Technical Annex on the Highways Maintenance Relative Needs Formula (RNF)

Introduction

The following classes of local authorities have a statutory duty to maintain the roads in their area (London Boroughs, Metropolitan Districts, Shire Counties and Unitary Authorities). Services provided consider all parts of the highway network such as bridges, cycleways, footways, and lighting columns.

The government will assess the relative needs across local authorities for these service areas using a separate simple formula, informed by local authority-level data on the traffic flow, road length and an adjustment for input costs through the use of an area cost adjustment. The use of an expenditure-based regression (a statistical approach to determine the relationship between variables) will determine the formula shares. The Revenue Outturn spending categories this formula is concerned with include environmental, safety and routine road maintenance, structural maintenance, street lighting, and winter services.

Methodology

The following detailed steps would enable the reproduction of the formula shares. Note the terms in **bold** are explained in detail in the technical definitions part below.

1. For each relevant local authority (subsequently referenced as **relevant LAs**), using the Revenue outturn multi-year data set, obtain their total net current expenditure for the financial years 2021/22, 2022/23 and 2023/24, for the following spending lines[1]:
    a. 11 - Highways maintenance planning, policy and strategy
    b. 31 - Structural maintenance (principal roads)
    c. 32 - Structural maintenance (other LA roads)
    d. 33 - Structural maintenance (bridges)
    e. 41 - Environmental, safety and routine maintenance (principal roads)
    f. 44 - Environmental, safety and routine maintenance (other LA roads)
    g. 48 - Winter service
    h. 49 - Streetlighting inc. energy costs

[1] Note the spending line numbers relate to the row number in the RO2 form. The RO metadata shows how these relate to the relevant column titles in the multi-year dataset.

2. For most local authorities, they will have reported three years' spend data. For some local authorities, such as Birmingham and Westmorland and Furness, there will be missing data as returns were not submitted for the full three years.
3. For those local authority areas where reorganisation has taken place during the three year period, the following steps are taken:
    a. For Somerset and North Yorkshire assign the previous county council spend to the new Unitary authority for 2021/22 and 2022/23
    b. For Cumbria, use the share of total population[2] that the new unitary authorities of Cumberland and Westmorland and Furness have to split the spend of the previous county council for 2021/22 and 2022/23
4. The data is in £ thousands, transform the data into £ millions by dividing by 1000.
5. Using the **GDP deflator**, transform the obtained values so that they are in constant prices/real terms (using the financial year 2024/25)
6. Sum by year for each local authority the total of the spending lines (detailed in step 1a to 1h). Deriving the total real net expenditure on Highways Maintenance for each of the three years.
7. Calculate the average (mean) expenditure from the previous step i.e. sum the total real term net expenditure on Highways Maintenance (for the three years) and divide this by three (years). Note, for the authorities of Birmingham and Westmorland and Furness ignore this step given their missing expenditure data. At this point the average total real term net expenditure on Highways Maintenance (for the three years) has been derived.
8. Calculate the mean total real term net expenditure on Highways Maintenance adjusted for the **Area Cost Adjustment** by taking the values calculated for the relevant authorities in the previous step and dividing this by the area cost adjustment for highways maintenance.
9. Next road length data for all **relevant LAs** for the years 2022, 2023 and 2024 is collated. Using the dataset RDL0202 (detailed in the section below)[3], obtain the data columns for local authority managed roads i.e. major principle roads[4] and all minor roads.

[2] Using 2023 data from the latest (30 July 2025 release date) sub-national mid-year population estimates
[3] RDL02 Road length (kilometres) by road type and local authority in Great Britain (RDL02). Individual year files, use sheet: RDL0202a and columns for major principal/locally managed roads and all minor roads
[4] Referred to as locally managed in the official statistics since 2024.

10. For most local authorities, they will have three years of road length data. However, for those local authority areas where reorganisation has taken place during the three year period, the following steps are taken:

    a. For Somerset and North Yorkshire assign the previous county council data (for 2022) to the new respective Unitary authority

    b. For Cumbria, use the proportional split of data (for 2023 and 2024 combined) that the new unitary authorities of Cumberland and Westmorland and Furness have, to split the data of the previous county council for 2022 only

11. Calculate the total road length for each authority for each year through finding the total of local authority managed roads i.e the sum of major principle/locally managed roads and all minor roads.

12. Calculate the average (mean) total road length for every local authority i.e. sum the total road length (for the three years) and divide this by three (years).

13. To derive the **dependent variable**, first divide the mean total real term net expenditure on Highways Maintenance for the three years adjusted for the area cost adjustment (obtained in step 8) by the average (mean) total road length (calculated in step 12). Finally, take the natural logarithm of this newly created variable which is then the dependent variable.

14. Next traffic volume data for all **relevant LAs** for the years 2022, 2023 and 2024 is collated. Using the dataset TRA8906 (detailed in the section below)[5], obtain the relevant years' columns of data.

15. For most local authorities, they will have three years of traffic volume data. However, for those local authority areas where reorganisation has taken place during the three year period, the following step is taken:

    a. For Cumbria, use the proportional split of data (for 2023 and 2024 combined) that the new unitary authorities of Cumberland and Westmorland and Furness have, to split the data of the previous county council for 2022 only

16. Calculate the average (mean) total traffic volume for every local authority i.e. sum the total traffic volume (for the three years) and divide this by three (years).

17. Calculate the **independent variable** in our regression by taking the variable average total traffic volume (obtained in the previous step) and dividing this by

[5] TRA8906 Motor Vehicle traffic (vehicle kilometres) excluding trunk roads by local authority in England
Use sheet: TRA8906 and select columns for 2022 to 2024

the average total road length (obtained in step 12). Finally, take the natural logarithm of this newly created variable which is then the independent variable.

18. Next run an **ordinary-least squares (OLS) regression** with the dependent variable (created in step 13) and the independent variable (created in the previous step) using all observations for **relevant LAs** but excluding City of London, Birmingham and Westmorland and Furness[6].
19. Obtain the values of the intercept (-5.02850) and coefficient (1.21704) from the OLS regression.
20. Calculate the fitted values from the regression for all **relevant LAs**. Note this includes the aforementioned City of London, Birmingham and Westmorland and Furness in this step. This is done through summing the intercept with the outcome of the coefficient multiplied by the value for the independent variable (obtained in step 17) for each local authority.
21. Exponentiate the values obtained in the previous step to in effect return these fitted values to their original levels i.e. modelled estimates of average total real term expenditure on Highways Maintenance per unit of average total road length.
22. Multiply the result in the previous step by:
    a. The Area Cost Adjustment for Highways Maintenance, multiplied by
    b. Average total road length (obtained in step 12)
23. The results of the previous step for all **relevant LAs** are added together.
24. The final formula shares of each authority are the share of each authority's contribution to that sum.

Changes from the Fair Funding Review 2.0 consultation

There has been a data update. The government proposes updating the years of traffic flow from an average of using years: 2021, 2022 and 2023 to now using: 2022, 2023 and 2024, with the availability of the most recent years' data. This also aligns this with the years used for road length data.

Based on a recommendation in the Institute for Fiscal Studies (IFS) peer review[7], a GDP deflator is now applied to annual formula expenditure when estimating the dependent variable. This was to avoid biasing the value of the dependent variable towards those years where councils experienced higher nominal prices due to inflationary factors.

[6] Due to missing expenditure data and outlier nature of the City of London's data values
[7] A technical peer review of MHCLG's suggested approach to allocating funding between English local authorities

Data and technical definitions

Data:

- Local authority revenue expenditure and financing England: Revenue outturn multi-year data set[8] (years 2021/22, 2022/23 and 2023/24, see methodology for specific detail within these years) and metadata guidance[9]
- GDP deflator from the OBR's November 2025 Economic and fiscal outlook – detailed forecast tables: economy (tab 1.7, column V - headed 'GDP deflator')[10]
- TRA8906[11]: Motor Vehicle traffic (vehicle kilometres) excluding trunk roads by local authority in England (years 2022, 2023 and 2024). Found here: https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra#traffic-volume-in-kilometres-tra02
- RDL0202[12]: Road length (kilometres) by road type and local authority in Great Britain. Total of Major Principal Roads and All Minor Roads (years 2022, 2023 and 2024). Found here: https://www.gov.uk/government/statistical-data-sets/road-length-statistics-rdl#road-length-in-kilometres-rdl02
- MHCLG Area Cost Adjustment[13]
- ONS, total population mid-year estimates[14]

Technical definitions:

- Relevant LAs: all London Boroughs, Metropolitan Districts, Shire Counties and Unitary Authorities[15]
- GDP deflator: an index that measures the change in prices over time. Use of which enables us to understand the inflation-adjusted value of revenue outturn expenditure in different years in a common unit value.
- Area cost adjustment: an index that is applied to account for the differences in the costs of delivering services.

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[8] https://assets.publishing.service.gov.uk/media/68e3b61b49e17d00a56ffe12/Revenue_Outturn_time_series_data_v3.csv

[9] https://assets.publishing.service.gov.uk/media/68e35f9bdadf7616351e4e18/Revenue_Outturn_metadata.ods

[10] https://obr.uk/download/november-2025-economic-and-fiscal-outlook-detailed-forecast-tables-economy/?tmstv=1764610561

[11] https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra#traffic-volume-in-kilometres-tra02

[12] https://www.gov.uk/government/statistical-data-sets/road-length-statistics-rdl#road-length-in-kilometres-rdl02

[13] https://www.gov.uk/government/publications/area-cost-adjustment-values-table

[14] https://www.nomisweb.co.uk/datasets/pestsyoala

[15] Excluding Isles of Scilly for which a needs share is not produced

- Ordinary least squares regression: a statistical method which enables us to estimate the relationships between a dependent variable and one or more independent variables in a linear model and derive the weight or strength of these relationships.
- Dependent variable: a variable that depends or responds to the outcome of independent variable(s).
- Independent variable: a variable that is closely connected or explains an event or outcome.