

Exercise Spatial SQL with Digital Map Data - SOLUTIONS

Write Spatial SQL statements to answer the following questions

1. Name the populated places that are within 300 metres of the M4 Motorway.

```
select distinct(p.distname)
from cardiffpopulatedplaces p, motorwayssouthwales m
where (sdo_geom.sdo_distance(p.geometry, m.geometry, 0.005) <= 300)
and p.classifica = 'Populated Place' and m.number_mb='M4';
```

Ballas Cottage

Hendre

Heol Las House

Ruthin Fach Farm

Castell-Y-Mwnws

Llwyna Farm

Capel Llanilltern

The Retreat

Maes Y Crogchan House

Began Farm

Wern Ddu House

Tre-Bryn Farm

Brynsadler

Greystone Cottage

Pant-Rhiw-Gch

Parkwall Lodge

Berryhill Farm

Longacre

Llanfarach Farm

Brook Cottage

Tyla Morris Farm

Morganstown

Five Oaks

Reservoir House

St Julians

Pen-y-cae

Parc Cottages

Miskin Manor

Hollyoaks

Caergwanaf-Uchaf Farm

Maes-Y-Bryn Lodge

Lawrence Hill

Ballas Farm

Pant Ruthin Fch Farm

Tylamorris Lodge

Ty-Yn-Y Berllan

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Pantysgawen Farm
 Woodlands Cottage
 Mawdlam
 New Mill Farm
 Gwaun-Llyn
 Fron-Wen Farm
 Llanwensan-Fawr
 Maurice Cottage
 East Lodge
 Llan Farm
 Longhouse Farm
 Llangewydd Cottage
 Giblet
 Ty'n-Y-Cernydd
 Duffryn Tawel
 New Park Cottages
 St Julian's Manor
 Brynglas
 Pen-yr-heol
 Nythfa
 New House Farm
 Pantmawr
 Gwaunshonbrown Farm
 Cleppa Park
 Christchurch

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2. *Name the populated places in the district of CAERDYDD - CARDIFF that are within 100 metres of a motorway (within the region of the provided datasets).*

```

select distinct(p.distname)
from cardiffpopulatedplaces p, motorwayssouthwales m, districtssouthwales d
where (sdo_inside(p.geometry, d.geometry) = 'TRUE') and d.name = 'CAERDYDD - CARDIFF'
and
(sdo_geom.sdo_distance(p.geometry, m.geometry, 0.005) <= 100)
and p.classifica = 'Populated Place';
  
```

Ty-Yn-Y Berllan
 Tylamorris Lodge

- 3. Name the districts that share a boundary with CAERDYDD - CARDIFF and give their areas, in square kilometres, for each of them.**

```
Select d1.name, sum(sdo_geom.sdo_area(d1.geometry, 0.005, 'unit=SQ_KM'))
from districtssouthwales d1, districtssouthwales d2
where (sdo_touch(d1.geometry, d2.geometry) = 'TRUE') and (d2.name = 'CAERDYDD -
CARDIFF')
group by d1.name;
```

| | |
|---------------------------------------|------------------|
| BRO MORGANNWG - THE VALE OF GLAMORGAN | 331.688840552777 |
| RHONDDA CYNON TAF - RHONDDA CYNON TAF | 424.135125 |
| CASNEWYDD - NEWPORT | 90.7896964528866 |
| CAERFFILI - CAERPHILLY | 277.45317 |

- 4. What is the total area of the district CAERDYDD – CARDIFF? Note that there is more than one part.**

```
select sum(sdo_geom.sdo_area(d.geometry, 0.005))
from districtssouthwales d
where d.name = 'CAERDYDD - CARDIFF';
```

140324702.821054

- 5. What is the total length of the A48(M) motorway? Note that the Motorway is represented as multiple smaller line segments.**

```
select sum(sdo_geom.sdo_length(mot.geometry, 0.005, 'units=M'))
from motorwayssouthwales mot
where mot.number_mb='A48(M)';
```

3938.864703351939

- 6. What is the length of the part of the M4 motorway that passes through the district of CAERDYDD – CARDIFF?**

```
select sum(sdo_geom.sdo_length(sdo_geom.sdo_intersection(mot.geometry, d.geometry,
0.005), 0.005))
from motorwayssouthwales mot, cardiffdistricts d
where mot.number_mb='M4' and d.name = 'CAERDYDD - CARDIFF';
```

15475.7186655344571

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7. Which districts have a coastline?

```
Select distinct(d.name)
From cardiffdistricts d, coastlinesouthwales c
where sdo_touch(d.geometry, c.geometry) = 'TRUE';
```

```
BRO MORGANNWG - THE VALE OF GLAMORGAN
CASNEWYDD - NEWPORT
PEN-Y-BONT AR OGWR - BRIDGEND
CAERDYDD - CARDIFF
```

8. Name the districts that include a coastal boundary (as above) and contain at least 5 railway stations, giving the numbers of railway stations for each of the districts.

```
select d1.name, count(distinct(s1.name))
from stationsSouthWales s1, districtssouthwales d1, coastlinesouthwales c1
where (sdo_inside(s1.geometry, d1.geometry) = 'TRUE')
and
(sdo_touch(d1.geometry, c1.geometry) = 'TRUE')
group by d1.name
having count(distinct(s1.name)) >=5;
```

```
BRO MORGANNWG - THE VALE OF GLAMORGAN 11
PEN-Y-BONT AR OGWR - BRIDGEND 9
CAERDYDD - CARDIFF 20
```

9. Count the number of segments of railway line that cross the M4 motorway within the region of the provided dataset. Note that each segment of railway has a unique identifier.

```
select count(distinct(r.identifier))
from railwaysouthwales r, motorwaysouthwales m
where sdo_overlapbdydisjoint(r.geometry, m.geometry) = 'TRUE'
and m.number_mb='M4';
>>13
```

10. What is the total area of land, in square kilometres, that is within 5 metres of the M4 Motorway and is inside the district of CAERDYDD – CARDIFF?

```
select sum(sdo_geom.sdo_area(sdo_geom.sdo_intersection(theBuffer, d.geometry, 0.005),
0.005))
from
( select SDO_GEOM.SDO_BUFFER(SDO_AGGR_CONCAT_LINES(mot.geometry), 5, 0.005) as
theBuffer
from motorwaysouthwales mot where mot.number_mb='M4'),
cardiffdistricts d
where (d.name = 'CAERDYDD - CARDIFF');
>>154756.326783055
```

NOTE: the SDO_AGGR_CONCAT_LINES function is required to join together all the individual line segments of the motorway. NOTE also : the following SQL works to provide an answer but it is wrong because it is computing buffers around every motorway segment and those buffers overlap with each

```
select sum(sdo_geom.sdo_area(sdo_geom.sdo_intersection(  
SDO_GEOM.SDO_BUFFER(mot.geometry, 5, 0.005), d.geometry, 0.005), 0.005))  
from motorwayssouthwales mot, cardiffdistricts d  
where mot.number_mb='M4' and (d.name = 'CAERDYDD - CARDIFF');  
>> 156249.13846321742
```

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