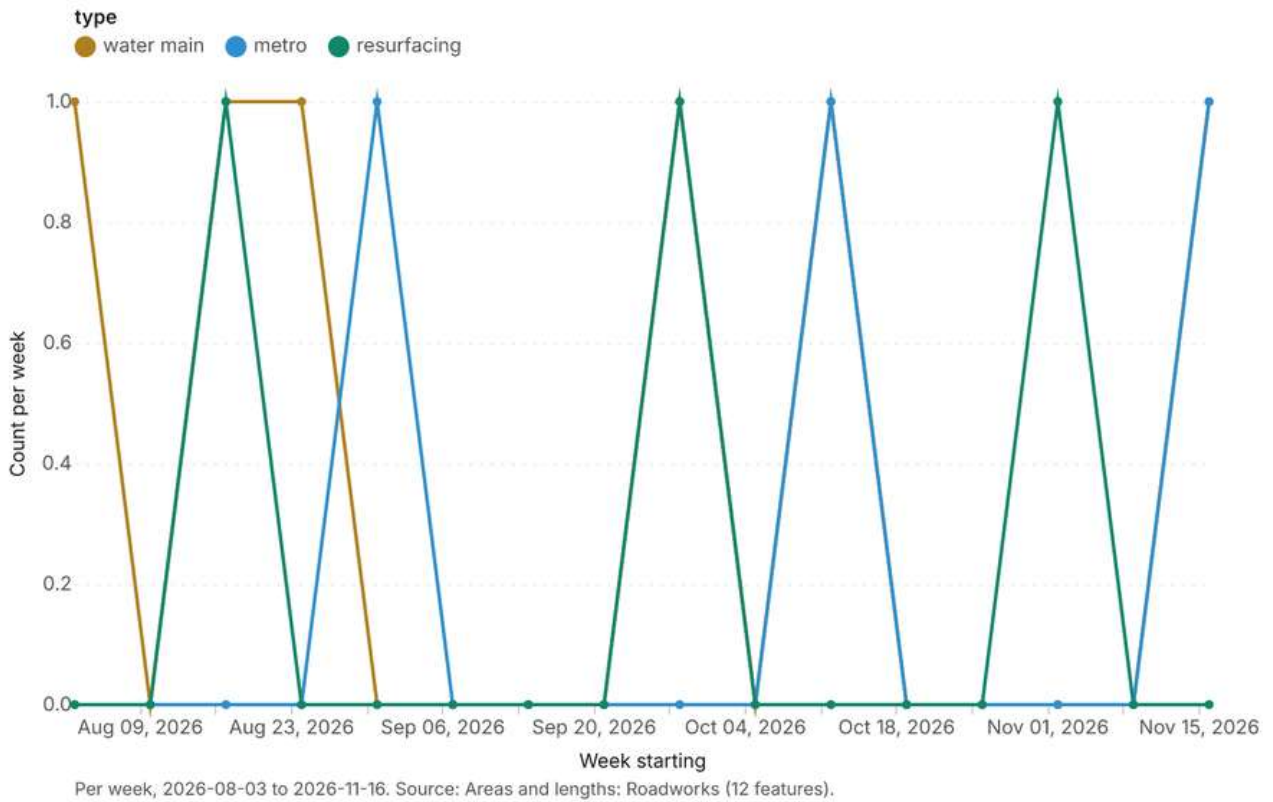


Figure 47. Areas and lengths: Roadworks [106]. Per week, 2026-08-03 to 2026-11-16. Source: Areas and lengths: Roadworks (12 features). The data is in the appendix.

Count per week by end_date and type

Per week: 16 weeks from 2026-08-03 to 2026-11-16; trend +0 per week; first half 5, second half 7 (+40.0%)

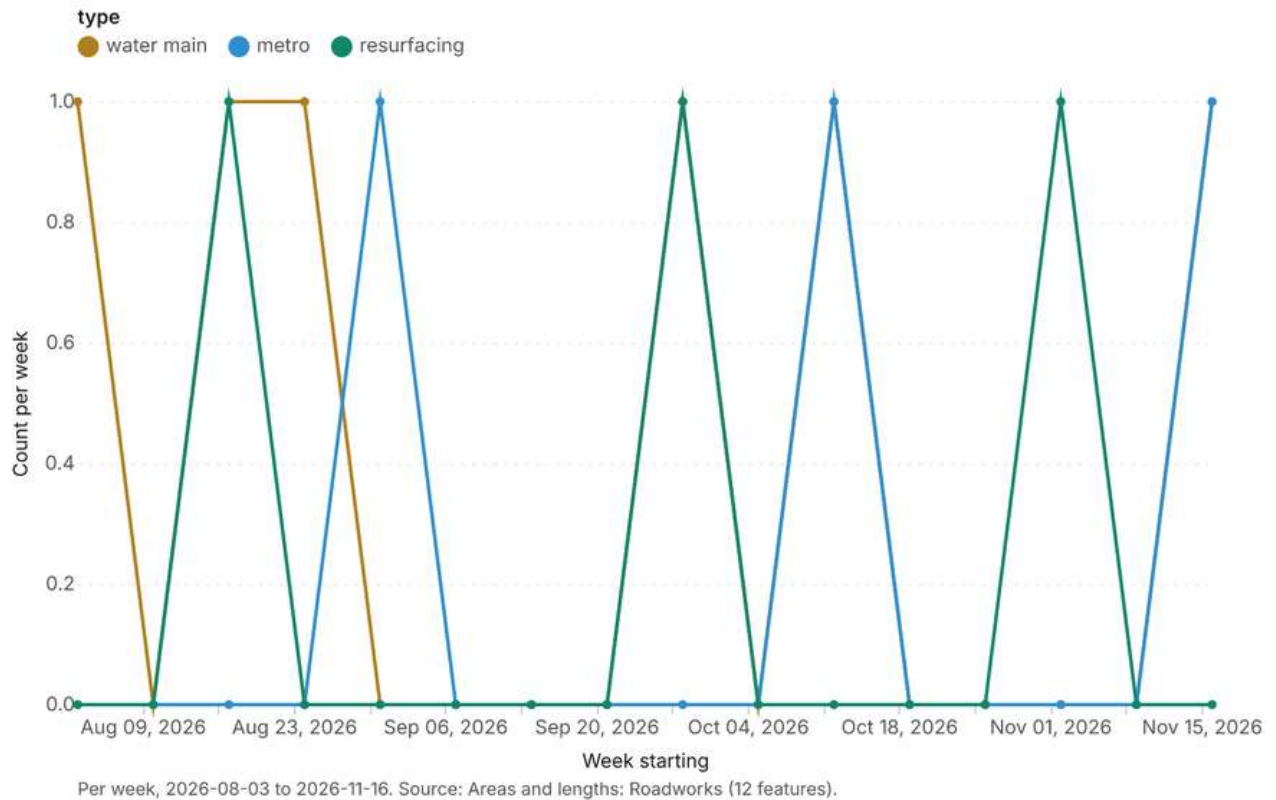


Figure 48. Areas and lengths: Roadworks over time [107]. Per week, 2026-08-03 to 2026-11-16. Source: Areas and lengths: Roadworks (12 features). The data is in the appendix.

Count per week by delivered_at and status

Per week: 8 weeks from 2026-07-27 to 2026-09-14; trend +0.0714 per week; first half 989, second half 1,011 (+2.2%)

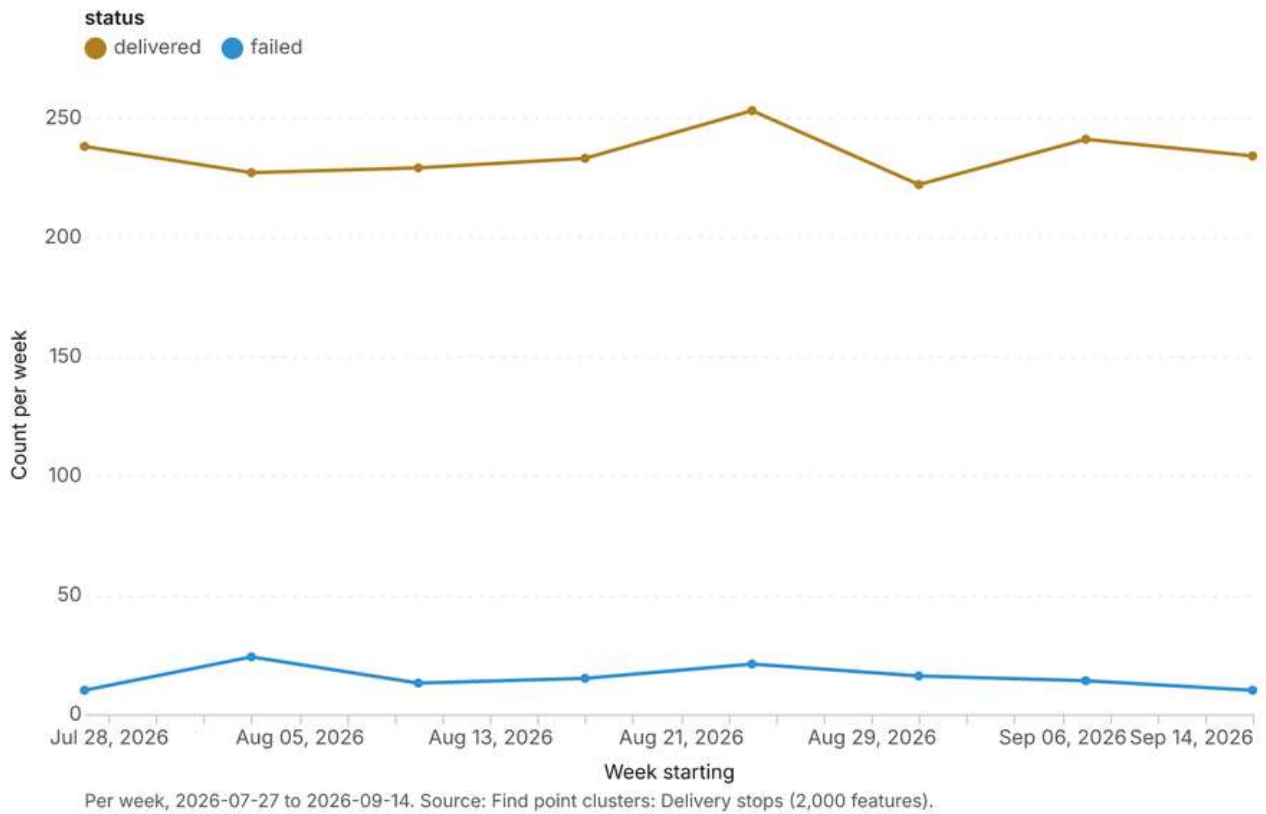


Figure 49. Find point clusters: Delivery stops over time [108]. Per week, 2026-07-27 to 2026-09-14. Source: Find point clusters: Delivery stops (2,000 features). The data is in the appendix.

Count per week by delivered_at and status

Per week: 8 weeks from 2026-07-27 to 2026-09-14; trend +0.0714 per week; first half 989, second half 1,011 (+2.2%)

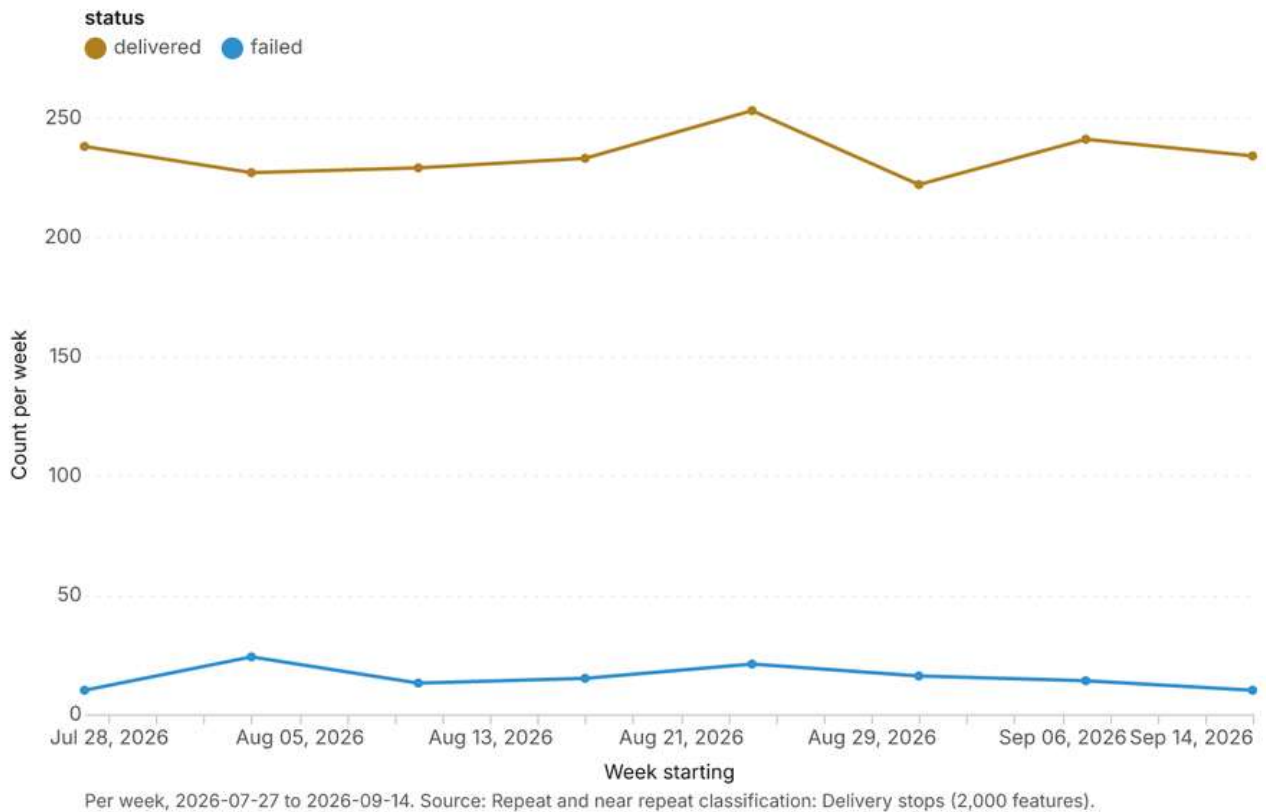


Figure 50. Repeat and near repeat classification: Delivery stops over time [109]. Per week, 2026-07-27 to 2026-09-14. Source: Repeat and near repeat classification: Delivery stops (2,000 features). The data is in the appendix.

Changes since the last run

This is the first report of this project.

Sources

- [1] Rendering: Chart: Timeline: events per week by dataset. 39 rows (id 1521b52f-2ba2-4bbc-a8f6-ccfe5e7fdf7f)
- [2] Dataset: Delivery stops. vector, 2000 rows (id b701b76f-6822-4c92-82fe-b4acdce6c331)
- [3] Dataset: Roadworks. vector, 12 rows (id 6fda682d-6a14-4d92-9cdd-cdcabec36863)
- [4] Dataset: Route performance by day. table, 1728 rows (id 93163425-d292-4c3d-9bd8-2e8681a816c2)
- [5] Tool result: gp_change_point_detection, step 2. Change point detection: done; no map output. (id 0bc1c879-b643-4a1a-9035-72f62d929ae4:2)
- [6] Catalog: Emerging hot spots (operation catalog, gp_space_time_hot_spots). Where hot spots are new, consecutive, intensifying, persistent, diminishing, sporadic, oscillating or historical over time. ArcGIS: Emerging Hot Spot Analysis, Create Space Time Cube. (id gp_space_time_hot_spots)
- [7] Plan: Space time hot spots of Delivery stops (the Start plan's candidate c_24901805ebc9). Delivery stops carry dates in 'delivered_at': emerging hot spot analysis finds new, intensifying and fading hot spots per week. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_24901805ebc9)
- [8] Tool result: gp_space_time_hot_spots, step 0. Emerging hot spots: 1 layer saved: Emerging hot spots: Delivery stops (88 features). (id 0bc1c879-b643-4a1a-9035-72f62d929ae4:0)
- [9] Layer: Delivery stops. 2,000 features (id ba8073d9-f217-4175-acc5-437aabf37b16)
- [10] Catalog: Repeat and near repeat classification (operation catalog, gp_near_repeat). Classify incidents as originators, repeats (same place) or near repeats within a distance and time window, with a Knox test table. ArcGIS: Repeat and Near Repeat Classification, Near Repeat Calculator. (id gp_near_repeat)
- [11] Plan: Near repeat of Delivery stops (the Start plan's candidate c_07c2356dde76). Near repeat analysis tests whether Delivery stops close in space also follow each other within 5 days. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_07c2356dde76)

[12] Tool result: gp_near_repeat, step 1. Repeat and near repeat classification: 1 layer saved: Repeat and near repeat classification: Delivery stops (2000 features). (id 0bc1c879-b643-4a1a-9035-72f62d929ae4:1)

[13] Catalog: Change point detection (operation catalog, gp_change_point_detection). When did the level, count, trend or variability change? For the whole study area or for every bin. ArcGIS: Change Point Detection. (id gp_change_point_detection)

[14] Plan: Change points of Delivery stops (the Start plan's candidate c_e6c80aa728e2). Change point detection finds when the weekly count of Delivery stops shifted. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_e6c80aa728e2)

[15] Catalog: Summarize within (operation catalog, gp_summarize_within). Count and aggregate the features inside each polygon (or bin), proportionally for lines and polygons. ArcGIS: Summarize Within, Aggregate Points. QGIS: native:countpointsinpolygon, native:sumlinelengths. (id gp_summarize_within)

[16] Plan: Depots per feature of Delivery zones (the Start plan's candidate c_63970c31d3b8). Count Depots inside each feature of Delivery zones; the counts map as a choropleth (natural breaks, sequential colors). (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_63970c31d3b8)

[17] Tool result: gp_summarize_within, step 0. Summarize within: 1 layer saved: Summarize within: Delivery zones (10 features). (id 06830d85-af54-42ad-b4e3-68502ee43e45:0)

[18] Layer: Depots. 3 features (id 84d3272c-9902-4e4b-a3a0-899c3b10edb7)

[19] Layer: Delivery zones. 10 features (id bfcf8b53-48d2-44c7-b00e-a89315aee1b5)

[20] Tool result: gp_summarize_within, step 1. Summarize within: 1 layer saved: Summarize within: Delivery zones (10 features). (id 06830d85-af54-42ad-b4e3-68502ee43e45:1)

[21] Tool result: gp_summarize_within, step 2. Summarize within: 1 layer saved: Summarize within: Delivery zones (10 features). (id 06830d85-af54-42ad-b4e3-68502ee43e45:2)

[22] Layer: Parcel lockers. 45 features (id 4e9e11a9-8154-47b8-a5ce-2ba3dbf5f3e6)

[23] Catalog: Hot spot analysis (operation catalog, gp_hot_spots). Getis-Ord Gi* hot and cold spots with z-scores, p-values and confidence bins. ArcGIS: Find Hot Spots, Hot Spot Analysis (Getis-Ord Gi*). QGIS: qgis:hotspot (plugin). (id gp_hot_spots)

[24] Plan: Hot spots of Delivery stops (the Start plan's candidate c_90d2c6f9911f). 2000 points: Getis-Ord Gi* tests whether the concentrations in Delivery stops are statistically significant. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_90d2c6f9911f)

[25] Tool result: gp_hot_spots, step 0. Hot spot analysis: 1 layer saved: Hot spot analysis: Delivery stops (254 features). (id baba02b7-1f72-470f-802a-5d9cf0a96e0e:0)

[26] Plan: Hot spots of Parcel lockers (the Start plan's candidate c_7f159ca7fe80). 45 points: Getis-Ord Gi* tests whether the concentrations in Parcel lockers are statistically significant. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_7f159ca7fe80)

[27] Tool result: gp_hot_spots, step 1. Hot spot analysis: 1 layer saved: Hot spot analysis: Parcel lockers (19 features). (id baba02b7-1f72-470f-802a-5d9cf0a96e0e:1)

[28] Plan: Hot spots of Loading bays (the Start plan's candidate c_be4560f0ca20). 60 points: Getis-Ord Gi* tests whether the concentrations in Loading bays are statistically significant. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_be4560f0ca20)

[29] Tool result: gp_hot_spots, step 2. Hot spot analysis: 1 layer saved: Hot spot analysis: Loading bays (19 features). (id baba02b7-1f72-470f-802a-5d9cf0a96e0e:2)

[30] Layer: Loading bays. 60 features (id 16574f8d-1ab3-403e-bf7c-ef2918a3168a)

[31] Catalog: Calculate density (operation catalog, gp_calculate_density). Kernel density per square kilometer on a grid. ArcGIS: Calculate Density, Kernel Density. QGIS: native:heatmapkerneldensityestimation. (id gp_calculate_density)

[32] Plan: Kernel density of Delivery stops (the Start plan's candidate c_b00e122abf70). 2000 points in Delivery stops: a density surface shows where they concentrate. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_b00e122abf70)

[33] Tool result: gp_calculate_density, step 0. Calculate density: 1 layer saved: Calculate density: Delivery stops (1654 features). (id 5426b1e3-5d44-4200-ad65-fcd6b9219354:0)

[34] Plan: Kernel density of Parcel lockers (the Start plan's candidate c_d0abfcdb6ebd). 45 points in Parcel lockers: a density surface shows where they concentrate. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_d0abfcdb6ebd)

[35] Tool result: gp_calculate_density, step 1. Calculate density: 1 layer saved: Calculate density: Parcel lockers (99 features). (id 5426b1e3-5d44-4200-ad65-fcd6b9219354:1)

[36] Plan: Kernel density of Loading bays (the Start plan's candidate c_f4d285023245). 60 points in Loading bays: a density surface shows where they concentrate. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_f4d285023245)

[37] Tool result: gp_calculate_density, step 2. Calculate density: 1 layer saved: Calculate density: Loading bays (101 features). (id 5426b1e3-5d44-4200-ad65-fcd6b9219354:2)

[38] Catalog: Find point clusters (operation catalog, gp_find_point_clusters). Density-based clusters (DBSCAN, HDBSCAN or OPTICS, optionally space-time) with hulls and noise. ArcGIS: Find Point Clusters, Density-based Clustering. QGIS: native:dbscanclustering, native:stdbscanclustering. (id gp_find_point_clusters)

[39] Plan: Cluster points of Delivery stops (the Start plan's candidate c_ecc06546584b). DBSCAN finds dense groups of Delivery stops and separates noise. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_ecc06546584b)

[40] Tool result: gp_find_point_clusters, step 0. Find point clusters: 2 layers saved: Find point clusters: Delivery stops (2000 features); Find point clusters: cluster hulls (2 features). (id 95a73131-a24c-4f4f-9468-8e9fb0e8dd34:0)

[41] Plan: Cluster points of Parcel lockers (the Start plan's candidate c_ea1cd80d3915). DBSCAN finds dense groups of Parcel lockers and separates noise. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_ea1cd80d3915)

[42] Tool result: gp_find_point_clusters, step 1. Find point clusters: 2 layers saved: Find point clusters: Parcel lockers (45 features); Find point clusters: cluster hulls (1 feature). (id 95a73131-a24c-4f4f-9468-8e9fb0e8dd34:1)

[43] Plan: Cluster points of Loading bays (the Start plan's candidate c_d272c4a82a27). DBSCAN finds dense groups of Loading bays and separates noise. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_d272c4a82a27)

[44] Tool result: gp_find_point_clusters, step 2. Find point clusters: 2 layers saved: Find point clusters: Loading bays (60 features); Find point clusters: cluster hulls (6 features). (id 95a73131-a24c-4f4f-9468-8e9fb0e8dd34:2)

[45] Catalog: Find outliers (operation catalog, gp_outliers). Anselin local Moran's I: HH, LL clusters and HL, LH outliers. ArcGIS: Find Outliers, Cluster and Outlier Analysis (Anselin Local Moran's I). (id gp_outliers)

[46] Plan: Local morans i of Delivery zones (the Start plan's candidate c_0bac5b3b8830). Local Moran's I maps clusters and outliers of 'parcels_per_day'. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_0bac5b3b8830)

[47] Tool result: gp_outliers, step 0. Find outliers: 1 layer saved: Find outliers: Delivery zones (10 features). (id 4c008862-b527-4c01-a253-53d590dcfc30:0)

[48] Catalog: Spatial autocorrelation (operation catalog, gp_spatial_autocorrelation). Global Moran's I: is the pattern clustered, dispersed or random. ArcGIS: Spatial Autocorrelation (Global Moran's I). (id gp_spatial_autocorrelation)

[49] Plan: Global morans i of Delivery zones (the Start plan's candidate c_49e20ce52312). Global Moran's I says whether similar values of 'parcels_per_day' sit next to each other. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_49e20ce52312)

[50] Tool result: gp_spatial_autocorrelation, step 1. Spatial autocorrelation: done; no map output. (id 4c008862-b527-4c01-a253-53d590dcfc30:1)

[51] Catalog: Areas and lengths (operation catalog, gp_measure). Geodesic area, perimeter and length of each feature. ArcGIS: Areas And Lengths, Calculate Geometry. QGIS: qgis:exportaddgeometrycolumns. (id gp_measure)

[52] Plan: Length stats of Routes (the Start plan's candidate c_85d40397c2bc). Lengths of the 36 lines of Routes (total and per feature). (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_85d40397c2bc)

[53] Tool result: gp_measure, step 0. Areas and lengths: 1 layer saved: Areas and lengths: Routes (36 features). (id 91b1b73d-cdc4-44e3-a35d-b8f649d4d58d:0)

[54] Layer: Routes. 36 features (id 93de6e09-79b3-40e9-8b57-4b7906bd7eef)

[55] Plan: Length stats of Roadworks (the Start plan's candidate c_a7200769644e). Lengths of the 12 lines of Roadworks (total and per feature). (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_a7200769644e)

[56] Tool result: gp_measure, step 1. Areas and lengths: 1 layer saved: Areas and lengths: Roadworks (12 features). (id 91b1b73d-cdc4-44e3-a35d-b8f649d4d58d:1)

[57] Layer: Roadworks. 12 features (id 50ecfc27-2fb7-43a7-a97c-62847d89632e)

[58] Catalog: Line density (operation catalog, gp_line_density). Length of lines per unit area around each cell (km per square km), optionally weighted by a field. ArcGIS: Line Density. QGIS: qgis:linedensity. (id gp_line_density)

[59] Plan: Line density of Routes (the Start plan's candidate c_42f6ef8679a2). Line density shows where Routes are densest. (id 99a0ba18-4245-45ac-a729-8f0ed736c8b0:c_42f6ef8679a2)

[60] Tool result: gp_line_density, step 2. Line density: 1 layer saved: Line density: Routes (480 features). (id 91b1b73d-cdc4-44e3-a35d-b8f649d4d58d:2)

[61] Rendering: Map: Emerging hot spots: Delivery stops (id f1d06252-1aff-40b3-8003-f6b25228a418)

[62] Rendering: Map: Repeat and near repeat classification: Delivery stops (id 56dbe991-5135-48c1-bc6c-7d3b6a07d808)

[63] Rendering: Map: Summarize within: Delivery zones (id 858fe721-2926-4049-9403-b702f7c1d708)

[64] Rendering: Map: Summarize within: Delivery zones (id 2824f9fd-2587-4fb5-a77e-a3aa3900d97b)

[65] Rendering: Map: Summarize within: Delivery zones (id 27fa5b0d-6371-4492-98c5-31025c68e575)

[66] Rendering: Map: Hot spot analysis: Delivery stops (id 2bach0be-de03-4c38-bf8f-0ae5de932ab2)

[67] Rendering: Map: Hot spot analysis: Parcel lockers (id 518d4c2b-80c3-42d9-bc31-0561cedde38a)

[68] Rendering: Map: Hot spot analysis: Loading bays (id 3bd8a3a6-8e83-4ea2-b732-5258f2917d5b)

[69] Rendering: Map: Calculate density: Delivery stops (id e5664686-25ef-412b-ba05-b9ff052753ba)

[70] Rendering: Map: Calculate density: Parcel lockers (id 9153e49e-e4a6-473d-9b9a-0c99aa981559)

[71] Rendering: Map: Calculate density: Loading bays (id 089aef48-4d04-4e2b-adf3-1b5f5ba6339b)

[72] Rendering: Map: Find point clusters: Delivery stops (id 7e2737d2-52c9-41a9-ba06-a22cd7165f20)

[73] Rendering: Map: Find point clusters: cluster hulls (id 4f3cc889-cd88-4ebf-a131-f8a38db74f3a)

[74] Rendering: Map: Find point clusters: Parcel lockers (id 980074f9-34f5-41ca-b730-bf16feeff400)

[75] Rendering: Map: Find point clusters: cluster hulls (id 7a66f851-f7b6-4f69-9d38-1eabeffea2a6)

[76] Rendering: Map: Find point clusters: Loading bays (id ce8ded9c-4170-4c0f-89c3-9e2f0139076b)

[77] Rendering: Map: Find point clusters: cluster hulls (id 3a1bb395-8af7-4e6b-92e6-5049fe664a97)

[78] Rendering: Map: Delivery zones by parcels_per_day (id 69ec72f2-551e-4c36-9de4-64b8694296ea)

[79] Rendering: Map: Find outliers: Delivery zones (id 784a0e29-5811-4741-945d-714d4fcd467c)

[80] Rendering: Map: Areas and lengths: Routes (id 79d6c4d8-5815-4392-acf3-1f691e6cd92c)

[81] Rendering: Map: Areas and lengths: Roadworks (id 639ec0fd-16fb-4b55-80ad-9ccaac010750)

[82] Rendering: Map: Line density: Routes (id c697b1c6-e2a2-4247-a4b7-0e7df7e97f00)

[83] Rendering: Chart: Delivery zones over time (parcels_per_day). 5 rows (id 3c505c95-3e52-4c5e-b196-a568f2171052)

[84] Rendering: Chart: Roadworks over time (start_date). 33 rows (id b39779d1-1e2b-44ac-aabb-76eb01c77d35)

[85] Rendering: Chart: Route performance by day over time (date). 8 rows (id b65bccae-a1a1-4e72-ad21-f8677654af9e)

[86] Rendering: Chart: Vehicle fleet over time (model_year). 7 rows (id 931218d3-0ce6-4d63-b966-4d7ecca4f72b)

[87] Rendering: Chart: Emerging hot spots: Delivery stops. 8 rows (id 001edf48-ce03-4110-b451-7e47cefb2ce2)

[88] Rendering: Chart: Repeat and near repeat classification: Delivery stops. 16 rows (id 2613f13d-0205-403c-968f-467d6b8f18f2)

[89] Rendering: Chart: Summarize within: Delivery zones. 5 rows (id 40091302-ced6-4853-a28e-c0ab84bba36e)

[90] Rendering: Chart: Summarize within: Delivery zones. 5 rows (id c26a03d2-ecac-406f-b1c6-cb323c8972c6)

[91] Rendering: Chart: Summarize within: Delivery zones. 5 rows (id 2e9694e1-5c83-4efa-9ca3-1f148701edd0)

[92] Rendering: Chart: Hot spot analysis: Delivery stops. 12 rows (id 6f99017b-7c08-476b-b981-9fa925479410)

[93] Rendering: Chart: Hot spot analysis: Parcel lockers. 6 rows (id 20343f2f-b6eb-4043-a48d-0151b407e909)

[94] Rendering: Chart: Hot spot analysis: Loading bays. 6 rows (id c1c9a919-b186-4232-8d8b-b7389924e9cd)

[95] Rendering: Chart: Calculate density: Delivery stops. 12 rows (id 0ba97a70-8aad-48cf-87c2-76cf7c7397ac)

[96] Rendering: Chart: Calculate density: Parcel lockers. 8 rows (id 497850ae-e8d8-417c-a07d-29a5ca46284e)

[97] Rendering: Chart: Calculate density: Loading bays. 8 rows (id 35ec39ed-b26e-42b1-bc59-ed94b99f9552)

[98] Rendering: Chart: Find point clusters: Delivery stops. 3 rows (id 38539886-bc2b-42a5-a72d-5568be187825)

[99] Rendering: Chart: Find point clusters: cluster hulls. 2 rows (id 338c3b9e-35ed-4db2-8bc0-a3a861c4c0a5)

[100] Rendering: Chart: Find point clusters: Parcel lockers. 2 rows (id 07017722-d2cb-4819-a0c1-8678ecaa6069)

[101] Rendering: Chart: Find point clusters: cluster hulls. 1 rows (id df1f8b27-67ba-452d-9903-5fb39e94536e)

[102] Rendering: Chart: Find point clusters: Loading bays. 7 rows (id 55877d31-670a-4414-b3d9-a5a94c031ea2)

[103] Rendering: Chart: Find point clusters: cluster hulls. 6 rows (id e2598c9e-3c2b-436e-ae2-463caf5d80d5)

[104] Rendering: Chart: Find outliers: Delivery zones. 10 rows (id 91935639-db85-4e93-abb1-ebacc5cbe28f)

[105] Rendering: Chart: Areas and lengths: Routes. 7 rows (id 35bb3975-be91-41d8-b635-b9396a602106)

[106] Rendering: Chart: Areas and lengths: Roadworks. 48 rows (id 0a975f43-6acf-4887-afda-2a66d1ef8d59)

[107] Rendering: Chart: Areas and lengths: Roadworks over time. 48 rows (id 9f61cad0-7d51-4311-a916-62ea61f27aa8)

[108] Rendering: Chart: Find point clusters: Delivery stops over time. 16 rows (id 71c46175-748d-4398-9f7d-e07e43524c4c)

[109] Rendering: Chart: Repeat and near repeat classification: Delivery stops over time. 16 rows (id 7f6f8dcd-9739-475e-8a73-e687a2eed73e)

[110] Dataset: Delivery zones. vector, 10 rows (id ad6ace2b-b87b-4426-b59c-fe04636a404c)

[111] Dataset: Depots. vector, 3 rows (id 01a5d86e-7877-46c0-b8d7-c7125ff945d6)

[112] Dataset: Routes. vector, 36 rows (id 6b02543e-134e-4798-8c55-7433740f3a99)

[113] Dataset: Parcel lockers. vector, 45 rows (id bec44bb9-e98a-4cba-ad40-4738c680b667)

[114] Dataset: Loading bays. vector, 60 rows (id c8f85255-787a-4380-8e60-7b2d51723499)

[115] Dataset: Vehicle fleet. table, 60 rows (id 247c930d-b071-44b8-abcc-a946270b0521)

[116] Dataset: Operations review. document, ? rows (id db8eab40-ac85-4720-ba18-144f3cb5e953)

[117] Record: Sample: Logistics, Madrid (id 55917da2-e619-41aa-b6a1-e521a75b705c)

[118] Layer: Emerging hot spots: Delivery stops. 88 features (id 3eda3d63-4109-4ada-a0a5-a28cb0adffff)

[119] Layer: Repeat and near repeat classification: Delivery stops. 2,000 features (id 16311f39-dfc9-4fec-9ba4-5ab359b9d89b)

[120] Layer: Summarize within: Delivery zones. 10 features (id eaca5331-e8c9-435a-bd13-b434e2db618e)

[121] Layer: Summarize within: Delivery zones. 10 features (id ddf33542-ad9c-48ca-92aa-bb183fc2175b)

[122] Layer: Summarize within: Delivery zones. 10 features (id 7f9be9fb-5f32-4d00-b86c-2ccbc578ecc5)

[123] Layer: Hot spot analysis: Delivery stops. 254 features (id 277a1b72-5c43-4bb2-8a19-af8ab6d8cc80)

[124] Layer: Hot spot analysis: Parcel lockers. 19 features (id 169714e0-714b-4884-8a02-53783c9c7f03)

[125] Layer: Hot spot analysis: Loading bays. 19 features (id 4caff2b6-ee3f-4415-bdc9-5fa9437fd063)

[126] Layer: Calculate density: Delivery stops. 1,654 features (id 99dbaab0-d5d0-4b45-987b-d2c43d1d09c8)

[127] Layer: Calculate density: Parcel lockers. 99 features (id 472257d0-327b-4c9e-a4a8-480595dc3856)

[128] Layer: Calculate density: Loading bays. 101 features (id b6afbcb2f-7942-4c9b-94f7-38c291b44345)

[129] Layer: Find point clusters: Delivery stops. 2,000 features (id cc731b64-afbe-4a38-943f-995b6107d190)

[130] Layer: Find point clusters: cluster hulls. 2 features (id 436a36cd-df6c-4e32-a0cc-26d50a8c6585)

[131] Layer: Find point clusters: Parcel lockers. 45 features (id 5e40b4a8-a526-40ac-b338-c5f4ebf27f56)

[132] Layer: Find point clusters: cluster hulls. 1 features (id 5ab85912-f47a-4fb3-b798-991d03f36a1b)

[133] Layer: Find point clusters: Loading bays. 60 features (id 90a837e8-38e5-46ee-a786-10b7fcae3bc0)

[134] Layer: Find point clusters: cluster hulls. 6 features (id 4e2df776-301c-492e-bb6b-6813e216076d)

[135] Layer: Find outliers: Delivery zones. 10 features (id 5e638f0b-04fd-4df9-a5c9-b3d338aebaea)

[136] Layer: Areas and lengths: Routes. 36 features (id 8b07f80e-053c-4638-867e-d4f875f2ab43)

[137] Layer: Areas and lengths: Roadworks. 12 features (id 2ce6988d-7414-430d-b0b9-ede487fe0343)

[138] Layer: Line density: Routes. 480 features (id 90fa509b-1446-4abc-b818-41008be35963)

Appendix: the data behind the charts

Figure 1. Timeline: events per week by dataset [1]

period	series	value
2026-06-22	Delivery stops	0
2026-06-22	Route performance by day	0
2026-06-22	Roadworks	1
2026-06-29	Delivery stops	0
2026-06-29	Route performance by day	0
2026-06-29	Roadworks	0
2026-07-06	Delivery stops	0
2026-07-06	Route performance by day	0
2026-07-06	Roadworks	2
2026-07-13	Delivery stops	0
2026-07-13	Route performance by day	0
2026-07-13	Roadworks	1
2026-07-20	Delivery stops	0
2026-07-20	Route performance by day	0
2026-07-20	Roadworks	3
2026-07-27	Delivery stops	248
2026-07-27	Route performance by day	216
2026-07-27	Roadworks	1
2026-08-03	Delivery stops	251

period	series	value
2026-08-03	Route performance by day	216
2026-08-03	Roadworks	0
2026-08-10	Delivery stops	242
2026-08-10	Route performance by day	216
2026-08-10	Roadworks	1
2026-08-17	Delivery stops	248
2026-08-17	Route performance by day	216
2026-08-17	Roadworks	0
2026-08-24	Delivery stops	274
2026-08-24	Route performance by day	216
2026-08-24	Roadworks	1
2026-08-31	Delivery stops	238
2026-08-31	Route performance by day	216
2026-08-31	Roadworks	2
2026-09-07	Delivery stops	255
2026-09-07	Route performance by day	216
2026-09-07	Roadworks	0
2026-09-14	Delivery stops	244
2026-09-14	Route performance by day	216
2026-09-14	Roadworks	0

Figure 24. Delivery zones over time (parcels_per_day) [83]

bin_start	bin_end	count
1,219	1,942	6
1,942	2,664	3
2,664	3,387	0
3,387	4,109	0
4,109	4,832	1

Figure 25. Roadworks over time (start_date) [84]

period	series	value
2026-06-22	water main	1
2026-06-22	metro	0
2026-06-22	resurfacing	0
2026-06-29	water main	0
2026-06-29	metro	0
2026-06-29	resurfacing	0
2026-07-06	water main	1
2026-07-06	metro	0
2026-07-06	resurfacing	1
2026-07-13	water main	1
2026-07-13	metro	0
2026-07-13	resurfacing	0
2026-07-20	water main	0

period	series	value
2026-07-20	metro	2
2026-07-20	resurfacing	1
2026-07-27	water main	1
2026-07-27	metro	0
2026-07-27	resurfacing	0
2026-08-03	water main	0
2026-08-03	metro	0
2026-08-03	resurfacing	0
2026-08-10	water main	1
2026-08-10	metro	0
2026-08-10	resurfacing	0
2026-08-17	water main	0
2026-08-17	metro	0
2026-08-17	resurfacing	0
2026-08-24	water main	1
2026-08-24	metro	0
2026-08-24	resurfacing	0
2026-08-31	water main	0
2026-08-31	metro	1
2026-08-31	resurfacing	1

Figure 26. Route performance by day over time (date) [85]

period	value
2026-07-27	216
2026-08-03	216
2026-08-10	216
2026-08-17	216
2026-08-24	216
2026-08-31	216
2026-09-07	216
2026-09-14	216

Figure 27. Vehicle fleet over time (model_year) [86]

bin_start	bin_end	count
35	52.86	13
52.86	70.71	0
70.71	88.57	0
88.57	106.4	13
106.4	124.3	20
124.3	142.1	0
142.1	160	14

Figure 28. Emerging hot spots: Delivery stops [87]

bin_start	bin_end	count
-1.381	-0.5457	20

bin_start	bin_end	count
-0.5457	0.2895	28
0.2895	1.125	17
1.125	1.96	11
1.96	2.795	3
2.795	3.631	5
3.631	4.466	1
4.466	5.301	3

Figure 29. Repeat and near repeat classification: Delivery stops [88]

period	series	value
2026-07-27	delivered	238
2026-07-27	failed	10
2026-08-03	delivered	227
2026-08-03	failed	24
2026-08-10	delivered	229
2026-08-10	failed	13
2026-08-17	delivered	233
2026-08-17	failed	15
2026-08-24	delivered	253
2026-08-24	failed	21
2026-08-31	delivered	222
2026-08-31	failed	16
2026-09-07	delivered	241
2026-09-07	failed	14
2026-09-14	delivered	234
2026-09-14	failed	10

Figure 30. Summarize within: Delivery zones [89]

bin_start	bin_end	count
0	0.2	7
0.2	0.4	0
0.4	0.6	0
0.6	0.8	0
0.8	1	3

Figure 31. Summarize within: Delivery zones [90]

bin_start	bin_end	count
62	145.2	6
145.2	228.4	1
228.4	311.6	1
311.6	394.8	0
394.8	478	2

Figure 32. Summarize within: Delivery zones [91]

bin_start	bin_end	count
1	3.2	5
3.2	5.4	2
5.4	7.6	1
7.6	9.8	1
9.8	12	1

Figure 33. Hot spot analysis: Delivery stops [92]

bin_start	bin_end	band	band_label	count
-1	-0.5	not_significant	Not significant	50
-0.5	0	not_significant	Not significant	127
0	0.5	not_significant	Not significant	41
0.5	1	not_significant	Not significant	11
1	1.5	not_significant	Not significant	13
1.5	2	hot_90	Hot spot, 90% confidence	4
1.5	2	not_significant	Not significant	1
2	2.5	hot_95	Hot spot, 95% confidence	3
4	4.5	hot_99	Hot spot, 99% confidence	1
5.5	6	hot_99	Hot spot, 99% confidence	1
6.5	7	hot_99	Hot spot, 99% confidence	1
7.5	8	hot_99	Hot spot, 99% confidence	1

Figure 34. Hot spot analysis: Parcel lockers [93]

bin_start	bin_end	band	band_label	count
-2	-1.5	not_significant	Not significant	2
-1	-0.5	not_significant	Not significant	6
-0.5	0	not_significant	Not significant	1
0	0.5	not_significant	Not significant	5
1	1.5	not_significant	Not significant	3
1.5	2	hot_90	Hot spot, 90% confidence	2

Figure 35. Hot spot analysis: Loading bays [94]

bin_start	bin_end	band	band_label	count
-1.5	-1	not_significant	Not significant	3
-1	-0.5	not_significant	Not significant	5
-0.5	0	not_significant	Not significant	2
0	0.5	not_significant	Not significant	3
0.5	1	not_significant	Not significant	4
1.5	2	hot_90	Hot spot, 90% confidence	2

Figure 36. Calculate density: Delivery stops [95]

bin_start	bin_end	count
0	3.667	129
3.667	7.333	155
7.333	11	113
11	14.67	149
14.67	18.33	156
18.33	22	115
22	25.67	154
25.67	29.33	152
29.33	33	116
33	36.67	154
36.67	40.33	156
40.33	44	105

Figure 37. Calculate density: Parcel lockers [96]

bin_start	bin_end	count
2.197e-05	0.1726	32
0.1726	0.3451	15
0.3451	0.5177	11
0.5177	0.6903	15
0.6903	0.8628	9
0.8628	1.035	6
1.035	1.208	8
1.208	1.381	3

Figure 38. Calculate density: Loading bays [97]

bin_start	bin_end	count
3.822e-07	0.2412	35
0.2412	0.4823	15
0.4823	0.7235	12
0.7235	0.9647	13
0.9647	1.206	11
1.206	1.447	6
1.447	1.688	6
1.688	1.929	3

Figure 39. Find point clusters: Delivery stops [98]

cluster	features	fraction	share
Noise	1,570	0.785	78.5%
0	402	0.201	20.1%
1	28	0.014	1.4%

Figure 40. Find point clusters: cluster hulls [99]

cluster	features	fraction	share
0	1	0.5	50.0%
1	1	0.5	50.0%

Figure 41. Find point clusters: Parcel lockers [100]

cluster	features	fraction	share
0	44	0.9778	97.8%
Noise	1	0.02222	2.2%

Figure 42. Find point clusters: cluster hulls [101]

cluster	features	fraction	share
0	1	1	100.0%

Figure 43. Find point clusters: Loading bays [102]

cluster	features	fraction	share
2	16	0.2667	26.7%
1	15	0.25	25.0%
0	12	0.2	20.0%
Noise	7	0.1167	11.7%
5	4	0.06667	6.7%
3	3	0.05	5.0%
4	3	0.05	5.0%

Figure 44. Find point clusters: cluster hulls [103]

cluster	features	fraction	share
0	1	0.1667	16.7%
1	1	0.1667	16.7%
2	1	0.1667	16.7%
3	1	0.1667	16.7%
4	1	0.1667	16.7%
5	1	0.1667	16.7%

Figure 45. Find outliers: Delivery zones [104]

value	lag	type
-0.2612	-0.2991	NS
-0.3242	-0.2814	NS
0.0467	-0.2927	NS
0.117	0.7266	NS
2.862	0.117	NS
-0.8708	-0.1672	NS
-0.0732	-0.3384	NS
-0.6094	-0.1465	NS
-0.2323	-0.6321	NS
-0.6549	-0.2323	NS

Figure 46. Areas and lengths: Routes [105]

bin_start	bin_end	count
9,145	1.29e+04	6
1.29e+04	1.665e+04	2
1.665e+04	2.04e+04	11
2.04e+04	2.415e+04	10

bin_start	bin_end	count
2.415e+04	2.79e+04	4
2.79e+04	3.165e+04	2
3.165e+04	3.54e+04	1

Figure 47. Areas and lengths: Roadworks [106]

period	series	value
2026-08-03	water main	1
2026-08-03	metro	0
2026-08-03	resurfacing	0
2026-08-10	water main	0
2026-08-10	metro	0
2026-08-10	resurfacing	0
2026-08-17	water main	1
2026-08-17	metro	0
2026-08-17	resurfacing	1
2026-08-24	water main	1
2026-08-24	metro	0
2026-08-24	resurfacing	0
2026-08-31	water main	0
2026-08-31	metro	1
2026-08-31	resurfacing	0
2026-09-07	water main	0
2026-09-07	metro	0
2026-09-07	resurfacing	0
2026-09-14	water main	0
2026-09-14	metro	0
2026-09-14	resurfacing	0
2026-09-21	water main	0
2026-09-21	metro	0
2026-09-21	resurfacing	0
2026-09-28	water main	1
2026-09-28	metro	0
2026-09-28	resurfacing	1
2026-10-05	water main	0
2026-10-05	metro	0
2026-10-05	resurfacing	0
2026-10-12	water main	1
2026-10-12	metro	1
2026-10-12	resurfacing	0
2026-10-19	water main	0
2026-10-19	metro	0
2026-10-19	resurfacing	0
2026-10-26	water main	0
2026-10-26	metro	0

period	series	value
2026-10-26	resurfacing	0
2026-11-02	water main	0
2026-11-02	metro	0
2026-11-02	resurfacing	1
2026-11-09	water main	0
2026-11-09	metro	0
2026-11-09	resurfacing	0
2026-11-16	water main	1
2026-11-16	metro	1
2026-11-16	resurfacing	0

Figure 48. Areas and lengths: Roadworks over time [107]

period	series	value
2026-08-03	water main	1
2026-08-03	metro	0
2026-08-03	resurfacing	0
2026-08-10	water main	0
2026-08-10	metro	0
2026-08-10	resurfacing	0
2026-08-17	water main	1
2026-08-17	metro	0
2026-08-17	resurfacing	1
2026-08-24	water main	1
2026-08-24	metro	0
2026-08-24	resurfacing	0
2026-08-31	water main	0
2026-08-31	metro	1
2026-08-31	resurfacing	0
2026-09-07	water main	0
2026-09-07	metro	0
2026-09-07	resurfacing	0
2026-09-14	water main	0
2026-09-14	metro	0
2026-09-14	resurfacing	0
2026-09-21	water main	0
2026-09-21	metro	0
2026-09-21	resurfacing	0
2026-09-28	water main	1
2026-09-28	metro	0
2026-09-28	resurfacing	1
2026-10-05	water main	0
2026-10-05	metro	0
2026-10-05	resurfacing	0
2026-10-12	water main	1

period	series	value
2026-10-12	metro	1
2026-10-12	resurfacing	0
2026-10-19	water main	0
2026-10-19	metro	0
2026-10-19	resurfacing	0
2026-10-26	water main	0
2026-10-26	metro	0
2026-10-26	resurfacing	0
2026-11-02	water main	0
2026-11-02	metro	0
2026-11-02	resurfacing	1
2026-11-09	water main	0
2026-11-09	metro	0
2026-11-09	resurfacing	0
2026-11-16	water main	1
2026-11-16	metro	1
2026-11-16	resurfacing	0

Figure 49. Find point clusters: Delivery stops over time [108]

period	series	value
2026-07-27	delivered	238
2026-07-27	failed	10
2026-08-03	delivered	227
2026-08-03	failed	24
2026-08-10	delivered	229
2026-08-10	failed	13
2026-08-17	delivered	233
2026-08-17	failed	15
2026-08-24	delivered	253
2026-08-24	failed	21
2026-08-31	delivered	222
2026-08-31	failed	16
2026-09-07	delivered	241
2026-09-07	failed	14
2026-09-14	delivered	234
2026-09-14	failed	10

Figure 50. Repeat and near repeat classification: Delivery stops over time [109]

period	series	value
2026-07-27	delivered	238
2026-07-27	failed	10
2026-08-03	delivered	227
2026-08-03	failed	24
2026-08-10	delivered	229

period	series	value
2026-08-10	failed	13
2026-08-17	delivered	233
2026-08-17	failed	15
2026-08-24	delivered	253
2026-08-24	failed	21
2026-08-31	delivered	222
2026-08-31	failed	16
2026-09-07	delivered	241
2026-09-07	failed	14
2026-09-14	delivered	234
2026-09-14	failed	10