Society of Chief Officers of Transportation in Scotland/Improvement Service

May 2021

The Value of the Local Roads Network Phase 2

VLRN Evaluation Model – Executive Summary

The Scottish Roads Research Board (SRRB) funded research into the Value of the Local Roads Network in Scotland commenced in spring 2019. A Community Models led consortium[1] was appointed to undertake the work.

The project sought to fill a current gap in the understanding of the value of the local road network to the social and economic wellbeing of Scotland and its communities. Closing this gap was considered important due to:

1. The perceived lack of an evidence base to point to the impact of roads-related decisions on communities (compared to that held for/by other council services)
2. Concerns that traditional definitions of the 'value' of roads may be either too narrow, or inconsistently applied
3. Concerns that the impact of roads-related decisions on communities (rather than primarily in terms of impact on the asset or the network) were poorly understood
4. Concerns about the absence of a consistently applied approach across Scottish local authorities to judging and/or articulating the relative 'value' of different interventions/scenarios.

In addition, the project sought to explore emerging thinking about the relationship between investment in infrastructure investment and *non-infrastructure* outcomes.

The research report was submitted to SRRB in November 2019, setting out the conceptual framework for a broadly based value model. Phase 2 funding was received from the SRRB in 2020 to further develop and test this model prior to a potential wider roll-out across Scottish local authorities.

The subsequent output from that Phase 2 work has involved the development of a 'minimum viable product' (MVP) prototype model that is currently being tested *in situ* within local authorities. It aims to allow local authorities to make judgements about the wider value of their local roads network, using a broad set of both roads-specific and wider business/economic statistics and social value data that function at local and sub-local levels.

The VLRN concept is based on the assessment of the value inherent in roads infrastructure at three related levels:

- Utility Value (level 1) – which is based on the direct use and costs of the network;
- Social Value (level 2) – which examines the broader effects of the network within communities and geographical locations;
- Future Value (level 3) – which takes into account the way in which function and use are likely to change as a result of external factors (e.g. transition to net zero carbon)

A mechanism for calculating Level 1 value was largely described in the Phase 1 report, but further work was identified as necessary for levels 2 and 3 to enable proof of concept by gathering and

[1] Comprising Community Models, Caledonian Economics and the Social Value Portal

organising a range of relevant datasets to provide the evidence base and organising them to feed into the model.

For Phase 2, the research team supplemented the transport and business/economic datasets used in level 1 with a set of around 50 social, economic and environmental datasets (level 2). Level 3 considerations were then explored through the weighting of the Level 1 and 2 datasets (to allow configuration with the preferred priorities of each user).

The datasets adopted for Phase 2 are all publicly available and already collected/captured nationally at an authority level (and some at sub-authority level) across Scotland. They cover economic, social and environmental considerations. The research team undertook a review of potential datasets, assessing them for relevance, robustness and completeness. A number of candidate datasets had to be discarded because they did not cover all of the local authorities in Scotland.

In each of the three categories (economic, social and environmental) there is a range of datasets that either identify relevant destination points (e.g. schools, railway stations, GP surgeries) or provide area-based information (e.g. deprivation indices, crime rates, air quality data, business growth rates) which combine to paint a picture of an area so that the business case for expenditure on roads can be contextualised. The datasets have then been converted to standardised ranked scores which can then be fed into the model. The dataset scores are weighted by the model, but this weighting is transparent and capable of variation. One of the key questions for further stakeholder consultation is to what extent the model weightings should be capable of being varied by users according to local need or strategic objectives, as opposed to being preset.

The research team consider that it is key for the data to be open-source and drawn in the main from readily accessible datasets to secure stakeholder buy-in and support future ease of use. The initial model has been populated for every authority in Scotland.

Having captured feedback from a small group of critical friends to critically assess the approach and the datasets, the team has been working with two councils to test the emerging prototype. This test phase concluded at end March 2021. It involved testing whether the datasets aligned with council perspectives on local priorities and provided valuable insights into the wider functionality and purpose of the local roads network and testing whether and how the model could contribute to investment and maintenance decisions for local roads.

A first version of the model (in an excel spreadsheet form) was made available to the two participating authorities (Angus and Aberdeenshire) at the end of November 2020 to test its application *in situ* over the three-month trial period. Generally, the feedback to date has been positive, with participants considering that the focus for the VLRN model should be at a strategic level (planning and budgeting across the network) and at a tactical level (validating specific spend decisions in different parts of the authority). Other existing tools are available to support more operational decision-making.

A number of other important observations were captured during the test phase, including:

- Strategic and tactical decision-making is inherently linked to wider Planning, Regeneration and Economic Development decisions made by councils, so liaison with colleagues working in these disciplines is essential.

- The strategic and tactical focus inherently has most value when the model is being applied at a service-wide or programme level, either for assessment of delivered impact or of potential options in the development of business cases for investment.
- The model could evolve to allow more granular definitions/judgements of value in both different recurring geographies (e.g. urban, suburban or rural areas) and on different categories of roads (with a primary distinction around roads as conduits between places and streets as key components of vibrant places). His ties in with the wider 'place' agenda and initiatives such as 20 Minute Neighbourhoods. The focus on 'place' is likely rise in coming years and informal feedback indicates that a tool to help to evaluate benefits of investment would be welcomed (with some element of participatory budgeting potentially worthy of consideration as part of that approach). A Phase 3 for the project was signed off by the SRRB in January 2021 with this more granular focus in mind.

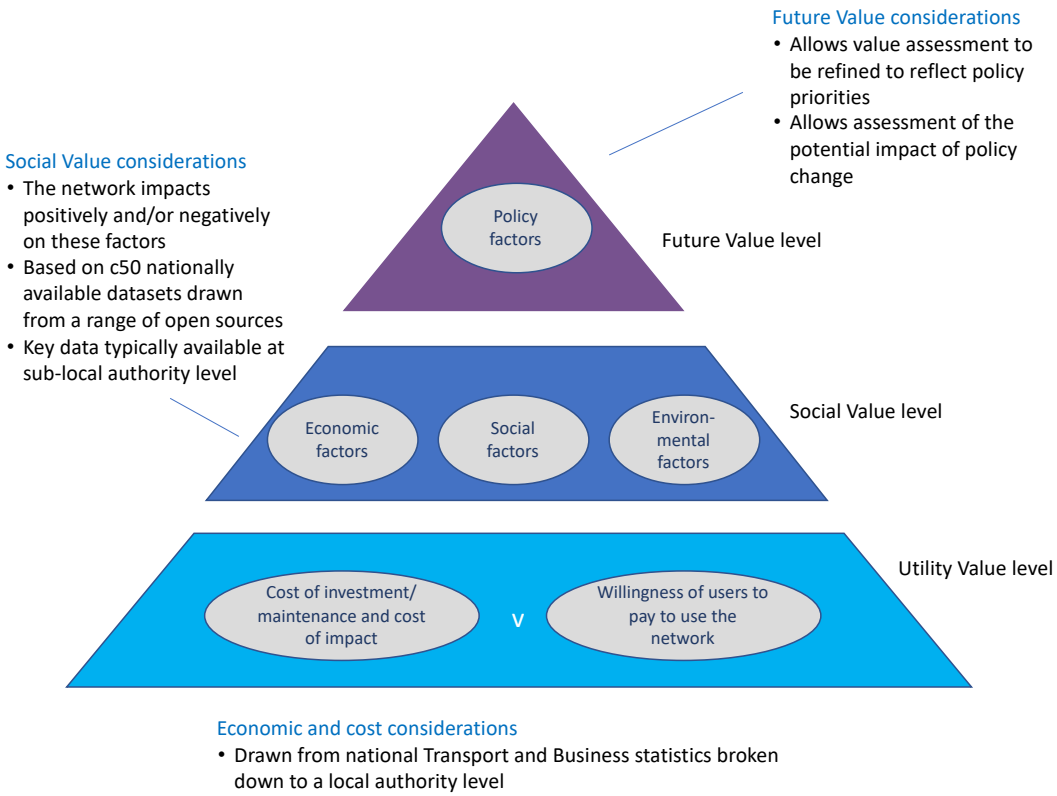
One key development area where the research team were not able to make the desired progress in Phase 2 was accessing space files for the road network itself. This is important for the future development of the model as it will enable the nodal and area-based datasets to be mapped against defined segments of the local roads network. It had been thought that via SCOTS and the Improvement Service the research team would gain access to Street Gazetteer, but this proved not to be possible and the trial local authorities have not as yet been able to provide usable space data for the network. The research team intend to find a resolution to this challenge during Phase 3.

The prototype model content will be shared with the wider SCOTS group and other key stakeholders in early 2021/22 (with the most appropriate forum still to be determined by SCOTS). Thereafter, and drawing on the *in situ* learning, the intention is that roll out of the model will follow on a phased basis across Scottish local authorities, with refinements made at each phase. The model will be available to authorities through an interactive portal/IT platform in due course.

1. Introduction

The VLRN evaluation model is designed to enable roads officers to incorporate a broader set of factors into the assessment of the function and funding of local road networks. It is evidence-led, using publicly available data to build a multi-layered picture which can then be used to undertake comparative analysis and inform investment decisions by contextualising the roads network in a broader policy framework at a national and a local level. The model is illustrated in figure 1 below.

Figure1: the LVRN evaluation model



2. Utility Value (Level 1)

The model starts by setting out the data on current usage and costs of the network. It does this by creating a Utility Value, which is based on a series of estimates of what the main user groups of the roads network are prepared to pay to use the network, measured against the estimated cost of the network. The different user groups are **Business**, **Personal** and **Social.**

The aggregation of these three activity components is an expression of what society is prepared to spend to use the local roads network in Scotland (= the Utility Value).

This is then set against what it actually costs to run the roads network in Scotland, which consists of:

- capital and maintenance spend by local authorities on roads; and
- the known cost to society in terms of accidents and emissions and road noise.

Together, these make up the direct and externalised costs of the network (Utility Cost), which can then be divided into the Utility Value to produce a Utility Ratio.

The Utility Value can be expressed at a national level and again at a local authority level using traffic volumes and roads expenditure data from STS.

STS 2019 was published in March 2020, so the input data for the Utility Value needs to be updated to reflect this as the model is adopted and applied.

3. Social Value (Level 2)

The next level of analysis introduces a broader range of datasets into the analysis, to encourage decision-makers and other stakeholders to move away from a purely condition and demand-led model of resource allocation for the local roads network. This is the Social Value level of analysis. Snapshots from the model file showing how the datasets are organised and presented in the prototype are provided in Annex 1.

In order to inform this level of analysis, the VLRN team assembled approximately 50 datasets under 3 broad themes:

- Economic
- Environmental
- Social.

The data is all 'open data' consistently available across Scotland. It comes from a number of sources including:

- Scottish Index of Multiple Deprivation (SIMD)
- Scottish Local Authority Economic Development Group (SLAED)
- Scottish Household Survey
- Statistics.gov.scot
- Google Mobility
- National Records of Scotland.

Proximity to strategic transport nodes as well other is included as a key consideration.

3.2 Selection of datasets and scoring

Once identified, the datasets required for the Social Value Level 2 analysis were subjected to a detailed compatibility review. This process included a standardised relative scoring process that fed the datasets into the calculator. The scoring works at two levels:

- Local authority level – comparing the performance of a particular local authority against other local authorities;
- Intermediate zone (sub-local) level – comparing the performance of a specified intermediate zone against other intermediate zones within the same local authority.

Intermediate zones ("IZ"), as the name implies, are an interim area between the local authority boundary and data-zones, the smallest standardised area of measurement for statistical purposes (typically with a population of around 750 people). For the purposes of this model, it was felt that IZ

would be a meaningful sub-local area. Not all datasets are available at the intermediate zone level, so the number of applicable datasets for intermediate zones is smaller.

The key considerations in scoring the datasets were:

1. Identifying a material causal relationship between the dataset in question and the roads network;
2. Making sure the dataset points "in the right direction". In other words, either:
    a. would additional investment in the roads network be expected to have a positive or negative impact on the outcome covered by the dataset in question? or
    b. does the dataset point to a relatively higher or lower dependency on the local road network?

Under (a) for example, SIMD income and employment rate indicators are scored according to levels of deprivation, a higher score denoting higher deprivation in these domains. The argument is that achieving a reduction in deprivation levels will (in part) be dependent on the quality of the road network. Therefore, a high score against these SIMD indicators will be reflected in a higher score in the calculator itself.

Under (b), an IZ might have a busy rail station in the area. The volume of passenger throughput implies a higher dependency on the road network, which feeds through to a higher score in the calculator.

Some indicators, on the other hand, will give rise to negative scores, if it is considered that further investment in the local roads network would have a negative impact. For example, we have a dataset that measures access to greenspace, so this will be applied as a negative score on the basis that close proximity to greenspace reduces the need for usage of the roads network.

Relevant datasets can be categorised as "Polygons" (area based – e.g. SIMD); "Nodes" (locations in the network – e.g. rail stations, hospitals, etc.); and "Lines" (segments of the network itself). It was intended to document Lines datasets based on information to be provided through the Improvement Service (most likely the Street Gazetteer), but this has not been forthcoming, so this element remains incomplete.

4. Future Value (Level 3)

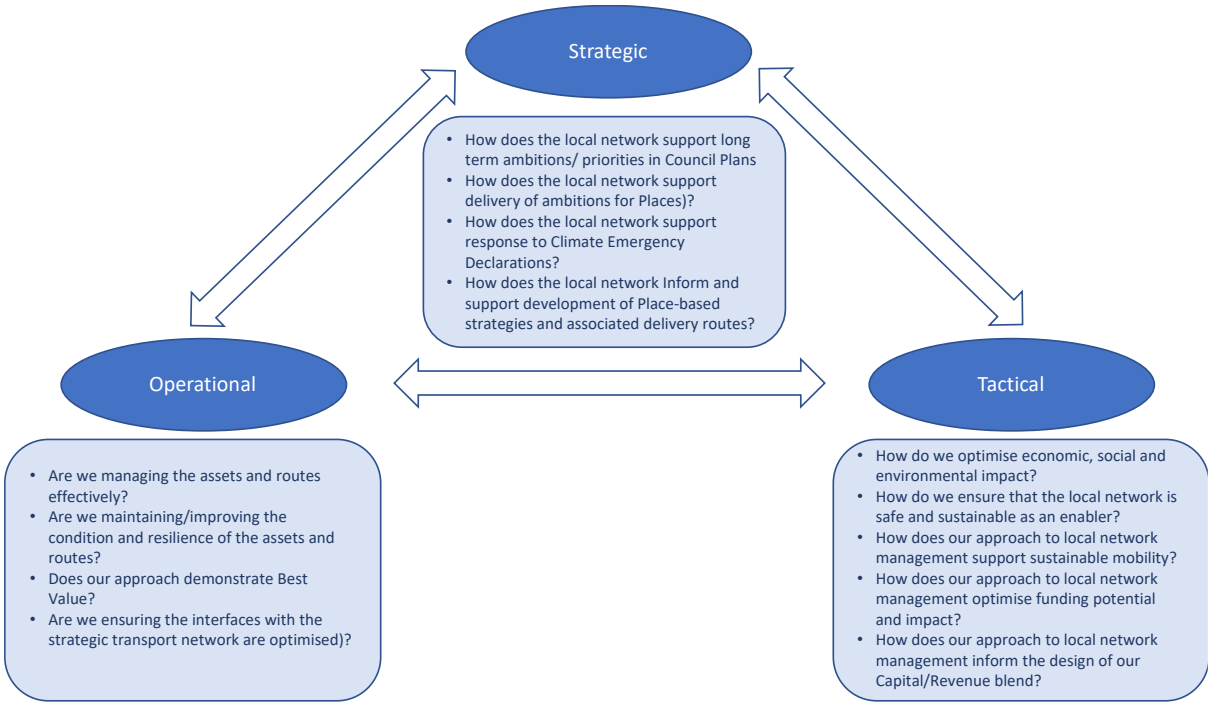
Estimating future value does not require additional datasets. Rather, the model provides scope for an adjustment to be applied to the default – within set parameters – to give emphasis to economic, social and environmental priorities. The parameters (upper or lower levels of adjustment) are set to prevent key social value strands from being wholly discounted.

The application of the adjustments are being tested as part of the wider *in situ* testing work. In parallel, the research team are exploring scope to refine the model to give a more explicit link to Scotland's National Performance Framework.

5. Feedback from the In Situ Testing

The *in situ* testing has been completed to assess the tool's potential use in practice across a series of recurring local authority activities including strategic and tactical planning, budget/programme planning, scenario analysis, impact assessment, business case development, operational prioritisation. These key areas of focus are illustrated in figure 2 below.

Figure 2: Strategic, tactical and operational decisions regarding the network



A number of other important observations were captured during the test phase, including:

- The model is most relevant when applied in supporting more strategic and tactical decisions being made by councils regarding the impact/value of their network. Other existing tools are available to support more operational decision-making.
- There may be benefits in identifying a common content and format for the presentation of related decision-making data across councils to build understanding of any proposed model. This may accommodate more operational considerations identified by the councils in addition to the strategic/tactical value generated by the model
- These strategic and tactical decisions are inherently linked to wider Planning, Regeneration and Economic Development decisions being made by councils, so liaison with colleagues working in these disciplines is essential for the successful application of the tool.
- The strategic and tactical focus inherently has most value when the model is being applied at a service-wide or programme level, either for assessment of delivered impact or of potential options in the development of business cases for investment.
- The model could evolve to allow more granular definitions/judgements of value in both different recurring geographies (e.g. urban, suburban or rural areas) and on different categories of roads (with a primary distinction around roads as conduits between places and

streets as key components of vibrant places). A Phase 3 for the project has been signed off by the SRRB in January 2021 with this more granular focus in mind.

The model was made available to the testing authorities in the form of an interactive spreadsheet. The intention is that the model will be migrated to a web-based portal, with log in provided from signed up authorities. This approach simplifies access, but also allows for a more resilient approach to both systems and dataset management and maintenance moving forward. Any formal discussions around how this is best hosted have still to take place with SCOTS.

6. Model Functionality and Applications

The research has identified the following functionality and potential applications of the model

Function	Application	Phase 1	Phase 2	Future phases
Utility Ratio scoring	Research	Yes	Yes	Yes
Utility Ratio comparisons	Research	Yes	Yes	Yes
Social Value scoring	Research		Yes	Yes
Social Value comparisons (LA)	Measurement		Yes	Yes
Social Value comparisons (IZ)	Investment appraisal		Yes	Yes
Overall Value scoring	Research		Yes	Yes
Overall Value comparisons (LA)	Measurement		Yes	Yes
Overall Value comparisons (IZ)	Investment appraisal		Yes	Yes
Value tracking over time	Measurement		Yes	Yes
Comparative spend analysis	Measurement		Yes	Yes
Future value impact modelling	Forward planning		Yes	Yes
Business case development	Forward planning		Can inform	Yes
Investment scenario planning	Forward planning		Can inform	Yes
Network re-classification impact	Forward planning		Can inform	Yes
Route resilience planning	Forward planning		Can inform	Yes
Geospatial mapping / digitisation	All of the above			Yes

7. Conclusion and next steps

Phase 2 has produced a prototype value model based on the Phase 1 principles and building blocks. The required data is open source and has been pre-populated into the first full iteration of the model itself. Its comprehensiveness, functionality, accessibility, and support for decision-making have been tested in two local authorities, with initial feedback included in this report and designed into the next steps of the work as follows:

- Research team to seek to align the model content and output more explicitly to the National Performance Framework
- Research team to explore the application in a number of further 'early adopter' councils as a desk-based exercise prior to wider roll-out across Scottish councils before end 2021
- Phase 3 research to be progressed by the VLRN research team to allow more granular definitions/judgements of value in both different recurring geographies (e.g. urban, suburban or rural areas) and on different categories of roads (with a primary distinction around roads as conduits between places and streets as key components of vibrant places).

Annex 1: VLRN data and its application

1. Authority	Angus							
2. Programme / project description		Road patching						
3. Council-wide capex and maintenance budget			£18,161,000					
4. Programme / project			£1,000,000					
5. Intermediate zones affected	Intermediate Zone	Distribution	Spend per IZ	LA Social Ratio	IS Social Ratio	LS SR differential £	IZ SR differential £	IZ Outcome Score (%)
A	Arbroath Landward	20%	£200,000	1.711909878	1.76734858	£23,905	£34,992	3.2%
B	Arbroath Kirkton	20%	£200,000	1.711909878	1.534720071	£23,905	-£11,533	-10.4%
C	Arbroath Keptie	20%	£200,000	1.711909878	1.550503559	£23,905	-£8,377	-9.4%
D	Arbroath Harbour	20%	£200,000	1.711909878	3.004078323	£23,905	£282,338	75.5%
E	Arbroath Cliffburn	20%	£200,000	1.711909878	2.206242884	£23,905	£122,771	28.9%
6. Estimated date of delivery	31/03/2021	OK						

8. Utility ratios:	Scotland	Angus	Utility differential	*Positive means greater than national average and vice versa. Before social value analysis*	
	2.347	1.592	-0.754343115		
9. Outcome Score (+/- percentage points)	7.51%	Economic (+/- %)			6.94%
10. Differential based on council budget (5 above)	£2,170,666	Environmental (+/- %)			-7.94%
11. Local Authority Social Ratio ("LASR")	1.712	Social (+/- %)			8.51%

Fig 1: Concept Model dashboard

The upper section (items 1 – 6) provide basic programme and location details and socio-economic scoring at an intermediate zone (IZ) level. The grey cells alongside each IZ show the distribution of spend between IZs and scoring from the socio-economic datasets, which show how the application of the weighted socio-economic scoring adjusts the input cost figure. In this case, based on the sub-local socio-economic datasets, while the proposed spend based on local authority-level data shows a positive differential of £23,905 per £200,000 of spend relative to the local authority Utility Ratio (see item 8), the IZ or sub-local analysis shows a wide disparity between the data-zones, with the LA positive differential going negative in two datazones (Kirkton and Keptie) and significantly positive in two others (Harbour and Cliffburn).

The lower section (items 8 – 11) shows how the Utility ratio compare between Scotland and the local authority (item 8), how the socio-economic datasets score overall (item 9) and how this is made up between economic, environmental and social datasets, the percentage overall score expressed as proportion of the Council budget and the Council Social Ratio (Utility Ratio plus social score).

Theme	Maximum theme adjustment	Theme score - local authority (average of indicator type scores)	Indicator type	Type score - local authority (average across all included sub-localities)	Weighted score (sub-component of theme)	Dataset share of theme	LA Data set ref
Economic	80.00%	6.94%	Resilience	5.55%	0.291%	7.27%	Ec1
					0.309%	7.27%	Ec2
					-5.613%	7.27%	Ec3
					3.991%	7.27%	Ec4
					4.507%	7.27%	Ec5
					1.234%	7.27%	Ec6
					1.259%	7.27%	Ec7
					-0.432%	7.27%	Ec8
			Wellbeing	1.40%	0.000%	0.00%	Ec9
					4.902%	7.27%	Ec10
					-5.747%	7.27%	Ec11
					2.241%	7.27%	Ec12
Environmental	60%	-7.94%	Wellbeing	-7.46%	-8.498%	10.00%	En1
					-6.272%	10.00%	En2
					-4.035%	10.00%	En3
					5.440%	10.00%	En4
					5.904%	10.00%	En5
			Resilience	-0.48%	-0.483%	10.00%	En6
Social	60%	8.51%	Resilience	8.87%	0.298%	2.61%	S1
					1.973%	2.61%	S2
					0.401%	2.61%	S3
					0.234%	2.61%	S4
					-1.187%	2.61%	S5
					0.919%	2.61%	S6
					-2.300%	2.61%	S7
					2.412%	2.61%	S8
					2.016%	2.61%	S9
					0.412%	2.61%	S10
					1.789%	2.61%	S11
					0.435%	2.61%	S12
					0.534%	2.61%	S13
					0.587%	2.61%	S14
					0.347%	2.61%	S15
			Wellbeing	-0.37%	-1.714%	2.61%	S16
					-0.037%	2.61%	S17
					0.815%	2.61%	S18
					-2.300%	2.61%	S19
					-1.058%	2.61%	S20
					1.239%	2.61%	S21
					0.375%	2.61%	S23
					2.315%	2.61%	S24

Fig 2: Local authority scoring mechanism

Each dataset has a relative scoring mechanism for each local authority relative to its peers. The datasets and then the themes are weighted (this weighting can be varied) and the weighted scores feed into the dashboard.

Dataset	IZ Dataset ref	Dataset score (out of 10)	LA rank (1 (highest) - 32 (lowest))*	Counter	IZ dataset scores as a percentage				
					Arbroath Landward	Arbroath Kirkton	Arbroath Keptie	Arbroath Harbour	Arbroath Cliffburn
Ports & Harbours		0.40	17.00	1					
Rail stations	IEc1	0.43	22.00	1	0.000%	0.000%	0.000%	11.333%	0.000%
Google Global Mobility report: Workplaces		- 7.72	1.00	1					
Registered enterprises by Local Authority area, employee size-band and sector		5.49	12.00	1					
Journey times for essential services	IEc2	6.20	10.00	1	2.474%	0.257%	-0.499%	-1.200%	-0.036%
SIMD Employment domain indicators	IEc4	1.70	19.00	1	-2.579%	1.159%	0.943%	8.239%	4.286%
SIMD Income domain indicators	IEc5	1.73	19.00	1	-2.137%	1.178%	0.763%	8.142%	5.453%
Household density	IEc6	- 0.59	12.00	1	-6.857%	0.900%	-0.967%	6.414%	3.085%
Airports		-	N/A	0					
New business starts		6.74	17.00	1					
Town vacancy rates		- 7.90	28.00	1					
Broadband	IEc3	3.08	23.00	1	7.705%	-1.705%	-2.904%	-2.912%	-2.736%
Scottish Household Waste		- 8.50	21.00	1					
Private gardens	IEn1	- 6.27	20.00	1	5.481%	-0.868%	-0.824%	-2.631%	-1.026%
Parks	IEn2	- 4.03	9.00	1	5.167%	-3.117%	-0.079%	-4.979%	-5.439%
Accessible woodland		5.44	5.44	1					
Visits outdoors		5.90	26.00	1					
Air quality	IEn3	- 0.48	11.00	1	-12.571%	0.213%	-0.116%	0.325%	0.566%
Hospitals (with acute provision)		1.14	20.00	1					
GP surgeries	IS1	7.56	7.00	1	0.000%	0.000%	0.000%	13.333%	0.000%
Citizens Advice Bureaux		1.54	19.00	1					
Community Outcomes Planning Data - population indicators	IS2	0.90	22.00	1	13.147%	-12.842%	-3.073%	0.415%	4.185%
Healthy life expectancy		- 4.55	8.00	1					
Fuel poverty		3.52	20.00	1					
Google Global Mobility report: grocery & pharmacy		- 8.82	19.00	1					
Physical activity and sport		9.25	3.00	1					
Individual insolvencies		7.73	7.00	1					
Pupil density	IS4	1.58	7.00	1	-1.114%	1.410%	3.963%	-0.668%	4.421%
Free school meals	IS5	6.86	12.00	1	1.866%	1.070%	-7.744%	4.228%	-2.639%
Crime	IS6	1.67	15.00	1	-1.607%	0.569%	3.387%	7.276%	2.651%
SIMD Education, Skills and Training domain indicators	IS7	2.05	12.00	1	-1.763%	0.904%	-1.514%	2.956%	5.188%
SIMD Health domain indicators	IS8	2.25	20.00	1	-2.558%	0.517%	0.250%	6.097%	4.126%
SIMD Housing domain indicators	IS9	1.33	19.00	1	-1.417%	0.006%	-1.014%	5.778%	6.792%
Google Global Mobility report: residential		- 6.57	24.00	1					
Cultural engagement		- 0.14	12.00	1					
Electoral rates		3.13	12.00	1					
Google Global Mobility report: retail & recreation		- 8.82	9.00	1					
Google Global Mobility report: parks		- 4.06	19.00	1					
Neighbourhoods index (loneliness, safety, belonging, etc.)		4.75	16.00	1					
Community Centres	IS3	1.44	20.00	1	0.000%	0.000%	0.000%	13.333%	0.000%
Volunteering		8.87	2.00	1					

Fig 3: Intermediate zone scoring mechanism

Each dataset has a relative scoring mechanism for each IZ relative to its peers within the local authority. The datasets then feed into the IZ section of the dashboard. Note not all of the datasets used at LA level are available at IZ level (green cells denote datasets that don't go below LA level).