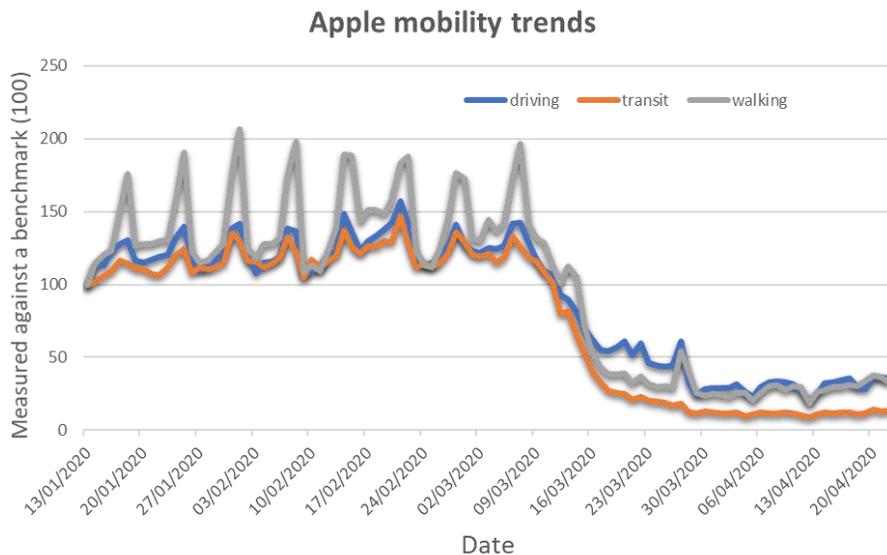


COVID-19 Mobility

The movement of population in Ireland has been limited during the COVID pandemic. The change began before St. Patrick's day when businesses and schools shut. Movement fell further after a 'stay-at-home' order was issued on March 28th restricting most to movement within 2km of their residence. The use of the Garda to ensure that this restriction was enforceable on April 17th confirmed the trend. The purpose of the restriction is to limit the spread of COVID19 through contact with affected individuals. Put simply, by ensuring the population is nearly immobile the hope is to prevent the widespread transmission of COVID19 through contact.



Mobility of the Irish population based on mobile phone tracking.

Source: <https://www.apple.com/covid19/mobility/>

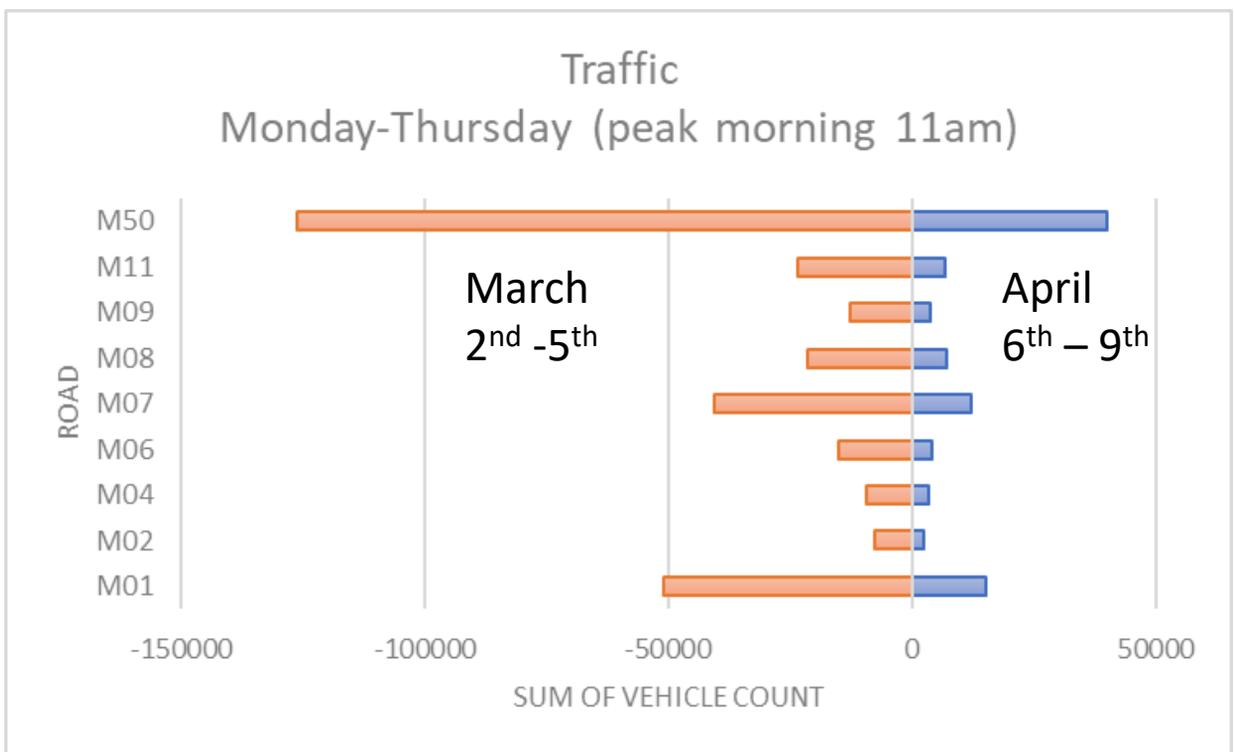
Evidence from mobile phone GPS systems (which shows the location of the phone) shows the impact on the pandemic on mobility. This graph shows relative movement against a baseline (100).

There are other sources of information that can demonstrate the effect of the 'stay-at-home' restrictions. The National Roads Authority (NRA) use cameras located at 350 locations around the country to track the movements of vehicles on roads. The patterns of movement will show distinct morning and evening rush hours during the working week and clear difference between workday and weekend traffic.

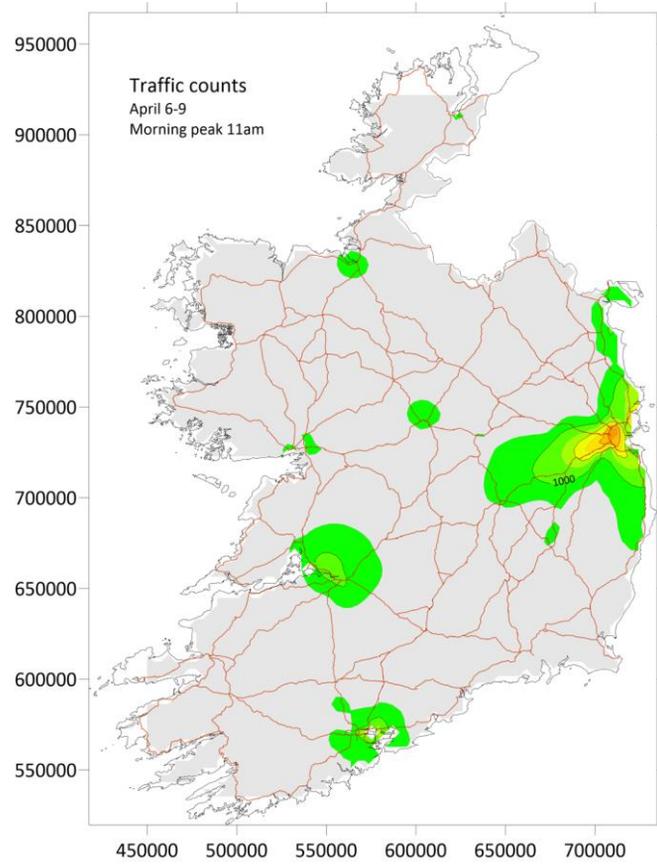
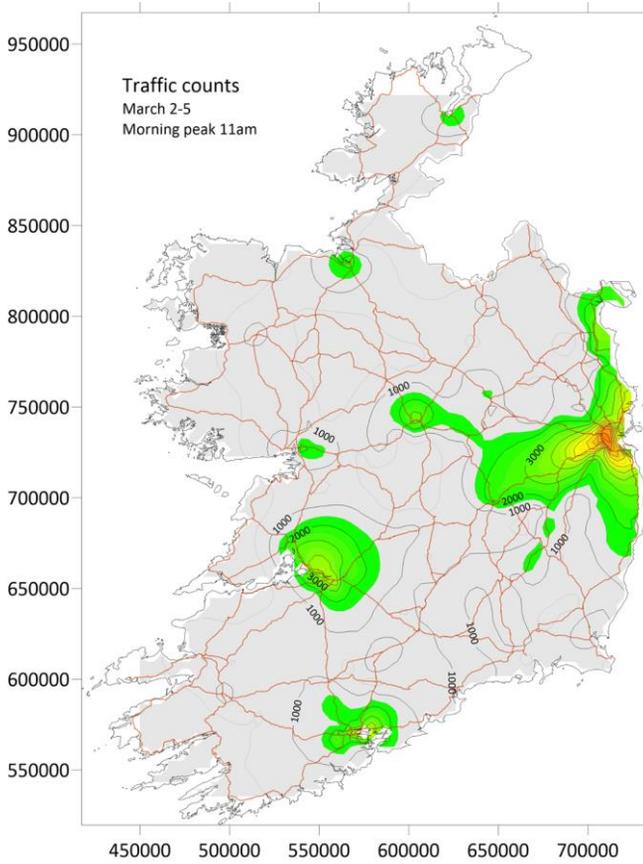
Road transport

Here I map the peak traffic in the morning at the 350 NRA count locations. To compare equivalent periods, I chose to look at the counts for Monday to Thursday and examine the traffic before and during the restrictions. The traffic in the morning hours is usually matched by an equivalent flow in the evening with a small drop during the middle of the day and a large drop at night. So, these data capture the daytime circulation of traffic taking people to work and home and the distribution of goods and services.

To illustrate, these are the total counts of average morning traffic on the motorways of Ireland for the period March 2-5 and April 6-9. The busiest road is the M50 C-ring road around Dublin; here the numbers on the road have fallen by about two-thirds.

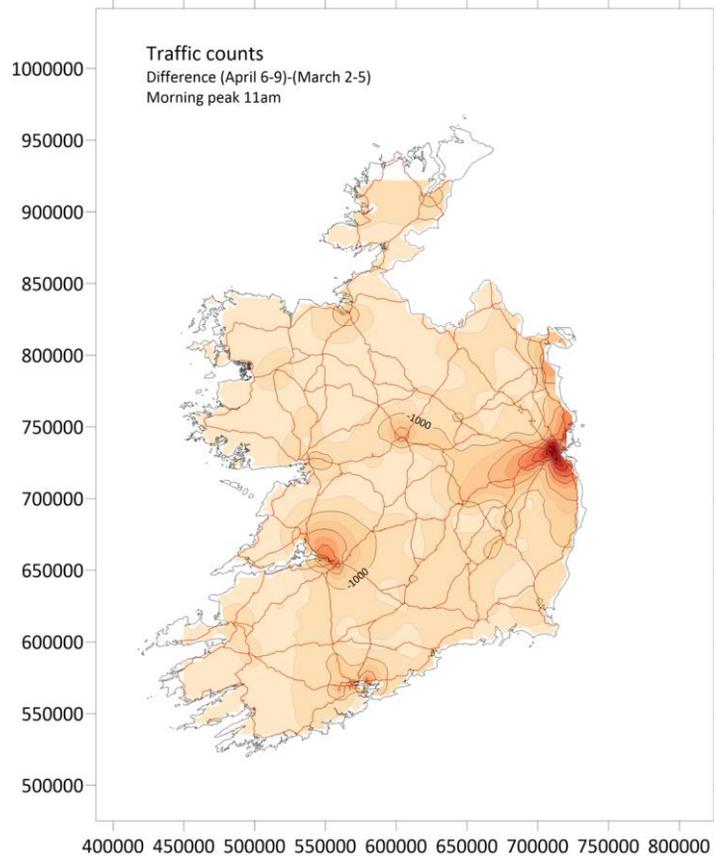


The total count of traffic at the peak morning rush hour on motorways in Ireland.
<https://www.nratrafficdata.ie/>

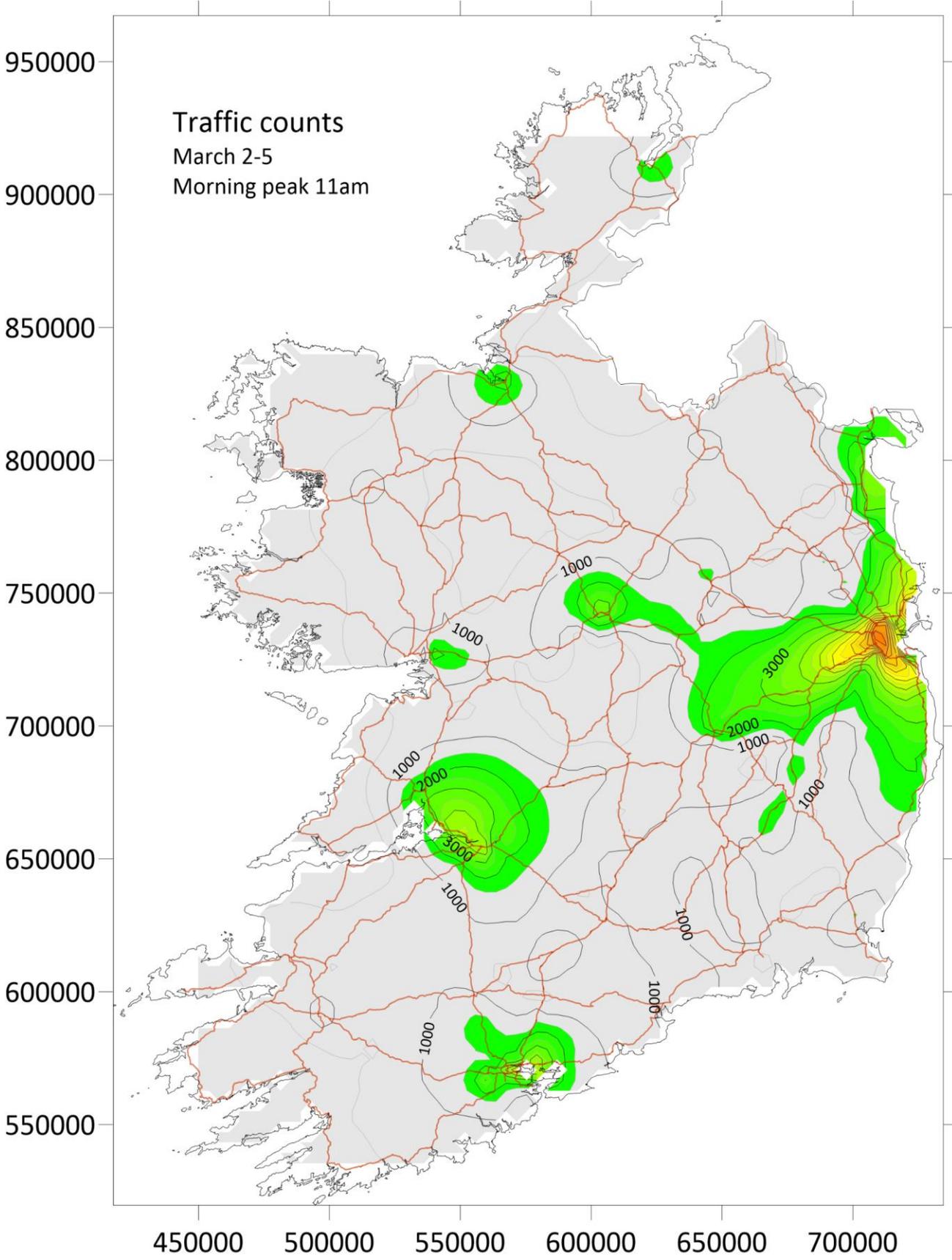


These data can be mapped using the information gathered at points (the camera locations) to create a traffic surface. In the following, the average daily traffic across the country at the morning rush hour is presented. The location of the major urban settlements and their 'catchment' areas is clear. The patterns on each of these maps are the same but the numbers differ substantially. Each map uses 500 unit intervals and the area within 1000 units is in green.

The final map shows the difference between the traffic for these two periods. The largest negative values are found around the cities in red.



400000 450000 500000 550000 600000 650000 700000 750000 800000



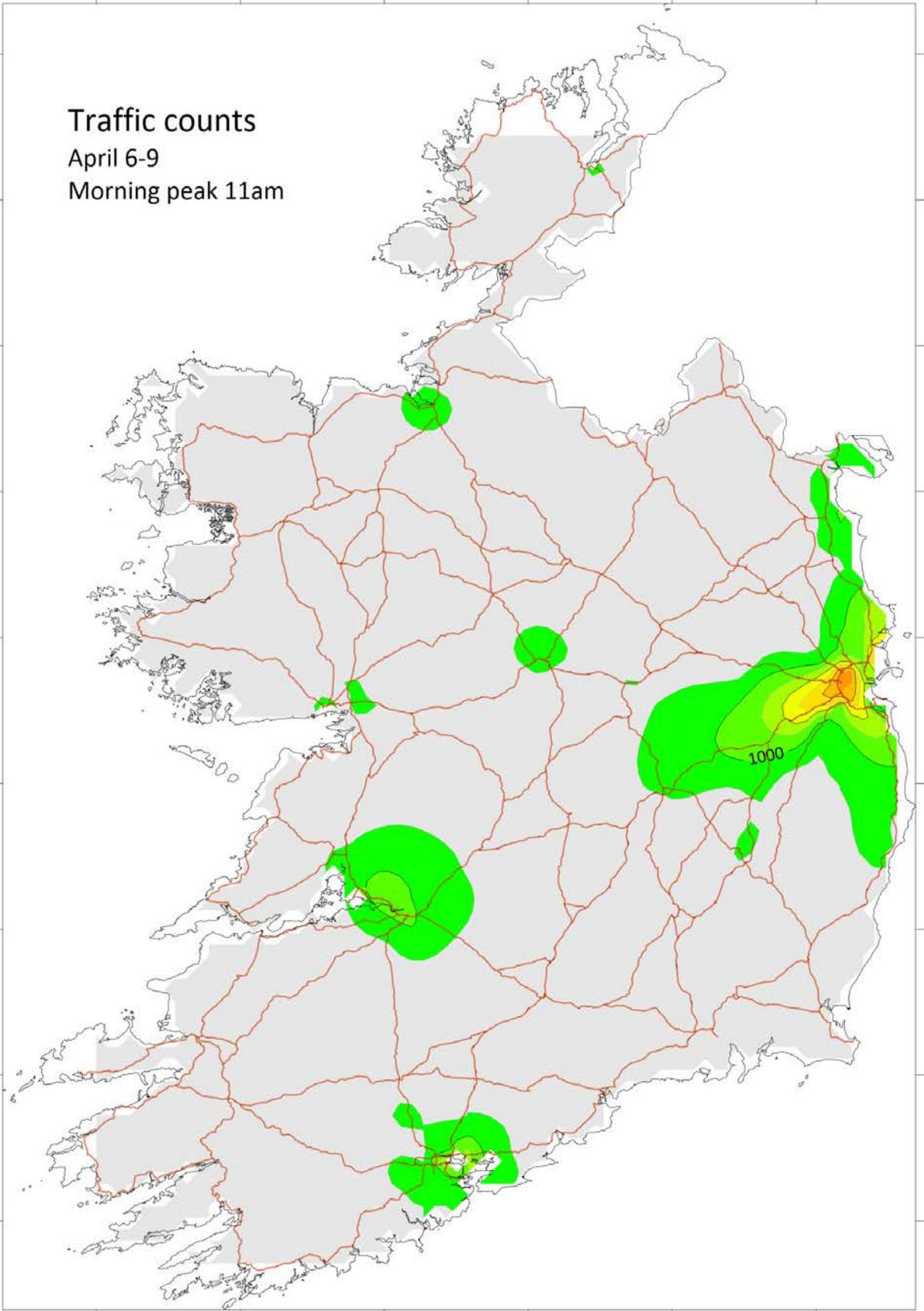
Traffic counts

April 6-9

Morning peak 11am

950000
900000
850000
800000
750000
700000
650000
600000
550000

450000 500000 550000 600000 650000 700000

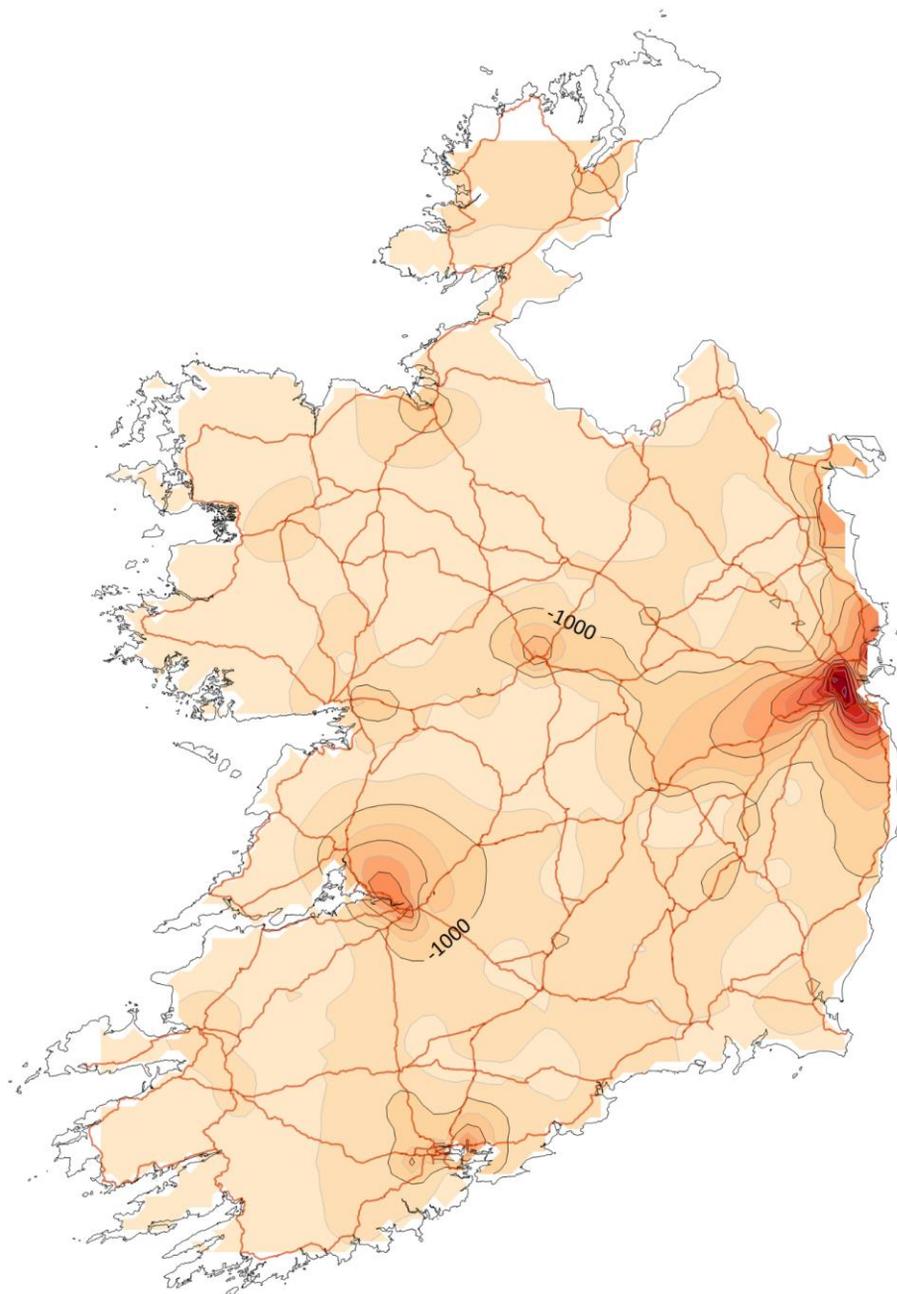


Traffic counts

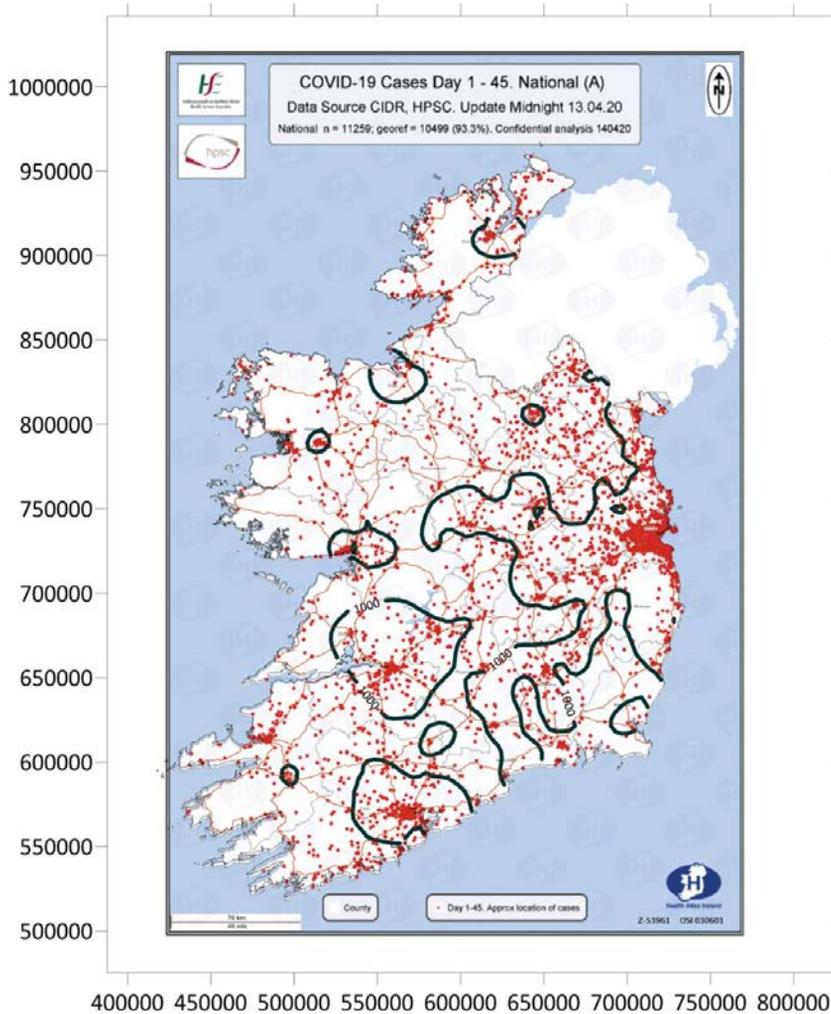
Difference (April 6-9)-(March 2-5)

Morning peak 11am

1000000
950000
900000
850000
800000
750000
700000
650000
600000
550000
500000



400000 450000 500000 550000 600000 650000 700000 750000 800000



Finally, I have placed the line representing ≥ 1000 vehicles over a map of individual COVID-19 test cases as of 13th April. These data are not available publicly, but the map was included as part of a report generated by the HSE (COVID-19 Daily Operations Update, Acute Hospitals Performance Management and Improvement Unit) on 15th April. It included a map.

The map shows the concentration of positive cases in the urban centres, especially Dublin and its commuter belt; note the concentration of cases along the east coast as far south as Gorey. The traffic maps can be taken as a measure of the circulation of population and the potential for spreading COVID-19. Note however, that there are spatial clusters evident outside of these urban catchments.

1000000

950000

900000

850000

800000

750000

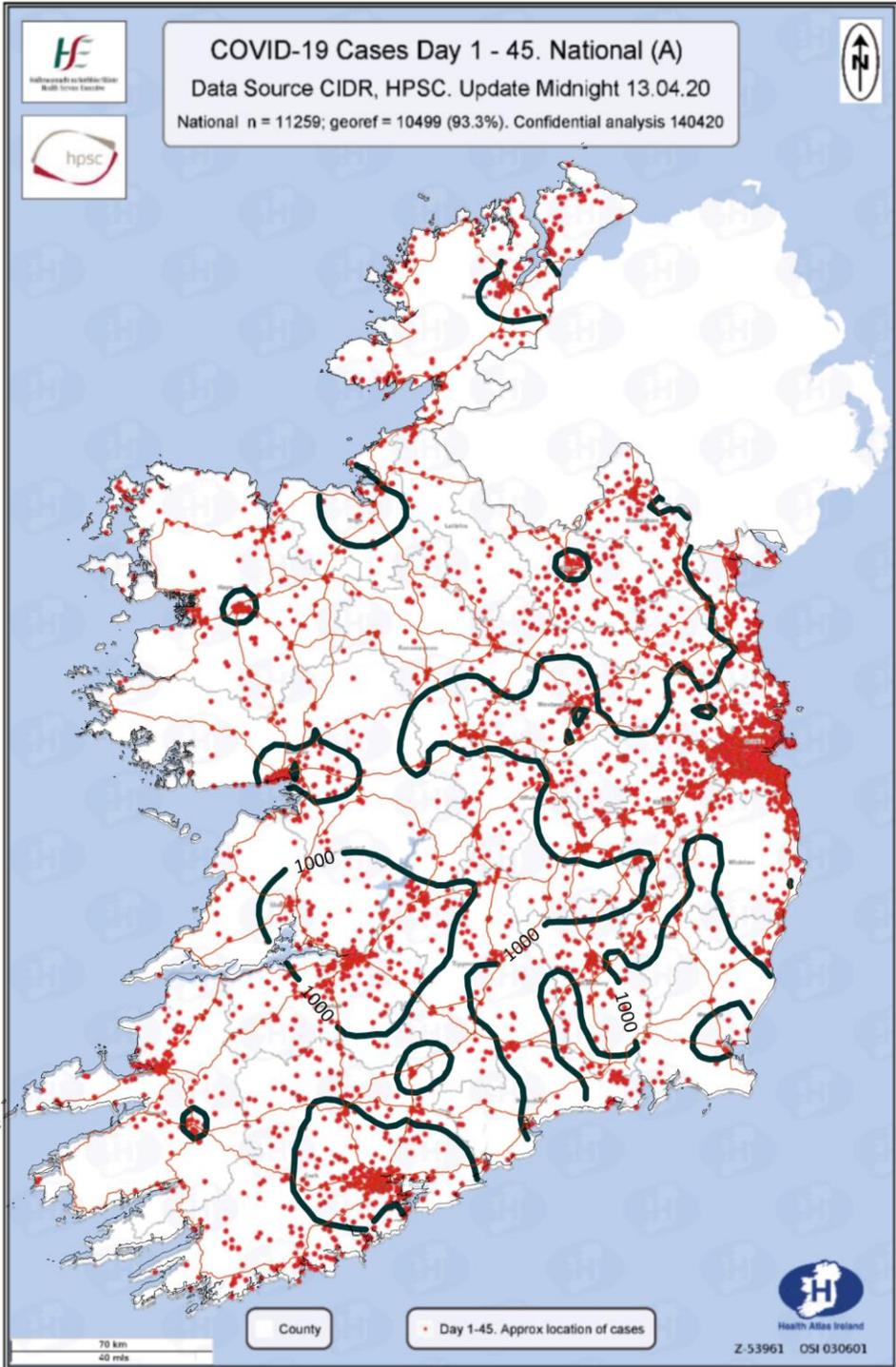
700000

650000

600000

550000

500000



400000 450000 500000 550000 600000 650000 700000 750000 800000