

*Cycle journey planning,  
for cyclists, by cyclists*



Mobile cycle routing in the browser

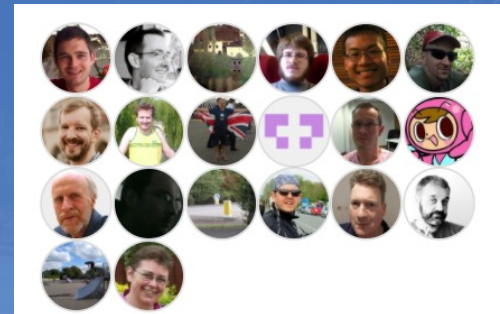


# About CycleStreets

- [CycleStreets.net](https://cyclestreets.net)
- UK social enterprise, not-for-profit
- 3<sup>rd</sup>-party API users
- 30+ APIs: routing, infra, photos, etc









# m.cyclestreets.net

Fastest Balanced **Quietest**

Park Street to Gwydir Street

2.4km 13min 33 calories 442g

↑ Park Street	Residential street	20m	7s
↗ Lower Park Street	Residential street	115m	31s
↖ Jesus Green	Cycle path	283m	1m
↖ Jesus Green	Cycle path	220m	56s
Short un-named link			

PHOTOMAP

Category **Cycle parking**

Good or bad **All**

Since **No date limit**

Only show reports with photos ☒

Journey planner

Photomap

Places

Data

Collisions

Traffic counts

Cycle theft

Planning applications

Cycling groups

Map style

Settings

Blog

Give feedback

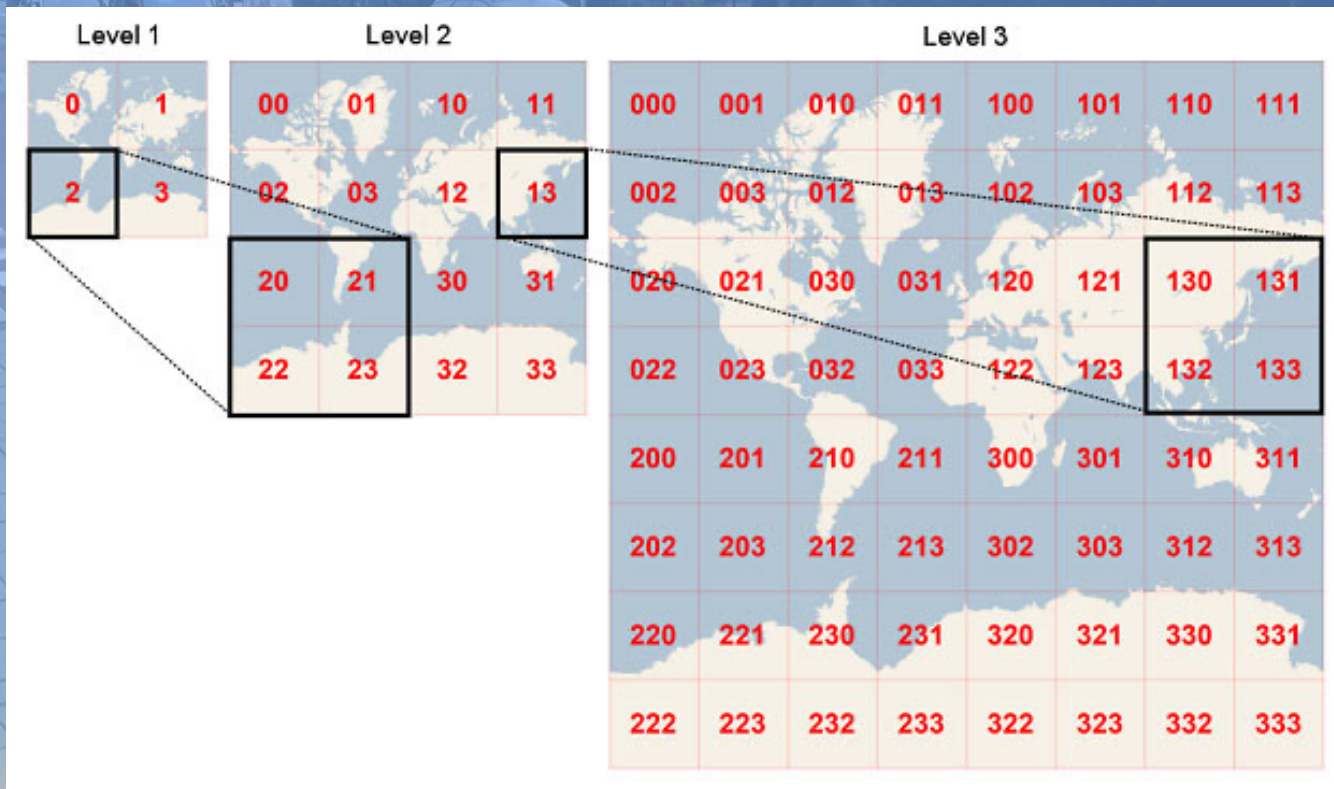
Donate

Sign in

CYCLESTREETS



# How does online mapping work?





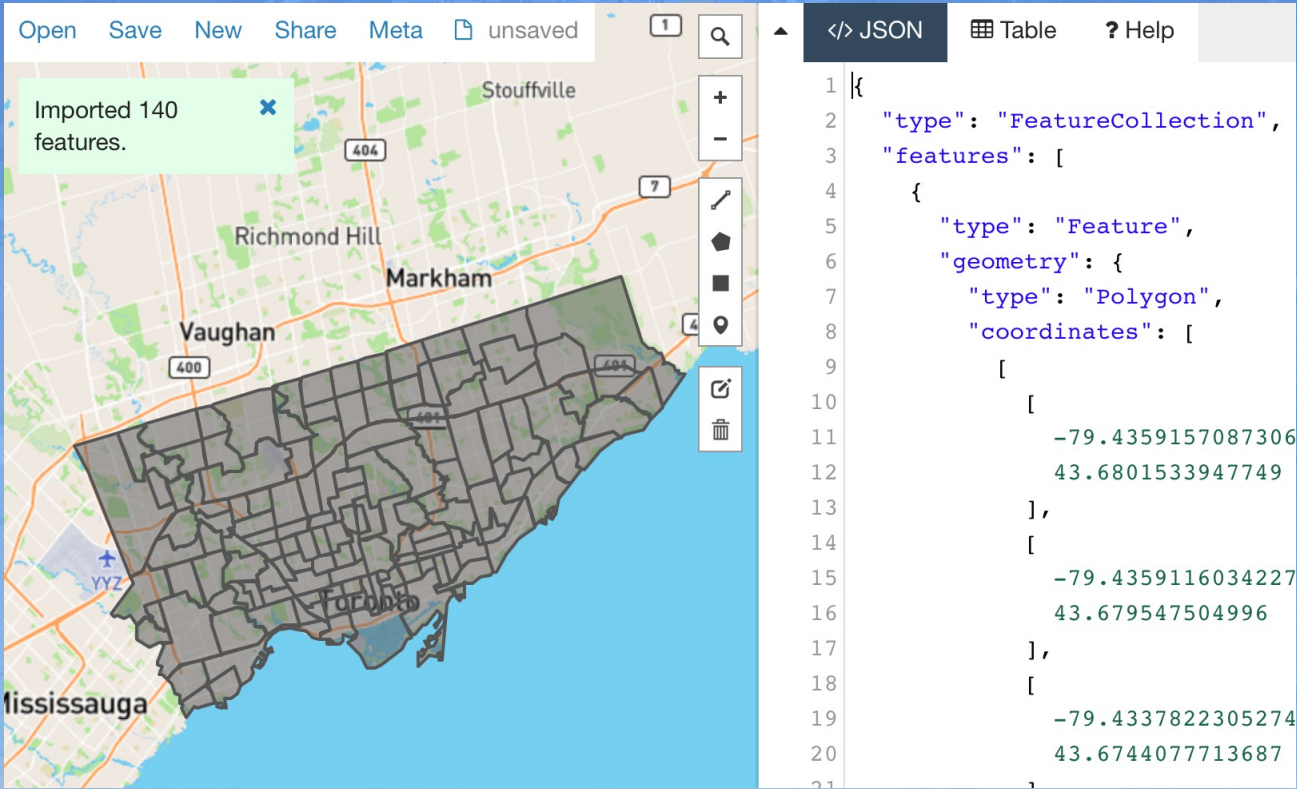
# Vector tiles



```
{
  "buildings": {
    "type": "FeatureCollection",
    "geometry": {
      "type": "Polygon",
      "coordinates": [
        [
          [-122.4024169, 37.7949617],
          [-122.4030374, 37.7952246],
          [-122.4045228, 37.7952246],
          [-122.4045246, 37.7952342],
          [-122.4045772, 37.7952280],
          [-122.4045950, 37.7952386],
          [-122.4046012, 37.7952716],
          [-122.4039039, 37.7953649],
          [-122.4038888, 37.7953649],
          [-122.4045221, 37.7949440],
          [-122.4045390, 37.7949440]
        ]
      ]
    },
    "properties": {
      "kind": "fire_station",
      "name": "San Francisco Fire Station 13",
      "area": 1247,
      "addr_street": "Sansome Street",
      "addr_housenumber": "51"
    }
  },
  "type": "Feature"
}
```







## Data overlaid on background tiles



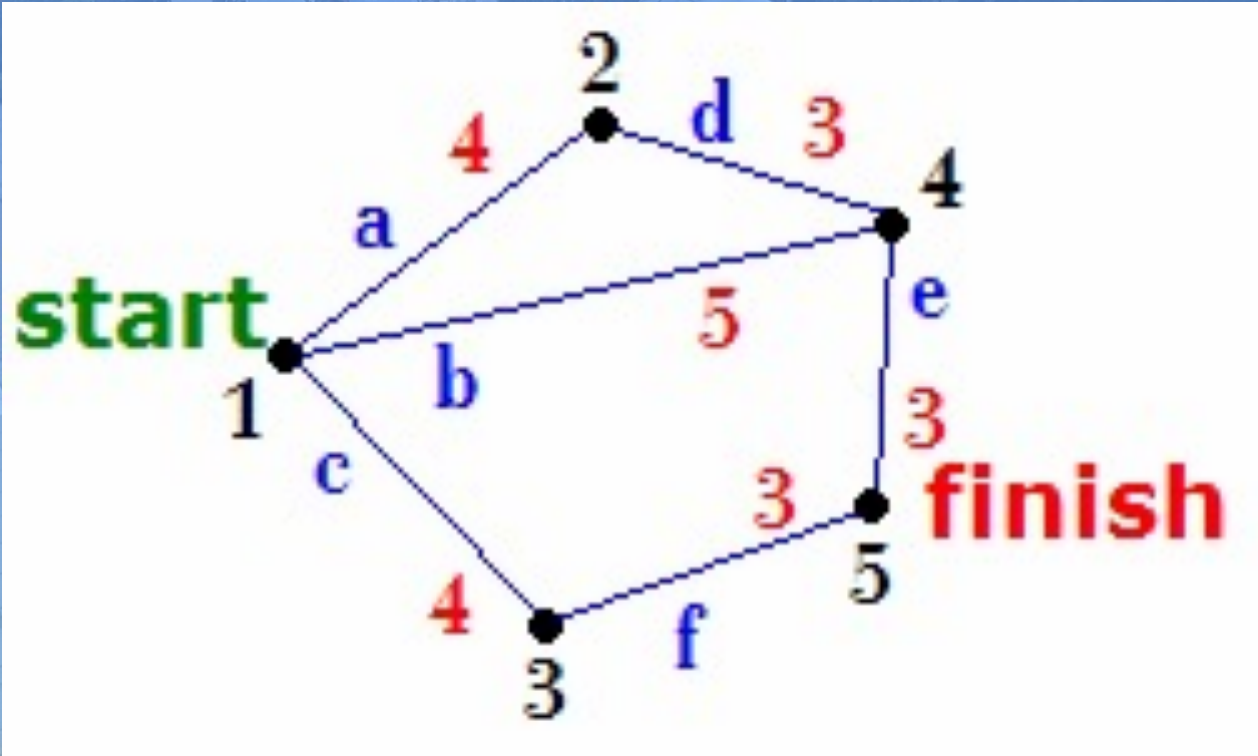


# GeoJSON

Type	Examples	
Point		<pre>{   "type": "Point",   "coordinates": [30, 10] }</pre>
LineString		<pre>{   "type": "LineString",   "coordinates": [     [30, 10], [10, 30], [40, 40]   ] }</pre>
Polygon		<pre>{   "type": "Polygon",   "coordinates": [     [[30, 10], [40, 40], [20, 40], [10, 20], [30, 10]]   ] }</pre>
		<pre>{   "type": "Polygon",   "coordinates": [     [[35, 10], [45, 45], [15, 40], [10, 20], [35, 10]],     [[20, 30], [35, 35], [30, 20], [20, 30]]   ] }</pre>

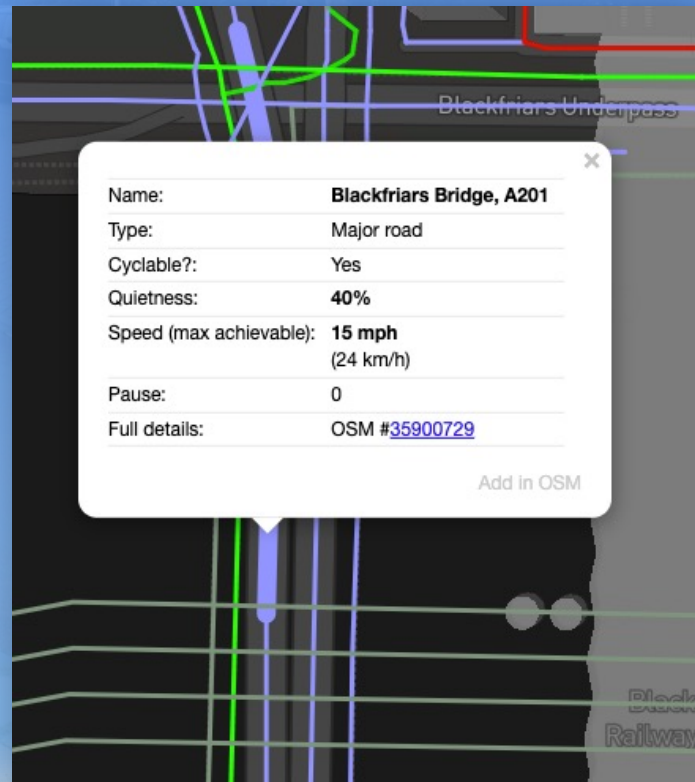
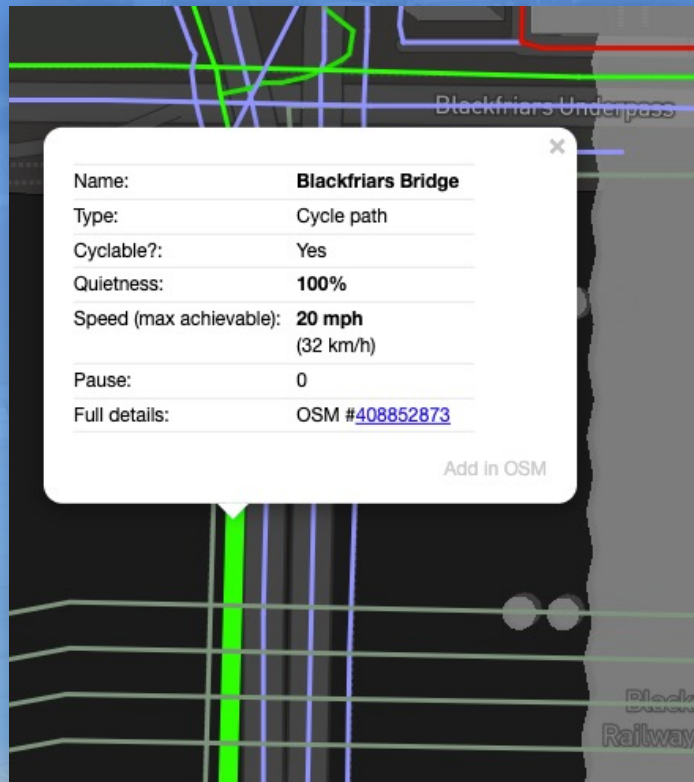


# How does routing work?





# Routing scoring



# Our API

```
https://www.cyclestreets.net/api/journey.json  
?key=...  
&itinerarypoints=0.117950,52.205302|0.147324,52.199650  
&plan=quietest
```

<https://www.cyclestreets.net/api/>



# Our API

```
marker":{
  {
    "@attributes":{
      "start":"City Centre",
      "finish":"Thoday Street",
      "startBearing":"0",
      "startSpeed":"0",
      "start_longitude":"0.117823",
      "start_latitude":"52.205299",
      "finish_longitude":"0.147448",
      "finish_latitude":"52.199619",
      "crow_fly_distance":"4604",
      "event":"depart",
      "whence":"1441579586",
      "speed":"20",
      "itinerary":"46014938",
      "clientRouteId":"0",
      "plan":"quietest",
      "note":"",
      "length":"6268",
      "time":"1611",
      "busynance":"8269",
      "quietness":"76",
      "signalledJunctions":"3",
```

```
      "type":"route"
    }
  },
  {
    "@attributes":{
      "name":"Senate House Hill, NCN 11",
      "legNumber":"1",
      "distance":"23",
      "time":"11",
      "busynance":"57",
      "walk":"0",
      "signalledJunctions":"0",
      "signalledCrossings":"0",
      "turn":"",
      "startBearing":"176",
      "color":"#7777cc",
      "points":"0.117823,52.205299 0.117836,52.205193 0.117797,52.205193",
      "distances":"0,12,11",
      "elevations":"9,9,10",
      "provisionName":"Service road",
      "type":"segment"
    }
  },
  {
    "@attributes":{
```

[www.cyclestreets.net/api/v1/journey/#jpReturn](http://www.cyclestreets.net/api/v1/journey/#jpReturn)

# Our API

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {
        "id": 10289,
        "hasPhoto": "yes",
        "thumbnailUrl": "https://www.cyclestreets.net/location/10289/cyclestreets10289-size200.jpg",
        "license": "cc-by-sa",
        "caption": "Complete lack of cycle parking on the highway forces cyclists to do this sort of thing. T",
      },
      "geometry": {
        "type": "Point",
        "coordinates": [
          0.146092,
          52.199314
        ]
      }
    },
    {
      "type": "Feature",
      "properties": {
        "id": 23583,
        "hasPhoto": "no",
        "thumbnailUrl": null,
        "license": "publicdomain",
        "caption": "A lot of residents in side streets off Mill Road use bicycles as their pri",
      },
      "geometry": {
        "type": "Point",
        "coordinates": [
```

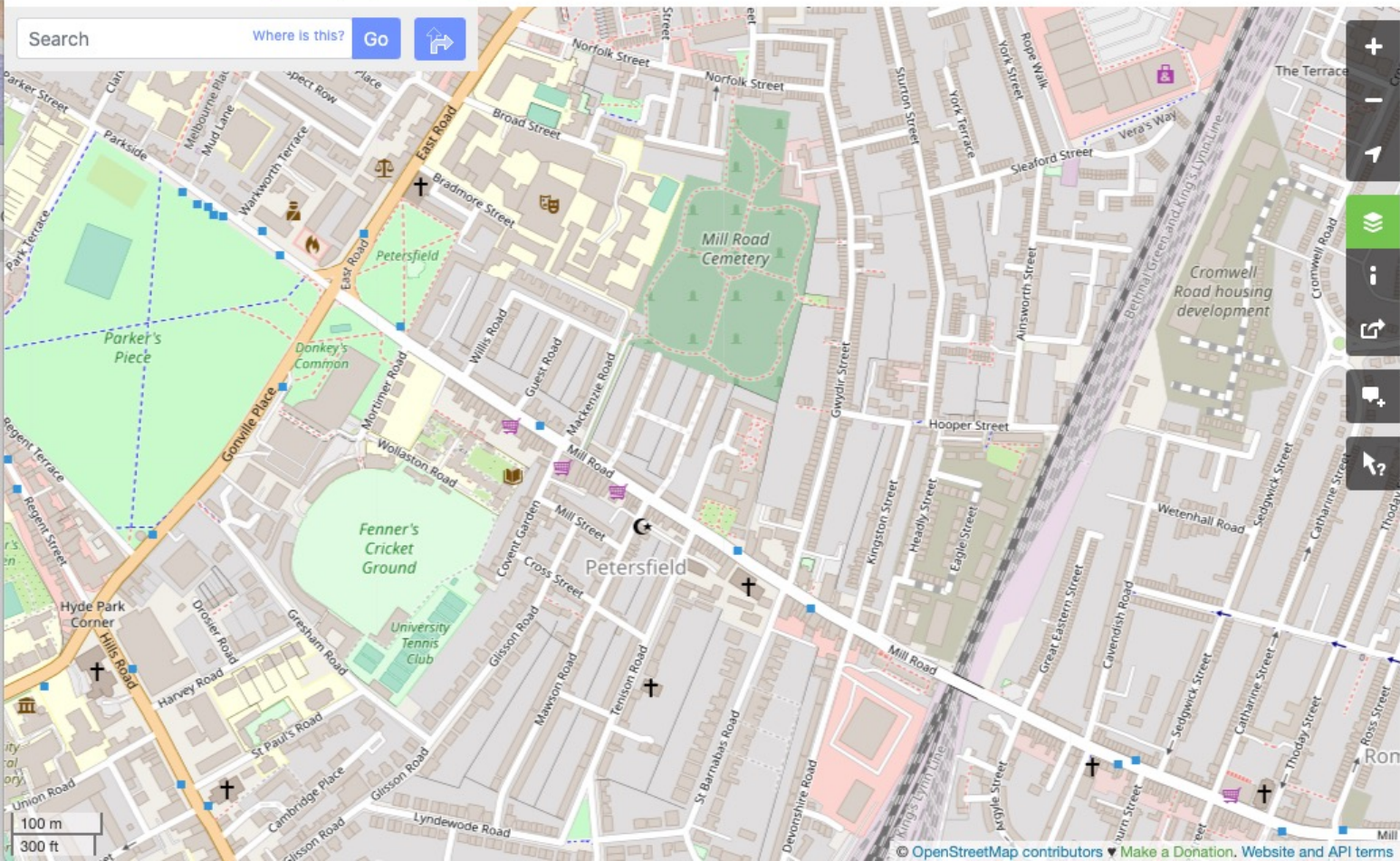








# OpenStreetMap



Search Where is this? Go 



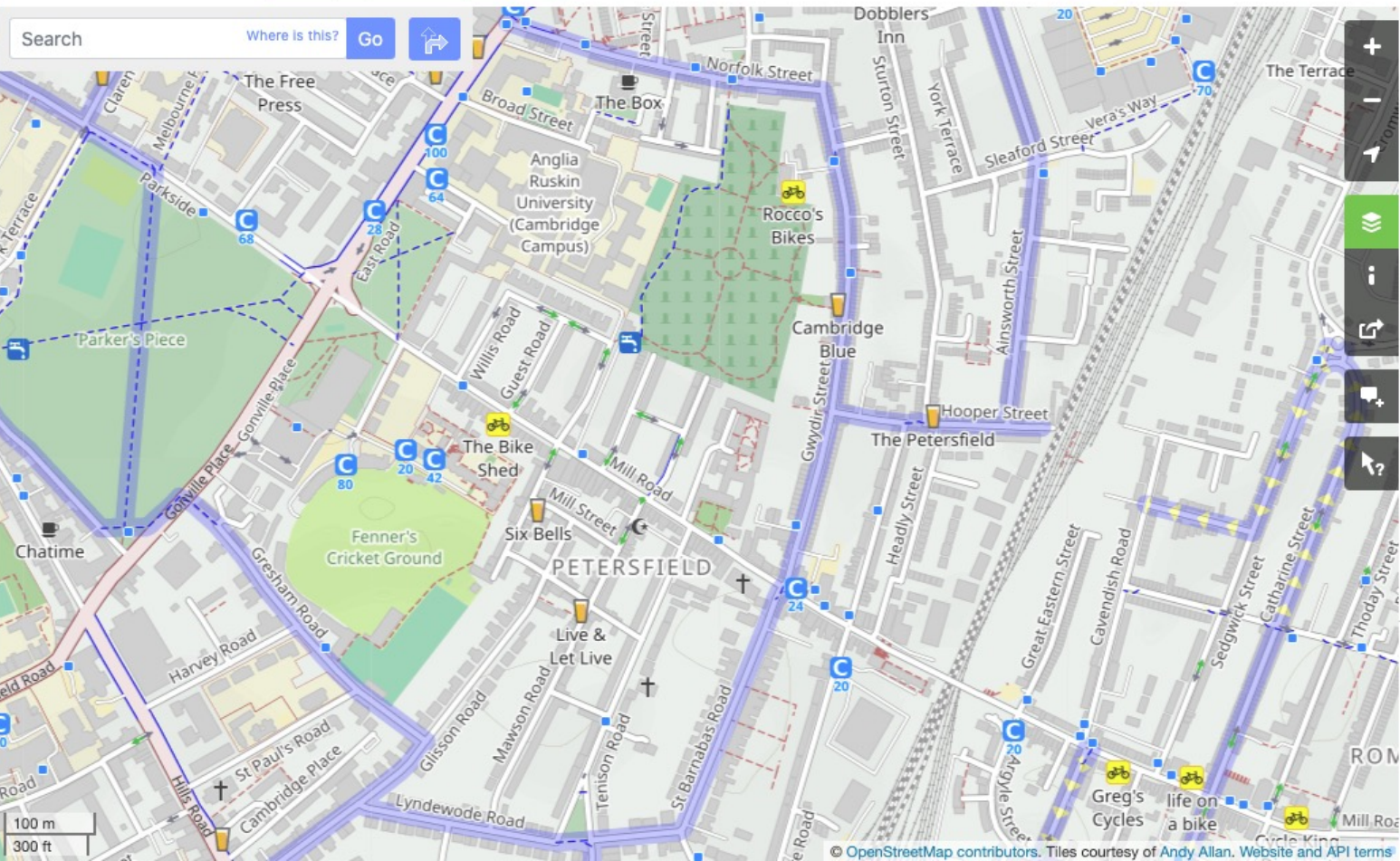
## Map Layers

- Standard** 
- CycLOSM** 
- Cycle Map** 
- Transport Map** 
- ÖPNVKarte** 
- Humanitarian** 

Enable overlays for troubleshooting the map

- ☐ Map Notes
- ☐ Map Data
- ☐ Public GPS Traces



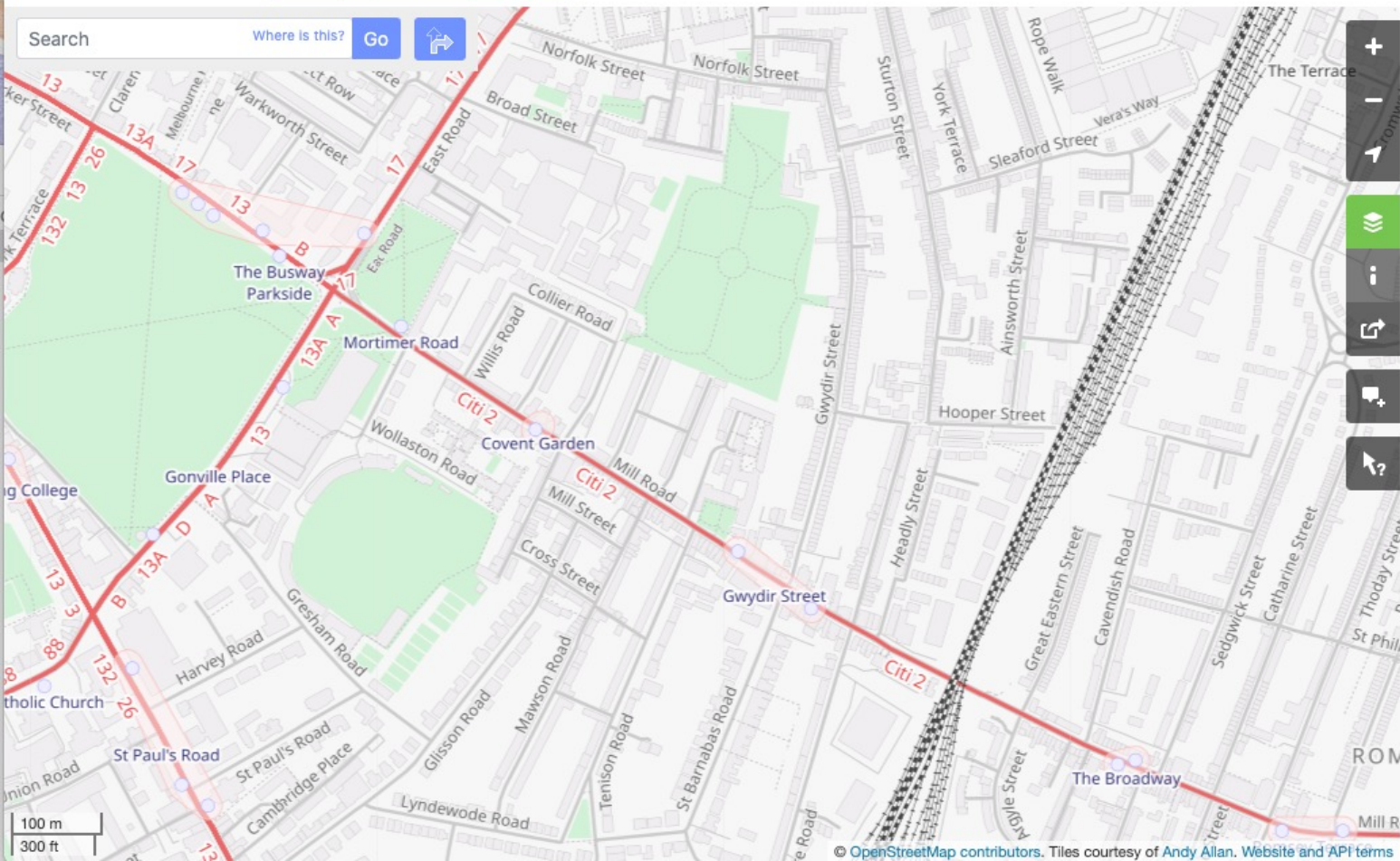


## Map Layers

- Standard
- CycloSM
- Cycle Map Bikes
- Transport Map
- ÖPNVKarte
- Humanitarian

- Enable overlays for troubleshooting the map
- ☐ Map Notes
  - ☐ Map Data
  - ☐ Public GPS Traces

Search Where is this? Go 



## Map Layers ✕

- Standard** 
- CycLOSM** 
- Cycle Map** 
- Transport Map** 
- ÖPNVKarte** 
- Humanitarian** 

Enable overlays for troubleshooting the map

- ☐ Map Notes
- ☐ Map Data
- ☐ Public GPS Traces



cambridge, uk Find




hire us! <image>













## Edit feature

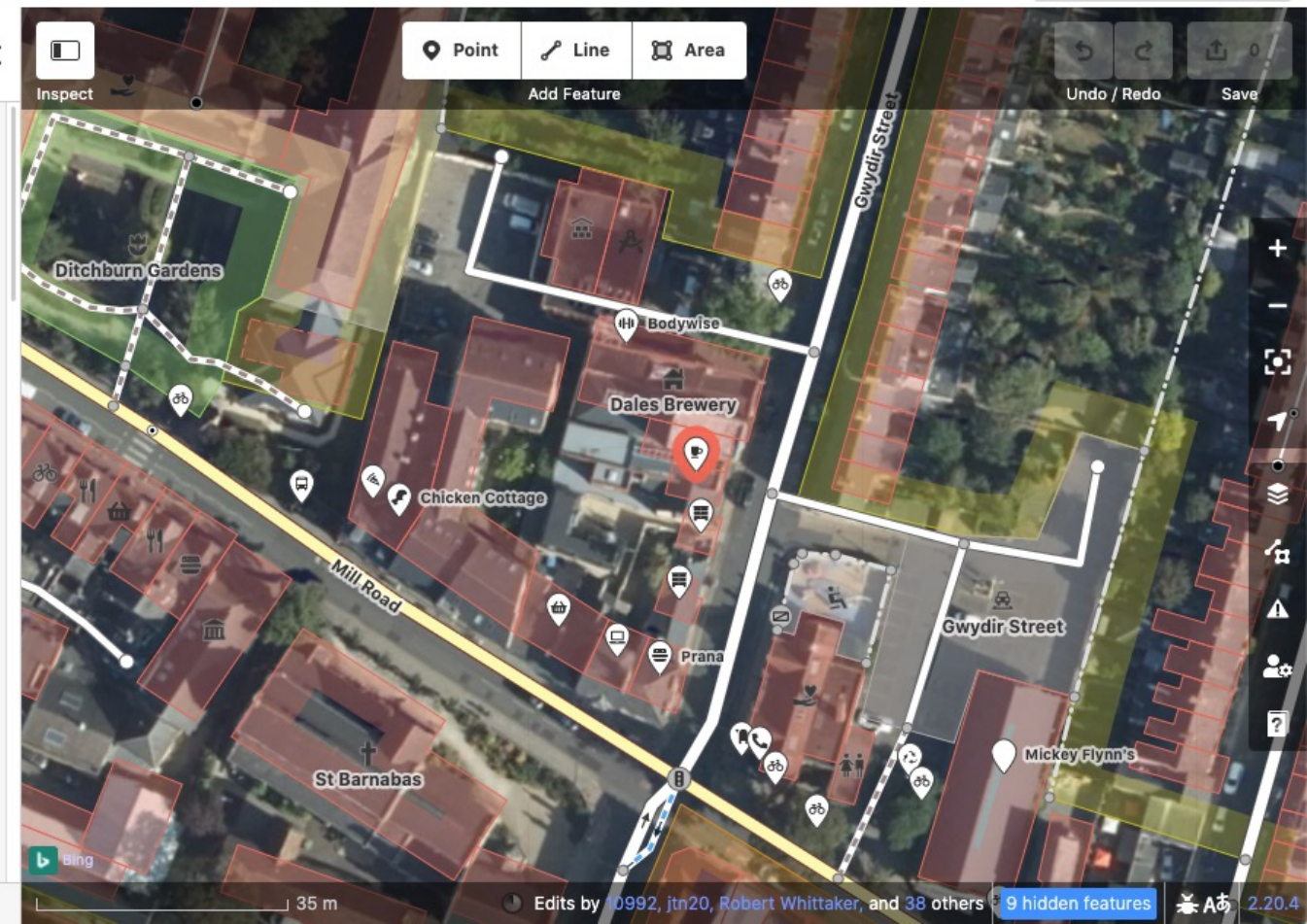
### Feature Type

	Cafe	i
---	------	---

### Fields

Name		
Hot Numbers	+	
Cuisines		
Coffee Shop x craft_beer x Add...		
Address		
Dales Brewery		
Unit 5-6	Gwydir Street	
Cambridge	CB1 2LJ	
Hours		
Mo-we 07:30-18:00; Th-Fr 07:30-22:30; Sa 0...		

[View on openstreetmap.org](#)





## Edit feature

Identifier: Q136287

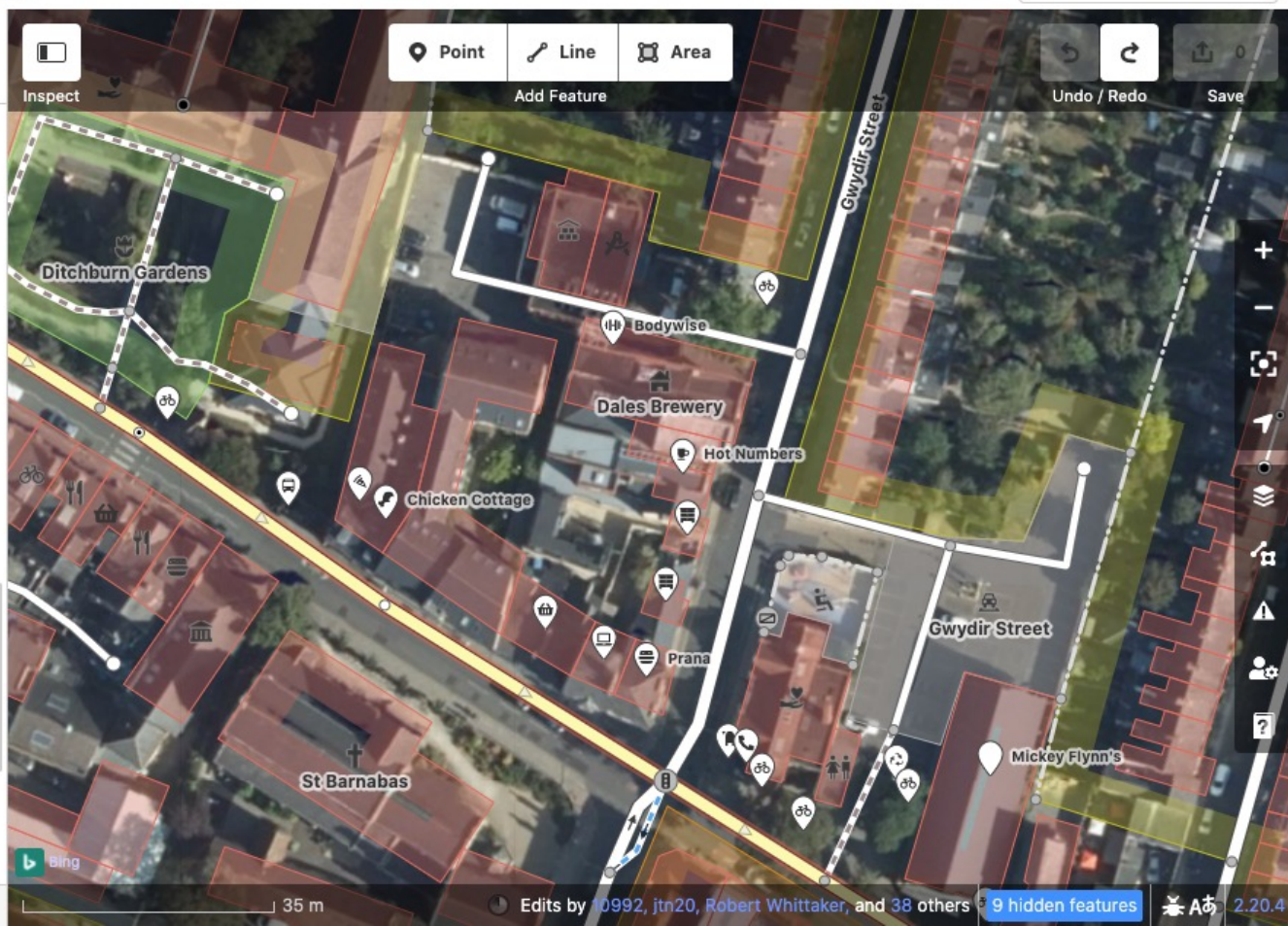
Add field: Bike Lanes, Description, Fix Me...

### Tags (8)

highway	tertiary		i
lanes	2		i
lit	yes		i
maxspeed	20 mph		i
name	Mill Road		i
sidewalk	both		i
surface	asphalt		i
wikidata	Q136287		i

### Relations (2)

Bus Route	Citi 2		
Role			



▼ All tags (12)

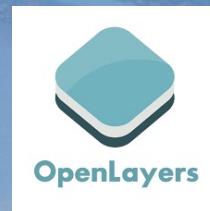
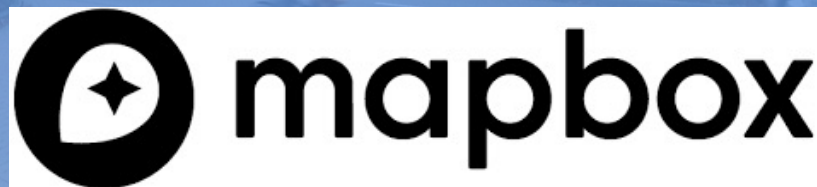


cycleway	track		
foot	no		
highway	cycleway		
lcn	yes		
lit	yes		
name	Hills Road (cycle...		
oneway	yes		
segregated	light		
sidewalk	left		
surface	asphalt		
surface:colour	red		
width	2.1		





# JS mapping frameworks



# Leaflet.JS



<https://leafletjs.com/examples.html>

<https://leafletjs.com/plugins.html>

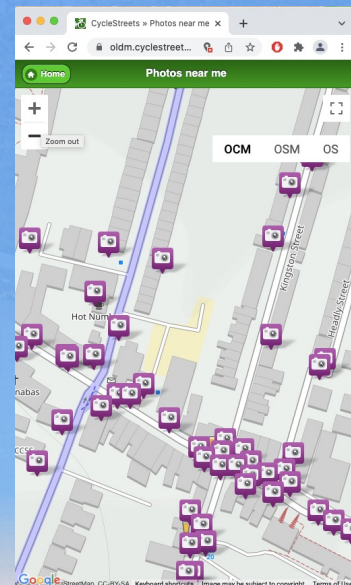
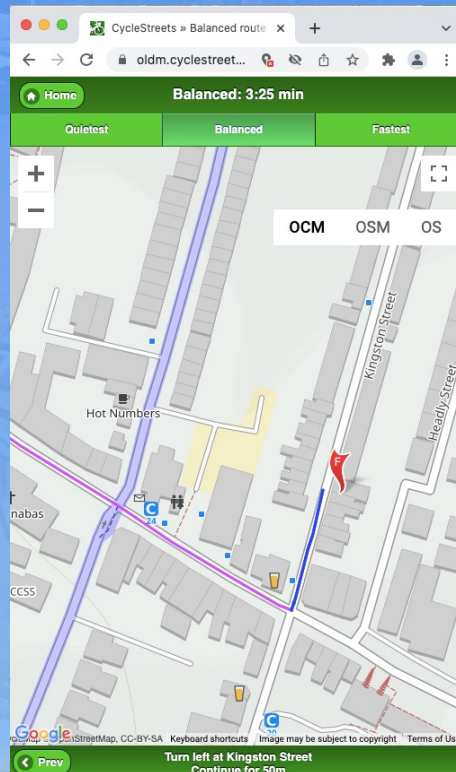
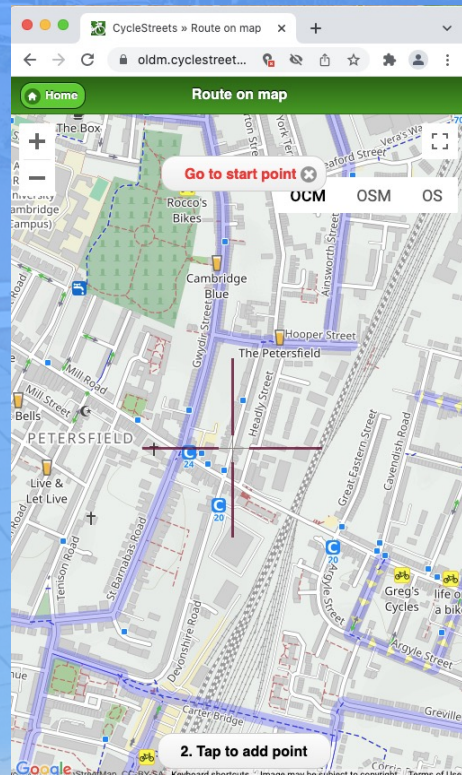
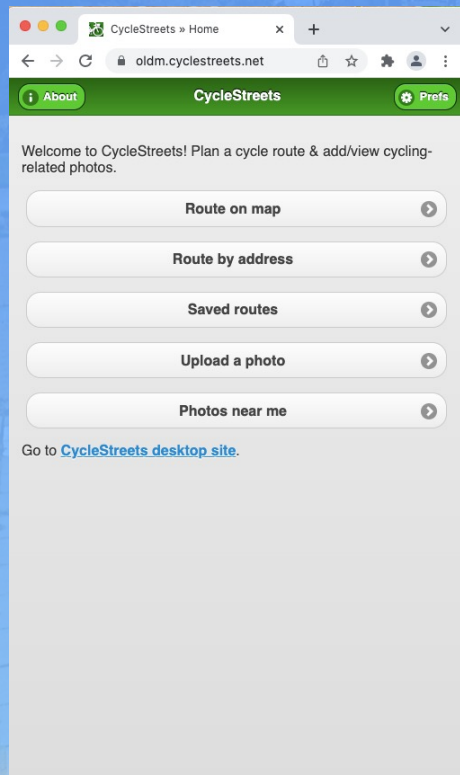


# Mapbox GL JS



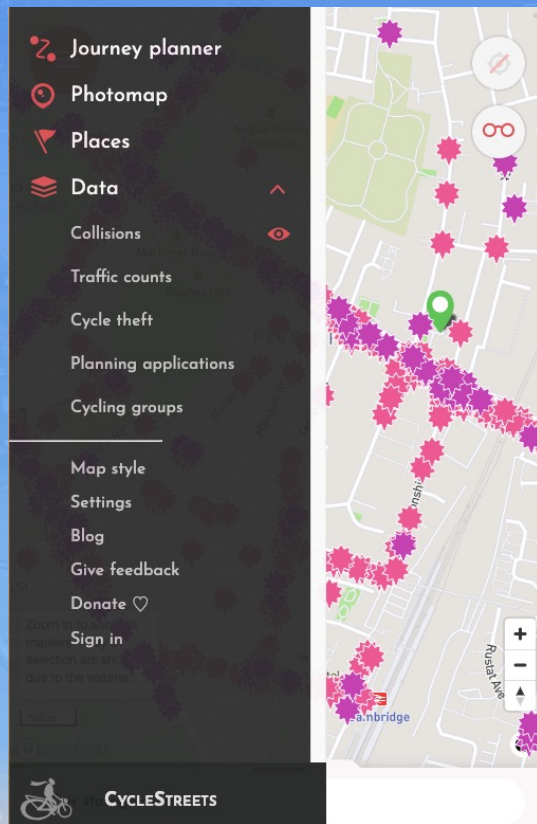
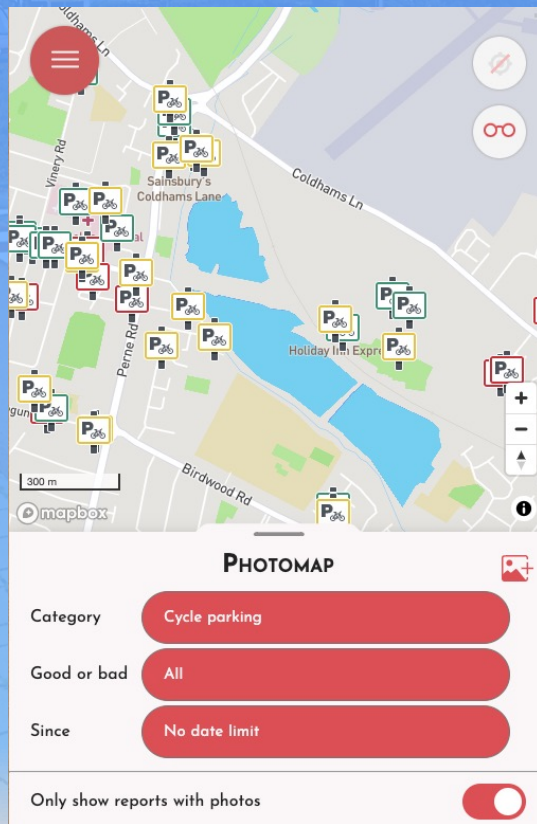
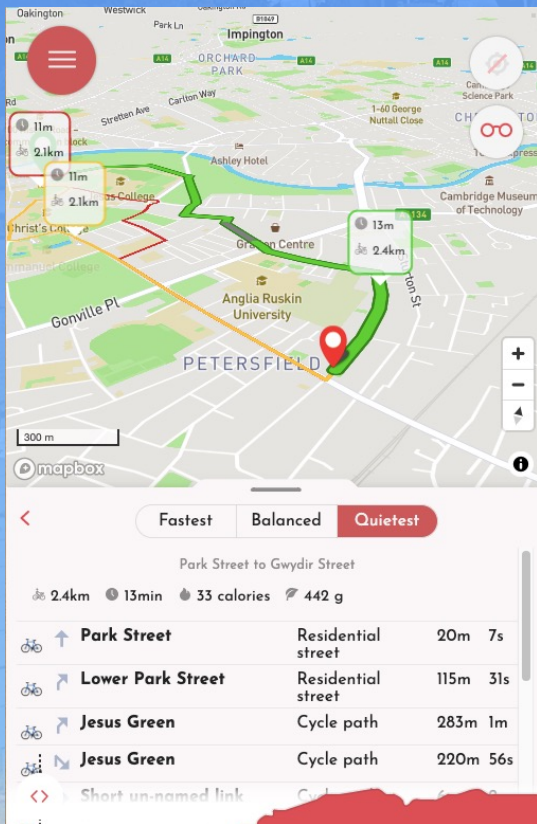
<https://docs.mapbox.com/mapbox-gl-js/example/>

# Our web app: 2011





# Our web app: 2022



# App structure

JS

API

cyclestreets/  
**mobileweb**



New design for mobile UIs (HTML implementation)

cyclestreets/  
**Mapboxgljs.LayerViewer**

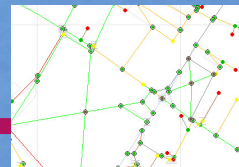


Layer viewer GUI using Mapbox GL JS

cyclestreets/  
**routing-ui**



Web user interface component for routing





# LayerViewer library

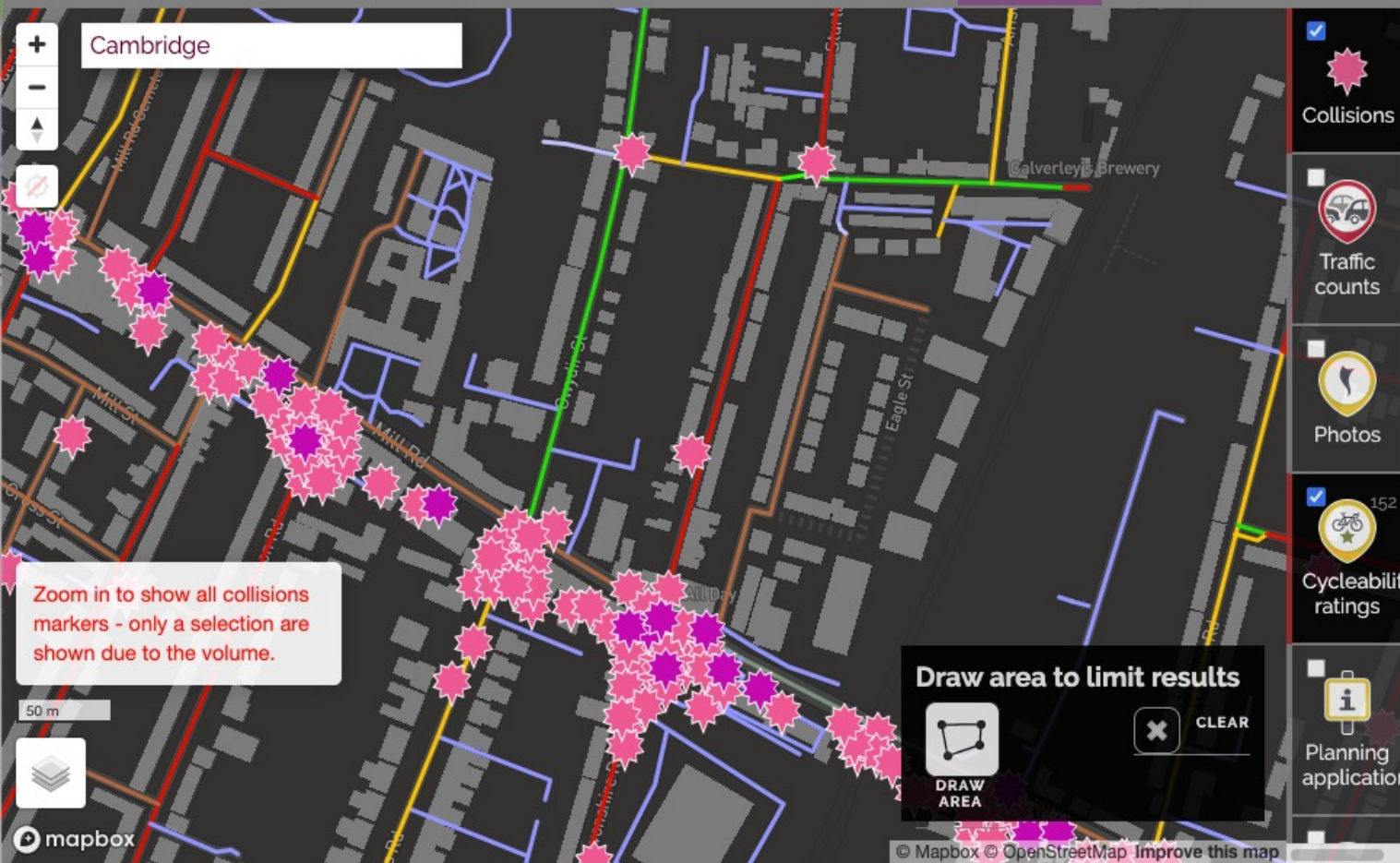
## Features

- Show/hide multiple layers
- Supports GeoJSON, heatmap and bitmap layers.
- Updating of GeoJSON over AJAX
- Form controls issue new API calls to send parameters
- Excel export buttons (where supported by API)
- Drawing integration
- Geocoder integration
- Geolocation integration
- Multiple bitmap background layers
- HTML5 pushstate URL support
- Mobile support
- Region switcher, using a GeoJSON file
- Page popup support
- Popup label dictionary support, including tooltips
- Basic password-protection
- Automatic legend generation

cyclestreets/  
**Mapboxgljs.LayerViewer**

Layer viewer GUI using Mapbox GL JS





infrastructure. Data is from DfT/police STATS19, from 1999-2020. See [definitions](#).

Zoom in to see all - while zoomed out only a selection is shown due to the volume.

#### Filter to:

Severity:

All

collisions

Casualty:

- ☒ Cyclist
- ☐ Pedestrian
- ☐ Car occupant

Date range:

-

Limit to:

- ☐ Junctions
- ☐ One-way streets
- ☐ A-roads

All speed limit

Export: (131)



```
// Layer definitions
var _layerConfig = {
```

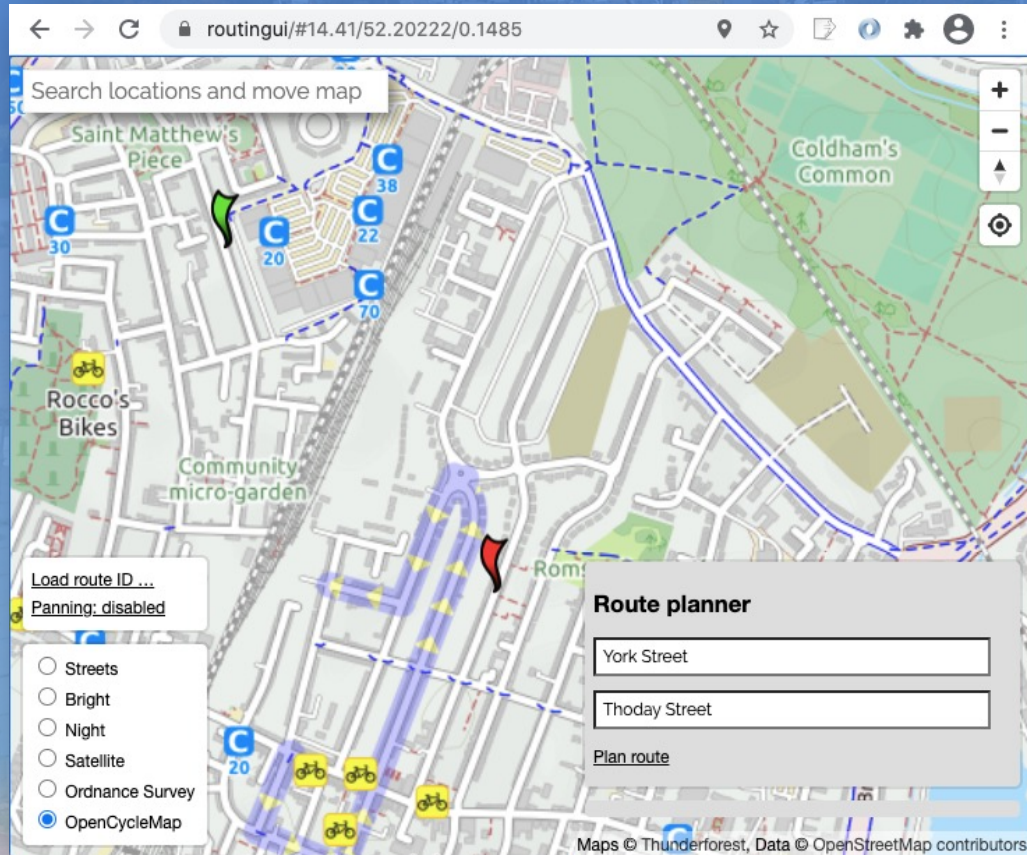
```
  collisions: {
    apiCall: '/v2/collisions.locations',
    apiFixedParameters: {
      jitter: '1',
      datetime: 'friendly'
    },
    fullZoom: 17,
    sendZoom: true, // Needed for jitter support
    iconField: 'severity',
    icons: {
      slight: '/images/icons/icon_collision_slight.svg',
      serious: '/images/icons/icon_collision_serious.svg',
      fatal: '/images/icons/icon_collision_fatal.svg'
    },
    markerImportance: ['slight', 'serious', 'fatal'],
    popupHtml:
      '<p><a href="{properties.url}"> <strong>View full, detailed report</a>'
      + '<p>Reference: <strong>{properties.id}</strong></p>'
      + '<p>'
      + 'Date and time: <strong>{properties.datetime}</strong><br />'
      + 'Severity: <strong>{properties.severity}</strong><br />'
      + 'Casualties: <strong>{properties.casualties}</strong><br />'
      + 'No. of Casualties: <strong>{properties.number_of_casualties}</strong><br />'
      + 'No. of Vehicles: <strong>{properties.number_of_vehicles}</strong>'
      + '</p>'
  },

  taxidata: {
    apiCall: '/v2/advocacydata.taxis',
    iconUrl: '/images/icons/road_neutral.svg',
    heatmap: true
  },

  trafficcounts: {
    apiCall: '/v2/trafficcounts.locations',
    apiFixedParameters: {
      groupyears: '1'
    },
    iconUrl: '/images/icons/icon_congestion_bad.svg',
    lineColourField: 'car_pcu', // ## Fixme - currently no compiled all_motors_pcu value
    lineColourStops: [
      [40000, '#ff0000'], // Colour and line values based on GMCC site
      [20000, '#d43131'],
      [10000, '#e27474']
    ]
  }
}
```

# Define layers declaratively

# Routing UI library



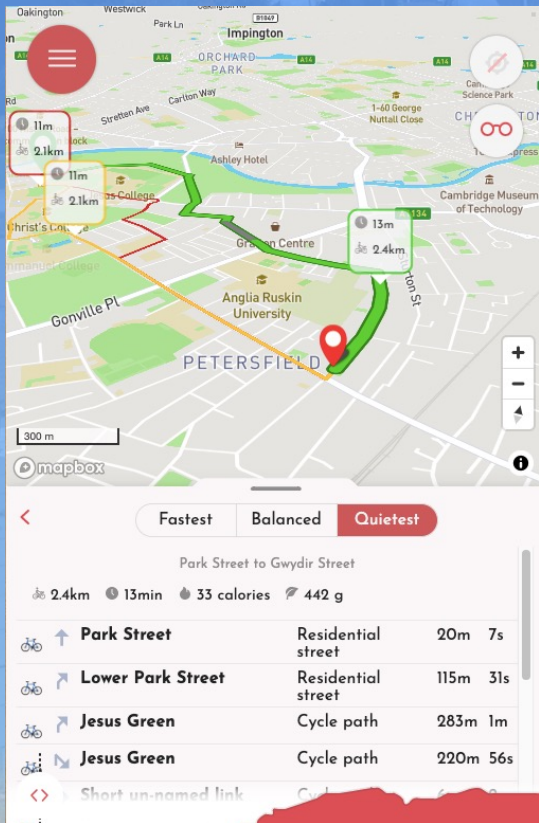
cyclestreets/  
routing-ui

Web user interface component for routing





# The app itself



cyclestreets/  
mobileweb

New design for mobile UIs (HTML implementation)



1. Defines the front-end (layout / menu / cards / buttons)
2. Defines layers
3. Journey planner layer run routing-ui
4. Passes layers to LayerViewer
5. LayerViewer loads map etc

# Current beta state

- Routing-ui library is a bit buggy still
- Front-end good but could be tighter
- LayerViewer is large and needs modularization
- Not yet in NPM/Yarn... about to be!
- Bit of a pain to install
- React/Vue?
- Compile for iOS...?



# Our other projects

- Main website
- Journey Planner API
- Bikedata
- Cyclescape
- StreetFocus
- Widen My Path
- Low Traffic Neighbourhoods .org

A background image of a city street scene. In the foreground, a person is riding a bicycle on a paved path. In the background, there are cars parked and driving on a road. The image has a blue tint and is overlaid with text.

# Get involved!

Can you help? 😊

[github.com/cyclestreets](https://github.com/cyclestreets)





Image: David Earl



**Martin Lucas-Smith**

**[www.CycleStreets.net](http://www.CycleStreets.net)**

**Twitter: @cyclestreets**  
**[info@cyclestreets.net](mailto:info@cyclestreets.net)**

