

Transport Poverty in Scotland

August 2016

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Executive Summary

- This report presents the findings of new research undertaken to examine the concept of transport poverty in Scotland. Building on previous research published by Sustrans in 2012, we use data on household income, car availability and access to the public transport network to allocate risk ratings to each Scottish data zone. This highlights areas where motoring costs may place pressures on income, and where there may be risk to communities from exclusion when alternatives to accessing key services are not available.
- Data concerning household income and public transport travel time from the Scottish Index of Multiple Deprivation were used together with car availability data from Scotland's census and public transport service frequency statistics to allocate a risk score to each data zone area. Risk of transport poverty was considered to be greatest in areas with (relatively) low income, high car availability and low access to essential services by public transport.
- Of the 6,505 data zones 20% (1,321) were placed in the 'high' risk category – encompassing 466,000 households and a population of 1 million. Most high risk data zones were located in accessible rural areas (30% of all high risk data zones) and accessible small towns (28%). Twenty per cent were located in remote rural/very remote rural areas, 13% in remote small towns/very remote small towns, and 9% in large/other urban areas.
- Nine per cent (120) of high risk data zones are in areas where public transport access to essential services is (by our definition) good. These data zones are areas with relatively low income and high car availability, situated in urban areas. Five per cent (61) of high risk data zones are in areas with poor links to the public transport network – typically in the most remote and rural areas.
- Based on estimated average cycling time to reach essential services, 61% (810) of the data zones with potentially high risk of transport poverty are areas where services can be accessed by cycle within 10 minutes. For 501 high risk areas (38%), commuting by cycle exceeds the national median of 1%. For around a quarter of high risk areas (337), potential access to services by cycle and current cycling levels are, relatively speaking, high.

1 Introduction

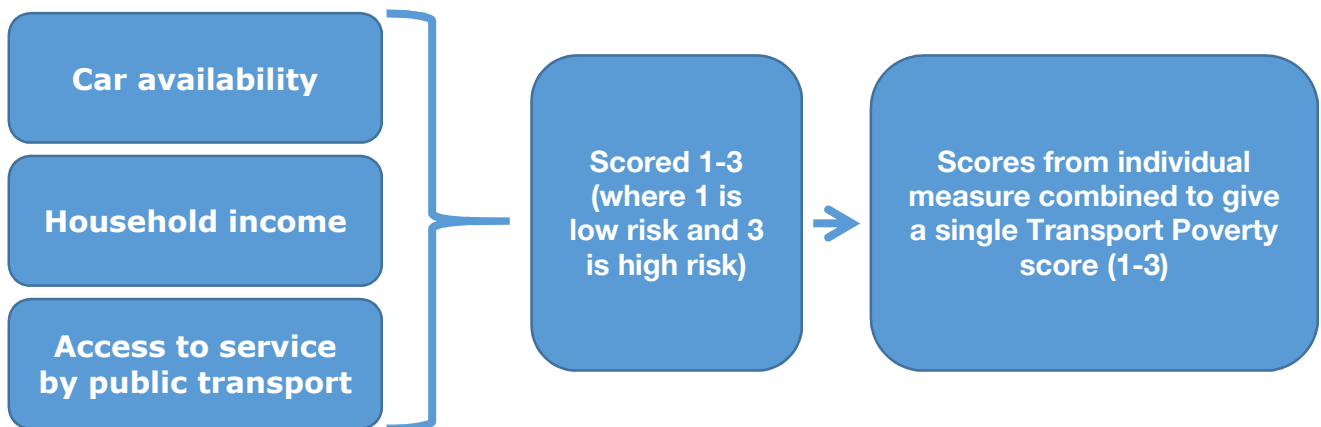
In 2012 Sustrans published *Locked Out*¹, a report examining transport poverty across England and Wales. Using data around household income, accessibility to the public transport network and journey time to reach essential services by modes other than car, the research produced a risk rating for each Lower Super Output Area in England and Wales. This highlighted areas where car ownership places pressures on income, potentially putting communities at risk from exclusion where alternatives to accessing key services are not convenient or attractive. This report presents the findings of research considering Scotland-specific data sets and their use to generate for the first time an indicator of potential for transport poverty in Scotland.

¹ <http://www.sustrans.org.uk/lockedout>

2 Methodology

2.1 Overview of approach

Building upon the approach applied in the Locked Out research, the methodology uses existing data to explore the concept of transport poverty. Bringing together data on income, car availability² and access to key services using public transport, an approximation can be made of the potential for pressure on household finances as a result of reliance on private transport and the most susceptible geographic areas, identified. The model works around the assumption that areas most at risk are those with low income, high car availability and low access to essential services by public transport.



² We assume that the number of cars available in a household equates to the number of cars in use – therefore the greater the number of vehicles, the greater the expenditure on motoring

2.2 Data review

A review was undertaken to identify data sets suitable for use in calculating a measure of transport poverty for Scotland. Measures of active travel were also identified to allow expression of the potential for such modes to replace car journeys. Table 1 below summarises the data sources used.

Table 1: Transport poverty measure and data set selected

Measure	Data source
Income	Income domain of the Scottish Index of Multiple Deprivation (SIMD), number of people per data zone who are income deprived (number of people in receipt of Income Support, Employment and Support Allowance, Job Seekers Allowance, Guaranteed Pension Credits and Child and Working Tax Credits) ³
Car availability	Number of cars or vans available. Scotland's Census 2011 Table CC04_a ⁴
Accessibility to services by public transport	Access domain of the SIMD, average time to access GP, Post Office and retail by public transport in each data zone ⁵
	Frequency of bus services. Transport Scotland bus and coach statistics Table 17 ⁶
Levels of cycling	Percentage commuting to work by cycle. Scotland's Census 2011 Table QS701SC Method of Travel to Work ⁴

2.3 Geographic outputs

The geographic unit used in this analysis is the 2001 Scottish data zone. Each of the 6,505 data zones⁷ has a population of between 500 and 1,000 residents. As data zones are defined by population size, geographic area varies substantially depending upon the type of area in which the data zone is located. The smallest data zone area is 12,367 m² and the largest, 1,159 km².⁸ Data zones are nested within council area boundaries.

³ <http://www.gov.scot/Topics/Statistics/SIMD/DataAnalysis/Background-Data-2012/Background3Income2012>

⁴ <http://www.scotlandscensus.gov.uk/ods-web/data-warehouse.html#standarddatatab>

⁵ <http://www.gov.scot/Topics/Statistics/SIMD/DataAnalysis/Background-Data-2012/Background8Access2012>

⁶ www.transport.gov.scot/system/files/documents/tsc-basic-pages/B_C2011_12.xls

⁷ This research relies on the 2001 data zone boundaries to maximise use of available data. Data zone boundaries were revised in 2011 to give 6,976 units

⁸ <http://www.nrscotland.gov.uk/files//geography/2011-census/geog-2011census-higher-geography-classifications.pdf>

2.4 Analysis and scoring of transport poverty metrics

In order to place each data zone into a category of risk (for each measure individually and the measures combined) it is first necessary to define thresholds for each component. The following sections describe for each measure in turn any manipulation of data prior to analysis, and the threshold applied. For most measures, threshold definition is based around 60% of the median value. This is the threshold for income poverty adopted by the European Union Social Protection Committee - that is, households with an income that is less than 60% of the median are considered low income.

Income

Income data are taken directly from the SIMD Income Domain and expressed as the percentage of people living in each data zone who are income deprived. The SIMD defines income poverty based on the number of people in receipt of Income Support, Employment and Support Allowance, Job Seekers Allowance, Guaranteed Pension Credits and Child and Working Tax Credits. For three data zones, an income poverty rate is not provided in the SIMD data set. The median across data zones in the same council area are used as a proxy for income poverty in these data zones.

The following thresholds are applied:

- High (scores 3): Data zones where >11.4% of the population are income deprived (50%, n = 3,242)
- Medium (scores 2): Data zones where 6.8-11.4% of the population are income deprived (20%, n = 1,326)
- Low (scores 1): Data zones where <6.8% of the population are income deprived (30%, n = 1,937)

Car availability

Car availability is used here as a broad measure of the potential pressures placed on household income from running a vehicle. Based on the assumption that if car(s) are available in a household they are being used, then running costs will contribute to household expenditure. Considering income and car availability together indicates areas where already (relatively) low household incomes are under added pressure from motoring costs.

For each data zone, the total number of cars/vans available (recorded in the 2011 Census) was divided by the population in that data zone to give vehicles available per head. For five data zones, car ownership data are not included in the published census data set. The median across data zones in the same council area are used as a proxy for car availability in these data zones.

The following thresholds are applied:

- High (scores 3): Data zones where car availability is >1.3 vehicles per head (44%, n = 2,835)
- Medium (scores 2): Data zones where car availability is 0.8-1.3 vehicles per head (43%, n = 2,802)
- Low (scores 1): Data zones where car availability is <0.8 vehicles per head (13%, n = 868)

Access to services by public transport

The SIMD data set includes average time to reach key services by driving and by public transport. For public transport access, the services included are: GP surgeries, Post Offices and Retail Centres.⁹ The journey time to essential services used within the access domain of the SIMD includes the time taken to reach the public transport network as well as journey time by as many modes as necessary. The following thresholds are applied to public transport journey time:

- High (scores 3): Data zones where PT travel time to more than one of the three services is >1 hour 0.8%, n = 52)
- Medium (scores 2): Data zones where PT travel time to one of the three services is >1 hour (0.9%, n = 58)
- Low (scores 1): Data zones where all three services can be accessed by PT within an hour (98%, n = 6,395)

In addition to public transport travel time, the frequency of public transport services (using bus service frequency as a proxy) was also scored. Even if journey time by public transport to reach an essential service is relatively short, if services are infrequent the appeal of public transport as an alternative to car travel may be reduced. A score was attributed to each data zone depending on area type.¹⁰ The following thresholds were applied:

- High (scores 3): Data zones in remote rural areas (29% of households have access to 1-2 services per hour, 29% have access to less than hourly service) and data zones in accessible rural areas (43% of households have access to 1-2 services per hour)
- Medium (scores 2): Data zones in small remote towns (55% of households have access to 1-2 services per hour) and data zones in small accessible towns (47% of households have access to 1-2 service per hour, 23% have access to 3-4 services per hour)
- Low (scores 1): Data zones in other urban areas (29% of households have access to 3-4 services per hour, 18% have access to 5+ services per hour) and data zones in large urban areas (43% of households have access to 5+ services per hour, 27% have access to 3-4 services per hour)

For each data zone the scores for public transport access time and frequency of bus services were summed. Combined scores ranged from 2 to 6. Areas with a combined score >4 were considered to high 'risk' – that is, areas where journey time and service frequency may make public transport a less acceptable alternative to driving.

Combined scores

A combined score to represent potential risk of transport poverty was arrived at by summing the scores awarded to each data zone for car availability, income and public transport access to essential services. The minimum possible score is 3 and the maximum, 9. Data zones scoring 3-5 are considered low risk and those scoring 7 or more, high risk.

⁹ For driving, average travel times are also included for access to primary schools, secondary schools and fuel stations

¹⁰ Transport Scotland publish statistics on the frequency of bus services in six area types: large urban, other urban, rural accessible towns, small remote towns, accessible rural and remote rural. Each of the 6,505 data zones is placed in one of these classifications

2.5 Access to essential services by cycle and current levels of cycling

Cycling time to essential services and current levels of cycling are not included in the overall transport poverty score. These measures have been calculated to enable exploration of the potential for cycling to replace car journeys, particularly in areas at high risk of transport poverty.

Cycling time to essential services

An approximate time taken reach essential services by cycle was derived from driving times to essential services from the SIMD access domain. A multiplication factor was calculated from Department for Transport accessibility statistics for England. DfT give average minimum travel times to essential services by area type and mode. By dividing cycle time by driving time, a factor was established for each area type. This factor was applied to the average driving time from the SIMD for GP, Post Offices and retail centres. Table 2 shows the English area types transferred to the Scottish data zones (urban and rural classifications are not consistent between England and Scotland), and the multiplication factor applied to arrive at an approximate cycle time.

Table 2: Multipliers applied to average drive times from SIMD to give approximate cycling time to essential services

Scottish area type	English area type applied	Average travel time to access essential services (England, minutes)		Factor applied to Scottish drive time to services
		Car	Cycle	
Large Urban Areas	Urban major conurbation	9.2	10.7	1.2
Other Urban Areas	Urban city and town	10.0	12.3	1.2
Accessible small Towns	Rural town and fringe	12.0	19.8	1.7
Remote Small Towns	Rural town and fringe in a sparse setting	12.6	22.5	1.8
Very Remote Small Towns	Rural village	13.9	26.0	1.9
Accessible Rural	Rural village in a sparse setting	17.6	36.9	2.1
Remote Rural	Rural hamlets and isolated dwellings	14.2	26.4	1.9

Following conversion of driving times to essential services from SIMD to give an approximate cycling time, the following thresholds were applied:

- High (scores 1): Data zones where cycle time to essential services is, on average, less than 10 minutes (85%, n = 5,537)
- Medium (scores 2): Data zones where cycle time to essential services is, on average, 10 - 20 minutes (10%, n = 679)
- Low (scores 3): Data zones where cycle time to essential services is, on average, more than 20 minutes (5%, n = 289)

Existing levels of cycling

Scores for current levels of cycling were derived from census commuting mode data. The percentage of the working age population who usually travel to work doing so by cycle is taken as a proxy for general levels of cycling in the data zone. The following thresholds were applied:

- High (scores 3): Data zones where more than 1% of the working age population commute by cycle¹¹ (50%, n = 3,234)
- Medium (scores 2): Data zones where 0.6-1% of the working age population commute by cycle (16%, n = 1,047)
- Low (scores 1): Data zones where <0.6% of the working age population commute by cycle (34%, n = 2,224)

¹¹ Excludes those who usually work from home

3 Results

3.1 Risk of transport poverty

Distribution of risk - individual measures

Just over a third (36%) of data zones where car availability is (by our definition) high are located in remote and rural areas.¹² Half are located in large or other urban areas. Low income tends also be to greatest in urban areas – 79% of data zones in the high risk category for income are in these area types. Considering car availability alongside income data, 303 data zones (almost 5% of all data zones) are in the 'high' risk category for both metrics. These are most concentrated in large/other urban areas (40%) and accessible rural areas (26%) and represent the areas where car use potentially places the greatest pressure on household income. The small proportion of data zones allocated to the highest risk category for public transport access are predominantly located in remote or very remote areas.

The percentages of data zones falling in each risk category for each measure separately, and measures combined are presented in Table 3.

Table 3: Distribution of data zones between risk categories

Measure	% data zones in each risk category		
	High	Medium	Low
Car availability	44%	43%	13%
Income	50%	20%	30%
Public transport access	2%	29%	69%
Combined	20%¹³	43%	37%

Distribution of risk - combined score

Of 1,370 high (overall) risk data zones, 49 are in the low risk category for income – in these cases, the combined score for car availability and public transport access has pushed the data zone into the high risk category overall, but in practical terms, the pressure on household income from running a car may not be problematic. All 49 are located in the most rural area types (accessible rural, remote rural and very remote rural areas). These 49 areas have been moved to the low risk category, leaving 1,321 high risk data zones.

The combined transport poverty score places 20% (1,321) data zones in the high risk category – encompassing 466,000 households and a population of 1 million. The distributions of all 1,321 high risk data zones between council areas and area types are shown in Figures 1-3, and mapped (with moderate and low risk areas) in Figure 4.

¹² Area type category remote small towns, very remote small towns, accessible rural areas, remote rural areas and very remote rural areas

¹³ Omits the 49 data zones that fall in the high risk category based on overall score but score as low risk for income

Figure 1: Percentage of high risk data zones located in each council area

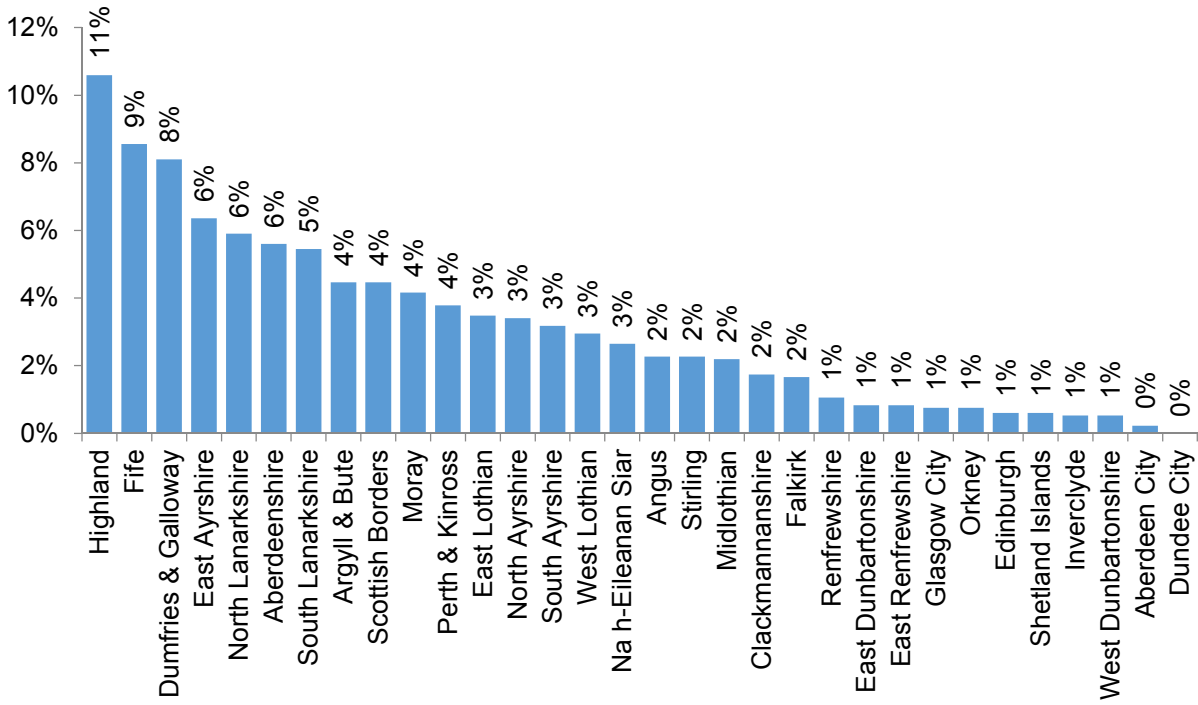


Figure 2: Percentage of all data zones in each council area in the high risk category

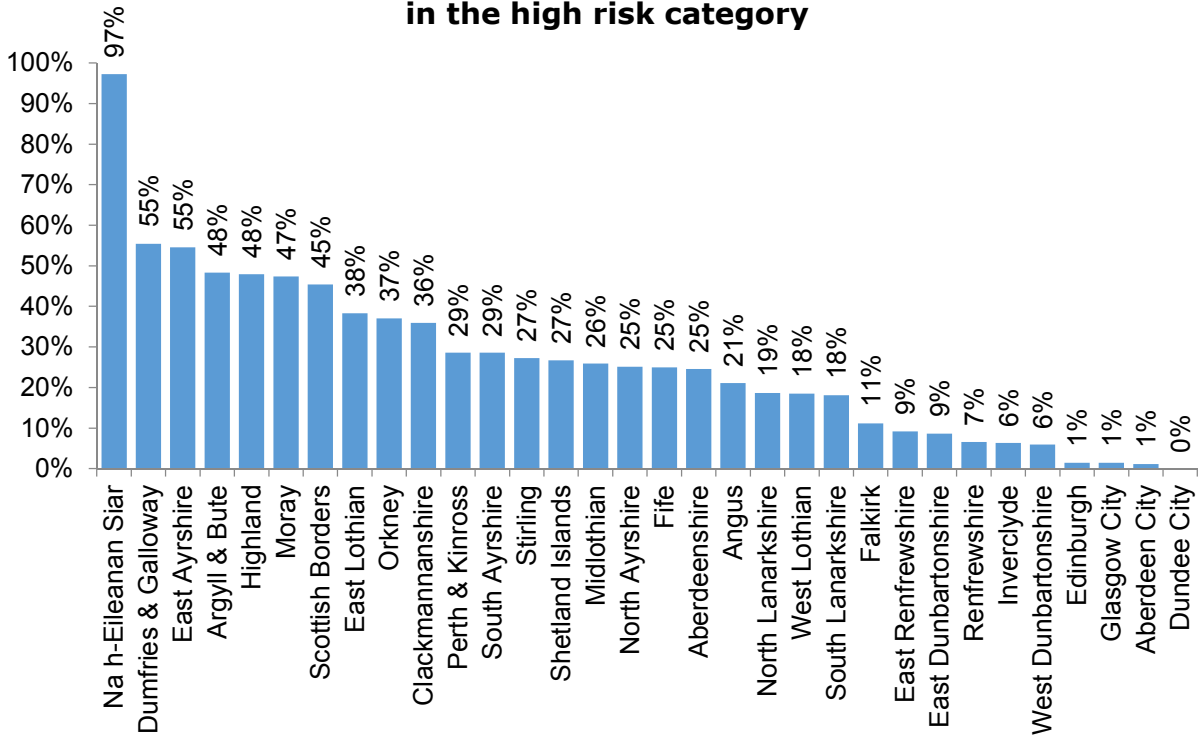
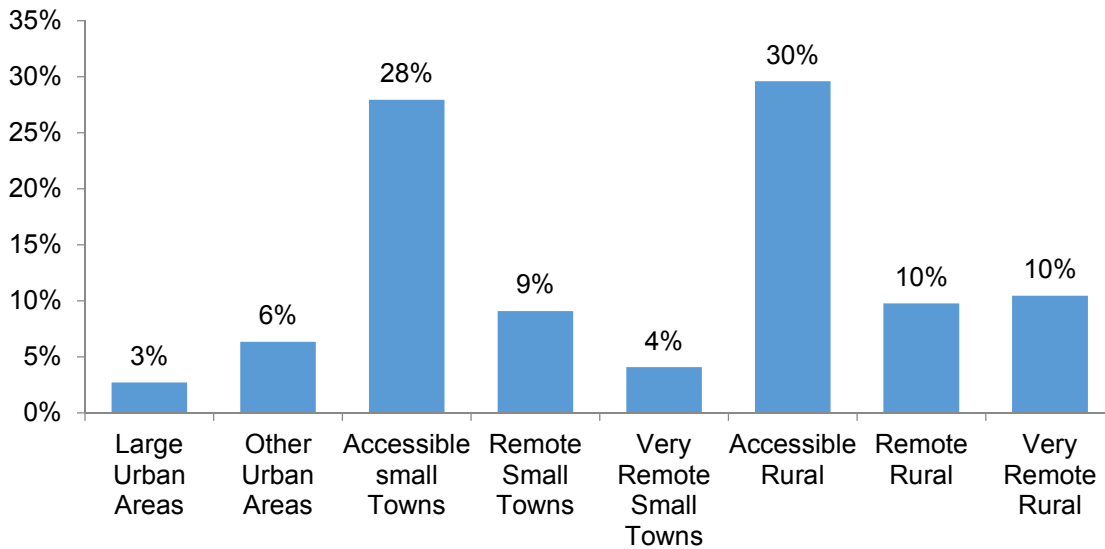


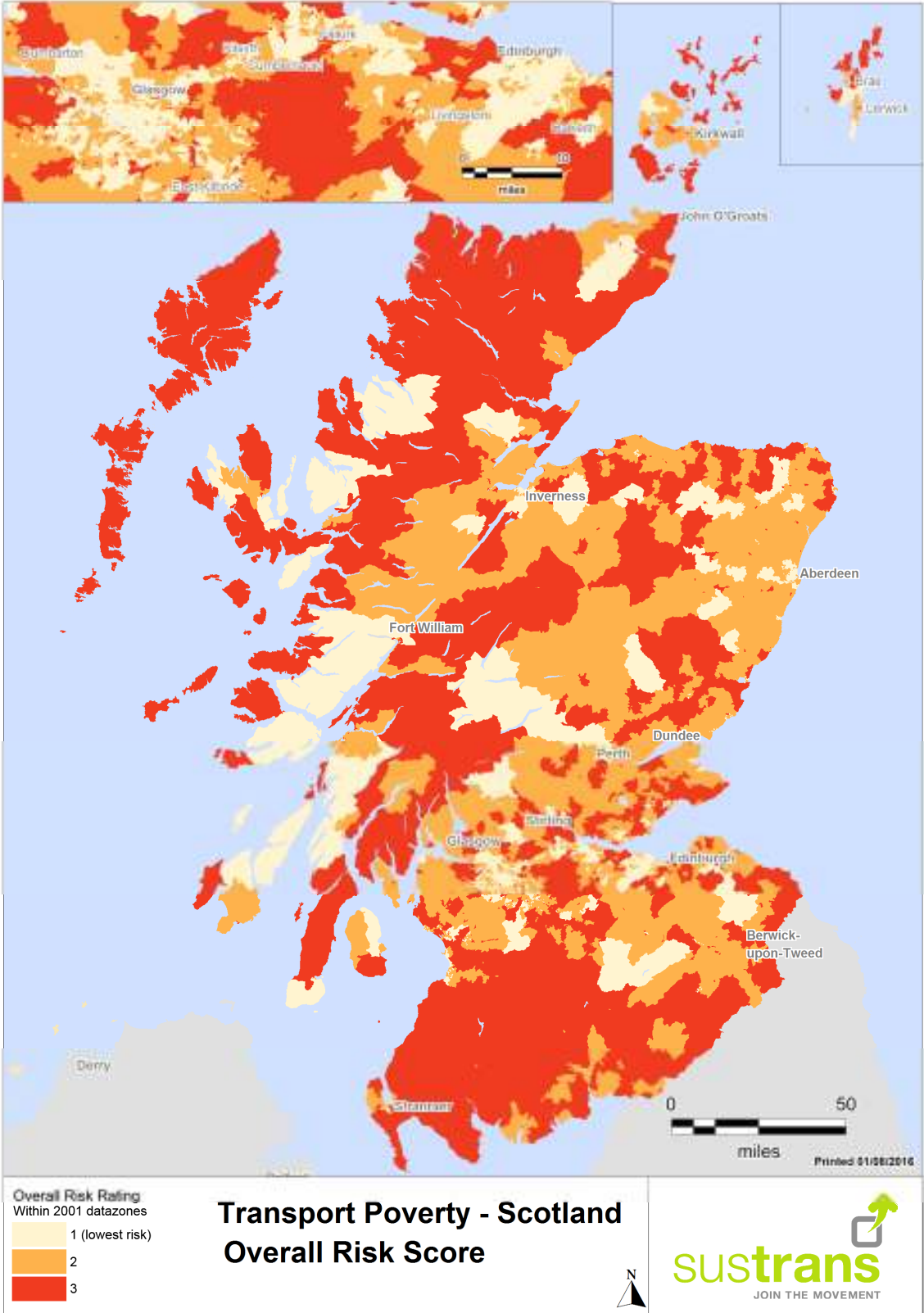
Figure 3: Percentage of high risk data zones located in each area type



Amongst the 1,321 high risk data zones, 9% (120 data zones) are in areas with good access to public transport. These are data zones with relatively low income and high car availability, in urban areas. Five per cent (61) high risk data zones are in areas with poor connectivity with the public transport network – predominantly in the most remote and rural areas.

Only 16 data zones are allocated the maximum risk score (9) – all are in rural areas, located predominantly in the Na h-Eileanan Siar and Highland council areas.

Figure 4: Distribution of transport poverty risk



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3.2 Potential for cycling to address transport poverty

Amongst the 1,321 high risk data zones, 810 (61%) are areas where essential services can be accessed by cycle within 10 minutes. Combining potential accessibility to services by cycle with existing levels of cycling, around 25% of all high risk areas (337 data zones) are areas where potential access to services by cycle and current cycling levels are, relatively speaking, high. A third (34%) of these areas are in the area classification type 'small, accessible towns' and 20% in 'remote small towns'. Cycling could present a viable alternative to driving to access services in these areas – travel times by cycling are reasonable, and some regular day to day journeys (namely commuting) are already being made by cycle.

3.3 Limitations

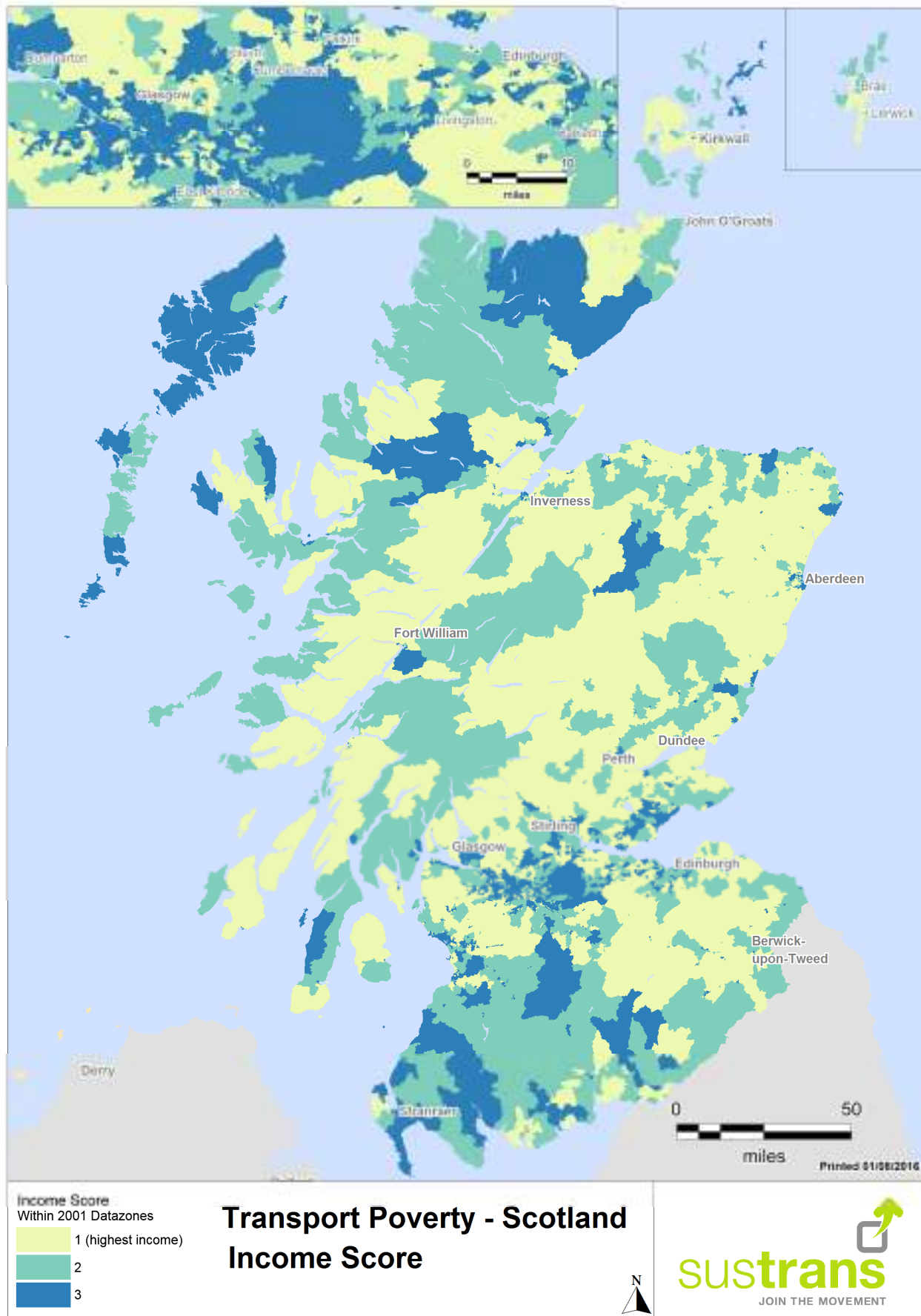
The following limitations apply to this analysis:

- The measures are area based, rather than population based. Whilst each data zone has been allocated a category of risk based on an average measure of income, car availability and public transport accessibility, this cannot be extended to individuals living within those areas.
- Similarly, when discussing estimated cycling times and existing levels of cycling these relate to the whole data zone area – cycling may be a more or less convenient transport option for sub-areas within a data zone.
- The measure of access to essential services by public transport includes a factor based on the frequency of bus services for different urban and rural areas. Access to essential services by rail is not considered. We assume that, geographically, coverage by bus services is more extensive than by rail. This approach may result in some areas being attributed a low public transport score when in fact households may have access to a frequent rail connection.
- The system of scoring allows relatively high income areas to be classified as at high risk of transport poverty where the overall area score is pulled up by low public transport accessibility and high car availability. As noted above, this applies to 49 areas which have been reassigned to the low risk category.
- The approach does not allow for other factors that may influence accessibility to public transport – for example, health issues or practical limitations.
- The data sets used in generating a measure of transport poverty are not directly comparable to those used in the measure for England and Wales. Comparison between nations is not advisable.
- Severance issues are not taken into account when estimating the cycle times. The calculated times (which are derived from driving times) assume that there is a safe and convenient cycling route available. This approach will underestimate cycling time in situations where the equivalent driving route is not appropriate for cycling (for example, using motorway or busy roads without cycling facilities).

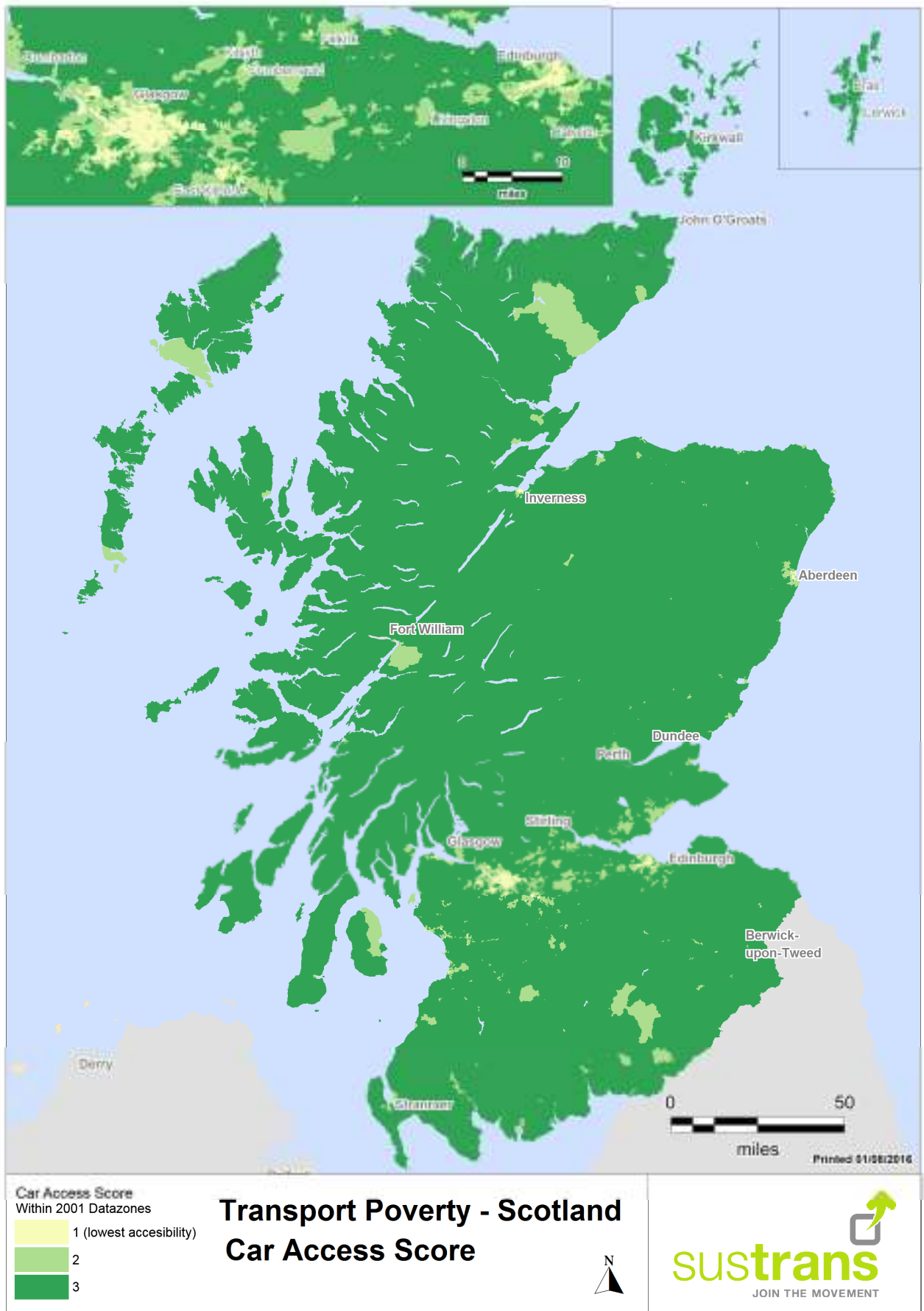
3.4 Recommendations

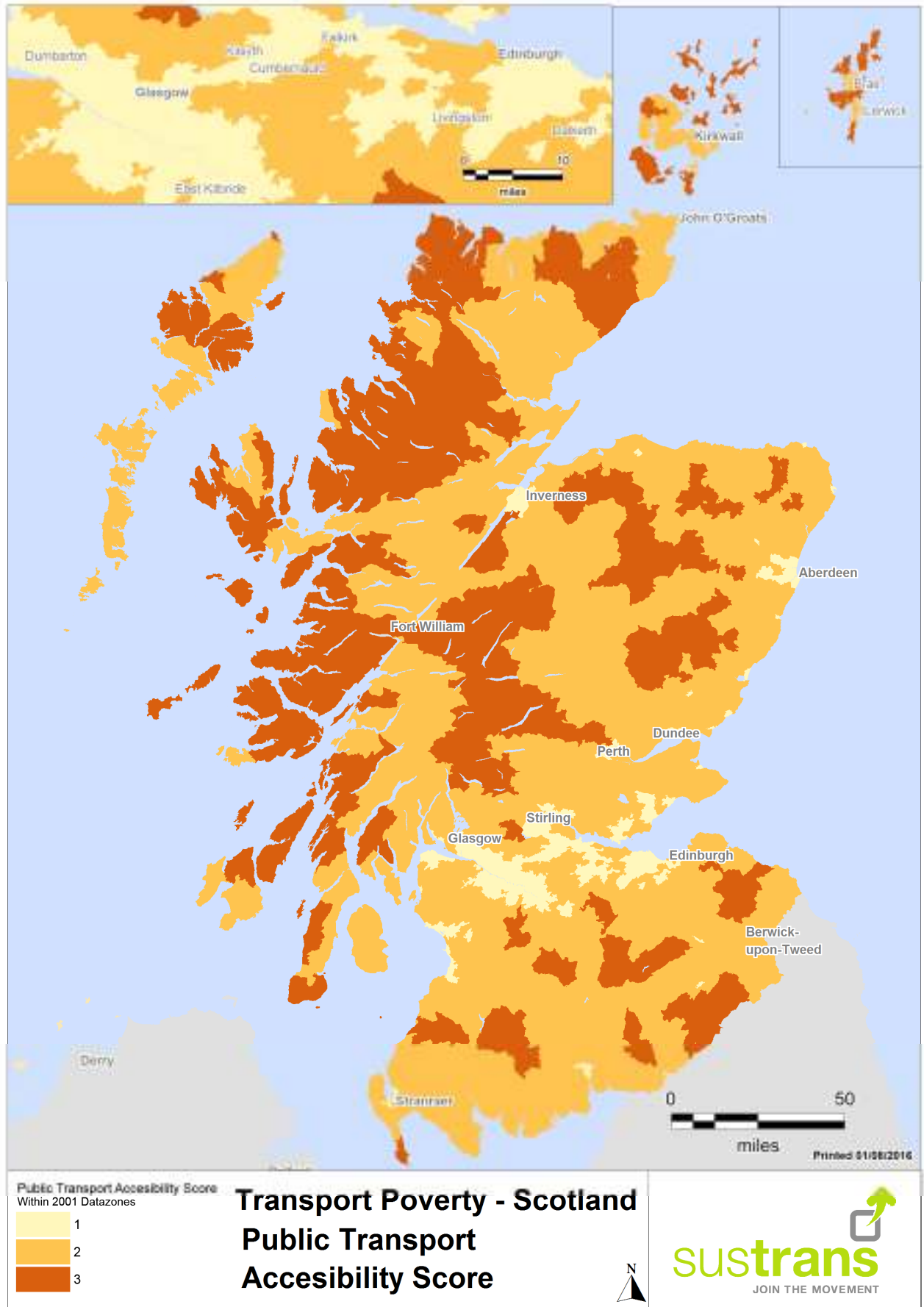
- This analysis relies on SIMD data published in 2012. A new release of data, superseding the 2012 iteration, is due to be released in late August 2016. The geographic unit for this release will be the 2011 data zone boundaries, of which there are 6,977 in total (compared to the 6,505 2001 data zones). An update to this analysis using the new data set is recommended once SIMD 2016 (and the associated background data sets) is released.

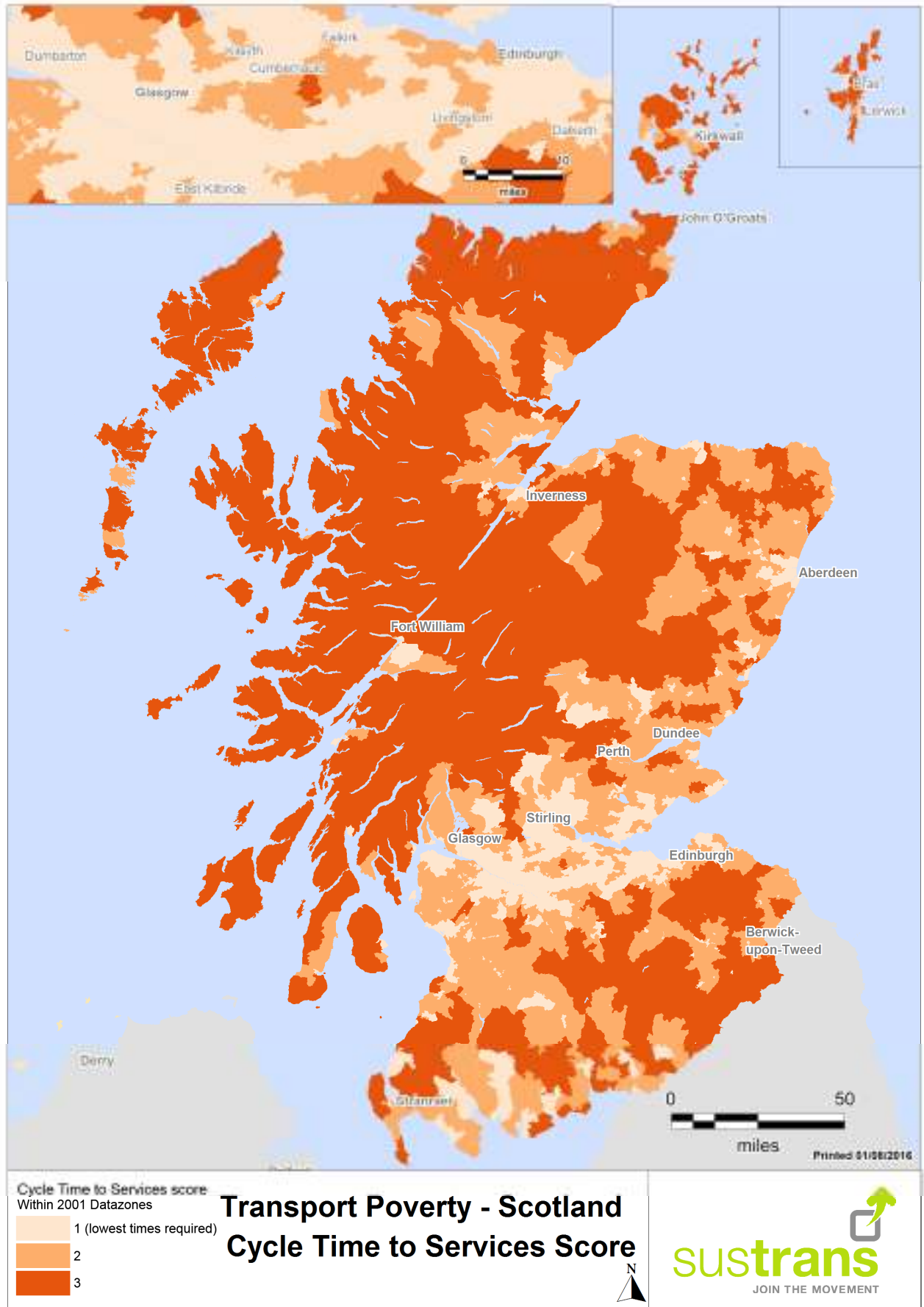
Appendix: maps



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