

# Using Native SQL Geometry for Cloud-Ready, Lightning-Fast Overlays

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King County GIS Center

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**King County**

Department of Information Technology

# Background



# Districts and Development Conditions Report (DDCR)

## KCGIS Center

We put geographic information systems to work for King County and beyond

KCGIS Parcel Reports

Districts and Development Conditions Report


Find Your Council District

Find Your Watershed

KCGIS Center

### King County Districts and Development Conditions for parcel 0942000860

Parcel number	0942000860	Drainage Basin	Elliott Bay
Address	516 JRD AVE	Watershed	Duwamish - Green River
Jurisdiction	Seattle	WRIA	Duwamish-Green (9)
Zipcode	98104	PLSS	NW - 5 - 24 - 4
Kroll Map page	44	Latitude	47.60264
Thomas Guide page	565	Longitude	-122.33053



**King County Electoral districts**

Voting district	SEA 34-3497	Fire district	does not apply
King County Council district	District 8, Teresa Mosqueda (208) 477-1008	Water district	does not apply
Congressional district	7	Sewer district	does not apply
Legislative district	34	Water & Sewer district	does not apply
School district	Seattle #1	Parks & Recreation district	does not apply
Seattle school board district	Director District 6	Hospital district	does not apply
District Court electoral district	West	Rural library district	does not apply
Regional fire authority district	does not apply	Tribal Lands?	No

**King County planning and critical areas designations**

King County zoning	NA, check with jurisdiction	Urban Unincorporated Status	does not apply
Development conditions	None	Rural town?	No
Comprehensive Plan Land Use Designation	does not apply	Water service planning area	Seattle Public Utilities
Urban Growth Area	Urban	Transportation Concurrence Management	does not apply
Community Service Area	does not apply	Forest Production district?	No
Community Planning Area	Seattle	Agricultural Production district?	No
Coal mine hazards?	Check with jurisdiction	Snoqualmie Valley watershed improvement district?	No
Erosion hazards?	Check with jurisdiction	Critical aquifer recharge area?	None mapped
Landslide hazards?	Check with jurisdiction	Wellands at this parcel?	Check with jurisdiction
Seismic hazards?	Check with jurisdiction	Within the Tacoma Smelter Plume?	Under 20 ppm
100-year flood plain?	None mapped	Shoreline management designation (% of parcel)	None mapped
Sea Level Rise Risk Area	Does not apply	Wildland Urban Interface	Does not apply

\*Most of these designations apply only to unincorporated areas

**Related resources**

King County Assessor: [eReal Property Report](#)

King County Assessor: [Quarter Section Map](#) (PDF format requires Acrobat)

King County DP&R: [Permit Applications Report](#) (for unincorporated areas only)

King County Treasury Operations: [Property Tax Information for this property](#)

King County Records Office: [Scanned images of plats](#)

King County Records Office: [Scanned images of surveys and other map documents](#)

Seattle/King County Public Health: [Septic records](#)

[Open IMap to this property](#)

[Open Parcel Viewer to this property](#)

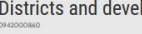
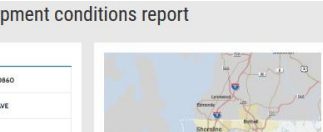
**Search**

Address or parcel number:

search by condo name

example address: 201 S. Jackson St | example parcel number: 0942000860

v2023-01-01

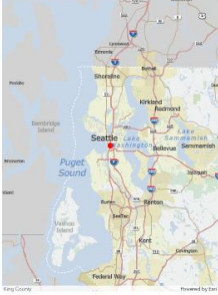



## Districts and development conditions report

0942000860

**Parcel definition**

Parcel number	0942000860
Address	516 JRD AVE
Jurisdiction	Seattle
Zipcode	98104
Watershed	Duwamish - Green River
Water Resource Inventory Area (WRIA)	Duwamish-Green (9)
Drainage basin	Elliott Bay
Public Land Survey System (PLSS)	NW - 5 - 24 - 4
Latitude	47.60264
Longitude	-122.33053



**More about this property...**

View in IMap  View in Parcel Viewer

Quarter section map  Permit applications report (for unincorporated areas only)

Recorded documents  Property tax statement

Septic records  eReal property report

Flat images

**Electoral districts**

Voting district	SEA 34-3497	King County Council district	District 8, Teresa Mosqueda (208) 477-1008 Email
Federal congressional district	7	State legislative district	34
School district	Seattle #1	Seattle School Board district	Director District 6
District Court electoral district	West	Regional Fire Authority district	Does not apply
Fire district	Does not apply	Water district	Does not apply
Sewer district	Does not apply	Water & sewer district	Does not apply
Parks & recreation district	Does not apply	Hospital district	Does not apply
Rural library district	Does not apply	Tribal lands?	No

**Planning and critical areas**

King County zoning	Check with jurisdiction	Development conditions	None
Comprehensive Plan land use designation	Does not apply	Urban Growth Area	Urban
Zoning code subarea geography development standards	Does not apply	Community Service Area	Does not apply
Community Planning Area	Seattle	Coal mine hazards?	Check with jurisdiction
Erosion hazards?	Check with jurisdiction	Landslide hazards?	Check with jurisdiction
Seismic hazards?	Check with jurisdiction	100-year floodplain?	None mapped
Sea level rise risk area	Does not apply	Urban Potential Annexation Area	Does not apply
Rural town?	No	Water service planning area	Seattle Public Utilities
Transportation Concurrence Management	Does not apply	Forest Prod District?	No

# App modernization

## Original DDCR & API

- Hosted on-prem
- .NET Framework 4.5 application
- ArcGIS Server map services
- NetTopologySuite

## Updated DDCR & API

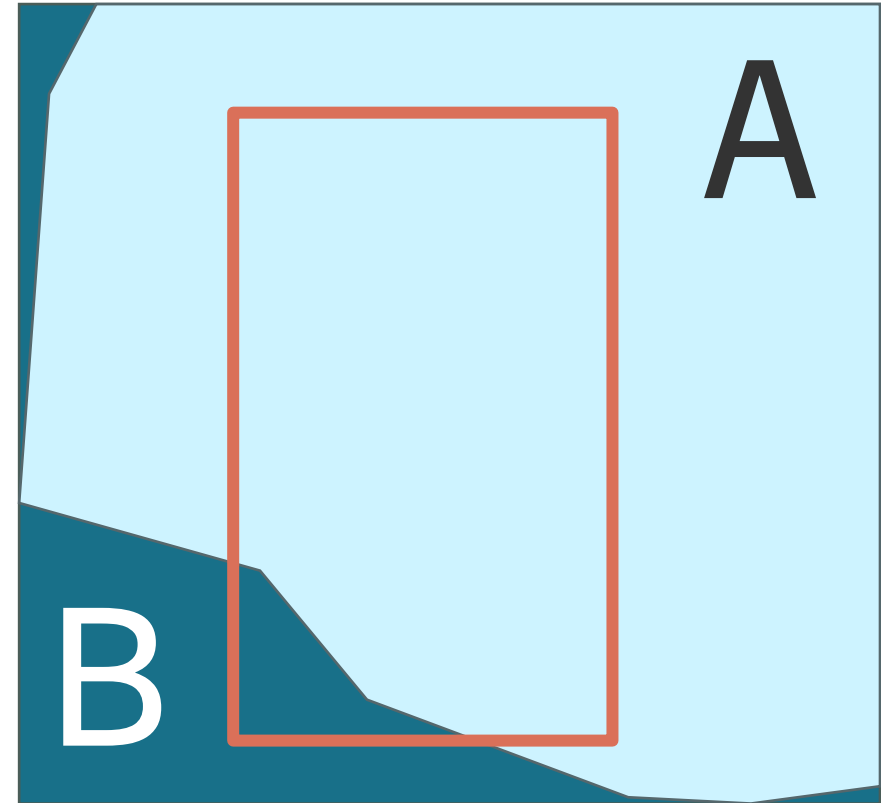
- Hosted in the cloud (Azure)
- .NET 10
- KCGIS Geocoding service
- SQL queries

# District reporting

# Single district

- Return **one** district
- Based on majority area
- 90% District A  
10% District B

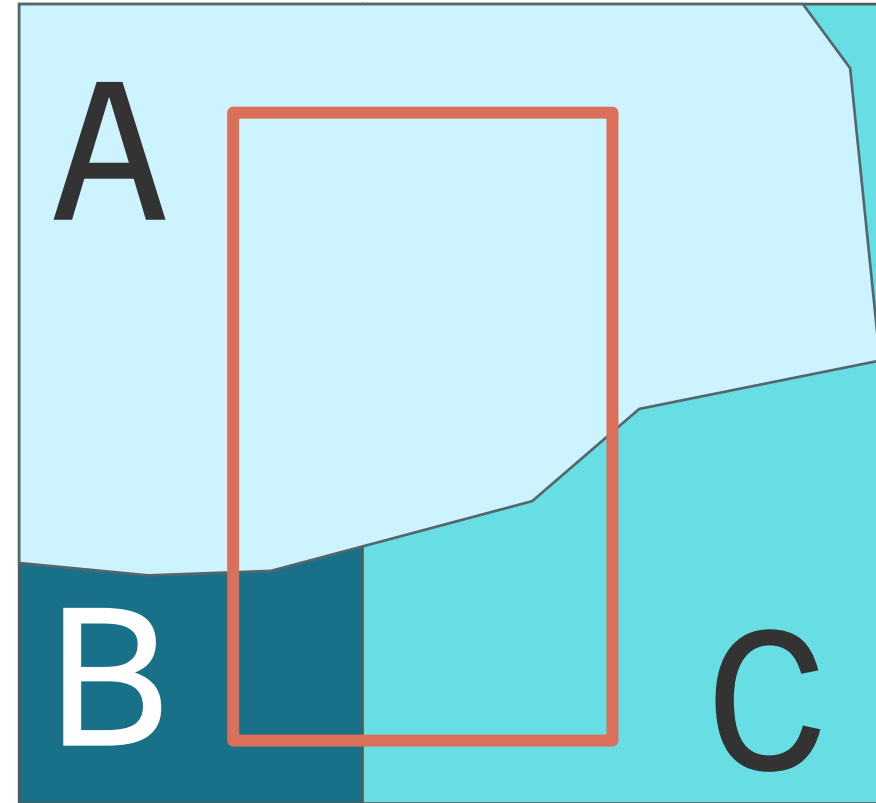
→ "District A"



# Multiple districts

- Return **all** districts
- Order by descending area
- 60% District A  
15% District B  
25% District C

➔ "Districts A, C, & B"



# Cloud conundrums

# Everything's better in the cloud... right?

- The data is still on-prem
- App service capacity varies
- Different considerations for performance

# Trial and error

1. Use Identify queries on the services
2. Process geometry with NetTopologyTools
3. Database functions



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# Solving for speed and simplicity

# What

- Spatial SQL queries

```
SELECT
  p.PIN
  ,CAST(srv.InCapChargeServiceArea AS BIT) AS InCapChargeServiceArea
  ,CAST(srv.InAlderwoodAnnex AS BIT) AS InAlderwoodAnnex
  ,CASE WHEN
    srv.InCapChargeServiceArea = 0 AND p.Shape.STCentroid().STWithin(cap.Shape.STBuffer(300)) = 1 then CAST(1 AS BIT)
    ELSE CAST(0 AS BIT)
  END AS InCapChargeServiceBuffer
  ,CASE WHEN
    srv.InAlderwoodAnnex = 0 AND p.Shape.STCentroid().STWithin(ald.Shape.STBuffer(300)) = 1 then CAST(1 AS BIT)
    ELSE CAST(0 AS BIT)
  END AS InAlderwoodBuffer
FROM
  in_service_areas srv
  , [plibrary].property.PARCEL_ADDRESS_UCO_AREA p
  , [plibrary].utility.capacitychargecsa_area cap
  , alderwood ald
WHERE p.PIN={fourCoCandidate.Parcel} AND p.county=UPPER({fourCoCandidate.County})
).ToArrayAsync();
```

- Embedded in the API code

```
var capChargeAreas = await dbContext.CapacityChargeAreas
    .FromSql($"")
    .ToListAsync();
```

(extension) IQueryable<CapacityChargeAreas> DbSet<CapacityChargeAreas>.FromSql<CapacityChargeAreas>(FormattableString sql)  
Creates a LINQ query based on an interpolated string representing a SQL query.  
If the database provider supports composing on the supplied SQL, you can compose on top of the raw SQL query using LINQ operators.  
As with any API that accepts SQL it is important to parameterize any user input to protect against a SQL injection attack. You can include interpolated parameter placeholders in the SQL query string. Any interpolated parameter values you supply will automatically be converted to a System.Data.Common.DbParameter.  
See Executing raw SQL commands with EF Core for more information and examples.  
Returns:  
An IQueryable<out T> representing the interpolated string SQL query.

```
AND p.Shape.STIntersection(cap.Shape).STArea(
ELSE 0
```

# Why

- We're already making database calls
- Handle all complex logic at once
- Runs where the data lives
- No change to the report application

- Built-in safety / parameterization
- Stays with the codebase
- Easier to migrate dev/test/prod

# Results

- Complex overlays from 20 seconds down to  $<2$ ; consistent performance
- Reduced network traffic
- Reduced dependencies
- Easier to read and understand logic
- Easier to maintain



# Recommendations



- Compute where your data lives
- Double-check your cloud defaults
- Be nice to future you

# Questions

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<https://gisandyou.org/2024/06/20/king-county-districts-and-development-conditions-report-improved-performance-and-modern-look/>



<https://gisandyou.org/2025/06/30/how-we-optimized-gis-data-loading-for-shoreline-designations/>



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