Izmir green space analysis with OSM data Step-2

In this notebook, the existing neighbourhood shapefile will be examined and be prepared for the step-3, where it will be spatially joined with the green areas data. The neighbourhood boundaries data contains neighbourhoods from other cities, not only Izmir. Also the dataset has the borough ID ("ILCEID") but does not contain the borough names. Based on this examination;

- There will be filtering out of the neighbourhoods that are not placed within Izmir boundary.
- Then,the ILCEID codes will be manually matched with their corresponding borough names.
- After that, borough-level shapefile will be generated from the neighbourhood dataset.

In [1]:
```python
import geopandas as gpd
```

In [2]:
```python
gdf_mahalle = gpd.read_file("IZMIR_MAH.shp")
```

In [3]:
```python
gdf_mahalle.head(2)
```

Out[3]:

	OBJECTID	ID	AD	ILCEID	TIP	SHAPE_Leng	SHAPE_Area	geometry
0	1	17032	Ovapınarı	1957	Kırsal Mahalle	0.297726	0.003541	POLYGON ((27.84937 37.52796, 27.84950 37.52812...
1	2	17357	Yalınkuyu	1542	Kırsal Mahalle	0.153390	0.000510	POLYGON ((28.39859 37.95343, 28.39871 37.95344...

In [4]:
```python
gdf_mahalle.info()
```

```
<class 'geopandas.geodataframe.GeoDataFrame'>
RangeIndex: 4290 entries, 0 to 4289
Data columns (total 8 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   OBJECTID    4290 non-null   int64
 1   ID          4290 non-null   int64
 2   AD          4290 non-null   object
 3   ILCEID      4290 non-null   int64
 4   TIP         4290 non-null   object
 5   SHAPE_Leng  4290 non-null   float64
 6   SHAPE_Area  4290 non-null   float64
 7   geometry    4290 non-null   geometry
dtypes: float64(2), geometry(1), int64(3), object(2)
memory usage: 268.3+ KB
```

NOTE

The dataset has been examined in QGIS, and it is observed that there are neighbourhood boundaries from districts outside of Izmir. Therefore, the outside neighbourhoods will be removed, reatining only those located within the Izmir boundaries.

This observation has been done in QGIS, by overlaying Google Maps imagery with neighbourhood dataset. By using ILCEID for labeling, neighbourhoods located within the Izmir boundaries identified.

Data Filtering

Retain only the neighbourhoods located within the Izmir boundaries and remove others.

In [5]:
```python
izmir_ilce_list = [1448, 1819, 2009, 2006, 2056, 2007, 1203, 1521, 1334, 1128, 1280, 1181, 14
```

In [6]:

```
gdf_mahalle_filtered = gdf_mahalle[gdf_mahalle["ILCEID"].isin(izmir_ilce_list)]
```

Generating Borough Names

At this stage, a new column for borough names will be genrated by manually matching the "ILCEID" codes to their corresponding names.

In [7]:

```
ilce_dict = {
    1448: "KARSIYAKA",1819: "KONAK",2009: "GAZIEMIR",2006: "BALCOVA", 2056: "BAYRAKLI", 2007:
    1128: "ALIAGA", 1280: "DIKILI", 1181: "BERGAMA", 1467:"KINIK", 1461:"KEMALPASA", 1682: "T
}
```

In [8]:

```
gdf_mahalle_filtered = gdf_mahalle_filtered.copy()
```

In [9]:

```
gdf_mahalle_filtered["ILCE_ADI"] = gdf_mahalle_filtered["ILCEID"].map(ilce_dict)
```

In [10]:

```
gdf_mahalle_filtered.head(2)
```

Out[10]:

	OBJECTID	ID	AD	ILCEID	TIP	SHAPE_Leng	SHAPE_Area	geometry	ILCE_ADI
1836	1837	35455	İhsaniye	1611	Kırsal Mahalle	0.082731	0.000216	POLYGON ((26.78859 38.28193, 26.79171 38.28251...	SEFERIHISAR
1837	1838	35632	Bademler	1703	Kırsal Mahalle	0.221304	0.001508	POLYGON ((26.82327 38.28687, 26.82340 38.28694...	URLA

In [11]:

```
gdf_mahalle_filtered.info()
```

```
<class 'geopandas.geodataframe.GeoDataFrame'>
Index: 1336 entries, 1836 to 3196
Data columns (total 9 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   OBJECTID    1336 non-null   int64
 1   ID          1336 non-null   int64
 2   AD          1336 non-null   object
 3   ILCEID      1336 non-null   int64
 4   TIP         1336 non-null   object
 5   SHAPE_Leng  1336 non-null   float64
 6   SHAPE_Area  1336 non-null   float64
 7   geometry    1336 non-null   geometry
 8   ILCE_ADI    1336 non-null   object
dtypes: float64(2), geometry(1), int64(3), object(3)
memory usage: 104.4+ KB
```

Creating Borough Geometries

Borough-level geometries will be generated by dissolving the neighbourhood boundaries based on the "ILCE_ADI".

In [12]:

```
gdf_ilce = gdf_mahalle_filtered.dissolve(by="ILCE_ADI", as_index=False)
```

In [13]:

```
gdf_ilce.head(2)
```

Out[13]:

	ILCE_ADI	geometry	OBJECTID	ID	AD	ILCEID	TIP	SHAPE_Leng	SHAPE_Area
0	ALIAGA	MULTIPOLYGON (((27.02683 38.69684, 27.02668 38...	2043	34284	Aşağışakran	1128	Kırsal Mahalle	0.131118	0.000878
1	BALCOVA	POLYGON ((27.07063 38.38425, 27.07172 38.38293...	2684	34326	Korutürk	2006	Mahalle	0.067043	0.000128

In [14]:

```
gdf_ilce.info()
```

```
<class 'geopandas.geodataframe.GeoDataFrame'>
RangeIndex: 29 entries, 0 to 28
Data columns (total 9 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   ILCE_ADI    29 non-null     object
 1   geometry    29 non-null     geometry
 2   OBJECTID    29 non-null     int64
 3   ID          29 non-null     int64
 4   AD          29 non-null     object
 5   ILCEID      29 non-null     int64
 6   TIP         29 non-null     object
 7   SHAPE_Leng  29 non-null     float64
 8   SHAPE_Area  29 non-null     float64
dtypes: float64(2), geometry(1), int64(3), object(3)
memory usage: 2.2+ KB
```

In [15]:

```
gdf_mahalle_filtered.to_file("izmir_neighbourhood.shp", driver="ESRI Shapefile")
```

In [16]:

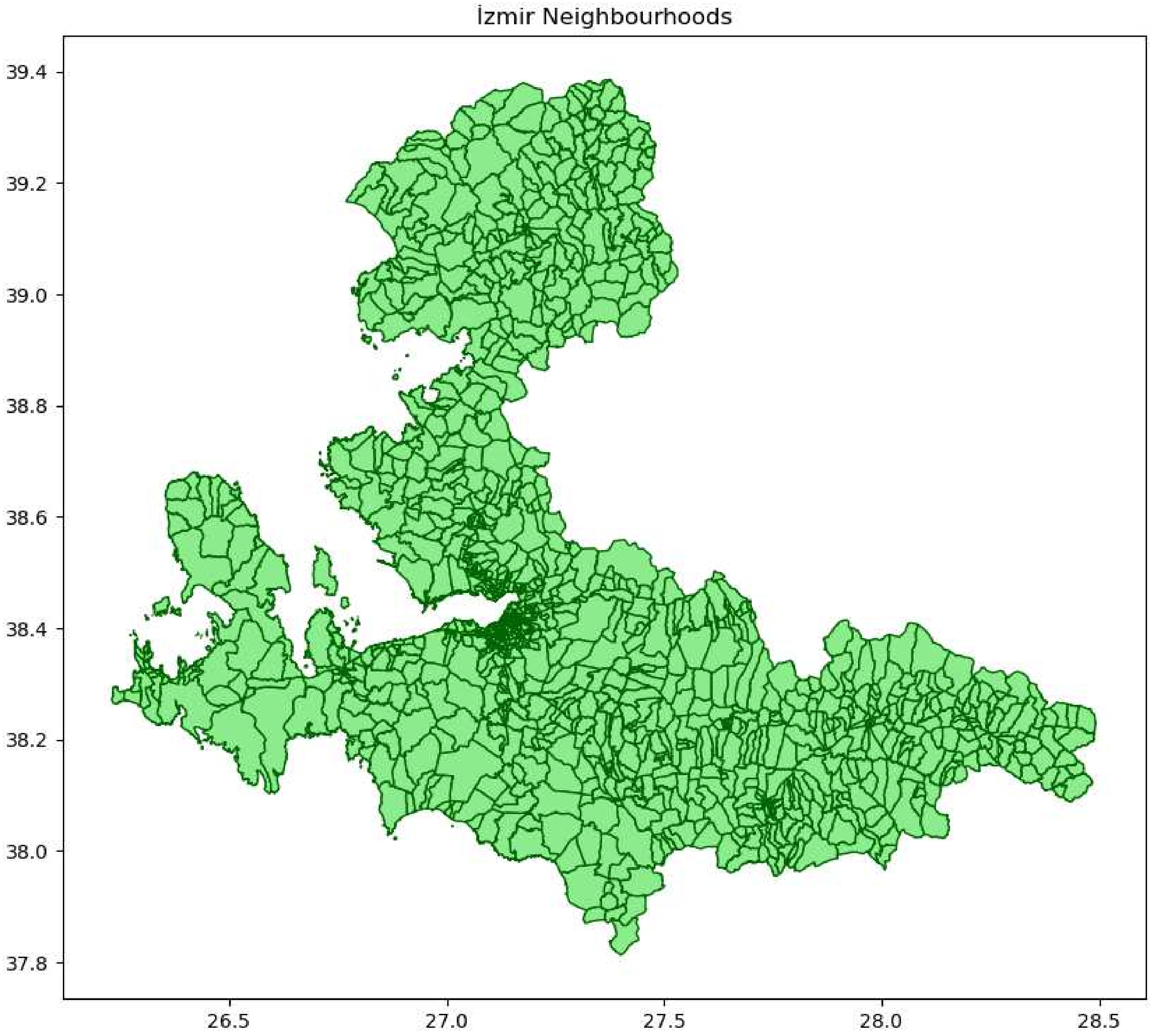
```
gdf_ilce.to_file("izmir_borough.shp", driver="ESRI Shapefile")
```

In [17]:

```
import matplotlib.pyplot as plt
```

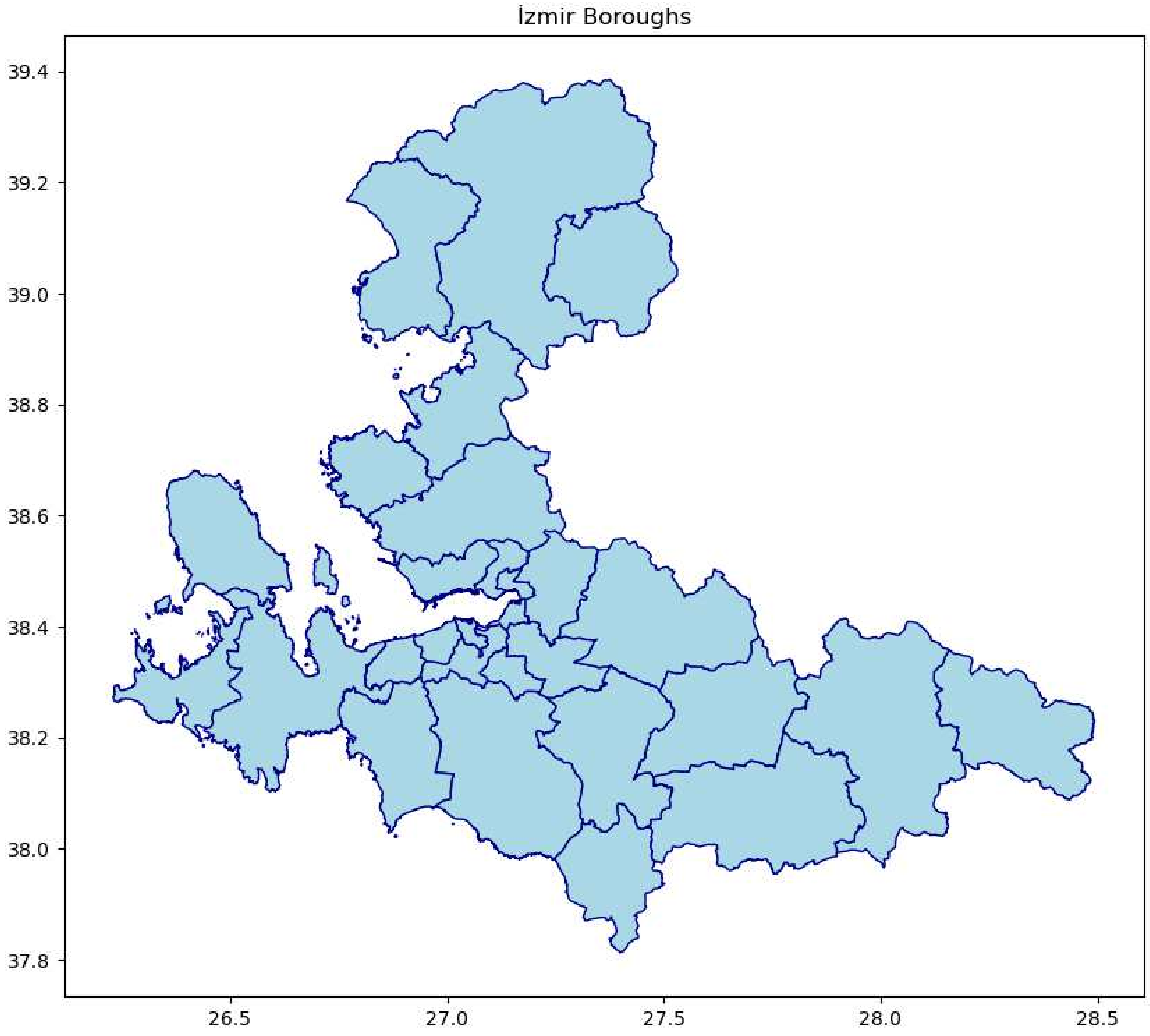
In [18]:

```
fig, ax = plt.subplots(figsize=(10, 10))
gdf_mahalle_filtered.plot(
    ax=ax,
    color="lightgreen",    # polygon rengi
    edgecolor="darkgreen" # sınır rengi
)
ax.set_title("İzmir Neighbourhoods")
plt.show()
```

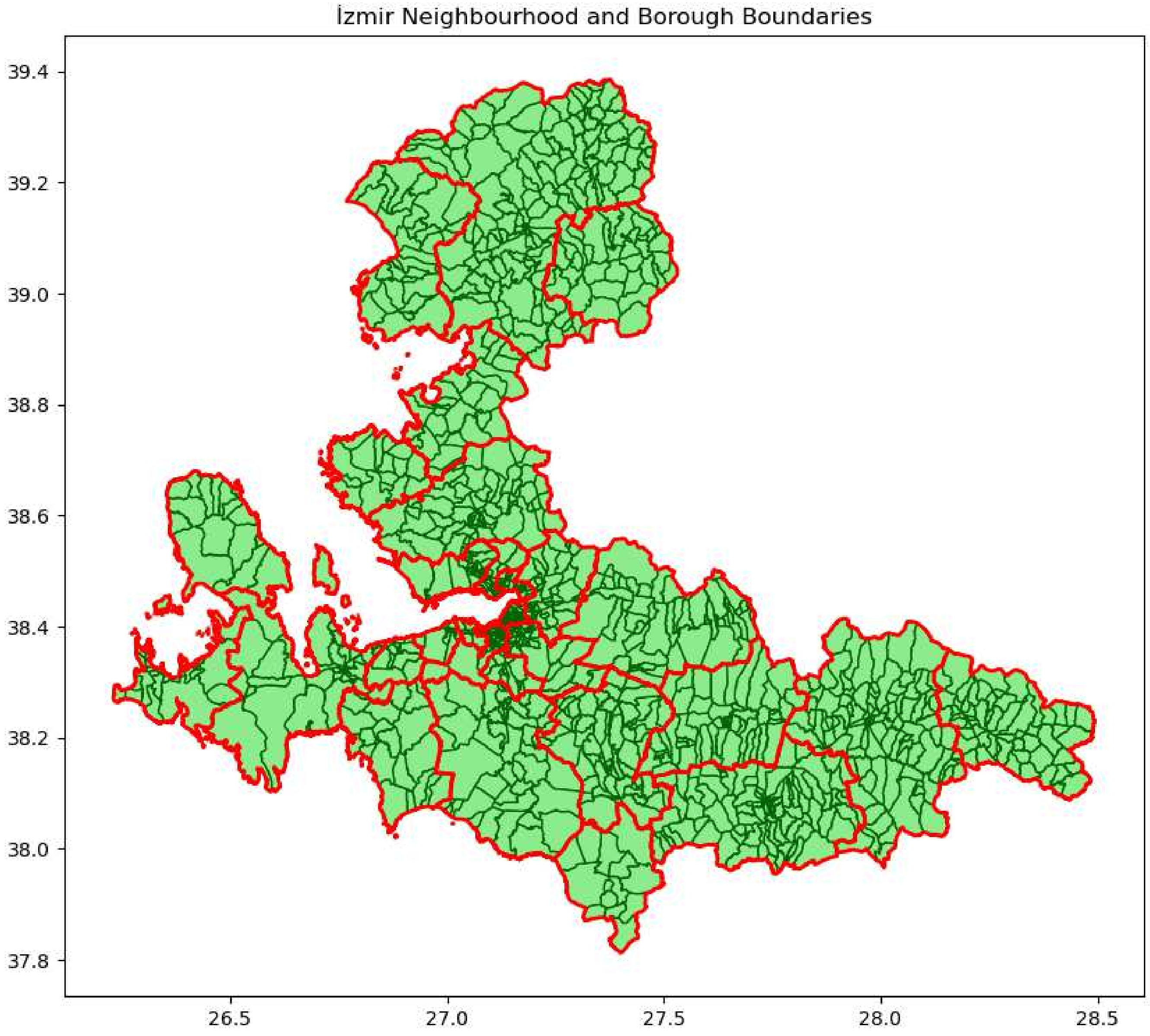


In [19]:

```
fig, ax = plt.subplots(figsize=(10, 10))
gdf_ilce.plot(
    ax=ax,
    color="lightblue",
    edgecolor="darkblue"
)
ax.set_title("İzmir Boroughs")
plt.show()
```



In [20]:
```
fig, ax = plt.subplots(figsize=(10, 10))
gdf_mahalle_filtered.plot(ax=ax, color="lightgreen", edgecolor="darkgreen")
gdf_ilce.plot(ax=ax, color="none", edgecolor="red", linewidth=2)  # İlçe sınırlarını kırmızı
ax.set_title("İzmir Neighbourhood and Borough Boundaries")
plt.show()
```



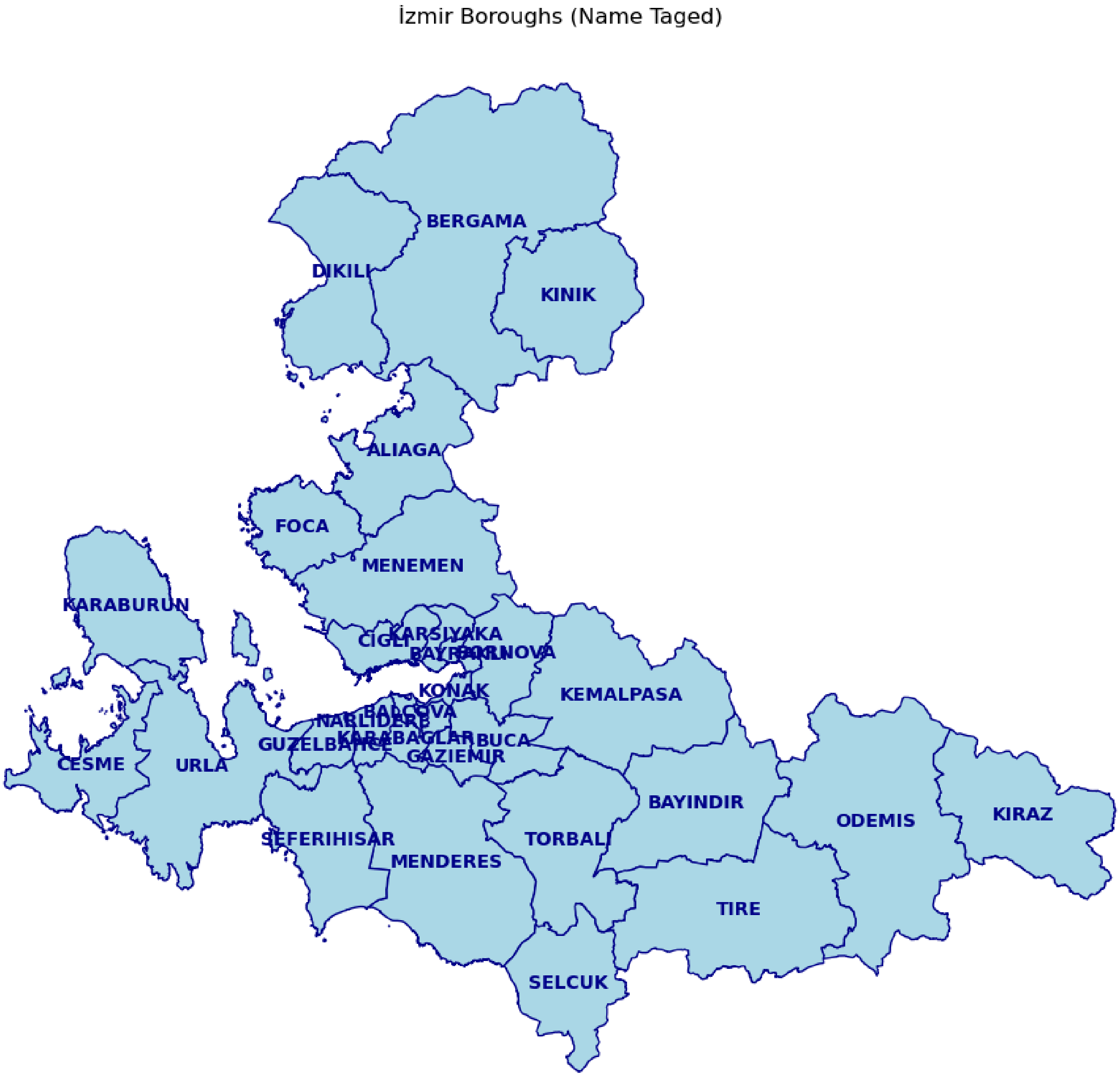
In [21]:

```
fig, ax = plt.subplots(figsize=(12, 12))

# İlçe polygonları
gdf_ilce.plot(
    ax=ax,
    color="lightblue",
    edgecolor="darkblue"
)

# İlçe isimlerini polygon merkezine yerleştir
for idx, row in gdf_ilce.iterrows():
    plt.text(
        x=row.geometry.centroid.x,     # x koordinatı
        y=row.geometry.centroid.y,     # y koordinatı
        s=row["ILCE_ADI"],             # ilçe adı
        horizontalalignment='center',
        verticalalignment='center',
        fontsize=10,
        fontweight='bold',
        color='darkblue'
    )

ax.set_title("İzmir Boroughs (Name Taged)")
plt.axis('off')
plt.show()
```



Outcome

The neighbourhood and borough datasets are now clean, properly labeled, and contain accurate geometries. These datasets are ready to be spatially joined with the OSM green areas data in Step-3.

In [ ]: