Department for Transport

Local Authority Major Schemes
Meta-evaluation report 2025

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Executive summary

This meta-evaluation reviews the outcomes of 36 Local Authority Major Schemes (LMS) funded by the Department for Transport (DfT), approved for construction between 2008 and 2020, representing £1.96 billion of investment. The schemes include highway, multi-modal, light rail, and bus and other rapid transport interventions. Findings are based on monitoring and evaluation (M&E) reports submitted one and 5 years after scheme opening, in line with DfT guidance. However, not all schemes reported on every topic, and methods varied, limiting comparability and the ability to attribute observed changes directly to the schemes.

Key findings

Scheme inputs

- **Scheme build:** from the 17 schemes reporting on delivery timelines, almost half (47%) were delivered on time or ahead of schedule. Slight delays were reported by 20% of schemes, while 33% had large delays (over 10% longer than planned). On average, delays lasted 7 months, mainly due to bad weather or unexpected ground conditions.

- **Scheme costs:** on average, cost overruns were 3% above the original forecasts, with larger schemes tending to have bigger overruns. From the 28 schemes reporting on scheme cost, 13 reported being on or below budget (46% of schemes providing data), and 15 reported being over budget (54%). All schemes that spent less than forecast were more than 5% under budget. Of the 15 schemes that went over budget, 8 were more than 5% above original forecasts.

Scheme outcomes

Travel demand and behaviour

- **Travel demand:** most schemes (69%) reported that objectives related to travel demand (traffic flows, rail and bus patronage) were fully or partially met. All highway schemes reported decreased traffic flows in target areas, as intended.

- **Public transport:** limited data was available, but both schemes reporting on rail demand saw increases. Bus demand results were mixed, with 2 out of 3 schemes reporting declines, reflecting wider national trends.

- **Mode shift:** evidence from 18 reports suggests a general shift from private to public transport, particularly for light rail schemes, where surveys indicated 18-29% of users would have otherwise travelled by car.

- **Active travel:** evidence on the impact on active travel (walking, cycling) is mixed, with 5 schemes reporting an increase in active travel for at least one mode, and 4 reporting a decrease.

Travel time and reliability

- **Improvements in travel times and reliability** were observed across most of the schemes, especially for public transport and multi-modal schemes where quantitative data was provided. Highway schemes also saw travel time improvements, though the findings were more mixed in terms of reliability.

Local economic impacts

- Evidence from 32 reports shows that 69% of schemes reported **positive local economic trends**, including growth in business activity, employment, and housing. However, due to methodological limitations, it remains unclear to what extent these changes can be directly attributed to the schemes. Light rail schemes offered the most robust evidence of positive economic impacts, particularly in relation to commerce and business development. It should be noted, however, that these schemes did not undertake a robust analysis of any displacement effects, and there remains the potential for negative impacts outside the immediate area that may not have been captured.

Environmental impacts

- **Carbon emissions:** evidence from 16 schemes showed that carbon emissions fell in multi-modal and rail schemes, but results were mixed for highway schemes, 3 of which saw an increase. Among 11 schemes with quantitative data, the average annual reduction was 850 tonnes of CO_2 equivalent per scheme.

- **Air quality:** 13 out of 14 schemes reported improvements in air quality, with average NO2 reductions of 19% (one year after scheme opening) and 36% (5 years after scheme opening).

- **Noise:** of the schemes reporting on noise, results were mixed (3 reported reductions, 4 increases).

- **Other environmental impacts:** evidence on impacts such as landscape, biodiversity, and heritage was rarely presented and sample sizes were too small for meta-analysis.

Safety

- Most schemes that reported on collision trends **fully or partially achieved their safety objectives** (64%); data from 14 schemes showed a 37% reduction in annual collisions 5 years post-opening at selected locations.

Value for Money

- Only 10 schemes provided post scheme-opening VfM data, of which 7 were provided at the year 5 post-opening stage. Most showed a drop in their BCR after opening, from a median BCR of 6.4 to 5.2, mainly because benefits were overestimated at the business case stage. The effects of the COVID-19 pandemic have often been quoted as an explanatory factor of deviation between outturn and forecast benefits of schemes.

- VfM categories stayed the same for most schemes, except for 3 that dropped by one category. Six schemes still had ‘very high’ VfM, 2 had ‘high’, and 2 had ‘medium’. Despite this, most schemes still offered ‘very high’ VfM.

Caveats and limitations

- Not all schemes reported on every topic, and data quality and methods varied.

- Most schemes did not attempt to define counterfactuals, so observed changes cannot be directly attributed to the schemes.

- Environmental and economic impacts should be interpreted with caution due to limited and inconsistent evidence.

- The COVID-19 pandemic has affected trends in private and public transport usage, potentially masking or dampening the effects of schemes on the indicators analysed in this document for most of the schemes.

Introduction, methodology, and information on the schemes

1. Introduction

1.1 Report background

Context of this report

The Department for Transport (DfT) provides financial support to Local Authorities to deliver local infrastructure projects, a portfolio of interventions named Local Authority Major Schemes (LMS). The DfT has provided ongoing funding of LMS for over 20 years and in 2012 issued the LMS Monitoring and Evaluation (M&E) framework for promoters to assess the performance and impact of their schemes. In June 2025, DfT published an updated benefits management and evaluation framework, to be used for new schemes going forward. The schemes explored in this meta-evaluation follow the 2012 M&E framework – and all references to LMS guidance refer to the 2012 version unless otherwise indicated.

The 2012 framework defines 3 M&E tiers which are based on the size of the scheme and their degree of innovation:

- Standard monitoring (schemes under £50m, required to report on scheme outputs, travel, carbon, and economic impacts);
- Enhanced monitoring (schemes over £50m or which are expected to have major impacts, required to also add noise, air quality, and collision monitoring to standard indicators); and
- Fuller evaluation (a selection of large schemes where there is a need to strengthen evaluation evidence, learn lessons from scheme design/delivery, or where there are particular risks or sensitivities which may affect scheme delivery).

Interventions qualifying for fuller evaluations would need to assess the efficiency and effectiveness of the processes underpinning scheme delivery (process evaluation), the extent of the impact caused by the scheme (impact evaluation), and whether the scheme represents a good use of resources (value for money, VfM).

As part of the framework, scheme promoters are required to complete M&E reports in 2 stages: the first one year after (1YA) opening, focusing on scheme outputs,

outcomes, and early impacts, and the latter 5 years after (5YA), focusing on the short-medium term scheme outcomes and impacts. Reports at the 1YA and 5YA stage have not always been prepared in the years indicated. This is due to multiple reasons, including improving data quality (e.g., to avoid periods where other works or developments could affect findings), the effects of the COVID-19 pandemic, or managerial considerations agreed between scheme promoters and the DfT.

For the purpose of the analysis presented in this document, schemes have been classified into 4 types:

- **Highway schemes**: these include the maintenance, improvement, or creation of road links, roundabouts, bridges, junctions, bypasses, and more, as well as the enhancement of their safety features and signalling. Some of these schemes might also deliver improved walking and cycling facilities alongside the affected roads rather than as standalone scheme features.

- **Rail schemes**: these refer to light rail (tram) and involve local public transport improvements such as segregated tramways, IT systems for service travel updates, service enhancements, tram lines extensions, as well as upgrades to nearby public realm (for example, improved seating or greening in waiting areas, digital signage and pathfinding).

- **Bus & rapid transport schemes**: these involve improvements to bus public transport (e.g., including bus upgrades, or construction of segregated busways) as well as to IT systems, signalling, and public realm as above.

- **Multi-modal schemes**: schemes that aim to improve connectivity and access across transport modes (e.g., public transport interchanges), or specifically aim to improve travel conditions across multiple modes of transport (e.g., a composite scheme with bus, cycling, and highway provisions each with standalone features).

The classification of schemes into types is not based on rigid criteria and has been subject to a degree of judgement based on a scheme's key characteristics. M&E data for individual interventions has been compared against each other (comparative analysis) or averaged across schemes (meta-analysis) to identify common threads, average impacts, cross-cutting insights, and learning elements relevant to the entire LMS portfolio (the broader meta-evaluation). Ideally, data should also be aggregated to identify the overall impacts of the entire group of schemes (portfolio-evaluation – e.g., to derive the overarching VfM or total carbon impact of LMS), however the variety within the data only allows production of such estimates for scheme costs. In the past, 3 meta-evaluations have been completed, published in 2014, 2018, and 2022, including evidence from schemes being delivered between 2006 and 2018.

Purpose of this report

This document sets out the meta-evaluation of the new M&E evidence which has become available since the preparation of the previous 2022 research. The analysis aims to:

- Understand whether schemes were delivered on time, on budget, and delivered value for money (see Chapters 5, 6, and 14);
- Understand the extent to which the expected outcomes and impacts of the LMS have materialised and the contribution of the schemes to the observed change (see Chapters 4, and 8 to 13);
- Identify key learning points to assist scheme promoters and their delivery partners to respond to their scheme prioritisation and local delivery responsibilities (throughout and in Chapter 15);
- Support transparent decision-making and accountability, by learning lessons from the LMS portfolio;
- Inform future investment decisions by central and local governments; and
- Contribute to the DfT's goal to publish and disseminate monitoring and evaluation evidence, in line with the Government Social Research publication protocol.

1.2 Evidence base

This meta-evaluation is based on data from **36 schemes**, 18 of which were not part of the previous research. The remaining 18 schemes were analysed in the preceding 2022 meta-evaluation as 1YA reports, and have now been included in this meta-evaluation as 5YA data was made available. This section provides details about the sample reports in terms of their M&E tier, scheme type, and the timeline of creation of the reports. Information on the geographical distribution of schemes, their size, and funding is discussed in Chapter 3.

Figure 1-1 summarises the distribution of scheme by type (outer circle) including their breakdown into 1YA and 5YA reports (inner circle). There are 9 1YA reports in total, representing 24% of the sample, which are concentrated among highway schemes.

The following 4 schemes submitted combined 1YA/5YA reports, which have been classified as 5YA reports:

- Elmbridge Transport (Phase 1);
- Ipswich Transport Fit for the 21st Century;
- Midland Metro Birmingham City Centre Extension;
- Taunton Northern Inner Distributor Road (NIDR).

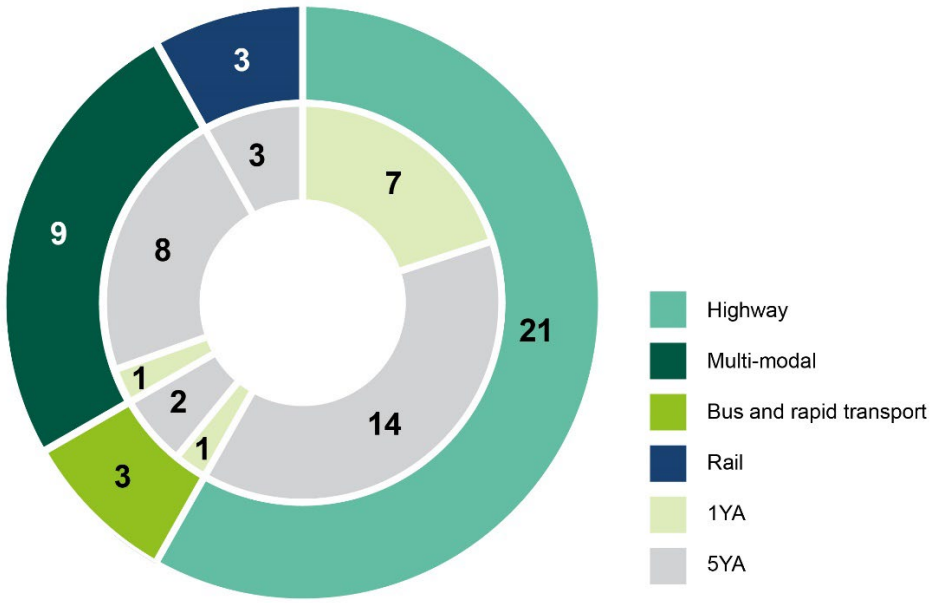

Figure 1-1: Meta-evaluation sample distribution by scheme type and reporting stage

In terms of evaluation tiers, 18 schemes were standard tier (11 highway and 7 multi-modal), 2 were enhanced tier (both highway schemes), and the remaining 16 schemes qualified for fuller evaluations (8 highway, 3 bus & rapid transport, 3 light rail, 2 multi-modal).

Figure 1-2 shows the timeline of approval, construction, and M&E of the schemes, which spans nearly 2 decades. Nearly half the schemes received full approval between 2011 and 2013, followed by a long tail of nearly 2 approvals per year until 2020. Construction started between 2012 and 2016 in 75% of the cases and opened between 2013 and 2017 for a similar proportion, with a further 17% opening in 2021 and 2022. 1YA and 5YA data collection started in a year affected by the COVID-19 pandemic for 10% and 8% of schemes respectively. Most of the 5YA reports will include some data affected by the pandemic, and results should be interpreted with this in mind.

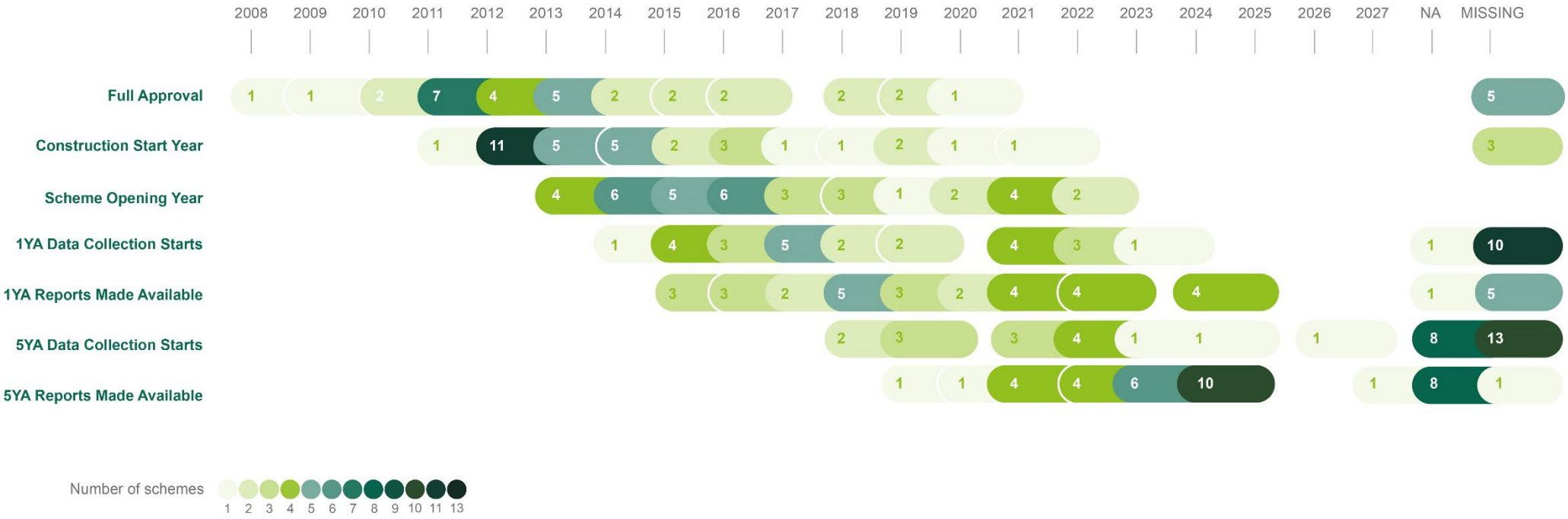

Figure 1-2: Scheme construction and evaluation timeline

Note: 2026 and 2027 are expected timelines. 'NA' means that a certain stage does not apply to a certain scheme – for example, 1YA reports with no declared timeline for 5YA evaluation will be counted as NA for 5YA stages. The NA for 1YA stages refers to Ipswich Transport Fit for the 21st Century, which did not start 1YA data collection. 'Missing' means that for some schemes, it was not possible to determine what year a certain stage referred to based on available information.

1.3 Context to the schemes

Figure 1-3 gives the traffic context for highway schemes, using DfT Road Traffic Statistics (TRA0101). As previously mentioned, most schemes opened between 2013 and 2017 but the reduction in road traffic caused by the COVID-19 pandemic has likely affected the post-opening usage of several schemes. The data below indicates that scheme outcomes and impacts should be interpreted with caution, although data for schemes after 2022 could be considered stable due to 2022-2023 yearly growth being in line with pre-pandemic growth. Notably, trends in roads controlled by Local Authorities (principal 'A' roads and minor roads) follow the same patterns as the aggregate statistics for all roads in Great Britain.

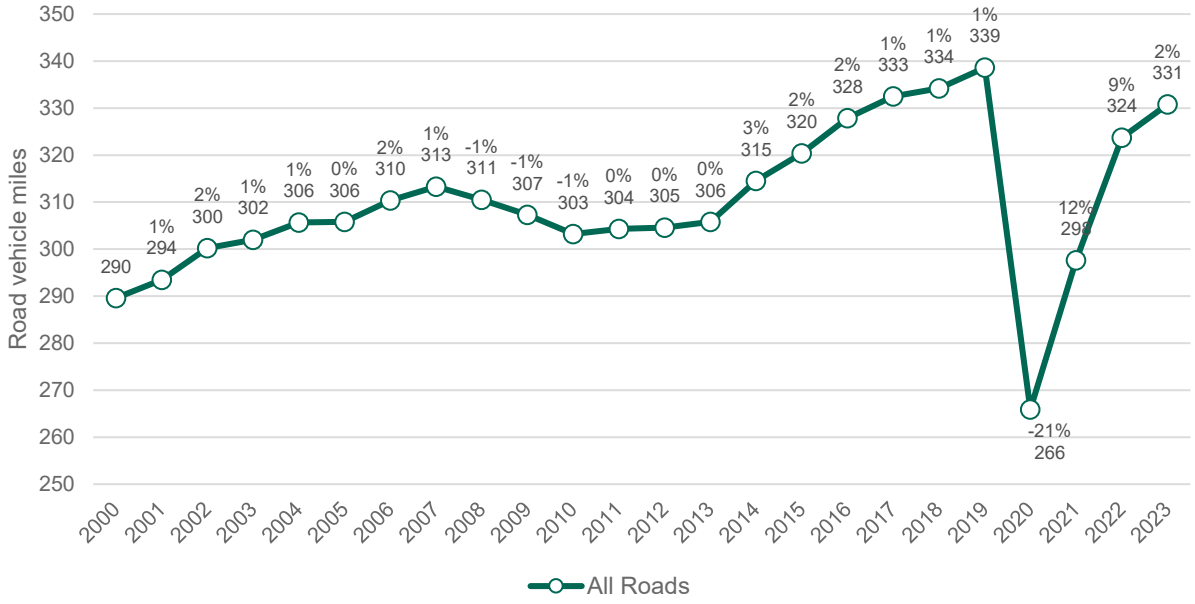

Figure 1-3: **Yearly road traffic and % change from previous year (Great Britain)**

Figure 1-4 and Figure 1-5 show the bus and light rail usage context for public transport and multi-modal schemes, using DfT local bus passenger (BUS01a) and light rail and tram (LRT0104) statistics. With the exception of post pandemic recovery, the bus data shows decreasing usage of local bus transport since 2016. Rail schemes, on the other hand, show increasing demand pre-pandemic, which has not yet recovered. Nonetheless, national trends might not be reflective of regional ones, meaning that schemes performing better than national trends should not necessarily be deemed successful.

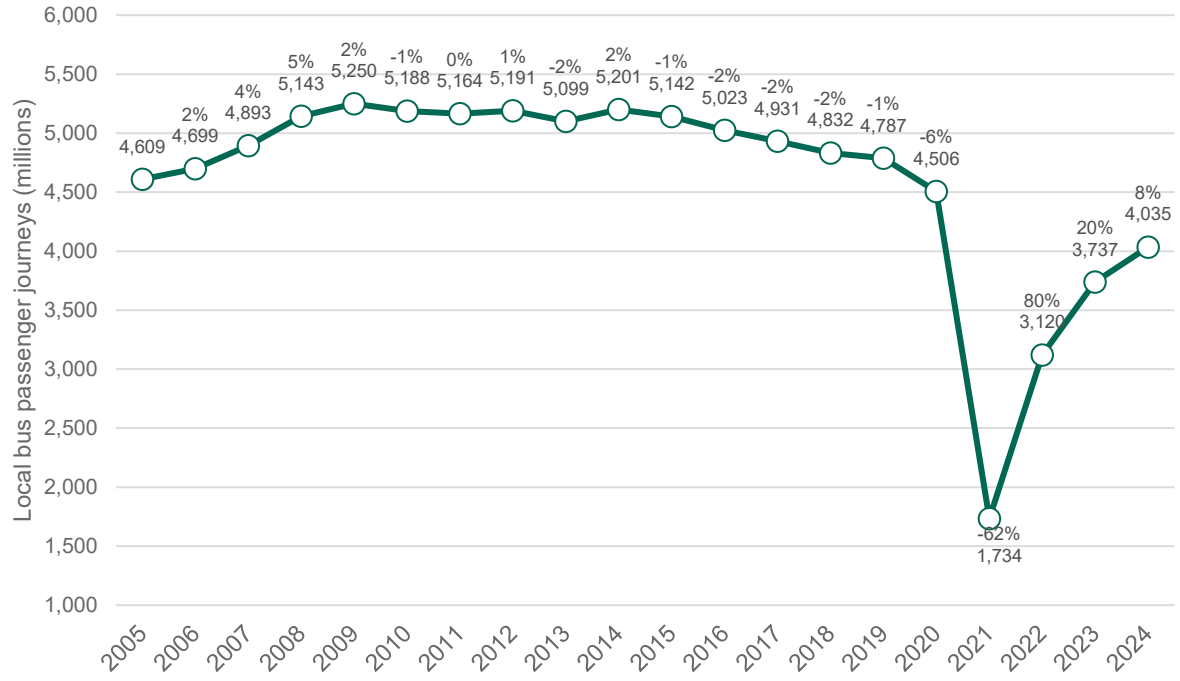

Figure 1-4: Yearly bus passenger journeys and % change from previous year (Great Britain)

Note: Year ending: March

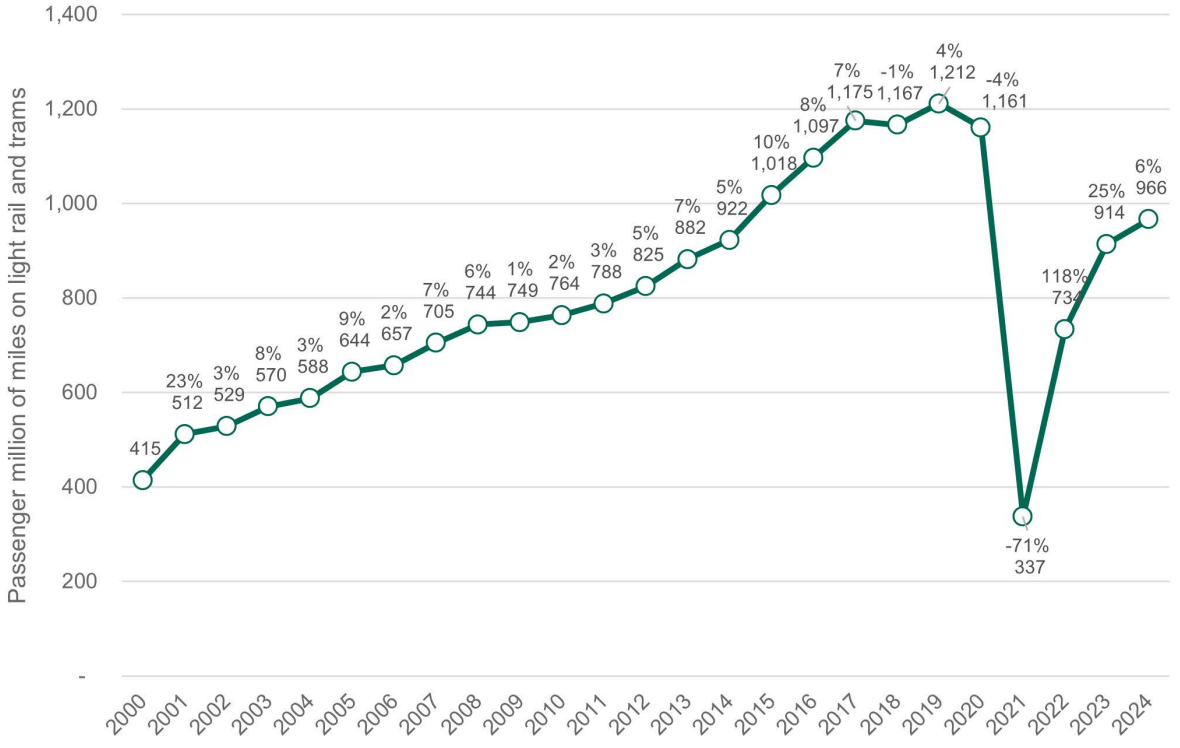

Figure 1-5: Yearly tram passenger million miles and % change from previous year (Great Britain, excluding London and Edinburgh underground)

Note: Year ending: March

2. Methodology

2.1 Research questions

The 2012 LMS Monitoring and Evaluation framework provides a list of topics which detail the set of indicators that schemes need to evaluate according to their tier. These topics are:

- Scheme objectives
- Scheme inputs: scheme build, scheme costs
- Scheme outputs: delivered scheme
- Scheme outcomes: travel demand, travel behaviour, time and reliability
- Scheme impacts: local economic, environmental (carbon, noise, air quality, and other), safety
- Scheme Value for Money

This report is structured around these same topics, with an additional section describing the schemes' details and a further one discussing cross-cutting lessons learnt (either reported from schemes or resulting from this meta-evaluation).

Within each topic, this report looks to address up to 4 groups of research questions, detailed below, highlighting potential patterns, differences and underlying causes arising from the comparison of:

1. **Strength of evidence and overall impacts**
   This includes questions such as: how strong is the evidence on the contribution of schemes to the observed change between pre- and post-opening of the schemes?

Are schemes achieving consistency in the way data is collected, analysed, and reported? Can data be aggregated to generate overall findings? What are these findings?

2. **Post-opening time trends**
   This includes questions such as: for schemes providing both 1YA and 5YA post-opening data, is the change from pre-opening data similar at the 2 measurement points? Or does the data show post-opening time trends? Do certain impacts take longer to materialise?

3. **Scheme type effects**
   This includes questions such as: do bus & rapid transport or rail schemes show distinct results from highway schemes for a given topic?

4. **Forecasting**
   This includes questions such as: do schemes provide comparisons between realised ('outturn') change and change that was forecasted to happen at appraisal stage? Do schemes overstate or understate their costs/benefits on average?

Due to the varying number of schemes reporting on specific topics and differing data quality, it has not always been possible to address the research questions above – see a summary of the evidence base in Section 1.2. Other types of comparisons and breakdowns have been provided where data was available (e.g., travel demand at different parts of the day).

2.2 Overview of the meta-evaluation process

Figure 2-1 below illustrates the process which underpinned this meta-evaluation.

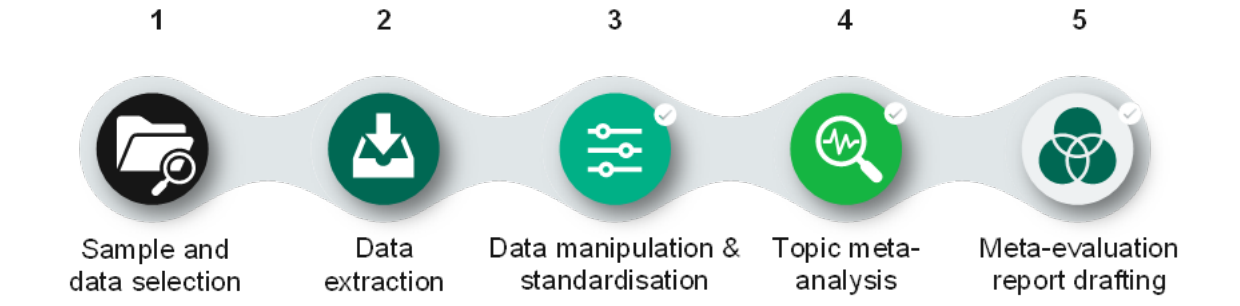

Figure 2-1: Meta-evaluation process overview

Sample and data selection

The DfT has collected the reports for the 36 schemes included in this research from scheme promoters. Depending on the available data in each report, schemes are retained or excluded accordingly from the analysis in each section.

Data extraction

No datasets were made available for this meta-evaluation. Information has been manually extracted from reports. For certain topics, the high variability of indicators provided across reports meant that a choice had to be made about which data to extract. This meant, for example, extracting quantitative data only for the most frequently recurring indicators (as in the travel demand section).

This also entailed extracting information qualitatively where it was not possible to extract it in detail or standardise data to enable comparability of overarching trends. In these cases, this report refers to 'qualitative data' even when it is provided quantitatively in the original report. For example, data on local economic impacts across schemes was highly varied even when it referred to the same type of economic effect (e.g., on housing). It was not possible to determine average quantitative trends across schemes; therefore trends have been qualitatively classified into positive or negative per scheme and impact type. The analysis then focused on measuring how many schemes within an impact type recorded positive trends (e.g., housing provision or conditions improved).

Data manipulation and standardisation

Schemes often included data at very localised levels (e.g., for a specific travel direction on a road segment). To allow a comparison across schemes, data has been aggregated using totals or averages per scheme (in some cases using figures directly provided in the reports, in others deriving estimates indirectly). Note the term 'average' through the document refers to the unweighted mean of values unless otherwise specified. Where needed and feasible, data has also been standardised, for example to convert different measures of air pollutants concentration into a common measurement unit, or to convert scheme costs from £ or £ thousands into £ millions.

Topic meta-analysis

Once cleaned, scheme data has been used to derive percentage and absolute changes between pre- and post-opening of schemes at the following levels:

1. individual monitoring points, segments, or areas within a scheme;

2. schemes, across monitoring locations, using averages from the previous level; and

3. across schemes for specific breakdowns (e.g., by reporting stage, scheme type, or overall), using scheme-level averages.

Notably, aggregating percentage change data through the different levels introduces inconsistencies which affect the robustness of averages and comparisons across schemes. This is due to mathematical properties not detailed here, and the different ways in which the most granular data is provided by schemes. However, the same does not apply to absolute changes. For this reason, this report gives more

prominence to the analysis of absolute changes when discussing key findings. Percentage changes have been included for completeness (when available) and should be interpreted with more caution.

More details on this and other elements of the underpinning meta-evaluation process, as well as more technical findings by topic, are provided in a separate Technical Annex, available upon request.

Meta-evaluation report structure

The report has been structured by topic. Learnings reported by the schemes, and insights for the improvement of future LMS evaluations, are summarised in Section 15, while overarching findings addressing the research questions set out above.

Quality Assurance

Quality Assurance (QA) has been delivered at multiple stages and covered checking that extracted data matched the data in the reports, sense-checking the extracted data controlling for outliers, and cross-checking the consistency between this document and the underlying data. It should be noted that the process does not include the QA of scheme-level data, which has been considered at face value. Moreover, notwithstanding the 3 layers of QA for the data extraction, manipulation, and synthesis, the extraction process and data classification could still be subject to errors or discrepancies compared to scheme level data. This is due to the lack of standardised and streamlined tools for data collection and reporting across schemes (e.g., the manual extraction of data from reports could result in a greater risk of typos compared to data collected from datasets).

The remainder of this report provides details of the schemes' geography and funding as well as their objectives, then looks in turn at scheme inputs (scheme build and costs), outputs (delivered scheme), and outcomes (travel demand, time, reliability, and mode shift) before focusing on scheme impacts (environmental, economic, and safety) and the VfM of schemes. The last section on concluding remarks includes lessons learnt for scheme promoters and evaluators, as well as a summary of the strength of evidence for each topic, and cross-cutting findings.

2.3 Strength of evidence

The results emerging from the analysis should be interpreted in light of the quality of the evidence available across schemes. The key findings set out at the beginning of each analytical chapter provide a concise summary of the strength of evidence for the portfolio of interventions examined within each topic. This influences the overall conclusions for the meta-evaluation, reported in the final chapter to this report.

Table 2-1 below offers an overview of the strength of evidence by topic, including a 'Red-Amber-Green' (RAG) rating to facilitate the reading (red for low or medium-low strength of evidence, amber for medium, green for medium-high to high).

It should be noted that the strength of evidence does not reflect a judgment on the degree of improvement that individual scheme-level data should undertake. Each scheme requires ad-hoc adjustments, and some natural variation in quality is introduced by the 2012 LMS Monitoring and Evaluation framework's evaluation tiers (e.g., with attribution considerations being relevant to fuller tiers only). The criteria that informed the assessment of the strength of evidence include but are not limited to:

- **Comparability and standardisation:** insights based on averages or comparative assessments are less reliable if based on data from schemes which are underpinned by different collection and analysis processes. For example, there was no common threshold or criterion for schemes to claim whether their objectives were achieved or not; VfM assessments did not discount values to a common base year.

- **Ambiguity and causality:** schemes may have used indicators which do not fully characterise an outcome, or methods which do not help establish how much of the observed change is due to the intervention. For example, certain schemes provided cyclist counts as the sole evidence for mode shift but did not attempt to establish how much of the variation in such counts was due to users shifting away from, for example, car usage.

- **Completeness:** schemes that focus data collection on very narrow areas may miss to account for wider effects. For example, calculating improvements to reliability only on enhanced segments may not reflect how conditions have worsened on other local segments.

- **Representativeness:** certain trends might have only been observable for a small sample of schemes overall or by scheme type, limiting the extent to which findings could be generalised to the overall LMS programme. This criterion has been applied while acknowledging that more complex outcomes and impacts were only required to be monitored by schemes qualifying for enhanced monitoring and/or fuller evaluations, which already represent a small share of the schemes analysed in this research.

Topic	RAG rating	Strength of evidence
Scheme objectives	**Medium**	Although the analysis in this section has focussed on the achievement of objectives which have been subject to M&E, scheme-level interpretation of findings varies – for example, considering local economic impacts to have been achieved even though the extent of the contribution of a scheme to observed change cannot be determined.
Scheme build	**High**	Relatively simple type of data to collect and analyse
Delivered scheme	**High**	Relatively simple type of data to collect and analyse
Scheme costs	**Medium-high**	Despite the guidance provided in the LMS M&E framework, schemes have often reported total costs only or have broken them down into different categories than those prescribed, in some cases affecting comparability (e.g., by omitting operating and maintenance costs).
Travel demand	**Medium**	Nearly all schemes monitored travel demand impacts, often (but not always) controlling for effects for both construction sites and other nearby sites. There is a large variation in the type of indicator adopted to monitor travel demand, affecting direct comparability across schemes.
Safety	**Medium-high**	Over half of the sample provided information on safety impacts, usually allowing to compare changes in total yearly collision numbers as a minimum (and to a lesser degree in slight or serious collisions). However, natural fluctuations in yearly data for this set of indicators means that data based on a single year of observation (as is the case for 1YA schemes) needs to be interpreted with caution (but these represent only a fraction of all reporting schemes).
Mode shift	**Medium-low**	Most of the reports do not make use of data and methods which allow to define the extent of changes in travel behaviour from one mode to another. An exception are rail schemes, which provided survey data to evidence shift from cars to newly introduced services.
Travel time	**Medium**	Several schemes monitored travel time impacts in a relatively homogeneous way. However, it was not possible to weight time savings/delays by the number of travellers experiencing them, which hampers the comparability of findings across schemes.
Reliability	**Medium**	Data for public transport or multi-modal schemes often lacks assessments of reliability of travel on car trips, offering a partial representation of impacts. Highway schemes offer a more complete representation of impacts, although the monitoring indicators chosen are varied and not always directly comparable.
Carbon impacts	**Medium-low**	On top of a small sample size of schemes providing quantitative data on changes in emissions, several schemes only evaluated carbon impacts along the routes of intervention and not on the surrounding network, potentially missing increases in emissions.
Noise impacts	**Medium-low**	On top of noise impacts being monitored by just a third of the sample, a fraction of schemes only monitored impacts at the site of intervention. Moreover, the type of data collected across schemes varied (in some cases, it followed adjustments to reflect impacts perceived by the human ear).
Air quality impacts	**Medium**	Nearly half of the sample reported on these impacts, most often making use of multiple monitoring stations, though sometimes their location did not allow for benchmarking of directly or indirectly affected areas with areas unaffected by the scheme.
Local Economic Impacts	**Low**	With the exception of few schemes, evidence lacks attribution of impacts to the effects of the schemes.
Value for Money	**Medium-low**	Data comparability is challenged by several factors, ranging from the use of different base years (affecting the degree of discounting of costs and benefits), to the usage of different re-appraisal methods including simple projections of outturn benefits as well as model re-runs.
Cross-cutting comment	**The strength of evidence appears to be higher on topics which are more directly related to transport impacts, whereas environmental and local economic impacts face more significant challenges. Value for money estimates across schemes should not be used to derive a portfolio-level estimate.**	

Table 2-1: Assessment of the strength of evidence by topic using a Red, Amber, Green (RAG) rating.
Note: Green represents high strength of evidence indicating reliable, consistent data, through to red which represents low strength of evidence indicating inconsistent data requiring more caution in interpretation.

3. The schemes

3.1 Introduction

Overview and summary

Section 1.2 provided introductory information about the sample underpinning this meta-evaluation. This section sets out the schemes' geography and the composition of their funding.

The North West and South East have the highest number of schemes – 8 each. Just under half of the schemes (16) in the sample listed their funding provider; in these cases, the DfT provided the majority of scheme funding (£633.6m or 70%) while Local Authorities provided most of the remaining funding (£256.2m or 28%).

3.2 Schemes geography

Figure 3-1 below summarises the geographical distribution of the 36 schemes by scheme size, defined as small (S) for schemes below £20 million, medium (M) for schemes between £20 - 50 million, and large (L) for those beyond £50 million (see Section 3 for a more in-depth analysis of scheme costs).

The greatest number of schemes were located in the North West and South East (8 schemes, 22% of the sample in each), followed by both the East Midlands (6 schemes, 17% of the sample). There were 7 small schemes, 17 medium schemes, and 11 large schemes. One scheme was not classified as cost data was not available. Schemes of different sizes are fairly evenly distributed across the different regions.

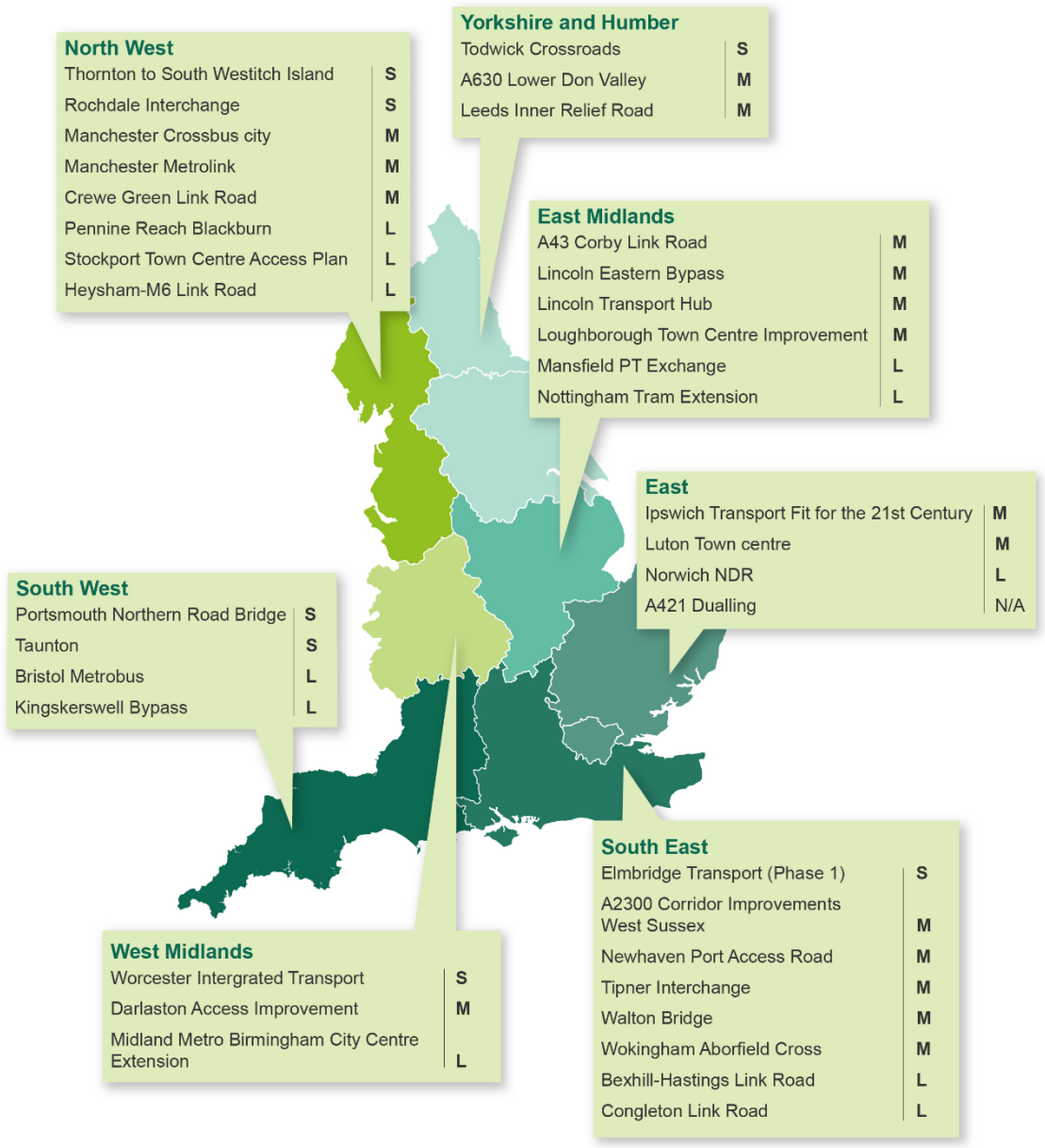

Figure 3-1: Distribution of schemes by region and small (S), medium (M) or large (L) size

3.3 Schemes funding

A breakdown of the source of scheme funding was provided by 16 schemes. Of these, 14 listed funding provided by the DfT, 12 listed funding from Local Authorities, and 3 listed other sources of funding (nominal figures). As can be seen in Figure 3-2 below,

the largest funding source was the DfT with £616.5m, while Local Authorities were reported as providing £250.9m and other sources accounted for £13.9m of funding. Other sources of funding include contributions from Network Rail, British Land, a lottery grant, and regeneration funds.

Figure 3-2: Scheme funding by DfT, Local Authority, or other sources

Scheme size by scheme type

Figure 3-3 shows the distribution of scheme size by the scheme typology. There is a total of 7 small schemes, which include 5 highway schemes and 2 multi-modal schemes. There are 17 medium size schemes, which include 10 highway schemes, 5 multi-modal, one bus & rapid transport, and one rail scheme. Finally, there are 11 large schemes, including 5 highway schemes, 2 multi-modal schemes, 2 bus & rapid transport schemes, and 2 rail schemes. There was one highway scheme for which cost data was not available and has not been classified by size.

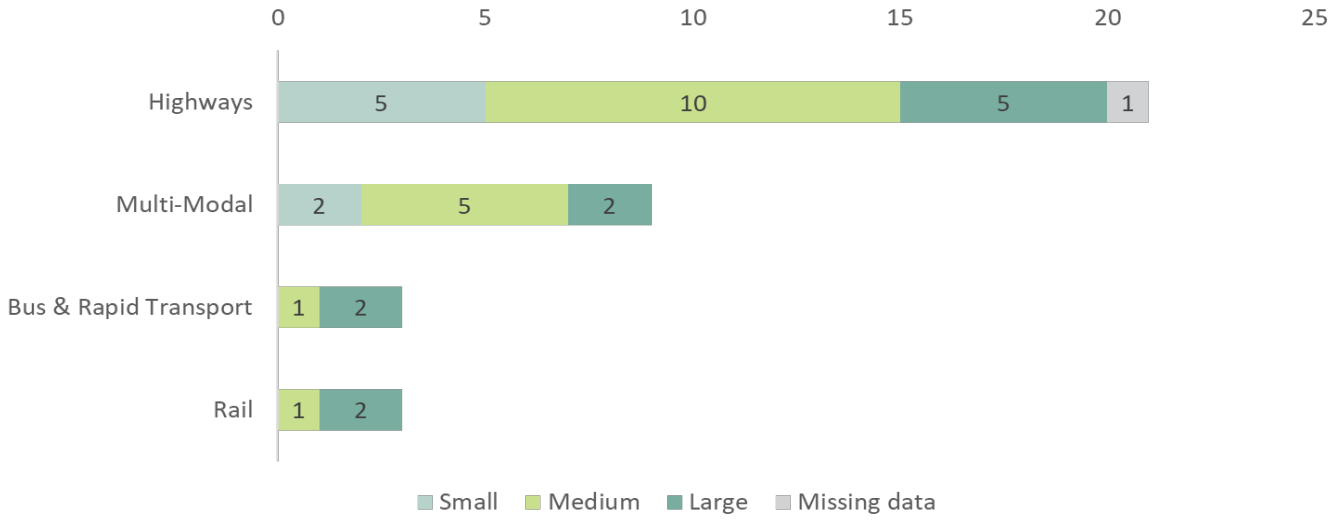

Figure 3-3: Scheme size by scheme type

4. Scheme objectives

4.1 Introduction

Overview and summary

This section provides a review of the schemes' objectives. Scheme objectives have been analysed for all 36 schemes in the sample, which collectively reported a total of 215 objectives. Of these, 39 objectives were not evaluated, as schemes in some cases only evaluated their main 3 objectives, leaving a total of 176 objectives included in the scope of this meta-analysis.

The most reported scheme objectives related to:

- Economic growth and regeneration
- Sustainability and environment
- Efficiency and reliability

Schemes reported that, of these 176 objectives, 27% were fully met, with a further 34% partially met (the assessment of the extent to which a scheme has met its objectives is self-assessed and therefore the definitions of what is partially or fully met may vary across schemes).

About 3% of scheme objectives were not met, while for the remaining 36% of objectives either the extent of achievement was unclear, or schemes did not provide commentary on them.

Methods

The 2012 LMS Monitoring and Evaluation framework specifies that schemes should provide up to 3 main objectives consistent with the best and final funding bid submitted to the DfT. It is not uncommon for schemes to report more than 3 objectives (with schemes on average reporting 6 objectives). The guidance also specifies that the objectives should have appropriate metrics for measurement which should be reported in the 1YA and 5YA reports.

Notably, not all objectives formed part of the schemes' evaluations and were only presented as ancillary or aggregate/high-level aims. For the purposes of the analysis in this section, only evaluated objectives have been considered.

Moreover, a distinction should be made between scheme objectives that define the overarching ambitions for each intervention, and more granular targets introduced for specific topics of analysis. For example, an overarching objective could refer to bolstering the economy, while the analysis of a scheme's local economic impact may refer to a more precise objective of attracting a certain level of workforce to a local area.

This chapter focuses on the status of achievement of the schemes' overarching objectives as reported by scheme evaluators. In contrast, the individual topic chapters throughout the report also consider secondary or narrower objectives and targets. As schemes did not always link the assessments of narrower objectives to an overarching objective, the statistics reported here and in subsequent chapters should be considered separately.

4.2 Qualitative findings

Categories of objectives

The objectives of the 36 schemes have been grouped into the categories presented in Figure 4-1 below.

Figure 4-1: Number of schemes objectives across 36 schemes

Note: Each scheme can have multiple objectives in the same category

The top 3 most reported objectives were:

- 41 objectives related to economic growth and regeneration across 32 schemes (89% of the sample).
- 34 objectives related to efficiency and reliability, reported by 23 schemes (64% of the sample). These included objectives related to reducing congestion and delay time and improving traffic flows.
- 33 objectives related to sustainability and environment, reported by 22 schemes (61% of the sample). These objectives included reducing carbon emissions, pollutants, and noise, and improving biodiversity.

For highway schemes, objectives typically related to:

- Economic growth and regeneration (26)
- Efficiency and reliability (23)
- Sustainability and environment (21)

For bus & rapid transport schemes, objectives typically related to:

- Capacity and usage (6)
- Sustainability and environment (6)
- Economic growth and regeneration (5)

Objectives for multi-modal schemes typically related to efficiency and reliability (6), economic growth and regeneration (6).

The 22 safety objectives which were reported by 20 schemes (56% of the sample) related to reducing collisions and improving conditions for pedestrians, cyclists, and other vulnerable road users. Accessibility objectives (reported by 33% of the sample) typically related to improving links to the town centre and areas of employment.

A quarter of schemes reported on capacity and usage objectives which are related to increasing patronage on public transport and maintaining or expanding road network capacity. Finally, integration objectives include those focused on improving transport links while social and inequality objectives focus on alleviating social exclusion and on improving the liveability of communities.

Achievement of scheme objectives

The achievement of scheme objectives can be broken down by objective type (Figure 4-2). Of the 41 objectives related to economic growth and regeneration, 28 (68%) were either fully met (22%) or partially met (46%). Some of these assessments come with limitations that are discussed in Chapter 14. Correspondingly, 68% of efficiency and reliability objectives were fully (24%) or partially (44%) met and 48% of sustainability and environment objectives were either fully (33%) or partially (15%) met.

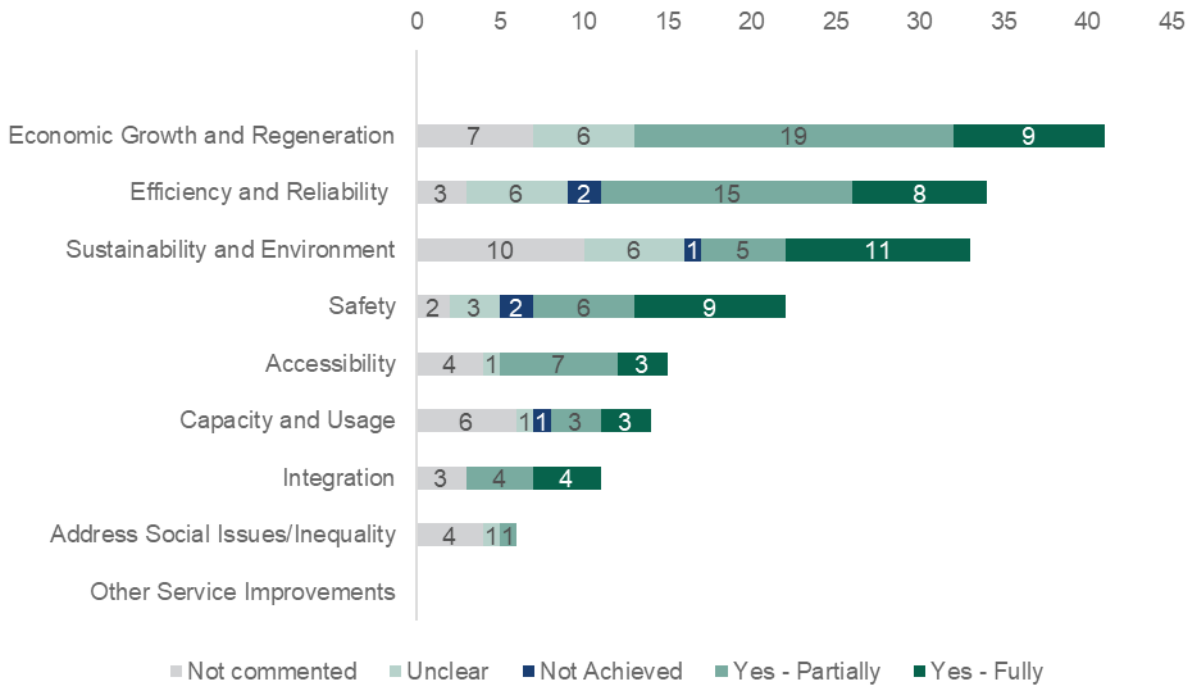

Figure 4-2: Achievement of scheme objectives, by objective type

Figure 4-3 below outlines the extent to which scheme objectives were met. Of the 176 scheme objectives, 41 objectives (27%) were fully achieved, 60 objectives (34%) were partially achieved, and 6 objectives (3%) were not achieved. From the review of the scheme's evaluation reports, it remained unclear whether scheme objectives had been met for 24 objectives (14%), while evaluation reports did not comment on the achievement of 39 objectives (22%). In many cases when a high number of objectives were listed by schemes (for example more than the recommended 3), many are not commented on in full to outline the extent of their achievement.

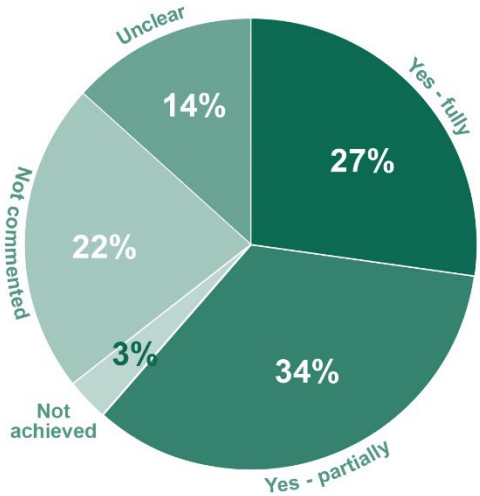

Figure 4-3: Share of schemes' objectives by degree of achievement

Figure 4-4 below shows the achievement of scheme objectives by scheme type. Highway schemes reported a total of 105 objectives, of which 38 (36%) were fully achieved and 40 (38%) were partially achieved. Sample sizes for the other scheme types are much smaller, making direct comparisons challenging. However, as a point of contrast, of the 8 and 29 objectives reported by the respective rail and bus & rapid transport schemes, the majority were not commented on. In the case of the rail schemes this is largely the result of 4 schemes' reports not containing an objectives section. Note percentages may not sum to 100% due to rounding.

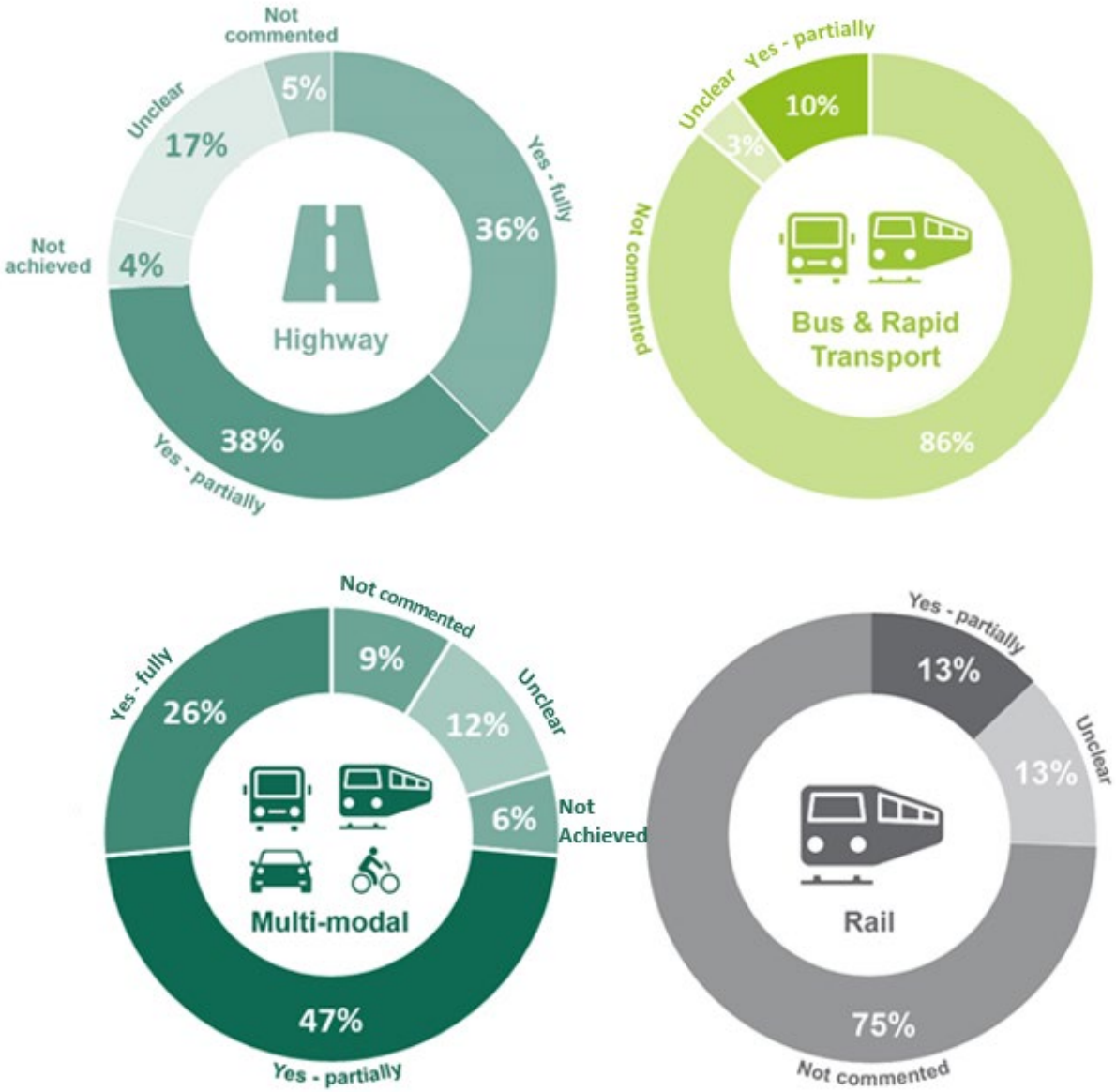

Figure 4-4: Achievement of objectives by scheme type

Scheme inputs

5. Scheme build

5.1 Introduction

Overview and summary

This section analyses the information concerning the construction of schemes, in particular whether interventions have been completed on time, or how early/late they have been built compared to expectations.

The average construction time of schemes was 28 months, though this number was driven up by a small number of lengthy schemes (such as the Manchester Cross City Bus which lasted 65 months due to the need to carefully phase the scheme delivery around other city centre works, utility diversions associated with wider developments, and stakeholder requirements to minimise disruption on the wider highway network), with the majority (64%) of schemes having a construction period of less than 24 months. Of the schemes providing data on delays, 47% were delivered on time (within a 5% deviation from the original forecasts), 20% were delivered with slight delays (between a 5 and 10% deviation in forecast), and 33% were delivered with major delays (more than 10% deviation).

Sample description

- Only 17 schemes provided scheme build data, despite it being a requirement for all schemes. Of these, 9 provided data at the 1YA stage and 8 at the 5YA stage.
- The sample is comprised of 11 highway schemes, 3 multi-modal schemes, 2 bus & rapid transport schemes, and one rail scheme.
- There were 8 standard tier reports (including 2 with additional monitoring), 7 fuller tier evaluations, and 2 enhanced monitoring schemes.

Methods

Scheme build data focuses on construction time, delays and an overall assessment of whether the scheme is on track to deliver its anticipated benefits. Delays to scheme delivery are measured either by number of months or by the percentage delay relative to the initial forecasted delivery time.

5.2 Quantitative findings

Length of construction period

Of the 17 schemes reporting data on scheme build, 14 reported the length of construction period. The majority (9) of schemes had a construction time between 12 and 24 months (see Figure 5-1 below). The overall average construction period across all schemes was 28 months, driven up by the Manchester Cross City Bus (65 months) and Taunton NIDR (48 months) schemes. The average construction period across the 9 highway schemes is slightly lower at 25 months.

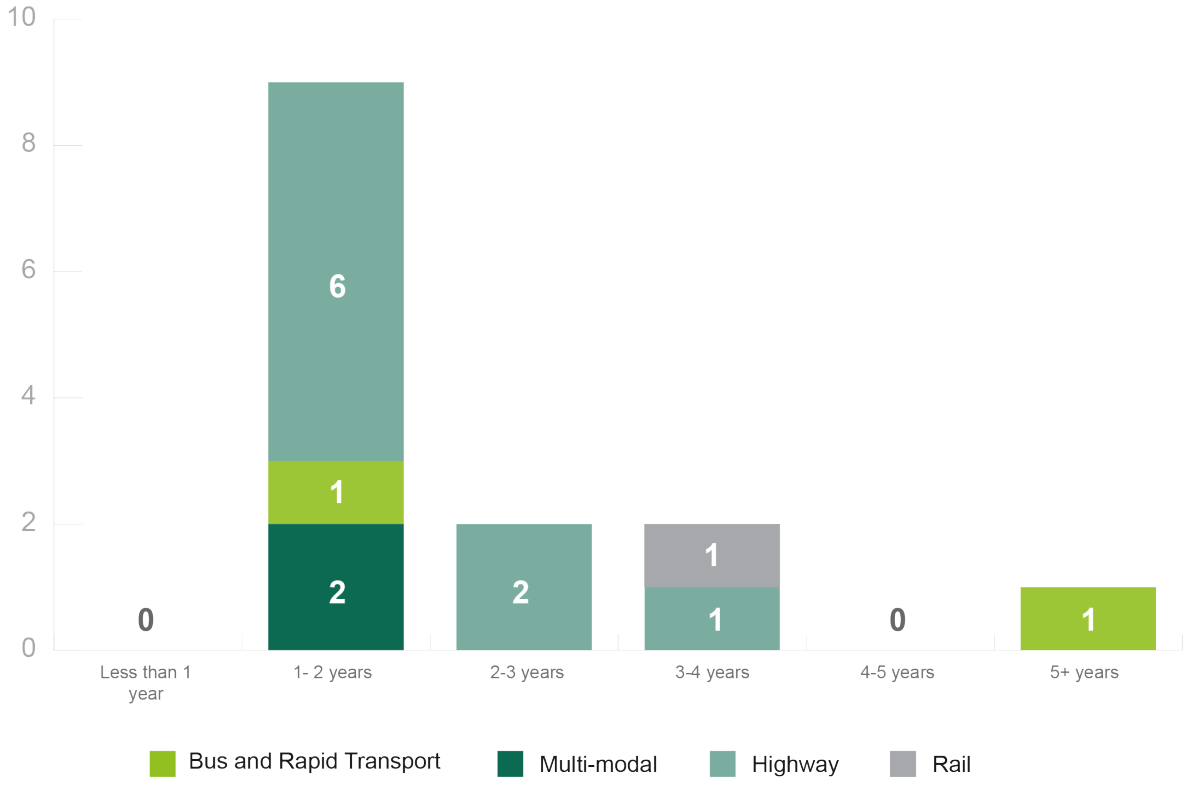

Figure 5-1: Length of construction period

Deviation from initial timelines

Schemes presented deviation from timelines either pertaining to the scheme as a whole or to specific work packages. Where schemes presented the overall scheme delay, this was an average deviation of 7 months from the initial timelines, with all but one scheme (Portsmouth Tipner Interchange) reporting the deviation as a delay as opposed to completion ahead of schedule. The largest delay reported was for Taunton Northern Inner Distributor Road (NIDR), which reported a delay of 29 months.

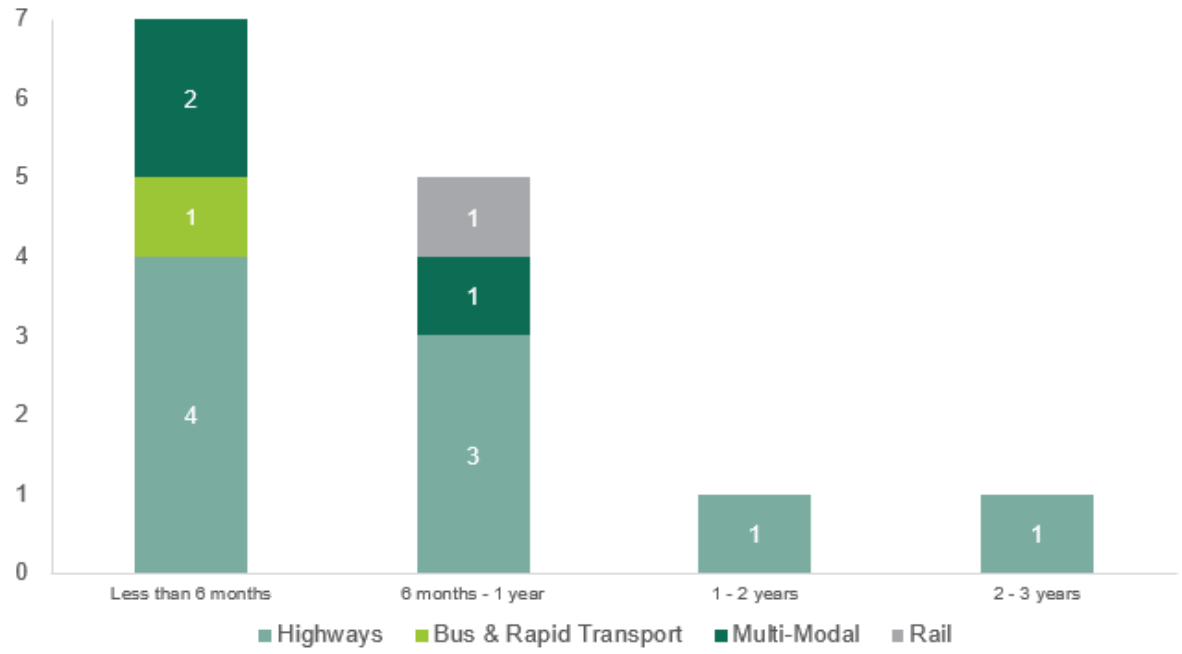

Figure : Scheme delays

Scheme delays can be reported as a percentage deviation from the forecast (Figure 5-2) which was reported by 15 schemes. Of these 15 schemes, one reported that the scheme was delivered more than 10% ahead of forecast, 6 schemes reported that delivery was made on time (no more than 5% deviation), 3 schemes reported a slight delay (5-10%) and 5 reported a large delay (more than 10% deviation from forecasts).

Schemes reported delays for a wide range of reasons, sometimes citing multiple causes. These could include staffing issues, delays in receiving funding, and the discovery of archaeological remains on the site. The most reported causes of delays were poor weather conditions (7 schemes), supply chain issues (5 schemes), requirements for further groundwork (5 schemes), and the impact of COVID-19 (4 schemes).

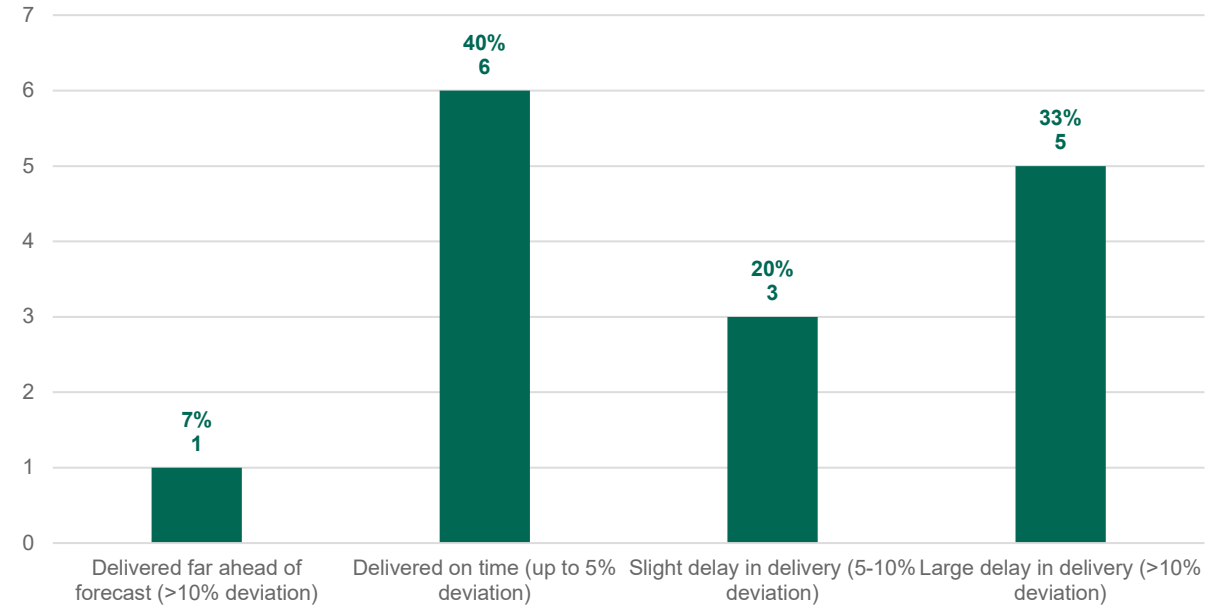

Figure 5-2: Scheme completion compared to original forecasts

6. Scheme costs

6.1 Key findings

Overview and summary

Scheme costs have been provided for 28 schemes. Schemes have adopted a variety of indicators for this topic, with little consistency or overlap across reports. As a result, only the 'total overall costs' metric can be used for comparisons.

- **Overall findings**: jointly, the 28 schemes were forecasted to cost £1.85 billion (including adjustments such as optimism bias). The £1.96 billion of costs reported post-opening represent an overrun of £108 million (+5.8%), with an average of £3.9 million (+3%) per scheme. The drivers of variation are discussed in the additional findings section below.

- **Findings by scheme type:** on average, multi-modal projects had the smallest cost, with a forecast average total cost of £26 million, followed by highway projects at £52 million. The only bus & rapid transport project providing cost forecasts had a planned value of £200 million, while the single rail project with cost data, Nottingham Tram Extension, represents the largest scheme, with a forecast value of £538 million. The group of highway schemes recorded both the largest budget savings and overruns in the sample, ranging from £6.1 million saved (6.8% of the budget, although the largest percentage saving was of 17.1% for another highway scheme) to £39.3 million (41.5%) of overspending. Multi-modal schemes remained within £1.1 million (-4.1%) of underspend and £1.52 million (2.1%) of overspend. The bus & rapid transport scheme increased by £30.7 million (+15.4%), while the Nottingham Tram Extension rail scheme achieved a £1.8 million (-0.3%) reduction.

- **Findings by reporting stage:** the 21 available 5YA reports showed a high degree of convergence between outturn and forecast costs – with an average overspend of £3.3 million (1.5%), although variation is considerable within the sample, especially for highway schemes. Average variation among 1YA reports – all highway schemes but one multi-modal – was more pronounced (+£5.8 million, +7.6%), although this was largely driven by a single scheme (Lincoln Eastern

Bypass) showing over 40% increase in costs (+£39.3 million). Without this, schemes would be on average 1.9% overbudget.

- **Strength of evidence:** overall, the evidence on scheme costs and their deviations from forecasts is moderate-high strength, notwithstanding some important limitations outlined in the next paragraphs.

- **Comparison with previous research:** findings remain aligned with results from the previous meta-evaluation: the average cost overruns per scheme, expressed as a share of forecast costs, have marginally decreased, from 4% in the previous meta-evaluation's sample to 3% in the sample included in this meta-evaluation. Both studies highlight that the overspend increases with scheme size.

- **Suggested improvements:** the comparability of data across schemes could improve with increased standardisation of the reporting of cost items, in line with departmental framework guidance (e.g., breakdown of total costs into operational, capital, and maintenance costs, alongside the time period each cost figure covers). As a minimum, costs should be presented in the same terms as those used in the economic dimension of the business case (e.g., discounted to a common base year). Ideally, costs should also be presented in nominal terms (i.e. the actual costs resulting to the financial analysis up to the time of the evaluation), as well as expressed into a base year aligned with DfT appraisal guidance to maximise comparability across schemes. Moreover, scheme promoters could embed adjustments for optimism bias which increase with scheme size to minimise the risk of cost overruns.

Sample description

All schemes were required to provide data on total, capital, maintenance, and operating costs, including identification of elements with realised cost savings or overruns compared to original plans. Out of the 28 schemes for which cost data is available, 7 provided 1YA data and 21 5YA data. The sample is made of 17 highway schemes, one bus & rapid transport schemes, 9 multi-modal schemes and one rail scheme. Scheme cost data is missing for 4 highway, 2 bus & rapid transport, and 2 rail schemes.

6.2 Additional findings

Total scheme costs have been reported inconsistently across schemes. For example, some only included capital costs (e.g., construction, land), others included maintenance and/or operation costs. Additional comparability challenges are linked to the base year of costs: in some cases, costs are reported in current prices, in others, they have been converted into a base year.

Variation in forecast costs was considerable depending on scheme type, although data had varied coverage for each scheme type, with just one rail scheme available – see Figure 6-1.

The overruns, of 3% on average per scheme and 6% overall across all schemes, were more frequently linked to changes to the project since approval (e.g., additional archaeological or decontamination work needed, and previously unidentified utilities). In isolated cases, these were due to issues such as unplanned protestor action or the contractor going into liquidation. Two schemes drove over half of the overspend and reported major changes to the delivered scheme compared to business case plans.

On the other hand, cost savings were achieved in some schemes thanks to efficiencies in the construction phase by the contractor, or the application of high risks and optimism bias to forecast costs which did not materialise. It should be noted that cost data might not yet be definitive, e.g., where land compensation claims were still being negotiated at the time of the evaluation.

There is a certain degree of correlation ($r = 0.17$) between the forecast scheme size and the percentage outturn-forecast cost deviation, as seen in Figure 6-2. The correlation is moderate after excluding the largest scheme from the calculation ($r^* = 0.47$, with the maximum correlation value being 1 and 0 indicating no correlation). This indicates that forecast cost estimates are typically less accurate for larger schemes, which are associated with a higher cost overrun. Adding an adjustment for scheme size or complexity when forecasting scheme costs may therefore be useful to help prevent future overruns.

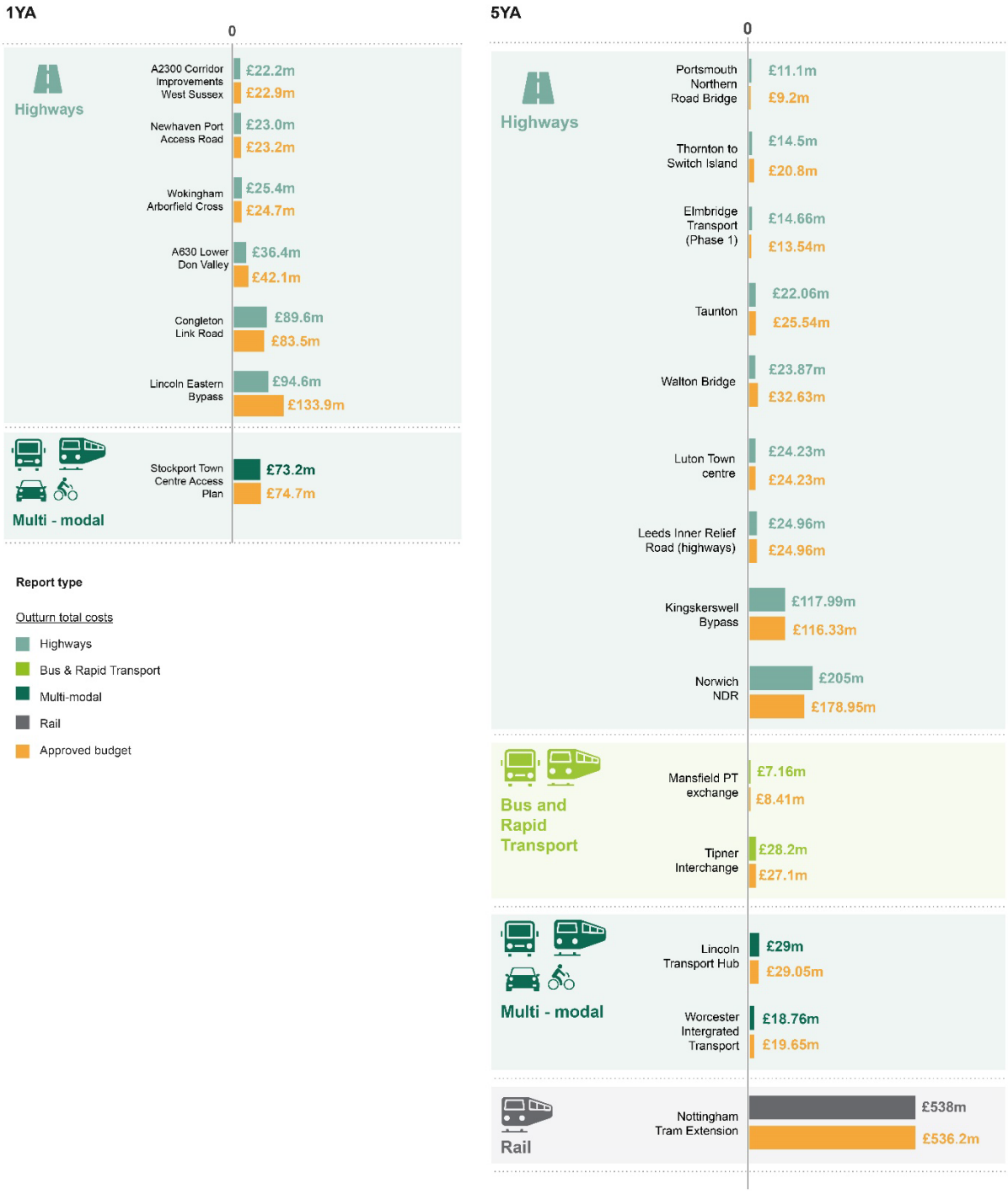

Figure 6-1: Outturn and forecast 1YA and 5YA scheme costs in £m

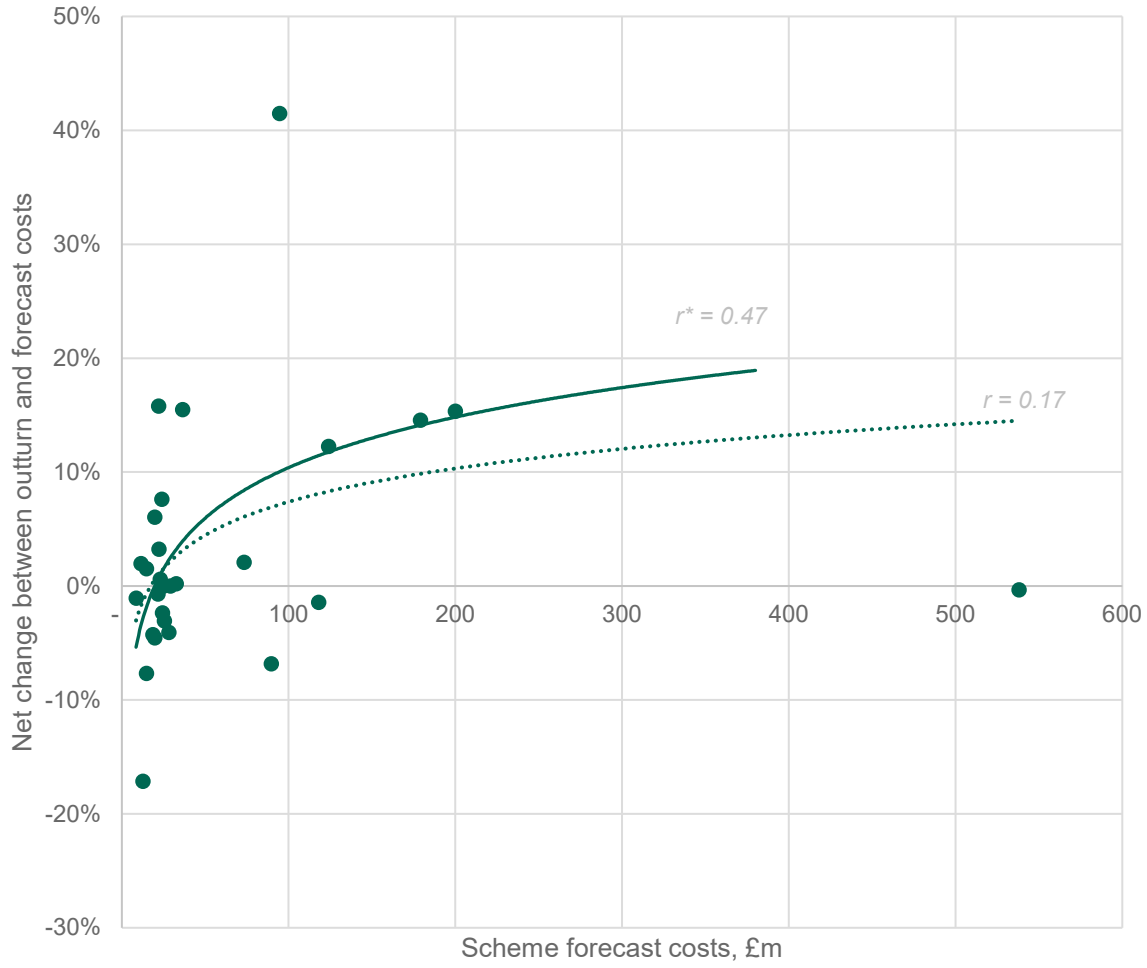

Figure 6-2: Relationship between scheme size and cost under/overruns

Note: the dotted curve represents regression line between costs and budget changes on a logarithmic scale

Scheme outputs

7. Delivered scheme

7.1 Key findings

Overview and summary

This section summarises the evidence concerning whether schemes have been delivered according to the specifications set out in the business case, and what changes to delivery assumptions have materialised. Changes against the business case could relate to changes in the underlying assumptions, mitigation measures, or scheme delivery.

Of the 21 schemes providing relevant information (excluding schemes that did not comment on scheme delivery), 33% were delivered exactly as originally set out in the business case, with a further 52% delivered with minor changes, and 14% making major changes as part of the scheme delivery (total is less than 100% due to rounding). In general, schemes did not report changes to assumptions made as part of the scheme delivery. In the few cases where commentary was provided, it was reported that either no changes were made (2 schemes) or that changes were made to the economic assumptions (2 schemes).

Sample description

Scheme delivery data was available for 26 schemes. The sample is made up of 15 highway schemes, 7 multi-modal schemes, 2 bus & rapid transport schemes, and 2 rail schemes. There were 10 standard tier (including 2 with additional monitoring),14 fuller tier evaluations, and 2 enhanced monitoring schemes.

Method

Scheme delivery metrics compare the extent to which the scheme has been delivered according to what was initially proposed in the business case, including any changes to the assumption made and the extent to which the intended beneficiaries have been reached through the scheme. Findings are reported qualitatively.

Delivery against the business case

Figure 7-1 shows that of the 26 schemes that provided commentary on whether the scheme had been delivered as planned:

- Seven reported that the scheme had been delivered exactly as set out in the business case (6 of which were highway schemes and one rail scheme).
- Eleven had made minor changes since the business case (5 highway schemes, 3 multi-modal, 2 bus & rapid transport, and one rail). Minor changes included amendments made to roundabout lining arrangements (Darlaston Access Improvement), and adjustments made to street lighting, safety rails, and noise fences (Heysham-M6 Link Road).
- Three schemes (one bus & rapid transport, one highway scheme, and one multi-modal scheme) reported that major changes had been made to the scheme since the business case.
    - In the case of the bus scheme, not all the services set out in the business case were operational due to a lack of interest from potential operators for the routes (Bristol Metrobus).
    - The Lincoln Eastern Bypass (highway scheme), which was originally proposed as a dual carriageway, was changed to a single carriageway following a review in which the scheme was subject to cost saving considerations.
    - The Luton Town Centre scheme (multi-modal) changed the location and design of the bus interchange to increase capacity and allow for greater pedestrianisation.
- The remaining 5 schemes did not comment on whether the scheme was delivered as planned.

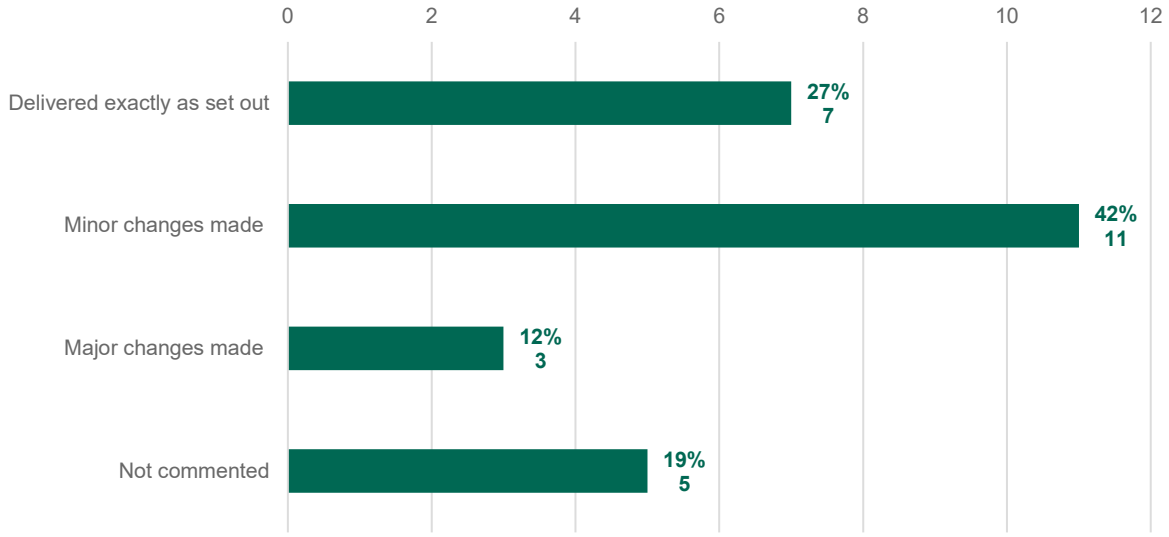

Figure 7-1: Scheme delivery against original plans

Changes to assumptions

In total, there were 4 schemes reporting changes made to assumptions since the business case. One scheme (A2300 Corridor Improvements West Sussex) reported changes in assumptions around travel behaviour, including modified travel demand as a result of COVID-19, and around how travel behaviour reacts to long term road works. Changes to assumptions for the other 3 schemes related to changes in the service frequency (related to unforeseen but unspecified factors) which impacted patronage forecasts; changes to assumptions around local economic activity; and changes to assumptions relating to bus fares and routes.

Scheme outcomes

8. Travel demand

8.1 Key findings

Overview and summary

Depending on the nature of the schemes, traffic demand could be expected to either increase or decrease, particularly in the case of traffic flows. For example, a bypass scheme may have the objectives of reducing traffic flow in a town centre and increasing flows on the bypass itself, while a road which is expected to help develop a new business park would be expected to be associated with an increase in traffic. To account for this, travel demand data in the construction/intervention area (such as the bypass in the example above) has been analysed separately from demand in the target benefit area (such as the town centre in the example above).

- **Overall findings:** when averaging across all data (both 1YA and 5YA) in the target area, where traffic flows would be expected to fall, schemes reported a reduction in outturn traffic flows as measured by both AM and PM traffic flows (-11.5%) and annual average daily traffic flows (AADT) (-44.6%) between the baseline and outturn data. Falls in traffic flows were also reported in the construction area, where they might be expected to increase following the intervention. Specifically, AM and PM traffic flows in the construction area fell by 10% while AADT fell by 14%. Potential explanatory factors, such as COVID-19, are discussed in Chapter 1.

- **Findings by scheme type:** when looking at the target benefit area for highway schemes, where traffic flows are expected to reduce, all schemes reported decreases in outturn traffic flows in both 1YA and 5YA data for both AM and PM flows and annual average daily traffic (AADT). This is in line with expectations that traffic flows should decrease in the target benefit area following the scheme intervention. In comparison to the baseline, AM and PM traffic flows reduced by an average of 15.1% and 21.1% respectively in 1YA data and by an average of 4.0% and 5.9% respectively in 5YA data, though 5YA data was only reported by 4 schemes. Comparatively, even larger percentage reductions for highways schemes were observed when looking at outturn changes in AADT, with an average fall of 41.2% in 1YA data (though based on just 3 scheme reports) and of 49.7% in 5YA

data (2 schemes). Only 4 schemes reported on outturn outcomes for traffic flows in the construction area (aggregating both AM and PM traffic flows and AADT data), where it would be expected that traffic flows would increase. In comparison with the changes seen in the target benefit area, there was a less consistent picture of changes in traffic flows in the construction area, where 2 schemes saw outturn traffic flows increase, while the other 2 saw outturn traffic flows decrease in comparison to the baseline. Relatively few schemes reported data on rail and bus patronage, both of which we would expect to increase following bus or rail scheme interventions. The 2 schemes reporting rail demand both saw increases in the outturn figures when compared to the baseline at both the 1YA and 5YA stages. Results for bus demand were more mixed, with 2 schemes reporting declines in passenger numbers and one scheme reporting an increase in passenger numbers.

- **Deviations from forecasts:** relatively few schemes (5 highway schemes and one rail scheme) provided a comparison between forecasts and outturn travel demand. Four of the 6 schemes reported that outturn results were below forecasts. In the cases where a reason for the differences was provided in these evaluation reports, it was attributed to the effects of COVID-19.

- **Strength of evidence:** the strength of evidence is rated as medium. Travel demand impacts were monitored by 33 of the 36 schemes in the sample which in many cases controlled for effects in both the construction and other nearby sites. Schemes used a variety of indicators to monitor transport demand, making direct comparability difficult.

- **Comparison with previous research:** in the previous meta-evaluation, travel demand was reported anecdotally and not summarised for all schemes, making direct comparisons difficult.

- **Suggested improvements:** to improve the quality of evidence on travel demand outcomes, schemes should consider reporting travel demand changes over the same segments and travel directions, allowing for travel demand-weighting of time savings.

Sample description

Reporting on travel demand was a requirement for all 36 schemes in the sample and relevant data was provided by 33 schemes. Of the 33 schemes, 5 provided a qualitative assessment of the scheme's travel demand outcomes. Data on the change between post-opening and baseline travel time savings was available for 25 schemes at 1YA stage and for 19 schemes at 5YA stage, with 14 schemes reporting at both stages.

Travel demand outcomes are reported by 20 highway schemes, 3 bus & rapid transport, 8 multi-modal schemes, and 2 rail schemes.

8.2 Achievement of scheme objectives

Figure 8-1 presents an assessment of the extent to which schemes have met their objectives. This considers that schemes may have multiple objectives which may either increase or decrease travel demand. For example, a bus scheme may have objectives to simultaneously increase bus patronage and decrease traffic flows. Therefore, the analysis allows for the fact that a scheme may meet some but not all their travel demand objectives.

Of the 33 schemes reporting outcomes on travel demand, 14 either exceeded or fully met all their relevant objectives, while 8 schemes partially met their objectives. Two schemes reported that objectives had not been met. The remaining 8 schemes either did not comment on whether objectives were met or were schemes for which travel demand-related objectives were not relevant.

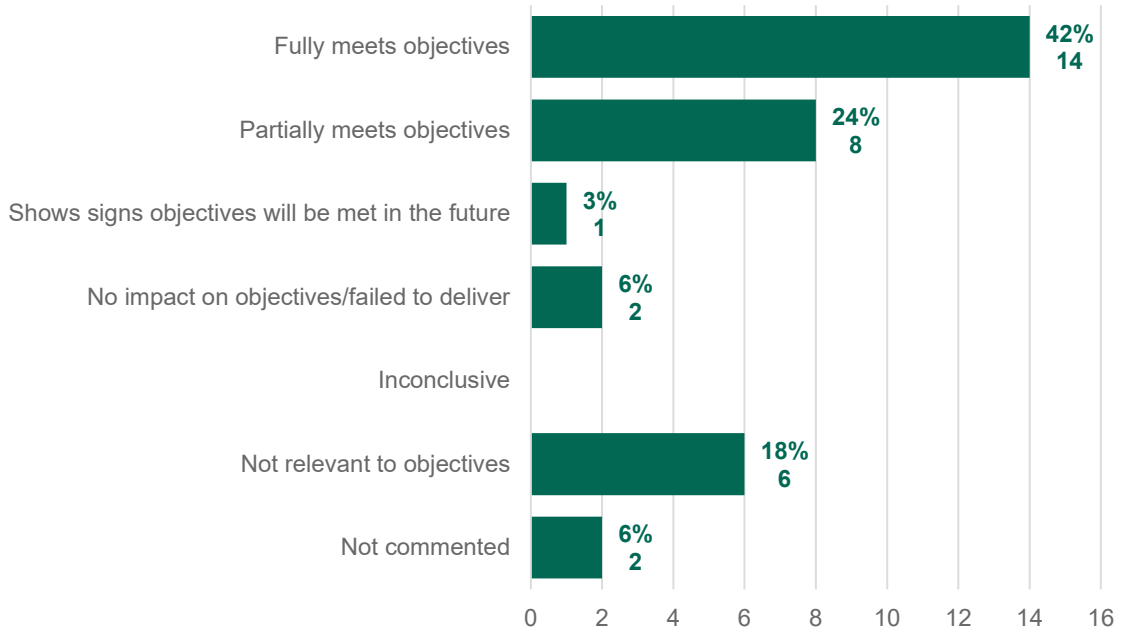

Figure 8-1: Distribution of schemes by status of achievement of travel demand-related objectives (n=33)

8.3 Additional insights

Schemes use a diverse range of metrics to measure travel demand including Annual Average Daily Traffic (AADT), average traffic flows (AM and PM), and Average Weekday Traffic (AWT) volumes. This diversity can make direct comparisons challenging, especially when conducting sub-group analysis for different transport modes.

The analysis differentiates between traffic counts undertaken at construction sites and those in areas meant to benefit indirectly from the schemes, such as city centres bypassed by new roads. This differentiation is crucial for accurately assessing the impact of interventions on travel demand.

Highway schemes generally report a decrease in traffic flows in target benefit areas following interventions, with some variations observed at different stages (1YA and 5YA). Conversely, traffic flows in construction areas are expected to increase, although the results are mixed, with some schemes reporting decreases.

9. Travel behaviour outcomes

9.1 Key Findings

Overview and summary

This section discusses the evidence from scheme evaluations on the change in travel behaviour, in particular the shift of travel demand from one transport mode to another ('mode shift' or 'modal shift'). Mode shift away from motorised private journeys is an important component in reducing carbon emission associated with transport. In particular, the shift to active travel (walking and cycling) is one of the most cost-effective ways of reducing transport emissions, as set out in DfT's (2020) Gear Change plan.

The key difference between this section's analysis and the transport demand section's analysis is that here the focus is on understanding the extent of demand shift between modes rather than on understanding how demand for individual modes changes over time.

A total of 18 schemes provided information on mode shift, with 14 having mode shift as an objective.

- **Overall findings**: quantitative assessments were provided for 5 schemes, with 3 adopting robust methodologies demonstrating a shift from car to new public transport services, and mixed evidence was presented in the 2 remaining schemes. The qualitative assessment of the remaining 13 reports (providing more high-level estimates) mostly points to mode shift from private to public transport, while changes in active travel over time are mixed. About half of the reports commenting on cycling trends found decreases in cyclist counts (4 out of 9).

- **Findings by scheme type:** the 2 rail schemes and 2 of the 3 bus & rapid transport schemes reported evidence in support of a shift from private to active or public transport modes. An additional bus & rapid transport scheme showed evidence of the opposite trend from public to private transport. Mode shift from private to public

transport ranged between 18 to 29% of surveyed passengers for 3 schemes. Evidence was mixed for multi-modal and highway schemes (and made use of medium/low-quality data).

- **Post-opening time trends:** trends were not available for analysis among schemes using moderate to high-quality evidence. Trends have not been assessed for the remaining schemes.
- **Deviations from forecasts:** no data was available for analysis.
- **Strength of evidence:** the aggregate strength of evidence across most of the 18 reports is low to moderate, making it hard to establish whether schemes are generally associated with mode shift. A few individual schemes provided more reliable evidence of a shift away from private vehicles.
- **Comparison with previous research:** the findings above are in line with those from the previous meta-analysis, which reported that it was hard to robustly establish a connection between the schemes and mode shift, despite the presence of some evidence from a small sample of reports.
- **Suggested improvements:** schemes should consider monitoring journeys for every mode rather than for only one or a few modes to understand potential changes to travel behaviour and mode shift. Variation in travel demand, such as counts of cyclists or walkers, alone is not evidence of mode shift. On the other hand, proportionality considering scheme tier and objectives should remain an important criterion in the design of evaluation methods.

Sample description

Out of the 18 schemes providing information on mode shift, 14 reported it as an objective. The evaluation of mode shift outcomes was required for fuller evaluations only, that is for 11 out of the 18 schemes reporting on mode shift. Five fuller evaluations which were required to report on mode shift did not do so. However, schemes might have provided such information at 1YA stage and not reported it again in the 5YA reports which were reviewed for this document.

There were 2 rail, 3 bus & rapid transport, 6 highway, and 7 multi-modal schemes – of which 8 with 1YA and 13 with 5YA data (3 with data at both stages). Information was not reported for one rail, 16 highway, and one multi-modal scheme.

Quantitative data which is descriptive of mode shift was available for only 5 schemes, of which 2 with 1YA data and 4 with 5YA data (one with data at both stages) – with one multi-modal, 2 bus & rapid transport, and 2 rail schemes. Additionally, qualitative data or information which, alone, does not help identify mode shift was available for another 13 schemes, 6 with 1YA data and 9 with 5YA data (2 with data at both

stages). These schemes have been analysed qualitatively and included one bus & rapid transport, 6 highway, and 6 multi-modal schemes.

9.2 Achievement of scheme objectives

Figure 9-1 shows how mode shift outcomes related to scheme objectives. The majority of schemes which reported mode shift outcomes reported to have fully or partly met their objectives (10 out of 18). Another 2 schemes reported no change, while mode shift was not a relevant scheme objective or was not commented upon (e.g., due to lack of evaluation data) for the remaining 6 schemes.

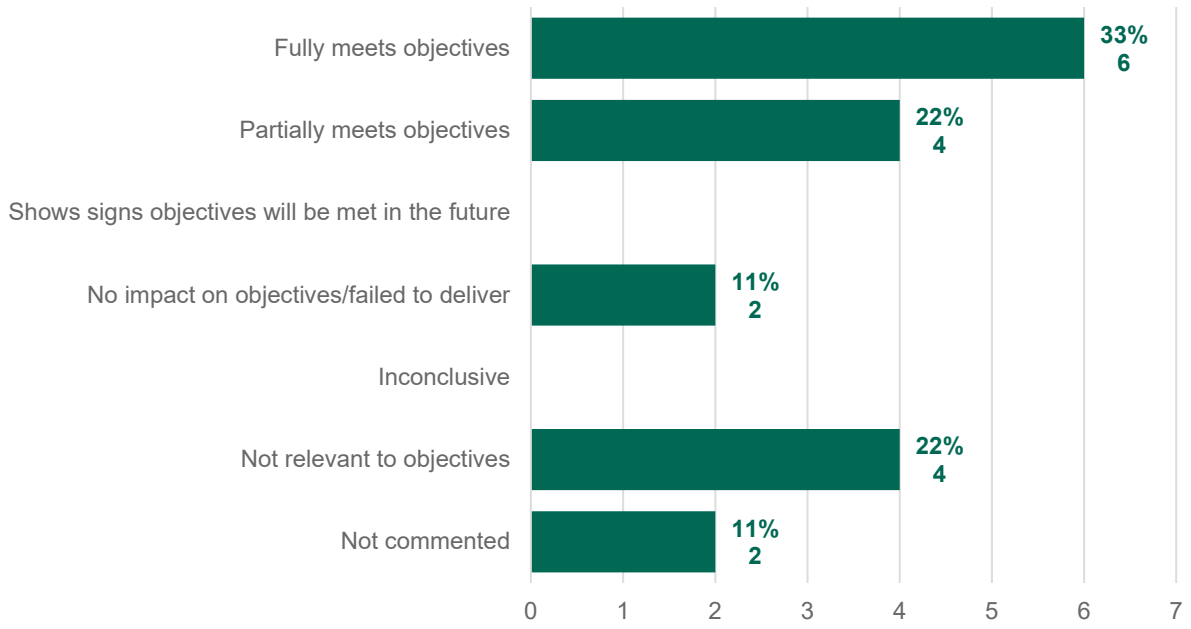

Figure 9-1: Distribution of schemes by status of achievement of mode shift objectives (n=18)

9.3 Additional findings

It has not been possible to aggregate findings using a single indicator to assess the evidence of schemes' mode shift outcomes. The exact approach to assess mode shift requires knowing how transport network users completed their journeys before and after the intervention. User surveys represent an important source of evidence to determine changes in behaviours. Three schemes estimated mode shift by surveying public transport users and checking the share of respondents that declared they would have travelled by car if the scheme had not been completed. The estimated share ranged between 18% (Manchester Metrolink) to 29% (Nottingham Tram Extension) for the 2 rail schemes, with the bus & rapid transport scheme (Manchester Cross City Bus) reporting a shift of 20-25%

It is also possible to infer mode shift via a more high-level analysis of the shares of journeys completed by each mode out of total journeys, with an increase over time of active or public transport shares indicating a potential shift from private transport. However, growth in such share could also happen if the number of active and public transport travellers remains constant and the number of private journeys decreases (say, because the area is no longer attractive to certain workers) - therefore conflating mode shift with other mechanisms. In the Pennine Reach Blackburn bus & rapid transport scheme, the share of bus-based journeys decreased by 0.6 percentage points after 5 years since opening, possibly indicating a nearly negligible shift to private journeys. On the other hand, in the Stockport Town Centre Access Plan multi-modal scheme, the share of non-car journeys has increased by up to 4 percentage points (PM peak), possibly indicating a mild shift away from private transport modes.

10. Time & reliability outcomes

10.1 Overview

A common objective of transport infrastructure interventions is the improvement of travel time and reliability. This is evident among Local Authority Major Schemes, whereby 30 out of 36 schemes analysed in this meta-evaluation provided information about their impacts on travel time, further backed up by 21 schemes discussing reliability impacts. All but 4 and 5 schemes in this sample had travel time and reliability objectives respectively.

The evidence shows with partial confidence that both travel time and reliability outcomes have been achieved on average across the programme. In the cases where positive average outcomes across scheme sites were observed (i.e., reduced travel time, or improved reliability), there may still be occasions of 'winners and losers', meaning that some road segments or public transport services within each scheme might have yet experienced a worsening of travel times and reliability.

10.2 Travel time outcomes

Key findings

Travel time impacts have been monitored by a considerably higher share of schemes compared to other type of impacts, with 25 schemes providing quantitative evidence and further 5 schemes providing qualitative evidence, out of 36 schemes reviewed in this study. The findings below exclude data from construction sites where possible (see section 8 Travel Demand) and refers to unadjusted means.

- **Overall findings:** averaging 1YA and 5YA data, schemes shows an average reduction in travel time of one minute and 27 seconds (corresponding to a -8% change in travel time). The majority of schemes show a drop in average journey times, especially at 1YA stage.

- **Findings by scheme type:** highway schemes showed on average greater reductions in travel times for both AM and PM peaks than multi-modal schemes. However, the distribution of impacts across schemes within scheme type showed that in both cases findings were varied, with approximately half of schemes at 5YA stage for both types reporting average increases in travel time.

- **Post-opening time trends:** 1YA data shows larger time savings of 2 minutes 28 seconds (-13%), compared to more contained savings in 5YA data of 22 seconds (-2%). These findings are achieved by excluding the time impacts along intervention/construction sites (analysed separately where possible). However, the comparison is based on sets of schemes which differ between the 2 stages. Since only 7 schemes provided data for both stages, and no clear patterns were observable within this set, it is not possible to determine specific time trends affecting the travel time outcomes of the schemes.

- **Deviations from forecasts:** comparisons between post-opening data and modelled with-scheme forecasts have been provided by 9 schemes, but 5 presented limitations preventing the ability to draw robust conclusions. In 3 out of the 4 schemes providing more reliable data, post-opening time savings have been found to be marginally lower than modelled forecasts.

- **Strength of evidence:** the evidence for travel time savings is moderately strong. However, the aggregate analysis is based on changes to travel times averaged across sites irrespective of the number of users affected. As such, estimates of the magnitude of the travel time savings should be handled with caution, since segments which experienced greater reduction in travel time savings might also be those where less travel demand is observed after opening (e.g., as traffic is diverted into other areas).

- **Changes from previous research:** these findings are broadly aligned with the findings from the previous meta-evaluation but show some improvement. The previous meta-evaluation found that just over half of the highway schemes reviewed (12 out of 23) had reported positive travel time impacts (i.e. travel time savings), alongside 2 public transport and multi-modal schemes.

- **Suggested improvements:** schemes should consider reporting travel demand and travel time changes over the same segments and travel directions, allowing for travel demand-weighting of time savings. Moreover, one of the modelled forecast years should align as far as possible with the year(s) of post-opening data collection for the evaluation to ensure alignment of the analysis.

Sample description

All 36 schemes in the sample were required to monitor/evaluate travel time outcomes, although information has been provided for only 30 schemes. Five schemes had only qualitative data on the likely changes of travel time related to interventions. Data on the change between post-opening and baseline travel time savings was available for 17 schemes at 1YA stage and for 15 schemes at 5YA stage, with 7 schemes reporting at both stages.

The majority of reports are highway schemes (21), followed by 6 multi-modal schemes and 3 bus & rapid transport schemes. For 4 of the 30 schemes reporting on travel time, the objectives did not include achieving such an outcome. Travel time outcomes have not been reported for 3 rail schemes and 3 multi-modal schemes.

Achievement of scheme objectives

Figure 10-1 shows how travel time impacts related to scheme objectives. Only 4 schemes which reported on time impacts did not have a relevant travel time objective, and all schemes commented on their objectives' achievement. Most of the remaining schemes have reported fully meeting their objectives on travel time, while 6 schemes reported meeting them partially and 2 schemes showed signs of meeting them in the future. For one scheme, the travel time objective was not achieved (as increased travel demand led to an increase in travel times).

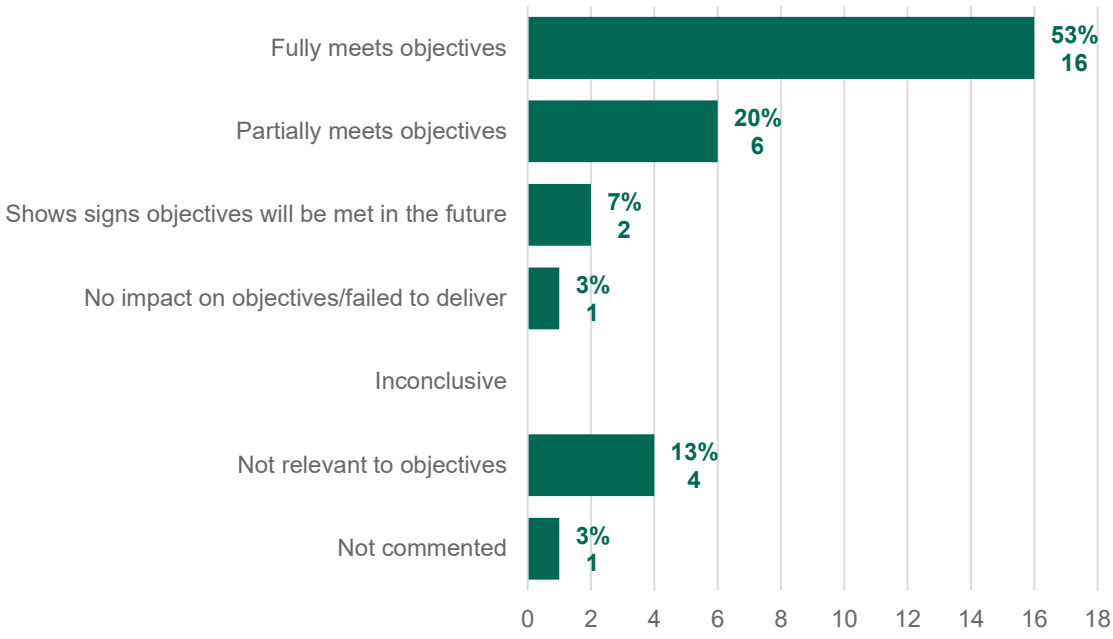

Figure 10-1: Distribution of schemes by status of achievement of travel time related objectives (n=30)

Additional findings

The analysis on travel time outcomes has been segmented based on the type of area analysed, and the type of indicator employed. In particular, data concerning changes to travel times on segments of infrastructure subject to intervention (e.g., enlargement or other improvements) has been analysed separately from data concerning other areas as far as possible. Cross-scheme averages have then been derived for schemes using the same indicator type, i.e. AM or PM peak traffic flows. All reported scheme-level outcomes refer to the simple (unweighted) average of changes to travel times across different segments, unless otherwise stated. This does not take into account the varying number of users on each segment and should be deemed as less robust than analyses adjusting for segment-level demand (i.e., based on average travel time weighted by the traffic flow on a given segment) or length of the segment.

Weighted analysis can yield lower time savings or larger time increases between baseline and post-opening compared to the unweighted analysis. This should be considered while interpreting the rest of the analysis.

Looking at the 5YA schemes with available data from areas directly affected by construction, the analysis shows negligible or positive impacts (savings of up to one minute 39 seconds for AM peak). This suggests that areas where improvements have been made have seen reductions in travel times.

There were 13 further schemes with 1YA data and 12 schemes with 5YA data on AM/PM peaks for areas where it was not possible to isolate observations for construction areas only. In these cases, data from both reporting stages showed positive impacts on average, although to a greater degree for 1YA data (savings between one minute and 45 seconds and 2 minutes and 4 seconds or a drop between -10/-12%, compared to 25 to 50 seconds saved for 5YA data, or -4%). Data for these schemes is visualised in Figure 10-2 and Figure 10-3.

A reduced number of schemes reported using other types of indicators (e.g., bus journey times, weekday journey time, or 10h journey time) – with no consistent observable pattern.

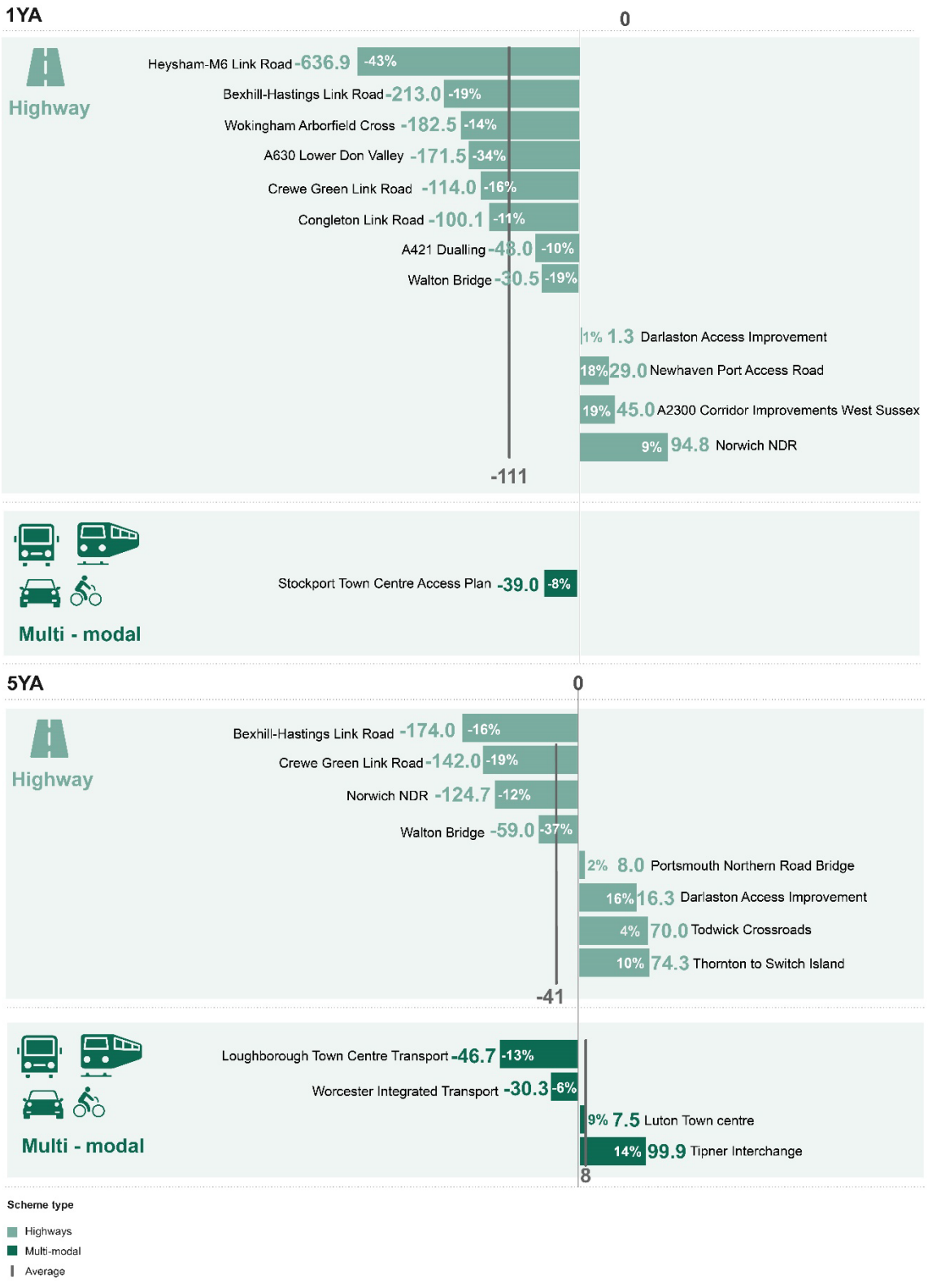

Figure 10-2: Baseline to post-opening changes in unweighted average AM peak road travel time - target benefit areas or mix of target and construction areas (seconds)

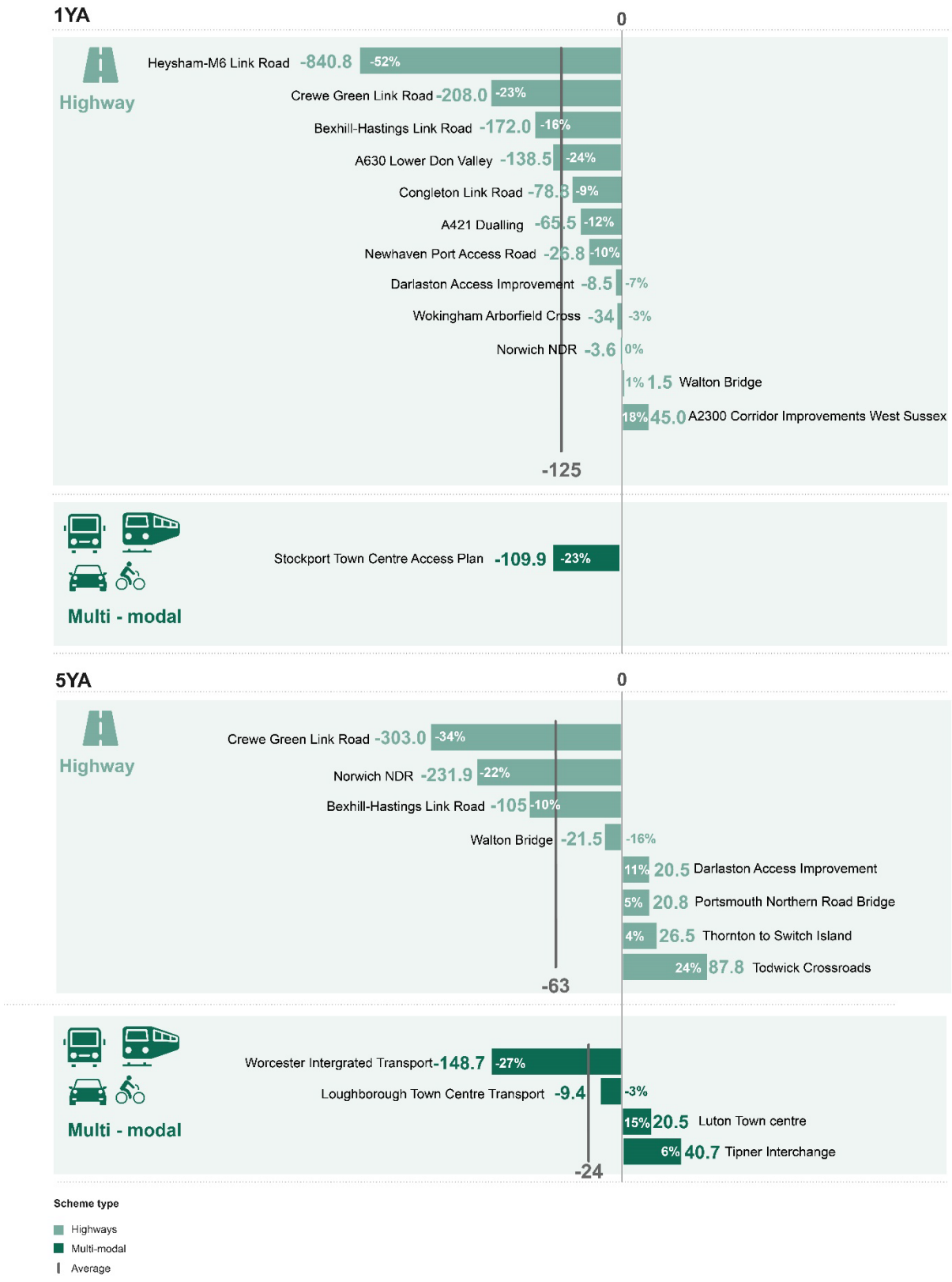

Figure 10-3 Baseline to post-opening changes in unweighted average PM peak road travel time - target benefit areas or mix of target and construction areas (seconds)

10.3 Reliability outcomes

Key findings

In total 21 schemes provided information on reliability impacts, with 10 providing quantitative data and 11 qualitative.

- **Overall findings:** across all 21 schemes, 12 (57%) reported positive trends in reliability using a variety of measures, and 4 (19%) suggested that the intervention led to a worsening of journey time reliability or mixed outcomes. In most cases, the worsening has been relatively small. The remaining schemes provided mixed or unclear evidence or displayed no/negligible outcomes.

- **Findings by scheme type:** among the 3 bus & rapid transport schemes, 6 multi-modal schemes, and one rail scheme, 5 reported positive outcomes, 4 negligible or no change, and one negligible or no change. Of the 11 highway schemes, 7 reported a positive impact while 3 reported negative or mixed outcomes, and one negligible or no change.

- **Post-opening time trends:** there is limited data available to assess specific trends between 1YA and 5YA observations.

- **Deviations from forecasts:** data was not available for an aggregate analysis of deviations from forecasts.

- **Strength of evidence:** it is hard to assess the effective strength of evidence. Analyses of reliability impacts often rely on a variety of secondary data sources whose robustness and extent of comparability have not been evaluated here. Service punctuality data for schemes involving public transport may be assumed to offer a good representation of the before/after change in travel reliability. On the other hand, not all of these schemes also assess reliability impacts from private means of transport (e.g. cars), hence offering a partial representation of the overarching scheme effects. Travel reliability evidence from highway schemes may be assumed to be of moderate/high strength since it is based on traffic data, yet it is still subject to caveats including lack of analysis for areas surrounding construction areas, or partial data comparability across schemes.

- **Comparison with previous research:** compared with the ‘largely inconclusive’ findings of the previous meta-evaluation, evidence from public transport schemes (the sole scheme type for which reliability was previously assessed) has now more clearly demonstrated positive impacts, especially when considering schemes which provided quantitative rather than qualitative assessments. At the same time, even in this iteration of the meta-evaluation there may be ‘winners and losers’ within each scheme (with individual services or segments within a scheme receiving positive or negative reliability impacts from the intervention).

- **Suggested improvements:** future meta-evaluation would benefit from a standardisation of reliability metrics to be monitored by scheme promoters, limiting the proliferation of alternative reporting approaches. This should leave room to accommodate specific needs for example by scheme type (with public transport reliability measuring services arriving on time compared to private travel reliability measuring travel time against free-flow). Comparisons with forecasts remain an area for improvement across most schemes.

Sample description

All schemes were required to monitor reliability outcomes, with information provided by 21 schemes, 19 of which had reliability as an objective. The sample includes one 5YA rail scheme, 3 bus & rapid transport schemes (of which one is at 1YA stage and 2 are at 5YA stage), 6 multi-modal schemes (of which only one is at 1YA stage) and 11 highway schemes (of which 3 are at 1YA stage). The sample captures information for most of the non-highway schemes, while 10 of the 21 highway schemes are not captured.

Achievement of scheme objectives

Figure 10-4 shows how reliability impacts related to scheme objectives. Excluding the 5 schemes where reliability impacts were not a relevant objective or did not comment on the achievement of the objective, 69% of the schemes (11 schemes out of 16) reported to have partially or fully met reliability objectives or showed signs to meet them into the future. Excluding the above mentioned 5 schemes, the remaining 25% of schemes (4 schemes out of 16) reported no impacts on reliability objectives.

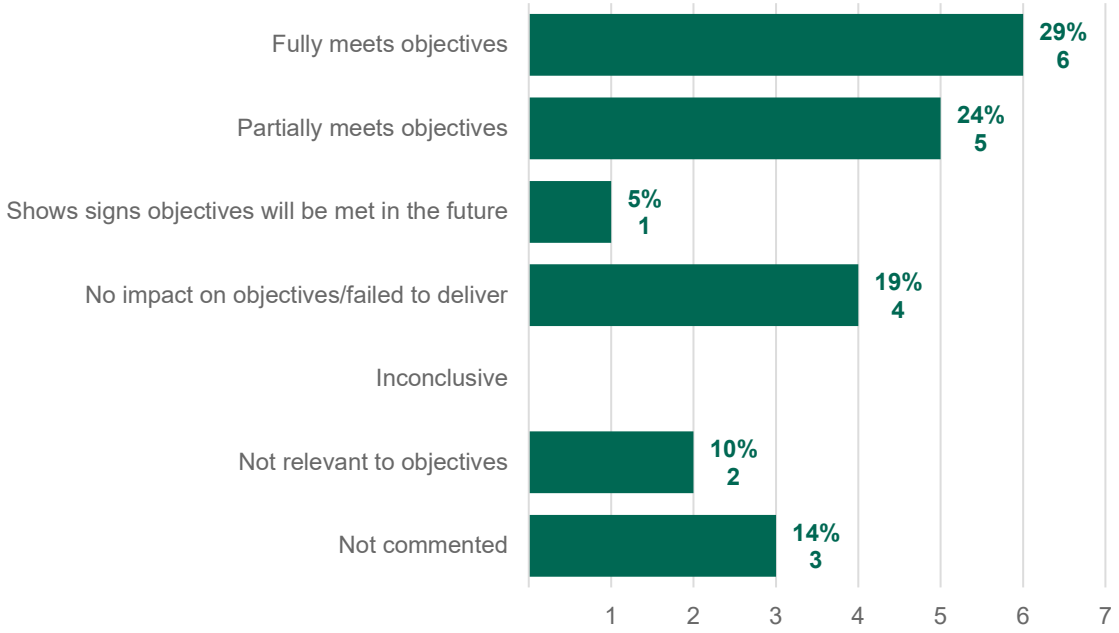

Figure 10-4: Distribution of schemes by status of achievement of reliability related objectives (n=21)

Additional findings

Most of the evidence pointed towards positive average change in transport network reliability. For 3 out of 4 schemes reporting data on public transport punctuality, reliability improved on average. This can be seen in Figure 10-5, which shows the percentage point change in the average share of services arriving on time per scheme (noting that for Bristol Metrobus this is averaged between first stop and intermediate stop reliability).

In terms of impacts on reliability for road trips, 16 schemes provided a mix of quantitative and qualitative data, of which displaying positive average trends in the case of 11 schemes, negligible or no change in 2, and negative in 3 cases.

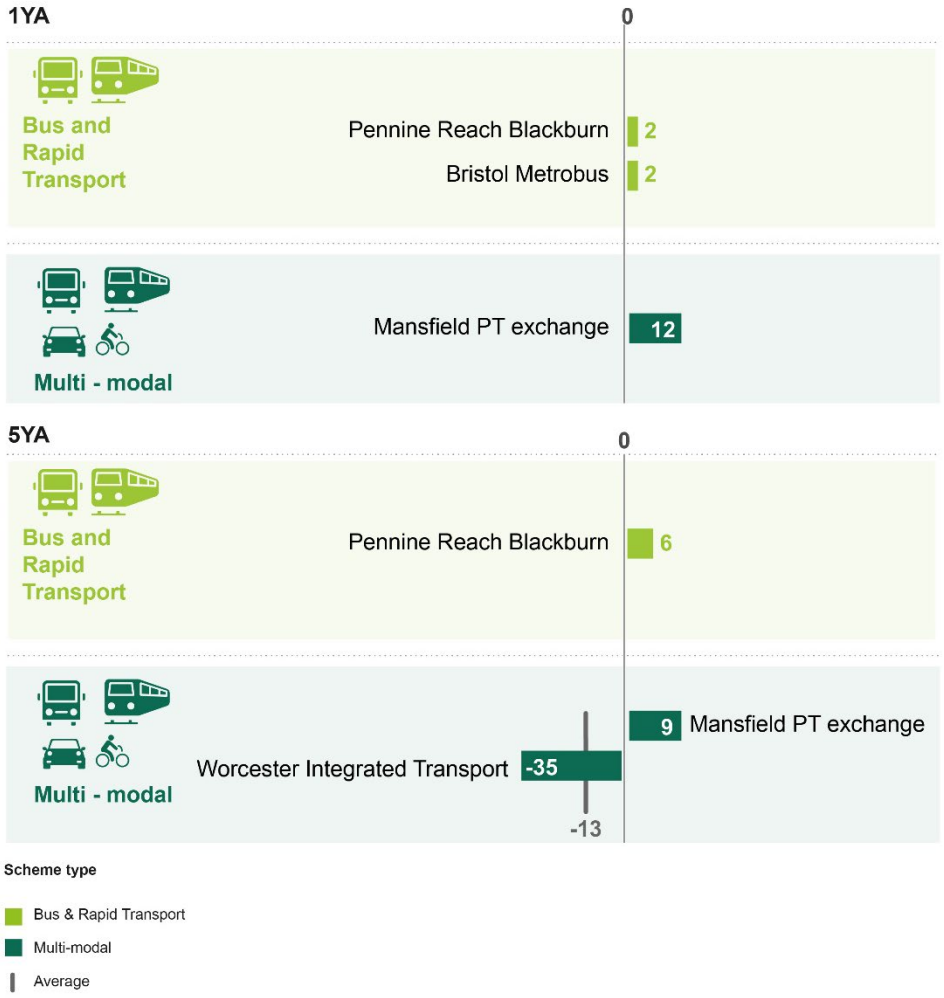

Figure 10-5: Baseline to post-opening change in average share of services arriving on time (percentage points)
Note: a 10 percentage point change means for example that a scheme with 80% of services arriving on time at baseline has reported 90% of services arriving on time after intervention.

Scheme impacts

11. Local economic impacts

11.1 Key findings

Overview

This section focuses on the local economic and social impacts (economic impacts for brevity) of LMS. These are impacts which affect the local economy beyond the direct benefits to the users of the transport network. For example, they include commerce, labour market, deprivation, and tourism impacts, but they exclude travel time savings for business travellers.

The breadth of the topic and the variety of indicators monitored even for the same type of economic impact (e.g., when looking at labour market impacts, number of jobs created, employment and unemployment rates in an area) make the aggregation and comparison of findings across schemes highly challenging.

For this reason, this section presents findings in a qualitative manner building from a mix of quantitative and qualitative data presented in the reports, aggregated into broader impact types, if not across all impact types per scheme. Impacts are classified as 'positive' if they are beneficial or advantageous to the local economy or provide societal benefits. For example, an increase in employment rates, higher productivity, more housing developments, or improved business performance would be considered positive impacts.

It should be noted that while reports have often monitored trends in economic indicators in key impact and benchmark areas, they typically did not or could not evaluate whether the observed changes were directly *caused* by the transport schemes. The causal assessment of the observed changes in economic indicators is more difficult to derive for local economic impacts due to several factors influencing local economic conditions beyond transport infrastructure, including the composition of local businesses and the evolution over time of demand and supply in their markets,

population movements, and wider policy and investment landscapes, including at regional or national levels.

Where this report describes schemes' economic impacts, these should be interpreted as simple economic trends in the areas where schemes have been delivered. For the top 3 most recurring types of economic impacts monitored by schemes (commercial and business, labour market, and housing), this meta-evaluation has nonetheless isolated the evidence that is based on methodologies which more confidently allow an understanding of the impacts caused by schemes.

Summary

Overall, 32 schemes have provided information on economic impacts, although only 14 of these were required to do so because of their evaluation tier. The sample is mostly composed of 5YA reports (24, or 75%), with highways schemes representing the majority of scheme types (19, or 59%).

- **Overall findings:** in general, looking across the changes in all economic indicators reported, economic trends are mostly positive (either in absolute terms or compared to benchmark areas). Over two-thirds (22, or 69%) of schemes reported positive change in local economies across the various set of indicators they monitored, with the remainder (10, or 31%) showing mixed trends (positive for some indicators, negative for others). Trends should not be interpreted as scheme impacts, for reasons discussed above.

- **Findings by scheme type:** the share of schemes by scheme type that reported positive trends was 78% for highway (14 out of 18), 63% for multi-modal (5 out of 8), 67% for rail (2 out of 3), and 33% for bus & rapid transport schemes (1 out of 3). The remaining schemes reported mixed impacts depending on the set of indicators analysed (e.g., positive for housing and negative for commerce). However, this should not lead to the conclusion that highway schemes provide on average greater local economic impacts than other scheme types, due to the lack of robust assessments.

- **Post-opening time trends:** it is not possible to robustly establish the presence of clear time trends. On one hand, the share of schemes reporting positive trends at 5YA is over twice the share for 1YA stage reports (respectively at 79% and 38%, with the remainder of each share representing schemes with mixed trends). However, this might be due to reasons which cannot be validated, including economic impacts requiring longer to materialise since scheme opening compared to other impacts, to the effect of COVID-19 on data (with 2021 data being used in 3 out of 8 1YA reports), and to background wider economic trends evolving over time.

- **Deviations from forecasts:** comparisons against forecasts were produced by a reduced set of schemes (10) and indicators. In most cases (8), impacts were below expectations (but again this does not entail schemes were not successful, since trends could have been worse in the absence of schemes).

- **Strength of evidence:** overall, the strength of evidence is low – with the exception of moderate strength for the top 3 impact types (commerce & business, labour market, and housing) in the case of rail schemes.

- **Comparison with previous research:** there are no major changes compared to the findings of the previous meta-evaluation, which came across similar issues around the attribution of observed changes to the schemes, with business surveys providing more reliable evidence on commercial and business impacts.

- **Suggested improvements:** evaluating economic impacts is a complex activity which requires assessment of causality for findings to be considered robust. The indicators of interest for a given scheme might not always lend themselves to such analysis. Scheme promoters are invited to fully assess how measurable their economic objectives are when defining them. If delivering robust quantitative evaluation methods is unfeasible (for technical or proportionality matters), promoters should consider whether alternative qualitative methods are available to develop a reliable narrative on the likely intended and unintended impacts.

Sample description

There are a total of 32 schemes commenting on various types of economic impacts, which includes 8 schemes at 1YA stage and 24 schemes at 5YA stage. Out of the 16 schemes qualifying for fuller evaluation reviewed as part of this meta-evaluation, 14 reported on local economic impacts. Moreover, 25 of the 32 schemes with available data for this topic had local economic development as an objective. Out of the 32 schemes, there were 18 highway (6 1YA and 12 5YA reports), 8 multi-modal (one 1YA and 7 5YA reports), 3 bus & rapid transport (one 1YA and 2 5YA reports), and 3 rail schemes (all 5YA reports).

11.2 Achievement of scheme objectives

Figure 11-1 shows how local economic impacts related to scheme objectives. Over a fifth of the schemes which reported on these impacts did not have a local economic impact objective as an aim for the scheme. Nine schemes reported to have fully met their local economic impact objectives, while 11 schemes reported to have partially met their objectives, with an additional scheme reporting signs that objectives will be met in future.

It should be reminded that the achievement of scheme objectives may be due to concurring factors beyond the delivery of the scheme and should not necessarily be interpreted as *caused* by schemes (e.g., employment may have increased in the whole local area irrespective of the scheme).

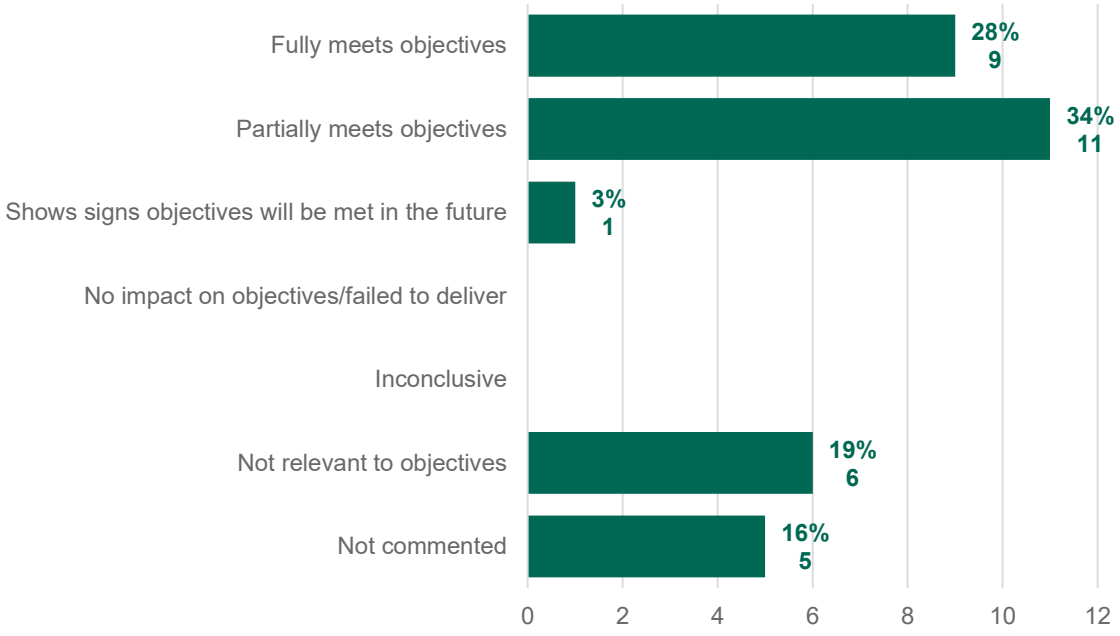

Figure 11-1 Distribution of schemes by status of achievement of local economic impact related objectives (n=32)

Focus on: Measuring local economic impacts

To effectively measure the impacts of LMS on housing, employment, and other socio-economic factors, it is essential to adopt robust methodologies that ensure accurate and reliable results.

Crucially, it is very difficult to evaluate whether and to what extent a given scheme has *caused* the observed changes in local economic conditions over time. This is due to several other factors affecting the local economy beyond transport infrastructure maintenance or upgrades, and the proportionality of evaluation methods adopted in light of scheme size. Take for example a scheme aiming to promote growth in a business area by improving its public transport connections with other areas and hence improve job market accessibility. Although the scheme may have successfully increased the frequency of local public transport services, the presence of more attractive businesses elsewhere might mean that fewer people decide to commute to the business area. The outturn employment trends in the area might therefore appear as decreasing. However, it would be wrong to conclude that the scheme had a negative impact on the local economy; in fact, it might be argued that without the scheme, even fewer people would have decided work in the business area (the scenario describing what would have happened in the absence of the scheme is named ‘counterfactual’).

To tackle this issue, some reports have benchmarked local economic trends in areas surrounding the scheme with those observed in wider areas, with the aim to contextualise their findings. Benchmarking involves comparing local economic trends in areas surrounding the scheme with those observed in wider areas to contextualize findings. While this approach could be considered proportionate to scheme size, it does not represent a robust counterfactual since it does not account for any other possible factors that may have impacted the scheme location but not the benchmark areas.

Compared to the approach above, assessments based on stakeholder engagement and surveys or other qualitative or semi-quantitative analysis specifically examining the causal connection between the scheme and observed outcomes can provide a more ground-based perspective. An example is surveying the propensity of travellers to changing job to a business in the scheme’s area had the scheme not been delivered (although this is still subject to potential biases, e.g. small sample sizes). As such, for the 3 most frequent impact types (commercial and business impacts, labour market impacts, and housing impacts), the analysis in this section assesses overall qualitative trends both across all schemes and for a subset of schemes for which a more confident attribution of observed change to the scheme delivery is possible.

Please refer to the DfT’s updated benefits management and evaluation framework from 2025 for best practice.

11.3 Additional findings

To allow a comparative assessment of findings, notwithstanding the breadth of indicators employed by schemes, impacts have been grouped into wider impact types (e.g., labour, commerce, etc.).

Impacts within a type for a given scheme have been classified as positive if every indicator for that type showed positive trends. Impacts have been classified as negative if all indicators for that type and scheme showed negative trends. If a scheme had some indicators showing positive trends and others showing negative trends within the same type, the impact within that type has been classified as mixed.

Out of 80 combinations of schemes and impact types, three-quarters are classified as positive impacts (61 cases, or 76%), led by 22 schemes showing positive commercial and business impacts. In 7 combinations (9%), schemes displayed negative local economic trends, distributed across different impact types, especially in the labour markets (4 schemes), for example, because of decreasing employment trends in the scheme area, which might not be directly linked to scheme delivery but to other socio-economic conditions.

Looking at the distribution of schemes' impacts within the 3 most frequently reported impact types (Figure 11-2), labour market impacts record the most varied trends across schemes, with 7 schemes out of 16 (44%) showing positive trends, 4 schemes (25%) showing negative trends, and 3 schemes (19%) showing mixed trends (i.e., improvement in one labour market indicator and worsening in another; the rest being unclear, negligible, or no change). Conversely, commercial and business impacts have been more consistently reported as positive, in 22 (92%) of cases overall, with negligible, or negative impacts reported each in just one (4%) case, out of 24 schemes. Housing impacts are discussed in the Focus box further below.

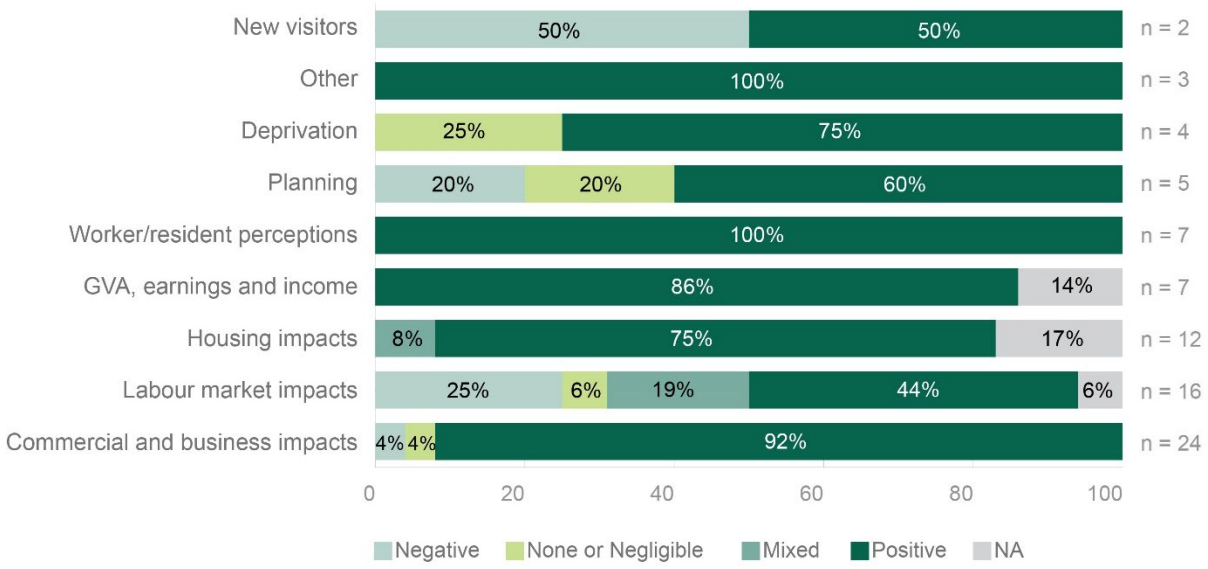

Figure 11-2: Distribution of schemes qualitative impacts within each local economic impact type

Focus on: Housing impacts

Twelve schemes reported impacts on actual, rather than planned, housing developments (Figure 11-3). The schemes show mostly positive impacts, with just one scheme, Pennine Reach Blackburn, reporting mixed housing trends as new homes built in areas of interest increased over time, but the number of affordable houses delivered decreased. For the 3 schemes providing more unequivocal evidence on the causal impact of the scheme on local housing (e.g., thanks to the collection of direct opinions of involved stakeholders), all evidence shows positive trends. The type of evidence assessed includes consultation with local stakeholders, data analysis of build-out rates, and references to the business case identifying the schemes as required to unlock developments in certain areas, which did come forward after scheme completion.

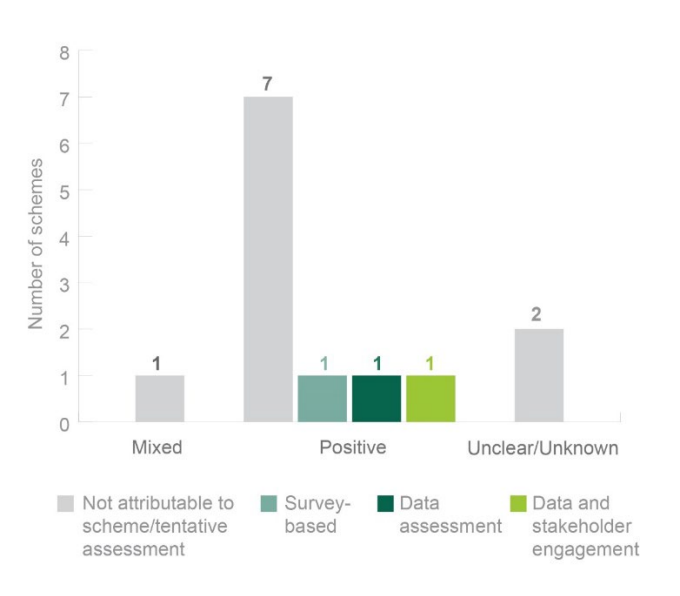

Figure 11-3: Number of schemes by qualitative housing impacts and type of evidence (N = 12 with one scheme providing evidence of positive impacts of 2 types)

12. Environmental impacts

12.1 Overview

Environmental impacts look at how schemes affected carbon emissions, air quality, and noise. The monitoring of carbon impacts is required for all schemes (this does not include operational, maintenance, or replacement emissions impacts which were not the focus of the 2012 LMS Monitoring and Evaluation framework, though going forward schemes are encouraged to monitor whole-life carbon).

Noise and air quality monitoring is required for enhanced and fuller schemes. Figure 12-1: Number of schemes measuring environmental impacts, broken down by 1YA and 5YA reviews reporting environmental data quantitatively and total schemes (including schemes with only qualitative reporting) presents the number of schemes that reported on their environmental impacts and the number that provided a comparison of 1YA or 5YA data and the baseline (pre-opening) level (quantitative assessment) as well as the overall number of schemes reporting their environmental impacts including qualitatively.

Schemes rarely presented evidence in the evaluation on other potential environmental impacts, such as biodiversity, landscape/townscape, water and heritage which is not required by the guidance (see Section 12.5 for further information).

Of the evaluations that reported their environmental impacts, evidence is mixed and partial and varies by sub-topic (carbon, air quality, or noise).

- For multi-modal and rail schemes, there has been a consistent reduction in carbon emissions suggesting public transport/multi-modal interventions are stronger drivers of reduced carbon emissions than highway schemes, which show mixed carbon impacts. However, the number of non-highway schemes reporting on carbon impacts is low compared to highway schemes, limiting the robustness of

comparisons by scheme type. Importantly, none of the schemes included whole-life carbon impacts of the delivered infrastructure.

- Reported results were similarly mixed for schemes impact on noise, with 4 schemes reporting falls in noise and 3 reporting increases in noise when comparing outturn and baseline results.

- The most consistent results were found when looking at air quality, where all but one of the 14 schemes reported air quality improvements when comparing baseline and outturn levels. It should be acknowledged that in general evaluation studies did not take into account the general improvement in vehicle fleet which would contribute to improvements in air quality.

Across the 3 environmental metrics, schemes often employed different indicators, measurement techniques, and units of measurement which created challenges in making direct comparisons across schemes. In addition, the number of measurement sites and the extent to which measurements are taken at locations beyond the direct intervention sites to take account of knock-on impacts, differs considerably across schemes, meaning the comparative results should be interpreted with caution.

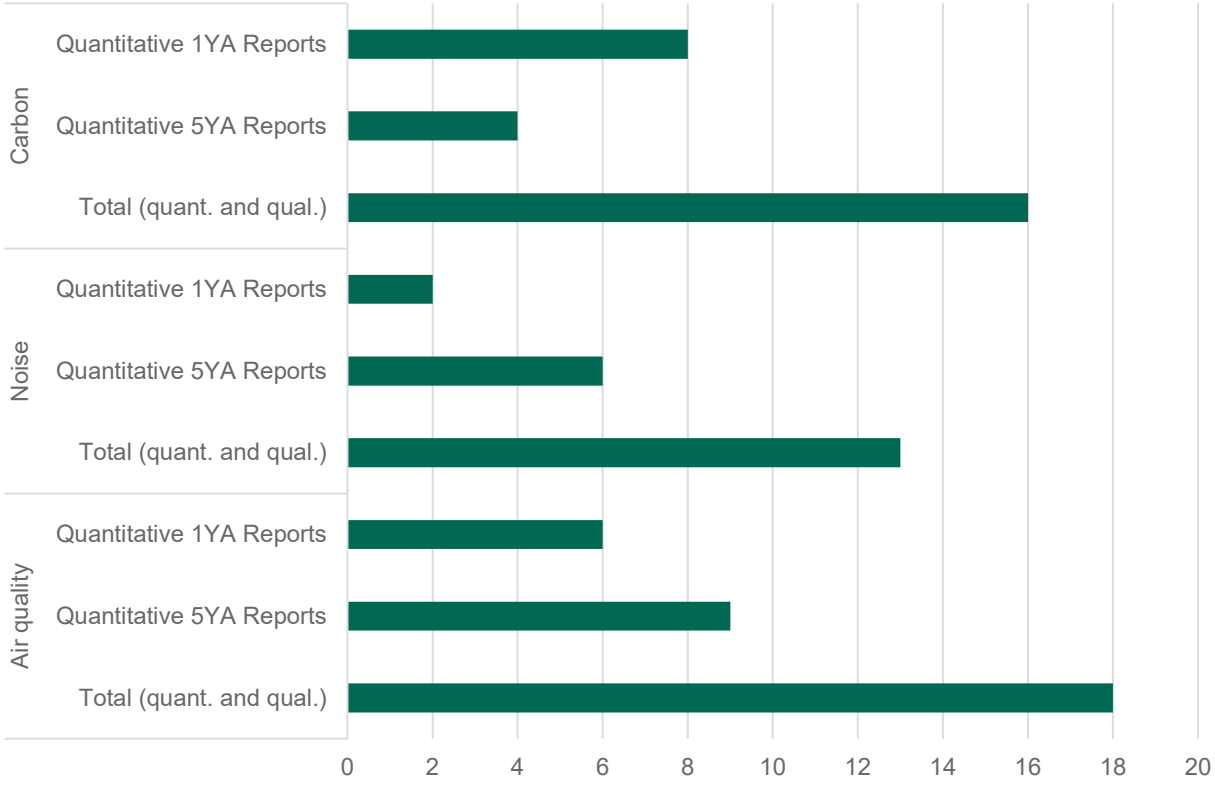

Figure 12-1: Number of schemes measuring environmental impacts, broken down by 1YA and 5YA reviews reporting environmental data quantitatively and total schemes (including schemes with only qualitative reporting)

12.2 Carbon

Key findings

- **Overall findings:** evidence on carbon impacts across the 16 schemes which report on them is mixed and partial (11 with quantitative data, 5 with qualitative data only). The 11 schemes providing quantitative data reported a decrease in annual carbon emissions of 850 tCO2e on average per scheme (% changes could not be derived for all the 11 schemes) – with 7 reporting an average decrease, one no change, and 3 an increase in emissions. Notably, all schemes are required to report on carbon impacts, but not all of them did.

- **Findings by scheme type:** for the 4 multi-modal and one rail schemes, there has been a larger reduction in carbon emissions (-1,806 annual tCO2e as an average per scheme) with only one multi-modal scheme reporting an increase. Highway schemes show more mixed carbon impacts between pre- and post-opening of the infrastructure. Indeed, 1YA data for 3 out of 6 highway schemes shows evidence of growth in yearly carbon emissions, resulting in an overall slightly increasing trend across schemes. Conversely, 5YA data shows an average drop in emissions, yet this drop is due to one scheme out of 3, with the other 2 reporting respectively no change or an increment in emissions. These results are aligned with the expectations that public transport/multi-modal interventions are stronger drivers of reduced carbon emissions than highway schemes. Due to the variability in the data, no robust conclusions can be derived on changes between 1YA and 5YA findings.

- **Post-opening time trends:** while carbon emissions marginally increased when comparing baseline and 1YA data, they fell by an average of 1,263 tCO2e per year when comparing baseline with 5YA data (largely driven by Manchester Metrolink).

- **Deviations from forecasts:** deviations from forecasts were available for only 4 evaluation reports (2 multi-modal and 2 highway schemes). Outturn data was below forecast for 3 schemes, ranging between -24 and -26% below forecast, with changes in travel behaviour resulting from the COVID-19 pandemic being identified as a driving factor for the discrepancy. However, the highway scheme reporting both 1YA and 5YA data reported outturn data to be higher than forecast – by 1.6% at 1YA stage, raising to over 23% at 5YA stage. This was due to greater travel demand than forecast. It should be noted that the accuracy of most of the carbon forecasts depends on the accuracy of underlying traffic forecasts as carbon calculations were generally based on vehicle speed and flow rather than by direct measurement.

- **Strength of evidence:** evidence on carbon impacts is rated medium-low. In several instances, scheme evaluations only monitored changes in emissions at the site of construction and did not account for other factors which may affect total emission impacts, for example vehicles in the wider area switching routes in response to delivery of the infrastructure (traffic reassignment).

- **Comparison with previous research:** in the previous meta-evaluation, the impact on carbon emissions was reported on a scheme-by-scheme basis, in many cases qualitatively, with no aggregation of data, making direct comparisons difficult.

- **Suggested improvements:** significant increases in the number of schemes reporting carbon impacts are needed to gain a better understanding of the LMS impact on user carbon emissions. In addition, greater consistency in the carbon monitoring approaches employed by schemes and further consideration of other explanatory factors that could impact emissions will strengthen the evidence base. Whole-life carbon emission (e.g., those resulting from the production and utilisation of construction materials and their shipment to the construction sites) should be included as evidence to compute the total carbon footprint of schemes.

Sample description

All 36 schemes in the sample were required to monitor/evaluate carbon outcomes, although information has been provided for 16 schemes. Data on the change between baseline and post-opening carbon emissions was available for 11 schemes (listed in Figure 12-2: Distribution of schemes by status of achievement of carbon related objectives (n=16)Figure 12-2), 8 schemes reporting 1YA data and 7 5YA data, with 4 schemes reporting at both stages. Five schemes commented qualitatively on the likely changes in carbon emissions-related interventions. The majority of reports are highway schemes (9), followed by 5 multi-modal schemes, and by one rail and one bus & rapid transport scheme.

Achievement of scheme objectives

Figure 12-2 shows how carbon impacts related to scheme objectives. Most schemes which reported on carbon did not have a relevant environmental objective as an aim for the scheme. Even among the 11 reports with quantitative estimates, carbon was a scheme objective only in 5 cases. Three schemes reported fully or partially meeting their objectives on carbon, and a further 3 schemes provide evidence to be on track towards future achievement of their environmental objectives, (for example, when they used the 60 years of life of the scheme as their reference time horizon).

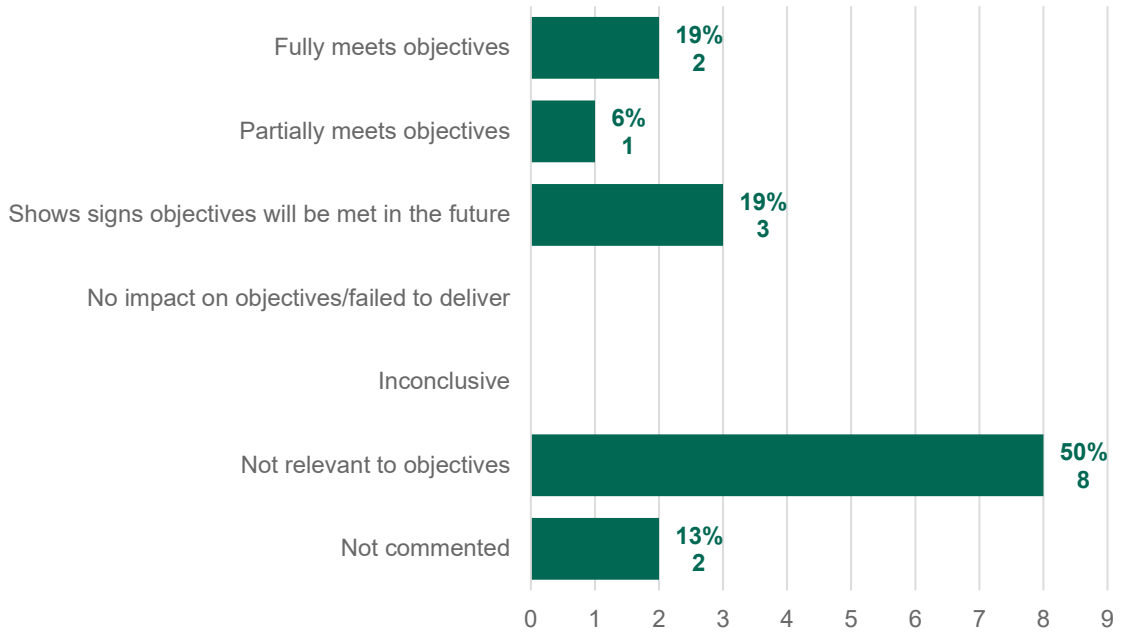

Figure 12-2: Distribution of schemes by status of achievement of carbon related objectives (n=16)

Additional findings

Most schemes used the DfT Carbon Toolkit to model carbon impacts, although a variety of approaches were taken, which in some cases makes it challenging to compare schemes.

On average, the 8 schemes providing 1YA data reported an increase in average emissions across sites of 9 tCO2e per year per scheme. However, there was large variation in the sample, with 5 of the 8 schemes each reporting a decrease in emissions.

Overall, the 7 schemes providing 5YA data saw a reduction in emissions on average of -1,263 yearly tCO2e, this has been largely driven by the rail scheme (-6,700 yearly tCO2e), and by the multi-modal schemes (-610 yearly tCO2e on average), while highway schemes recorded a smaller average decrease of -104 yearly tCO2e. Results are summarised in Figure 12-3.

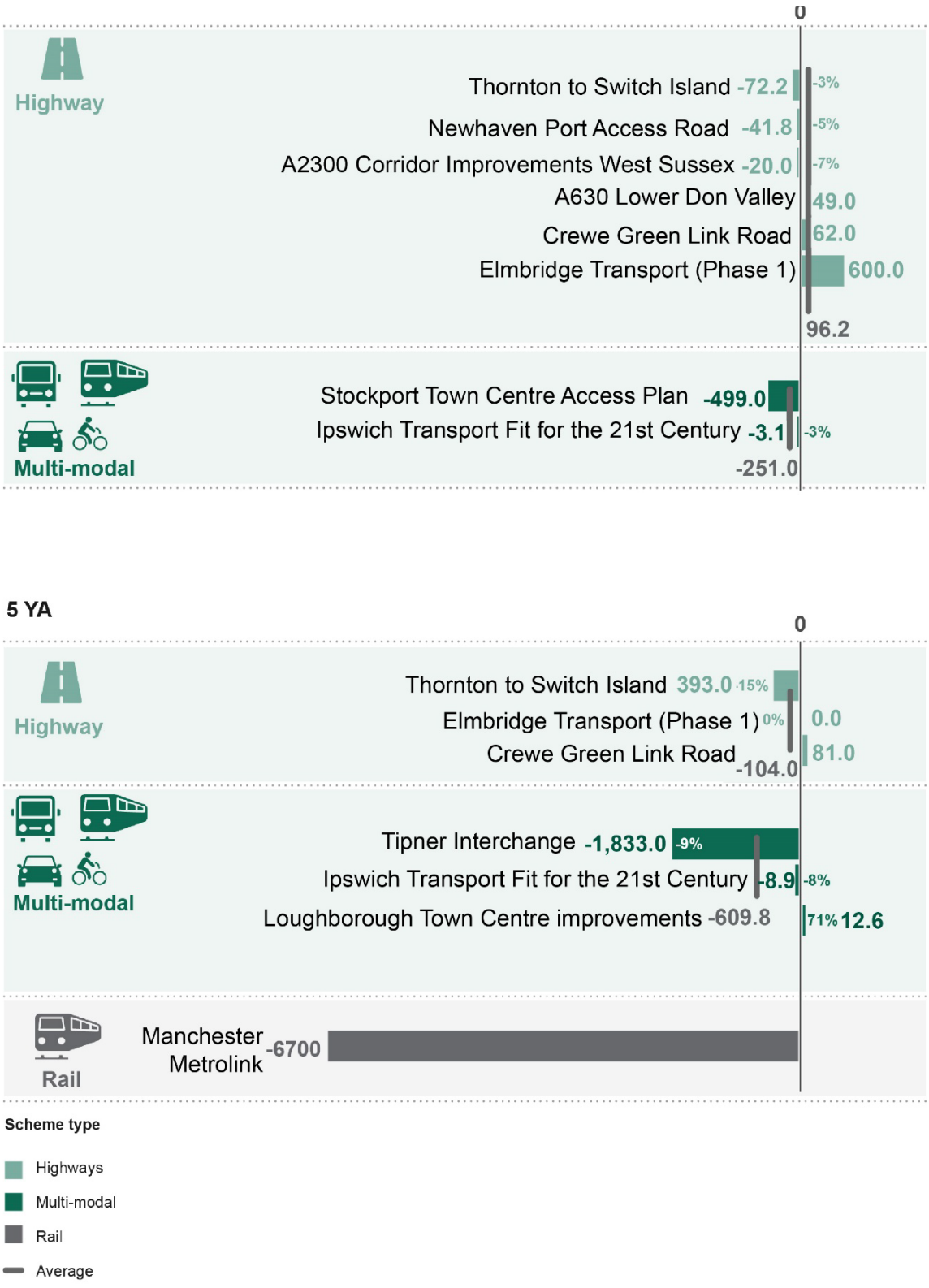

Figure 12-3: Baseline to post-opening change in average carbon emissions (tCO2e)

12.3 Noise

Key findings

- **Overall findings:** evaluation of the impacts of a scheme on noise is a requirement for enhanced and fuller evaluations. A total of 13 schemes reported their noise impacts. There were 7 schemes which measured the difference in noise levels between the baseline,1YA and 5YA levels (quantitative measurement); 3 of these observed a fall in noise levels, and 4 observed an increase in noise levels.

- **Findings by scheme type:** highway schemes reported a logarithmic mean average 3.01 decibel increase, which would be classified as a moderate adverse impact according to the Design Manuel for Roads and bridges (DMRB) which was used by some schemes to classify their noise impacts. Conversely, multi-modal schemes reported a logarithmic mean fall of 0.9 decibels which would be a classified as a negligible impact on the same scale.

- **Post-opening time trends:** the logarithmic mean change between baseline and 1YA data was an increase by 1.7 decibels (minor impact). Only 2 schemes (both highway schemes) reported their 5YA noise impact data, in both cases reporting major noise impacts >5dB. However, in one of these cases the evidence quality was low due to measurement issues.

- **Comparison with previous research** in comparison, the previous meta-evaluation found that 2 schemes saw a decrease in noise levels and 2 schemes saw an increase, while the remaining 8 schemes reported a negligible change or inconclusive results. However, aggregated results were not provided.

- **Deviations from forecasts:** only 3 schemes compared outturn results with forecast levels, despite the requirement to carry out this comparison in the evaluation guidance. In each of these 3 cases, the 1YA noise data was below the level forecast at the baseline stage.

- **Strength of evidence:** strength of evidence is rated as medium-low. Less than half of the enhanced or fuller evaluations provided quantitative data on changes in noise levels. Many of these only monitored noise at the site of the intervention. Furthermore, the unit of measurement differed across schemes, for example with some schemes adjusting collected data to reflect impacts perceived by the human ear.

- **Suggested improvements:** the DfT's updated benefits management and evaluation framework from 2025 is more prescriptive in terms of the metrics and measures of noise impacts to ensure greater levels of consistency to support future meta-evaluations.

Sample description

Evaluation of the impacts of a scheme on noise was expected for the 17 enhanced and fuller evaluations in the sample and was provided for 13 schemes. Five evaluation reports have provided qualitative commentaries on the likely noise impacts of schemes. Data on the change between post-opening and baseline noise was available for 8 schemes at 1YA stage and for 2 schemes at 5YA stage, with both of these schemes reporting at both 1YA and 5YA stages.

The majority of these reports are for highway schemes (7), followed by 3 multi-modal schemes and 3 bus & rapid transport schemes. For 4 of the 13 schemes, the objectives did not include achieving an outcome related to noise, while 5 schemes did not comment on their noise related outcome.

Achievement of scheme objectives

Figure 12-4 shows how noise impacts related to scheme objectives. Of the 13 commenting on the impact on noise, just 4 schemes included noise as a scheme objective, of which 3 reported that the scheme had partially or fully met the objective, while one had no impact or failed to deliver.

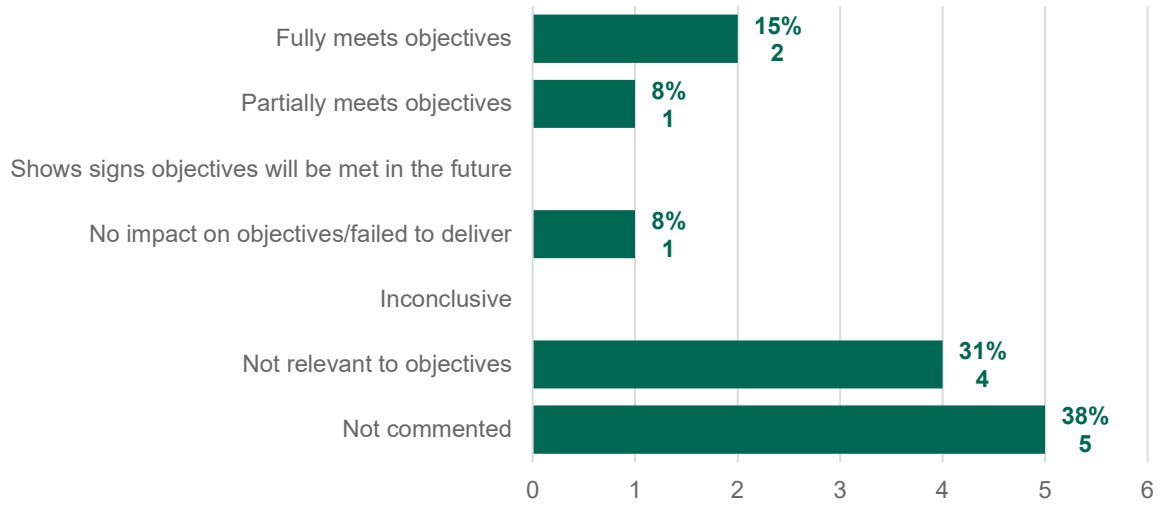

Figure 12-4: Distribution of schemes by status of achievement of noise related objectives (n=13)

Additional findings

The 2012 LMS Monitoring and Evaluation framework requires consideration of the scheme impact on noise levels at important receptor locations, as well as an analysis of the difference between outturn results and scheme forecasts.

Two primary methods were used to evaluate noise impacts: actual measurements of noise levels at key locations using specialist noise monitoring equipment, and assessments based on changes in traffic volumes, vehicle types, and speeds using established methodologies like the Calculation of Road Traffic Noise (CRTN). The robustness of impact estimates varied depending on whether measurements were taken at a single location or across multiple sites, with the number of monitoring locations ranging from 3 to 25.

Schemes also use different noise metrics to quantify noise impacts, such as $LA_{10,18h}$ and LA_{10} dB. $LA_{10,18h}$, used by 7 schemes, measures traffic noise levels over an 18-hour period, while LA_{10} dB is a more general metric. Additionally, 6 schemes used decibels (dB) and 2 schemes used A-weighted decibels (dB(A)) to measure noise impact. The choice of metric can influence the interpretation of results, as A-weighted decibels account for the human ear's sensitivity to different frequencies, making the measurement more representative of perceived loudness. The Norwich NDR scheme used $LA_{10\ dB}$ as opposed to $LA_{10,18h}$ as the noise metric and thus is not included in the aggregate analysis to ensure comparability across schemes. In Figure 12-5 below, schemes reporting noise as $LA_{10,18h}$ dB are marked with a circle, while those reporting in dB(A) are marked with a triangle.

Due to the logarithm scale of dB metrics, percentage changes are not included alongside the absolute changes. Averages are provided in log form.

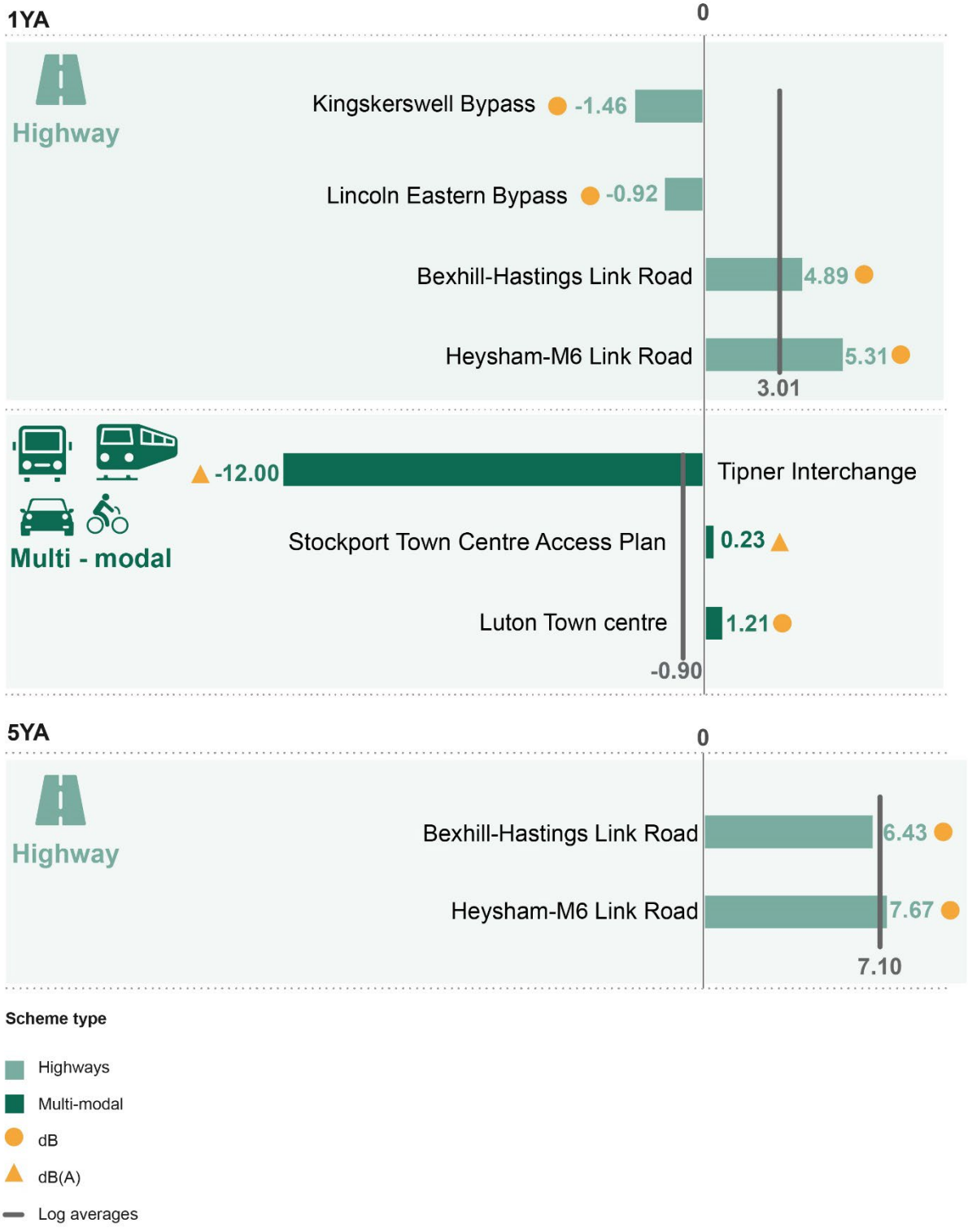

Figure 12-5: Baseline to post-opening change in average noise levels

12.4 Air quality

Key findings

- **Overall findings:** air quality improved in the vast majority of schemes which recorded this type of impact. Of the 14 schemes reporting changes in NO2 levels, 13 found a decrease in the average annual NO2 levels (in other words, an improvement in air quality). Across 1YA and 5YA reports the average change between baseline and outturn results was a 27% reduction in NO2 ug/m^3 levels.

- **Findings by scheme type:** the average decrease for the 9 highway schemes between the baseline and 1YA and 5YA was 21% (a 6.7µg/m^3 fall) and 33% (a fall of 9.8µg/m^3) respectively. Non-highway schemes reported an average fall between baseline and 1YA data of 14% (a fall of 1.45µg/m^3) and 43% (a fall of 13.4µg/m^3) for the 3 schemes where 5YA percentage change data is available.

- **Post-opening time trends:** the average percentage change in annual NO2 levels between baseline and 1YA was a 19% average decrease in the observed annual NO2 levels (corresponding to a fall of 4.9µg/m^3). A higher average decrease of 36% was found when looking at 5YA data (a fall of 11.4 µg/m^3). These changes suggest relevant improvements in air quality; the Air Quality Standards Regulations 2010 state that the average annual concentration of NO2 should not exceed 40µg/m^3 in locations where there may be receptors and a drop of 5µg/m^3 can result in fewer respiratory issues particularly in vulnerable populations. Only 2 schemes provided baseline and outturn levels to compare with, in both cases the baseline and outturn levels were below 40µg/m^3.

- **Deviations from forecasts:** only 2 schemes provided data on deviation from forecast despite the requirements in the 2012 LMS Monitoring and Evaluation framework. In both these cases outturn NO2 levels were below the forecast levels.

- **Strength of evidence:** the strength of evidence is rated as medium. Air quality was reported by all fuller and enhanced schemes, of which 15 provided quantitative data. While schemes often made use of multiple monitoring stations, this did not always allow for benchmarking of directly and indirectly affected areas with areas unaffected by the scheme.

- **Comparison with previous research:** when compared to the previous meta-evaluation, air quality findings are more positive. In the previous meta-evaluation, with 9 schemes reporting changes in air quality (of which 4 found evidence of an improvement, while the remaining 5 found evidence was inconclusive.)

- **Suggested improvements:** to allow more robust assessments of the impact on air quality, monitoring stations should be installed at locations directly and indirectly impacted by the scheme as well as at unimpacted locations.

Sample description

Evaluation of the impacts of a scheme on air quality is a requirement of the 18 enhanced and fuller evaluations and has been reported on by all 18 schemes. Three evaluation reports have provided qualitative commentaries on the likely air quality impacts of schemes. Data on the change between post-opening and baseline air quality was available for 12 schemes at 1YA stage and for 8 schemes at 5YA stage, with 5 schemes reporting at both stages.

The majority of reports are highways schemes (10), followed by 4 multi-modal schemes, 3 bus & rapid transport schemes and one rail scheme. For 3 of the 18 schemes reporting on air quality, the objectives did not include achieving such an outcome.

Achievement of scheme objectives

There were 8 schemes which provided a commentary on whether the observed changes in air quality met the scheme objectives, of which 5 schemes reported that the improvements in air quality observed fully met the scheme objectives, 2 schemes reported that objectives had been partially met, and one scheme reported there are signs that objectives will be met in future, as summarised in Figure 12-6.

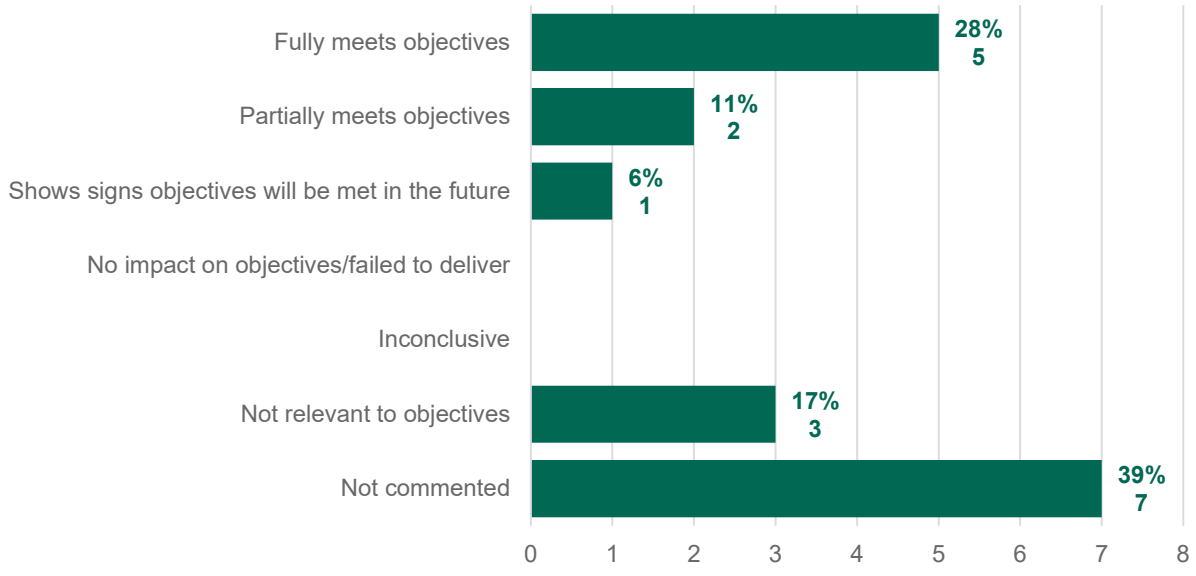

Figure 12-6: Distribution of schemes by status of achievement of air quality objectives (n=18)

Additional findings

Comparing the outturn change between the baseline and 1YA levels (Figure 12-7 below), all but one scheme (the Loughborough Town Centre Improvements) reported

a decrease in the average annual NO2 levels (in other words, an improvement in air quality).

There were 2 schemes, Stockport Town Centre Access Plan and A630 Lower Don Valley, which provided data on the deviation of outturn results from their original forecasts (1YA). For the Stockport Town Centre Access Plan, the annual average NO2 levels was 1.77µg/m^3 below the forecast, implying a greater reduction than forecast (the forecast value was close to zero making the percentage change figure misleading). The A630 Lower Don Valley scheme achieved a reduction in annual average NO2 of 29% (0.29 µg/m^3), however the forecast was limited to the year 2022 and the outturn value was taken in 2023.

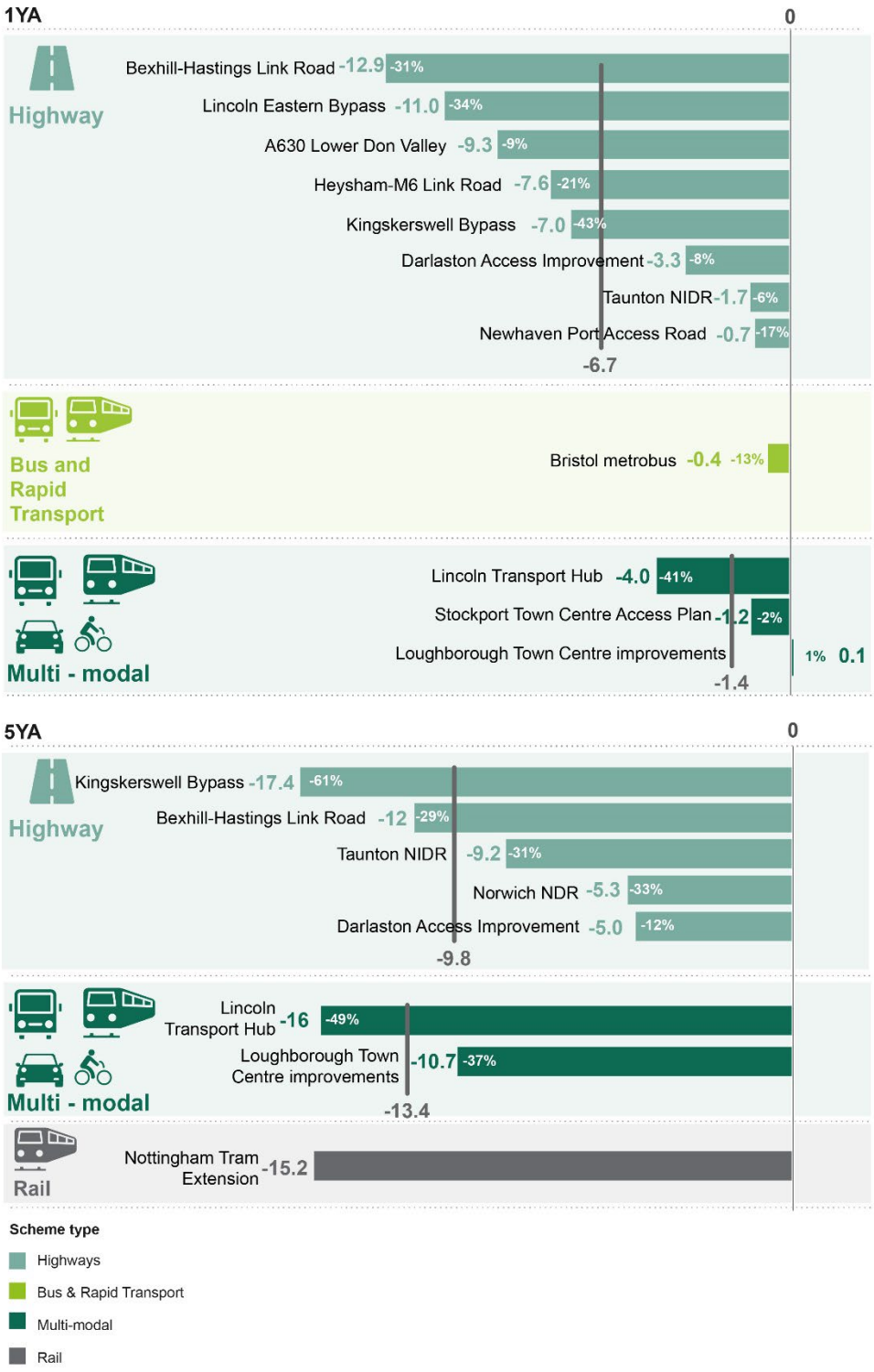

Figure 12-7: Baseline to post-opening change in average NO2 concentration (µg/m³)

12.5 Other environmental impacts

While reporting on environmental impacts beyond carbon, noise, and air quality is not a requirement of the guidance and hence not a focus of this meta-evaluation, a number of schemes have included an assessment on wider environmental impacts and are included as case studies below.

Case study: *Norwich Northern Distributor Road (NDR)*

Monitoring of other environmental impacts

In addition to reporting on carbon, noise, and air quality the scheme presents indicators which relate to the environment surrounding the scheme, including integration into the wider landscape, water quality and biodiversity.

Ecology, biodiversity, and nature conservation

Surveys were undertaken following best practice guidelines by members of the industry body, the Chartered Institute of Ecology and Environmental Management (CIEEM) to measure the changes in numbers and behaviour of a number of species including bats, newts, and breeding birds. Bats were recorded crossing the road at 7 gantries. Each of the 7 bat gantries have shown a decrease in the number of bats crossing in 2022 when compared to 2020. However, when calculating the proportion of safe crossings out of the total crossings for each gantry, 3 of the 7 gantries exhibited a greater proportion of safe crossings in 2022 compared to 2020.

Water quality

Due to the importance of both fluvial and groundwater in providing both habitat and drinking water, a regime of water quality monitoring was carried out during the construction phase to ensure that the construction resulted in no adverse effects. No issues with water quality were found and the post construction aquatic invertebrate monitoring surveys have shown no detriment to the number of species present.

Landscape integration

The purpose of this analysis is to provide an overview of how, 5 years after the completion of the NDR scheme, landscape mitigation planting has enabled the integration of the new road infrastructure into the wider landscape. The report compares 9 photomontages (showing the existing baseline view in 2013, prior to construction, and the predicted appearance of the scheme) prepared for the Environmental Statement with stitched panoramic photographs, taken in winter 2023 from the same locations as the photomontages, to show the actual appearance of the built scheme in years one and 5 of operation. The comparison between the Y5 photographs of the built scheme with the Y1

photographs and photomontages illustrates that across the majority of the key viewpoint locations, little has changed since Y1.

Case study: *Stockport Town Centre Access Plan*

Monitoring of other environmental impacts: ecology

Stockport Metropolitan Borough Council (SMBC) has commitment to protect and improve the amount, distribution, and quality of tree and woodland planting in the borough and, where appropriate, encourage its use for a variety of activities associated with woodlands, as set out within the Council's Tree Policy (2012) and Planning Policy. As such the scheme looked for opportunities to improve the tree cover and biodiversity of the site/borough. Throughout the timeframe of the scheme delivery, Council policy has evolved with the production of Stockport Climate Action Now (CAN), setting out the Council's commitment to being carbon neutral by 2038. As part of this, monitoring of green spaces and tree planting is monitored on an annual basis. This highlights that in 2021/22, the following planting has occurred:

- Planting of 1,170 standard trees in parks and along the highway.
- A total of 4,500 whips (young trees) were planted, creating 3 new woodland areas.
- One new grassland meadow was started.
- Creation of 2 new orchards and 2 existing orchards were supplemented.

13. Safety impacts

13.1 Key findings

Overview and summary

Safety has been a very significant topic for scheme promoters with 25 schemes commenting on this topic and 20 providing before/after-opening trends assessments.

Road schemes are expected to improve the safety features of the road (e.g., quality of surface, visibility of signage, traffic lights, and others), leading to fewer collisions per road user. It may however happen that improved road connectivity leads to an increase in the number of road users, which in turn may partially offset or even increase the absolute number and/or severity of collisions. Therefore, in understanding the impact of road schemes it is important to take into consideration how traffic volume changed on the impacted section. Ideally, a preferred metric would be the number of collisions in proportion to traffic volume for each road section. However, schemes did not provide such a metric (the deviations from forecasts at 5YA/1YA have also not been provided).

Changes to the types of road users may also make a difference, since roads that 'feel safer' may lead to more vulnerable road users (e.g., pedestrians and cyclists) using them and increasing the risk of more severe collisions.

When interpreting the findings, as for other impacts, the lack of counterfactual analysis represents an important barrier for assessing the net effect of schemes. In particular, across the UK, over the 10 years between 2013 and 2023, the total number of road collisions has fallen by 25%, a background trend which may be conflated with scheme effects when undertaking before-after analysis (based on ONS data RAS0101: Collisions, casualties and vehicles involved by road user type since 1926). With this in mind, the research has found that:

- **Overall findings:** among the 20 schemes looking at overall annual collisions at selected measurement locations, collisions have dropped since the baseline for all but one scheme, with an average reduction of 7.4 collisions per year across schemes (-35%). Among 5YA reports with more reliable data, the annual collisions fell by 9 instances (-37%). The drop in overall collisions appears to be led by a decrease in slight collisions (see definitions on GOV.UK Road casualty statistics: definitions, symbols and conventions), displaying a fall of nearly 5.7 collisions per year, or -40% on average per scheme. On the other hand, the number of serious collisions has remained approximately stable on average, while showing large variation across schemes. Indeed, among the 17 schemes reporting changes in serious collisions, 9 schemes reported a higher annual rate of this type of collision (although limited to an increase of up to one serious collision per year in 4 of these schemes) and 8 reported a drop.

- **Findings by scheme type:** the 5 multi-modal schemes which undertook before-and-after comparisons have achieved a similar percentage average reduction in annual collisions compared to the 15 highway schemes in the sample, despite a lower absolute reduction: -8.4 (-35%) and -4.2 (-34%) for highways and for multi-modal schemes respectively.

- **Post-opening time trends:** due to high volatility in yearly data, which is natural for collision statistics, and 1YA data being based on a single year of observation, conclusions based on the comparison between 1YA and 5YA data (based on multi-year averages) have not been considered for this topic.

- **Deviations from forecasts:** a comparison between post-opening data and forecasts has generally not been provided by schemes.

- **Strength of evidence:** the evidence on safety outcomes is of moderate quality, strengthened by the availability of 5YA, and the use of multi-year averages of yearly collision statistics. Although schemes did not rely on counterfactual analysis to assess the additional benefits of their schemes, it can be concluded that, as a minimum, schemes have not resulted on average in increased collisions at intervention sites.

- **Comparison with previous research:** the availability of evidence on safety outcomes represents a significant improvement from the reports analysed in the previous meta-evaluation, where no conclusive data on collisions was provided.

- **Suggested improvements:** statistical tests of change in each scheme would be important to appreciate the significance of observed trends compared to potential random variation. Safety could also be a topic that more easily lends itself to counterfactual analysis, which schemes should complete where possible and proportionate to determine the extent of change that is solely explained by each intervention. Moreover, schemes should report on the number of collisions per journey on the transport network to control for variations in travel demand.

Sample description

Safety analysis should have been covered by schemes qualifying for either enhanced monitoring or fuller evaluation – therefore by 18 schemes overall within this meta-evaluation. Specifically, safety outcomes have been reported by a total of 25 schemes, with all but 5 schemes having safety as an objective. However, as commented below, information on changes over time was available for a smaller number of schemes (e.g., information on how total collision rates changed over time was available for 20 schemes).

Only 10 of the 18 schemes required to report on safety did so, meaning that 15 (standard) schemes commented on safety even if not required to do so by the 2012 LMS Monitoring and Evaluation framework. The sample is made of 17 highway schemes, 6 multi-modal schemes, one bus & rapid transport scheme and one rail scheme, the majority being 5YA reports (19 out of 25). Before-and-after analysis was conducted for 20 schemes, made up of 15 highway (4 at 1YA and 11 at 5YA) and 5 multi-modal schemes (1 at 1YA and 4 at 5YA, although a 5YA scheme only reported 1YA data).

13.2 Achievement of scheme objectives

Over half of the sample (13) have reported fully meeting intended safety objectives (although objectives might refer to overall collisions rather than their severity). In some cases, schemes have reported partially meeting objectives (3 schemes) or inconclusive findings and no impact (2 schemes), since collisions might have followed different trends in specific segments of transportation (e.g., between bicycle and car users, or between serious and slight collisions). Focusing only on schemes where safety was an objective, 65% of schemes reporting on trends in collisions have fully met their objectives, and 80% have fully or partially met them (Figure 13-1).

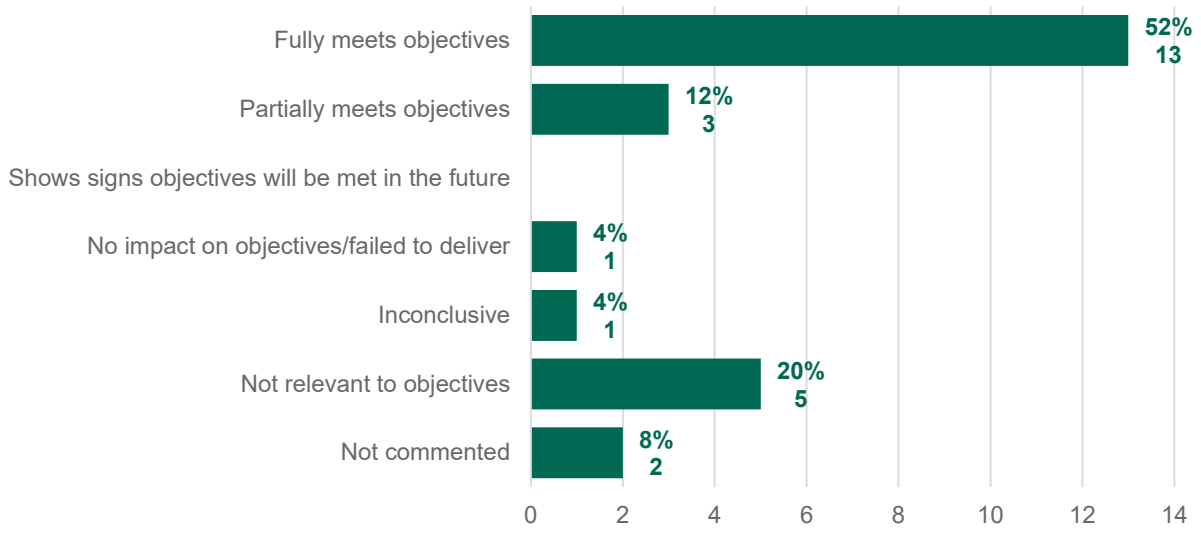

Figure 13-1: Distribution of schemes by status of achievement of safety related objectives (n=25)

13.3 Additional findings

Total collisions

Most schemes providing data on changes in total collisions have registered a decrease in collisions per year (19 out of 20, using the latest between 1YA and 5YA data where available).

Bexhill-Hastings Link Road witnessed the largest decrease in absolute terms, from 115 to 59 collisions per year over 5 years (-56 collisions, -49%), followed by Kingskerswell Bypass (-17.1 collisions per year over 5 years, -52%). The largest percentage decrease was recorded at Walton Bridge (-5 collisions per year over 5 years, -80%). Conversely, the largest increase in both absolute and percentage terms is reported in the Wokingham Arborfield Cross (+1.3 collisions, +12%), though this report is only based on one year of data and is therefore more subject to yearly fluctuations. This example shows that comparing percentage term changes can be informative, but absolute term changes are also important measures to understand the overall impact of schemes.

Figure 13-2 shows the average variation between pre-opening and post-opening yearly total collision levels recorded for each scheme (therefore including slight, severe, and fatal collisions). Data reported at 1YA is based on a single year of data and subject to volatility, whereas 5YA data is based on average values across 5 years since scheme opening and should be considered more reliable. Only 5YA data has been reported for schemes showing both 1YA and 5YA data for this reason.

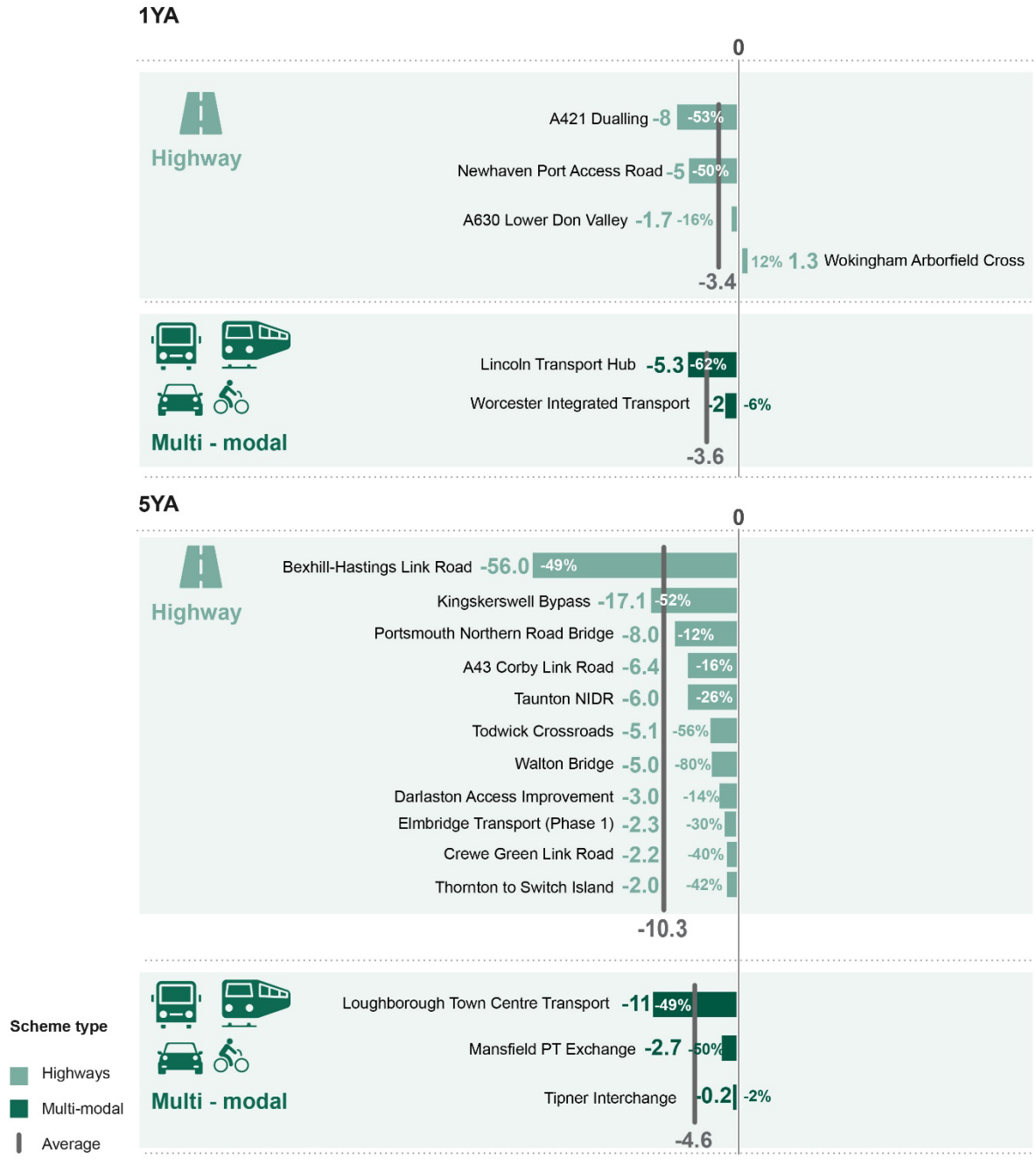

Figure 13-2: Baseline to post-opening change in total collisions per year (5-year average for 5YA data)

The average absolute change in total collisions across all schemes (excluding 1YA data where 5YA was available) between the baseline and the evaluation point is -7.4 while the average percentage change is -35% per scheme. Notably, the average percentage change in total collisions across schemes with up to 40 total collisions at the baseline remains equal to the overall average change (-35%). There was a slightly smaller average decrease for schemes with over 40 yearly total collisions in the

baseline (-30%), suggesting that it may be less likely to see results for schemes facing a higher number of collisions at baseline.

Severity of collisions

Schemes may have an important impact on the severity of collisions as well as on their frequency. The previous section showed that the overall number of collisions mostly decreased. Figure 13-2 shows results for the number of serious collisions. Baseline numbers of serious collisions are small, with an average of 4.1 collisions a year per scheme (which would be 2.4 if excluding 2 outliers), compared to an average of 24.9 total collisions across schemes at the baseline.

The analysis shows that despite total collisions having fallen on average across schemes, the number of serious collisions as a yearly average has not changed substantially (Figure 13-3). Indeed, the average change in serious collisions at 1YA or 5YA stage (considering only 5YA data for schemes reporting both) was limited to an increase of 0.2 collisions per year.

It should be noted however that there is variability across schemes, with Lincoln Transport Hub recording the largest absolute decrease of -1.75 serious collisions per year (-88%) and Wokingham Arborfield Cross recording the largest absolute increase of 2.5 serious collisions per year (+167%); both are based on 1YA data only and therefore more subject to yearly fluctuations.

The difference between highway and multi-modal average changes in severe collisions is relatively minor (-0.16 for multi-modal and +0.31 for highway schemes).

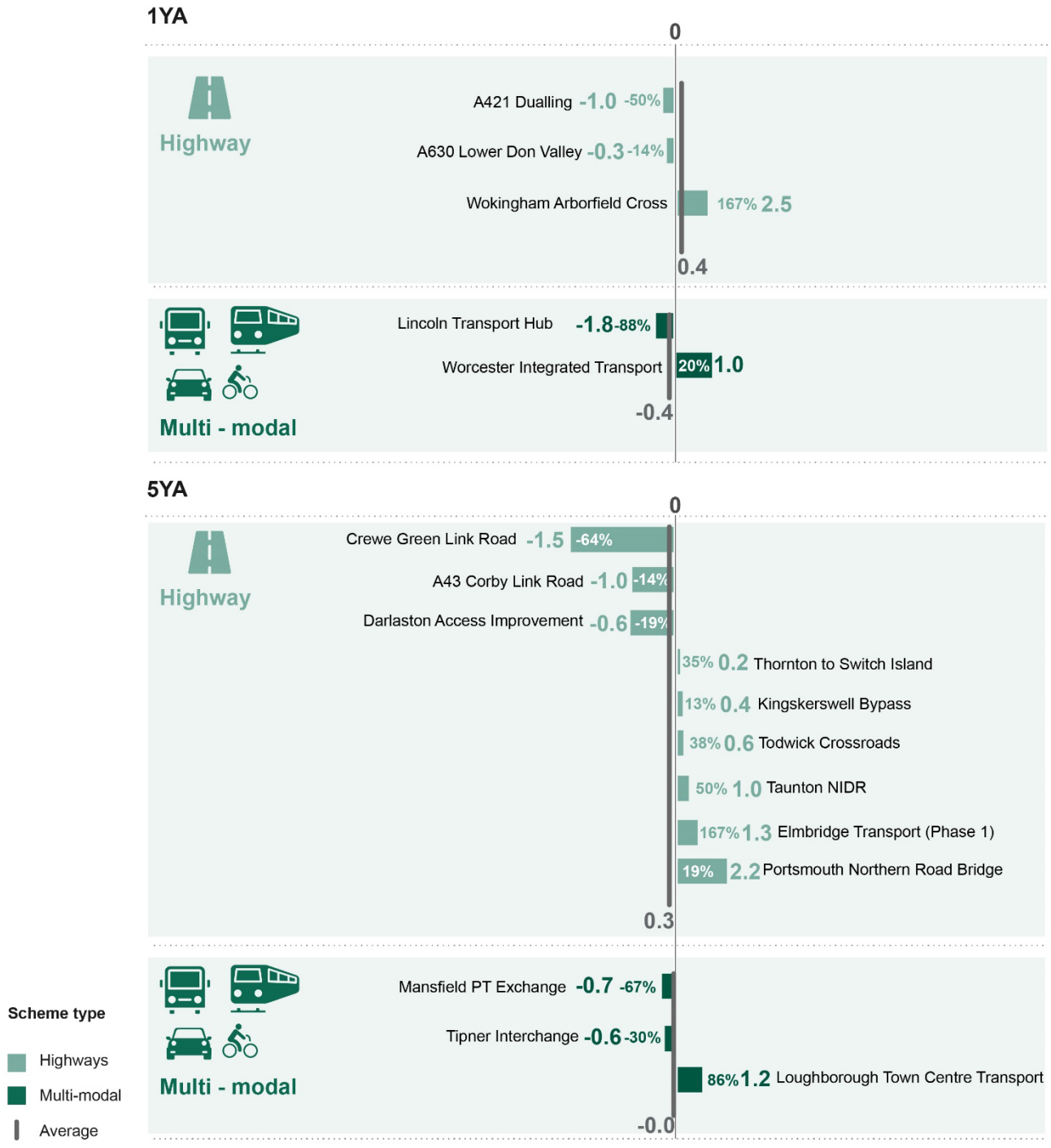

Figure 13-3: Baseline to post-opening change in serious collisions per year (5-year average for 5YA data)

Figure 13-4 shows summary statistics for slight collisions. As opposed to severe collisions, the results are more in line with expectations as they decreased for almost all of the schemes except one registering a 5% increase. On average, slight collisions decreased by 33% in 1YA data (-3.3) and 43% in 5YA data (-6.8). Highway schemes

witnessed a higher decrease in percentage change than multi-modal schemes (-43% and -33% respectively), as well as in absolute terms (-6.5 and -4.1 respectively; considering the latest year of data available for schemes reporting both 1YA and 5YA data).

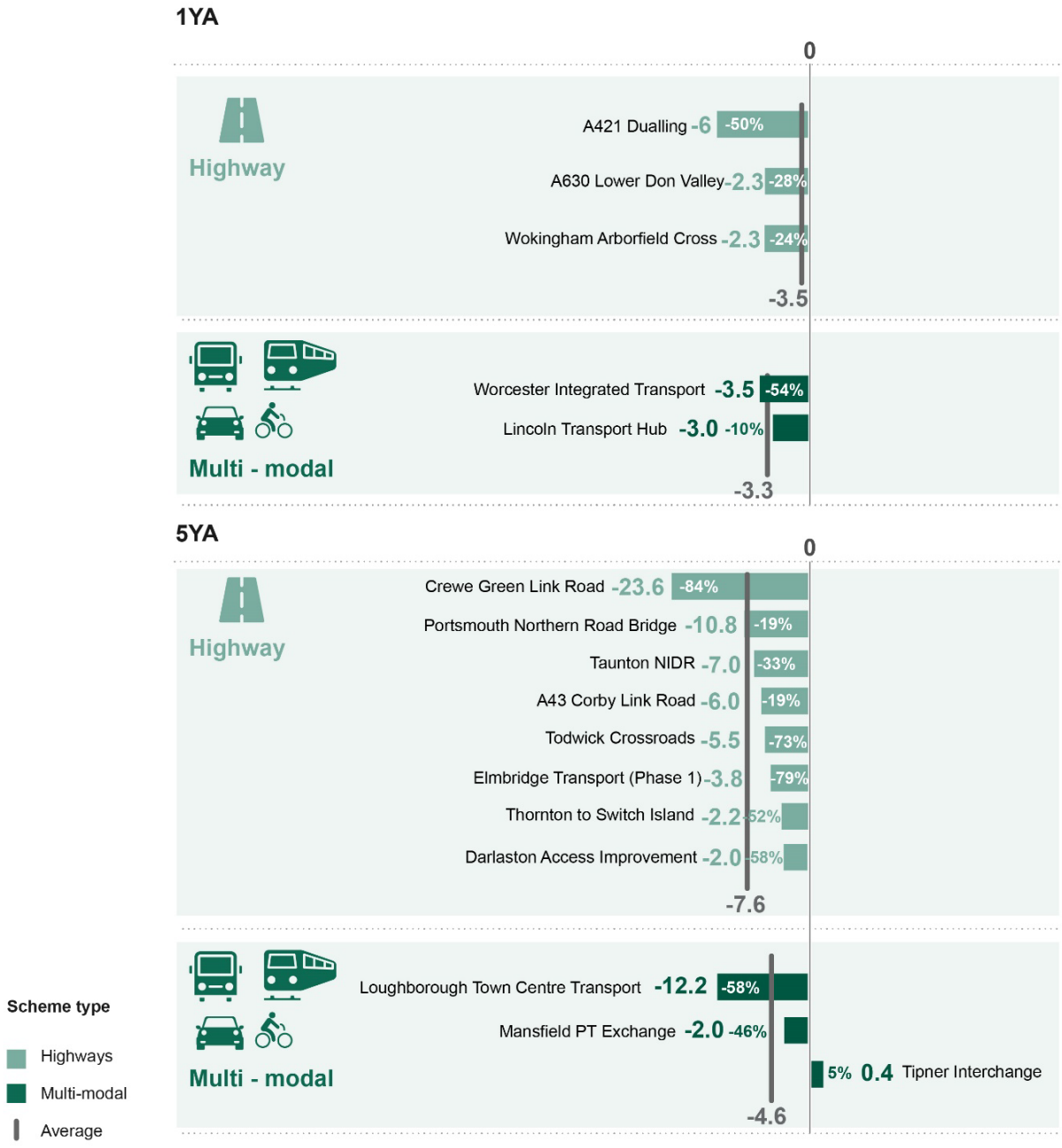

Figure 13-4 Baseline to post-opening change in slight collisions per year (5-year average for 5YA data)

Scheme Value for Money

14. Value for Money

14.1 Overview and summary

The analysis of the Value for Money (VfM) of Local Authority Major Schemes (LMS) interventions can be a very valuable instrument to decisions makers in understanding where to invest. Unfortunately, the variety of methods adopted for evaluating the VfM assessments of individual schemes represents a barrier to achieve an overarching estimate of outturn VfM for the LMS portfolio. The small number of schemes reporting quantitative data (10) also makes it difficult to identify significant trends. The following key takeaways should therefore be interpreted with caution, since the strength of evidence is considered as medium-low:

- **Overall findings:** post-opening re-assessments showed lower VfM than the original pre-opening assessments. The median Benefit-Cost Ratio (BCR) across schemes dropped from 6.4 to 5.2. It should be noted that this is still classified as a 'very high' VfM category according to DfT guidance (Value for Money Framework). Only 3 schemes saw a fall in their VfM category, and by one category only, from very-high to high or from high to medium VfM. The VfM categories adopted by schemes do not include non-monetised benefits.

- **Findings by scheme type:** the 3 multi-modal schemes were associated with the lowest forecast and outturn VfM, with higher values for 4 highway schemes (excluding an outlier maintenance scheme) and the highest values for 2 bus & rapid transport schemes (excluding an outlier from a maintenance scheme). No conclusions by scheme type can be based on this small sample of schemes. VfM was not reported on by any of the rail schemes in the sample.

- **Post-opening time trends:** no time trends could be detected.

- **Deviations from forecasts:** where outturn VfM was lower than forecast, this was led by over-estimation of benefits, whose present value dropped on average by -13% between the pre-opening and the post-opening stage, whereas whole-life costs appeared to vary much less on average (+6%), excluding the outlier. Notably,

this meta-evaluation has not sought to quantify the extent to which such deviations are explained by changes to background trends, valuation parameters, or scheme performance. However, scheme performance can be considered a major driver of such variations. Indeed, the methods adopted in the sample were mostly based on the sole adjustment of projected life-time costs, proportionally to the difference between outturn and forecast data in selected years.

- **Strength of evidence:** evidence has medium-low strength overall, due to the variety of methods of reporting monetised values (e.g., different base years).

- **Comparison with previous research:** compared to the sample analysed in the previous meta-evaluation, a similar proportion of schemes required to complete a post-opening VfM analysis (fuller evaluations) did so - 50% in the previous meta-evaluation, compared with 44% analysed here. A relatively similar number of schemes reported a drop in the VfM category post-opening in this meta-evaluation (3 out of 10) compared to previous meta-evaluation (5 out of 13).

- **Suggested improvements:** there is large room for improvement in the way schemes report their post-opening VfM to ensure higher comparability across reports. Similar recommendations to those mentioned for scheme costs' reporting apply to VfM. Where elements of the benefits of the VfM analysis have been monetised, they should be clearly reported. Ideally, both 'initial' and 'adjusted' BCRs should be presented consistently with departmental appraisal guidance. Costs presented in the BCR should be presented as the *additional* cost of intervention compared to a without-scheme scenario, with the difference from total schemes costs appropriately flagged in the evaluation. Investment costs should exclude private funding (e.g., donations), which should be subtracted from the monetised benefits of schemes (i.e., recorded as user disbenefits, as per TAG 2025, Unit A1.1, par. 3.2.5 – 3.2.7). These calculations should be clearly presented in the evaluation. Scheme promoters are also invited to present their findings for 3 progressive scenarios: in the first case, updated VfM metrics exclude changes to valuation parameters and economic trends; in the second case, they include changes to economic trends; and in the last case, they also account for updated valuation parameters.

Sample description

The re-assessment of VfM of schemes after opening was required irrespective of the evaluation tier. However, schemes qualifying for standard and enhanced monitoring could limit this to qualitative assessments of the extent to which pre-opening estimates could still be considered as valid. Fuller evaluations on the other hand required updating appraisal modelling and assumptions. Data on VfM re-assessment was available for 10 schemes, comprising of 3 1YA reports and 7 5YA reports, with 5 highway, 2 bus & rapid transport, and 3 multi-modal schemes. The sample includes 7 fuller schemes (out of 16 fuller schemes in the wider sample), and 3 standard

schemes. Schemes with their forecast and outturn BCR and VfM categories are reported in Table 14-1 below.

Scheme	Scheme Type	Forecast		Outturn		Change in VfM category
		BCR	VfM Category	BCR	VfM Category	
Stockport Town Centre Access Plan	Multi-modal	5.1	Very High	4.7	Very High	Same
Lincoln Eastern Bypass	Highway	10.5	Very High	8.1	Very High	Same
Bristol metrobus	Bus and Rapid Transport	22.7	Very High	17.4	Very High	Same
Bexhill-Hastings Link Road	Highway	1.5	Medium	1.5	Medium	Same
Heysham-M6 Link Road	Highway	4.4	Very High	3.5*	High	Lower
Thornton to Switch Island	Highway	13.1	Very High	12.2	Very High	Same
Portsmouth Northern Road Bridge	Highway	113.6	Very High	257.9	Very High	Same
Pennine Reach Blackburn	Bus and Rapid Transport	2.7	High	1.6	Medium	Lower
Rochdale Interchange	Multi-modal	4.2	Very High	5.6	Very High	Same
Tipner Interchange	Multi-modal	7.6	Very High	2.5	High	Lower

Table 14-1: Comparison of Forecast and Outturn BCR

*Note: for the Pennine Reach scheme, this analysis has considered the 5YA value to match the 1YA value, although the report recognises the final value could be higher or lower than that. *For the Heysham-M6 link Road an updated report has been provided to DfT since the analysis of the meta-evaluation was conducted, with an outturn BCR of 3.49, but the version of the report previously provided (and used in the analysis) estimated an outturn BCR of 3.2.*

14.2 Additional findings

Schemes have re-assessed the VfM of interventions using a variety of approaches which pose challenges to comparability. Because of this, the analysis presented here does not attempt to assess the overarching VfM of the schemes in the sample. Moreover, the analysis of BCRs (which describes how much monetised social welfare is delivered per £1 of the broad transport budget) is preferred to the analysis of the Net Present Value (NPV), the difference between monetised social benefits (Present Value Benefits, or PVB) and intervention costs (Present Value Costs, or PVC). In this way, the comparison across schemes will not require comparing monetary values which could make use of different base years.

The data shows how re-assessed, post-opening BCRs are below pre-opening estimates in 7 out of 10 cases, the same in one case, and above in 2 cases. Excluding an outlier scheme discussed below, the mean BCR per scheme is 6.3 (compared to 8.0 including the outlier, in both cases a very high VfM category). However, this does not take into account the different costs of schemes (i.e., it is an unweighted average. Moreover, as mentioned, an overarching BCR for the programme should not be derived using these estimates).

Using median rather than mean values can help better assess the distribution of VfM metrics across schemes (since by definition, 50% of schemes will fall below the median value, and 50% will fall above it). The forecast and post-opening median BCR across all schemes including the outlier is indeed lower than the mean values above, although these still represents a very high VfM (6.4 forecasted compared to 5.2 post-opening median).

Excluding the outlier, bus & rapid transport schemes have on average higher BCRs than highway schemes both at forecast and outturn. For bus & rapid transport schemes, the mean and median outturn BCR is 9.5 (compared to a forecast of 12.7). For highway schemes, the outturn BCR had a mean of 6.3 and median of 5.6 (compared to 7.4 mean and median at forecast). However, the sample is too small to draw strong conclusions about differences in value for money between modes. Moreover, the comparison of 1YA and 5YA data has not identified relevant trends and has not been reported here.

Although most schemes reported a drop in BCRs compared to forecasts, VfM categories of each scheme remained the same in all but 3 cases. This is due to most schemes forecasting to achieve a very high VfM category, with drops in the BCR being small enough to avoid falling into a lower VfM category.

One of the 2 schemes reporting an increase in the BCR, Portsmouth Northern Road Bridge, represents a substantial outlier in terms of the BCR levels at both forecast and outturn stages, where BCRs of 113.6 and 257.9 were reported respectively. Such levels are explained by the additionality of costs and benefits in the with-scheme

scenario compared to the without-scheme case. Maintaining the bridge is associated with high connectivity benefits which would not materialise in the absence of the bridge. Moreover, the cost of bridge removal (£12m, without scheme) was only relatively lower than the cost of maintenance (+£1.6m additional with-scheme), implying that a small additional cost results in very high benefits and delivers very high VfM.

The further uplift from forecast to outturn BCR is partly explained by high risk and optimism bias applied to forecast costs (representing 55% of total risk-adjusted costs) which did not materialise, further reducing the PVC. For the remaining scheme with increased BCR, Rochdale Interchange, the increment is explained in part by lower capital investment costs and mostly by higher footfall at the interchange than forecasted.

The average percentage change in BCRs per scheme is -18% excluding the outlier (-3% otherwise). The drop is mostly explained by over-estimation of PVBs (which dropped by -13%), and only marginally on the overrun of costs (6% increase on average, without the outlier).

The average change in PVCs is roughly consistent with the cost overruns findings for 5YA reports, although the sample composition for the analysis of the 2 topics is different. Importantly, while half of the schemes have re-assessed PVCs to be higher compared to original forecasts, PVBs have been re-assessed as higher than forecasts only in 2 cases out of 10.

Learning from schemes and conclusions

15. Lessons learnt

15.1 Introduction

This section summarises the lessons learnt reported by the schemes as part of their process evaluation while also highlighting learning points concerning the process underpinning this meta-evaluation.

15.2 Process evaluation - lessons learnt

Overview

Schemes lacked a standardised approach for reporting their lessons learnt. The best examples had dedicated ‘lessons learnt’ sections within reports; others provided commentary throughout the report. Fuller evaluations were required to undertake process evaluations which included more formalised lessons learnt, while some standard and enhanced evaluations included a light-touch lesson learnt exercise.

Sample description

While the learnings on how to improve the evaluation of LMS draws across the entire sample, lessons learnt have been provided by 26 schemes. Three themes have been identified across the sample, including: (1) construction and safety lessons (19 schemes); (2) stakeholder engagement and management lessons (19 schemes); and (3) programme management lessons (15 schemes). A summary of lessons learnt for these themes is provided below.

Construction and safety lessons

Construction and safety management

Key takeaway: early planning, phased delivery, and proactive safety oversight are critical to managing risks and ensuring efficient construction.

- **Utilities mapping and coordination:** several schemes highlighted the importance of early planning; it is useful to identify as soon as possible the extent of the utility services affected by the intervention, to reduce the risk of project scope change and programme delays. In some cases (such as in Stockport Town Centre Access scheme), having a utility coordinator helped speed up the works and allowed multi-utility operations at the same time, which reduced disruption to travellers. The Manchester Cross-City Bus scheme implemented an innovative multi-modal design which required diverting a significant number of utilities. Here, the scheme promoters found that early engagement with utility providers (as well as the contractor and specialist advisers) was key to help minimise network delays.

- **Phased delivery:** multiple schemes reported effective project management techniques to overcome risk of scheme delays and improve scheme delivery efficiency. The Darlaston scheme included contingency for delays in complex interventions, such as 'float' within the schedule for common delays like utility diversions, which relieved schedule pressure and allowed the project team to focus on the more critical elements. The Stockport Town Centre Access scheme reported dividing works into 'certain' and 'uncertain' packages to reduce contractual risk and improve delivery certainty. This approach, though more resource-intensive internally, was effective and recommended to neighbouring authorities.

"The delivery of works along St Marys Way was divided into separate packages (right turn, retaining wall etc). This enabled more certain parts of the overall scheme to start on time, while others were being finalised. This placed less risk into the Contracts, as only 'certain' packages were released to market/ the Contractor. This was an innovative approach which proved successful. A more traditional approach would have been to let the Contractor manage the entirety. Although it resulted in more internal process and repetition, it did mean that there was greater certainty on each element. Overall, this approach was deemed successful, and it has been recommended to neighbouring authorities."

Stockport Town Centre Access Plan, One Year After Report.

- **Safety oversight**: multiple schemes demonstrated the importance of Safety, Health & Environment (SHE) action plans and inspection. For example, the Rochdale Interchange scheme highlighted how continual inspection and audit by the Council helped to reinforce a mindset of safety first, which ensured sufficient

resources were in place to monitor health and safety standards throughout construction. The Walton Bridge scheme successfully set up a SHE step-up action plan as a method of notifying operatives about any issues raised and the actions taken in response, with monthly scored inspections and an innovation log. These lessons and best practice were shared through industry forums including the Highways Term Maintenance Association and the Road Worker Safety Forum.

- **Visioning and planning:** in a bus scheme (Manchester Cross-City Bus), the approach 'think tram, do bus' was flagged as important to ensure minimal bus network delays and reliable operations. A key lesson was that schemes should consider the benefits and disbenefits for all modes from the outset rather than focusing on individual modes. Another scheme (Darlaston Access Improvement) flagged that a lesson learnt was the need to consider the extent of necessary plant (e.g., rigs, excavators) and ensure that sufficient space is included within any Compulsory Purchase Order process.

Construction techniques

Key takeaway: innovative construction techniques can enhance delivery and reduce costs but must be carefully evaluated for unintended consequences.

- **Road designs, layouts and materials:** various schemes adopted kerbed edges to reduce land-take with the aim of cost savings. Both the Wokingham Arborfield Cross and Kingskerswell Bypass schemes reported the use of new methods of laying roundabout areas to reduce land-take and cost; this involved using kerbed edges to the new carriageway instead of verges. However, in the case of Kingskerswell Bypass Scheme, this meant a lower speed limit requirement which incurred enforcement costs, potentially offsetting the savings. A separate scheme (the A2300) reported changing the type of surfacing material from traditional asphalt to innovative low noise surfacing as a result of local stakeholder engagement, with the aim of reducing noise impacts for those living next to the road link.

- **Bridge construction:** some schemes implemented innovative bridge construction techniques which helped minimise disruption and were recognised as best practice. For example, the Walton Bridge scheme delivered a ground stabilisation initiative which was embraced by the Environment Agency as best practice due to fewer vehicle movements and reduced use of virgin materials. The Portsmouth Northern Road Bridge scheme won an Institution of Civil Engineers (ICE) award for an innovative construction which enabled working over an operational railway line and maintaining vehicular access while minimising disruption. Specifically, use of low height piling rigs to construct the new bridge foundations directly adjacent to the railway line and beneath the roadway above permitted daytime working within the restricted height, which allowed a faster build.

- **Multi-modal design:** the Manchester Cross-City Bus scheme included innovative design solutions to allow delivery of the busway along the alignment of a disused railway. To ensure all stops were fully accessible and attractive to users, the height of the Busway was raised, a number of bridges were removed, and cuttings were created for bus stops. This procedure required diverting a significant number of utilities - many of which were time critical and benefited from early engagement with the contractor, specialist advisors and utility providers. Thanks to stakeholder participation, the scheme also delivered innovative cycle bypass lanes, which are the cycle lanes that pass behind bus stops reducing interaction between cyclists and buses.

Stakeholder engagement and management lessons

Key takeaway: early, tailored, and continuous engagement fosters stakeholder support and improves project outcomes.

- **Clear communications plans:** findings across schemes consistently demonstrate that communications plans should be realistic, comprehensive, and adaptable, ensuring that information provided is relevant to stakeholders. Plans incorporating regular updates (e.g. weekly newsletters) and dissemination materials (e.g. fly-through videos) were perceived as helpful for stakeholders to understand project progress and outcomes. Setting out clear roles and responsibilities was also perceived to be beneficial. For example, the A630 Lower Don Valley scheme ensured its communications plan clearly set out the key project personnel, background information, and methods for distributing the information, as well as the roles and responsibilities of each body, and the tasks they should lead on. A flow diagram which explains the scheme development process, scheme stage, and when comments can be addressed within the emerging scheme design can be a helpful instrument to provide at the beginning of consultations, as learnt in the case of the Heysham-M6 Link Road.

- **Stakeholder engagement and management:** several schemes demonstrated that early and two-way communication with stakeholders (both internal and external), helped manage expectations and schedules. Schemes highlighted that regular drop-in meetings were beneficial, particularly for business owners affected by the works in question. These sessions often encouraged local business support while the works were undertaken. In the case of the Darlaston scheme, sharing information with other departments in the Council (e.g. traffic management) produced benefits in terms of schedule management. Scheme promoters (e.g., from Heysham-M6 Link Road) also recommended responding to criticism or misinformation as soon as possible to avoid worsening of public perceptions – empowering communications teams to act quickly helps builds trust and prevent negative narratives.

A "comprehensive and heavily resourced communication and stakeholder plan [was put] in place with the key aim of keeping affected parties as fully informed and engaged as possible. The communications strategy focused on local residents and businesses, but also the public in general, and was resourced by a dedicated on-site contractor public liaison team, a client project hotline and email response team and key stakeholder engagement team."

Nottingham Tram Extension, 5 Year After report.

- **Tailored strategies**: some schemes reported tailoring engagement strategies to specific stakeholder groups (e.g. local businesses, councils) to ensure differing needs were addressed effectively. For example, the Heysham scheme used customised dashboards for different stakeholder groups, while the Mansfield PT Exchange scheme involved bus operators in design testing. In the case of the Nottingham Tram Extension scheme, several tailored measures were introduced to help affected parties with the disruptive nature of the work, including financial assistance for small businesses, logistical support, free bus services, and marketing campaigns. These proved to be strongly beneficial and are recommended for similar schemes.

- **Political buy-in**: lack of early political support was identified as a barrier in some schemes, underscoring the need for early alignment with decision-makers.

Programme management lessons

Key takeaway: robust contractual arrangements, clear documentation, and strategic resourcing are essential for effective programme delivery.

- **Procurement strategies**: several schemes reported benefitting from early contractor engagement and pre-qualification processes, which led to cost savings and better tender responses. For example, the Stockport scheme reported that a 'design and build' contract was a procurement approach which resulted in cost savings due to greater efficiency, and the Bristol metrobus scheme commenced a pre-qualification process with contractors early on, which resulted in more contractors tendering for the work and lower costs. The Stockport scheme provides a recommendation to consider entering an Advance Works Agreement at the pre-tender stage, to allow non-construction activities to commence without full funding approval, especially if this allows construction to be undertaken in optimum (spring and summer) periods. However, the Worcester Integrated Transport scheme found sub-contracting various scheme elements to multiple contractors increased the risk of programming issues, due to the interdependency of different tasks between these companies.

- **Project management**: several schemes provided specific project management learnings. For example, the Wokingham Arborfield Cross highlighted the importance of ensuring Statutory Undertakers' works programmes are provided in writing to avoid miscommunication, while Luton Town Centre recommended collaborative IT systems between client and contractor for documentation sharing.

- **Resourcing**: co-location of teams and secondments were found to improve coordination and delivery. For example, the secondment of delivery team staff into utilities companies as part of the Manchester Metrolink was found to enhance working relationships and progress monitoring. Staff turnover management and clear post-handover roles were also flagged as critical; the scheme recommends that post-handover roles and responsibilities should be clearly defined, with dedicated contractor resource to manage this phase effectively.

- **Funding:** a range of funding decisions should be considered from the outset. For example, the Stockport scheme identified the need to explicitly include management fees in the business case costing process to avoid budget shortfalls. The Bristol metrobus scheme showed that decentralised funding - allocated to individual local authorities – led to challenges of disjointed project delivery and limited the authority of programme-level leadership. Centralising spending power can help to maintain programme cohesion and enable more effective decision-making across schemes.

- **Risk management**: several schemes reported that the use of risk logs helped them effectively manage the programme through its delivery. For example, the Rochdale Interchange scheme selected the Transport for Greater Manchester risk management process as its framework to risk management. This led stakeholders to hold monthly risk reviews and management meetings, escalate issues via set procedures, and update the monetary allowance to cover up for the materialisation of risks using advanced quantitative analysis (Monte-Carlo simulation) throughout the project.

"TfGM's risk management process proved to be of significant benefit in the support that it offers to the clients' project management, maintains a level of audit as the scheme progresses, highlights and affords the opportunity to review and counteract risks as they become apparent, and supports the decision making process"

Rochdale Interchange, 5 Year After report

Other lessons: environmental issues

The theme of environmental considerations emerged across 5 reports. Among the key highlights, the Bexhill-Hastings Link scheme mentioned that hedgerow planting across the scheme has greatly improved habitat connectivity to the benefit of bats by increasing their foraging and commuting habitat. However, the scheme also mentioned

that bat boxes should be located out of reach to prevent vandalism. Further management recommendations to increase the value of wildlife impact mitigation measures were included in the report.

15.3 Learnings to improve evaluation of LMS

The learnings from this research are broadly aligned with those highlighted in the previous meta-evaluation, which is expected due to the Evaluation Framework underpinning the M&E of LMS having remained the same. Although the execution of M&E has improved in certain cases depending on the topic considered (e.g., carbon impacts), the degree of comparability and aggregability of data across reports remains a barrier to derive overarching portfolio assessments. Key learnings for the DfT that could improve future evaluation of LMS include:

- **Forward-planning for information handover:** knowledge management systems could be set up to ensure key information is stored and maintained through the appraisal and evaluation stages for evaluators to use. This would be a significant improvement from current practice, as the review of the reports underpinning this study has revealed that evaluators had at times no access to data at the required level of detail (e.g., costs could not be broken down into the categories mentioned in the 2012 LMS Monitoring and Evaluation framework).

- **Improving comparability between schemes while balancing individual scheme needs:** as the DfT supervises the application of the 2012 LMS Monitoring and Evaluation framework to schemes, it should consider 'low-hanging fruits' available to enhance comparability across schemes. For example, mandating the conversion of all monetary values into pre-established base years would improve cost and VfM comparability. The introduction of criteria or thresholds to determine whether objectives should be deemed achieved or partially achieved would also be beneficial. This consideration should also be given to the trade-offs arising from an extensive standardisation of reporting to avoid reducing the relevance of evidence to individual schemes. For example, from a comparability perspective it would be ideal if reports provided travel time data for the same segments where travel demand data is also collected, in order to derive demand-weighted travel time benefits across schemes. At the same time, a given scheme might be interested in measuring travel times over much longer corridors than the segments for which demand data could be feasibly collected. Limiting the collection of travel time data to those same segments could therefore risk missing strategic evidence to assess scheme performance (e.g., on faster inter-city travel thanks to a bypass).

- **Design a portfolio-level evaluation to be delivered alongside individual schemes' evaluations:** given the trade-offs between comparability and scheme-level evidence requirements, it may be difficult to obtain portfolio-level outcome estimates (including the portfolio overall VfM) through aggregation of individual scheme evaluation. Moreover, attribution is likely to remain a common issue

regardless, meaning that even where scheme-level evidence can be aggregated, it would remain hard to establish how much of the observed impacts are solely due to the LMS interventions, as many reports have flagged. Furthermore, the frequent lack of attempts to control for knock-on impacts on other parts of the transport systems beyond the links directly affected entails any aggregated evidence would likely remain partial. Therefore, it might be helpful to assess the feasibility of a portfolio-level evaluation to be designed and delivered alongside individual schemes' evaluations. This would facilitate gathering data in consistent formats, choosing control areas for a particular number of schemes and delivering a centralised assessment of selected interventions.

In the absence of the above, a meta-evaluation can still add value. It enables an assessment of the 'direction of travel' of the portfolio, examining whether observed change in key indicators are consistent with expectations. It also highlights important differences across scheme types, such as between highway and public transport interventions, which represents useful information for decision makers. In addition, it enables the identification of best practices examples, therefore improving the future quality of scheme-level evidence.

16. Conclusions

This meta-evaluation reviewed the outcomes of 36 Local Authority Major Schemes (LMS) funded by the DfT, covering highway, multi-modal, rail, and bus and other rapid transport interventions delivered between 2008 and 2020. Findings are based on M&E reports submitted one and 5 years after scheme opening. However, not all schemes reported on every topic, and methods varied, limiting comparability and the ability to attribute observed changes directly to the schemes.

A summary of findings in relation to the 4 groups of research questions is provided below, including (1) strength of evidence and overall impacts, (2) scheme type effects, (3) post-opening time trends, and (4) forecasting, followed by recommendations for future schemes.

Strength of evidence and overall impacts

Overall, the majority of schemes demonstrated positive impacts in areas including travel time, journey reliability, mode shift (particularly towards public transport), user carbon emissions, air quality, safety, and local economic performance. Among these, safety improvements emerged as the most consistent finding: 80% of schemes that had safety as an objective reported safety gains, with a 37% reduction in annual collisions observed 5 years post-opening. In contrast, evidence relating to travel demand and noise impacts was more variable and less conclusive.

Ten schemes provided post-opening VfM data. Most showed a drop in their BCR after opening, from a median of 6.4 to 5.2, mainly due to overestimated benefits at the planning stage. Despite this, most schemes still offered ‘very high’ value for money. Bus and multi-modal schemes generally had marginally higher BCRs than highway schemes.

Despite these encouraging trends, the evidence base remains insufficient to fully quantify and value the contribution of different types of schemes. The quality and

consistency of evidence varied significantly. Differences in data collection, analysis, and reporting methods limited the ability to aggregate findings and draw firm conclusions about scheme impacts. Strengthening the quality, consistency, and coverage of evaluations will be essential to ensure future schemes generate clearer, actionable insights and better support evidence-informed decision-making.

Scheme type effects

Highway schemes: on average, highway schemes showed positive results for travel demand, travel time, air quality, and safety. More highway schemes were linked to positive local economic trends than any other scheme type. However, results for mode shift, reliability, and carbon emissions were mixed and generally lower than for other types of schemes. Highway schemes also tended to result in a slight increase in noise, reporting a moderate negative impact in this area.

Bus & rapid transport and rail schemes: there were notable gaps in the evidence for these scheme types, with no quantitative findings reported for travel time, noise, or safety (and no carbon data for bus & rapid transport). Rail schemes generally showed positive results for the outcomes that were measured, including travel demand, mode shift, local economic impacts, and carbon emissions, though these were often based on just one or 2 schemes. Bus & rapid transport schemes showed mixed results for travel demand, mode shift, and local economic impacts.

Multi-modal schemes: overall, trends were mostly positive, especially for noise reduction and safety improvements. However, results for travel time, reliability, and mode shift were mixed.

Post-opening time trends

Some impacts changed over time, based on one year (1YA) and 5 year (5YA) post-opening data, as shown below. Only a small number of schemes had both 1YA and 5YA data (between 2 and 7, depending on the topic, except for travel demand, with 14 schemes reporting on different types of travel demand), so findings should be interpreted carefully.

- Travel demand often increased further at 5YA, or declines became less pronounced, while safety gains were more pronounced at 5YA.

- Travel time savings compared to the pre-opening baseline year were generally smaller at 5YA than at 1YA. Air quality and local economic impacts tended to improve more at 5YA; this may reflect broader trends (rather than being solely attributable to the scheme in question), or the fact that such changes can be difficult to detect at the 1YA stage.

Forecasting

Reporting against forecasts was inconsistent and often based on small samples. Where data was available, post-opening results were generally less positive than forecast, especially for construction time, costs, and travel demand. Local economic impacts were also typically below expectations. COVID-19 was often cited as a reason for differences between forecast and actual outcomes.

Almost half (47%) of schemes which reported on delivery timelines were delivered on time or ahead of schedule. One in five (20%) had slight delays, and one third (33%) had large delays (over 10% longer than planned), with an average delay of 7 months. On average, cost overruns were 3% above original forecasts, with larger schemes tending to have bigger overruns.

Considering schemes' VfM, post-opening re-estimations of lifetime BCRs showed an average decrease compared to initial forecasts. However, 7 out of the 10 schemes that reassessed their VfM remained within the same category, such as 'high' or 'very high', indicating that deviations from forecasts were generally modest and VfM typically remained high.

Summary of improvements and continuing challenges in scheme evaluations

Compared to the last meta-evaluation of LMS, this report indicates incremental improvements in reporting and assessment, particularly in areas such as scheme objectives, travel demand, travel time and reliability, and safety. More schemes now provide clearer commentary on whether objectives have been met, and there is stronger evidence of mode shift, especially for rail schemes. Reporting on travel time and reliability is more robust with an increase in quantitative data, and reporting of safety has improved significantly, with most schemes showing reductions in collisions. Local economic impacts are more frequently reported, especially at the 5YA stage, and air quality impacts are now consistently measured and reported on.

However, persistent challenges remain. Many schemes still list more objectives than recommended, and a significant proportion lack clarity or commentary, limiting comparability. Attribution of impacts - whether considering travel behaviour, local economic impacts, or safety - remains difficult. Environmental impact reporting, particularly for carbon and noise, is partial and inconsistent, with varied metrics and approaches. Comparability is further hampered by inconsistent methodologies, and only a minority of schemes provide robust comparisons with forecasts or quantitative post-opening VfM analysis. Overall, while reporting and evidence are improving, standardisation and attribution of impacts continue to be barriers.

Recommendations for future schemes

Future evaluations should ensure comprehensive, standardised data collection and reporting, including counterfactual analysis where proportionate and coverage of all required outcomes and impacts.

Scheme promoters should prioritise robust monitoring frameworks and transparent reporting to improve the reliability and usefulness of evaluation findings.

Future schemes should follow the requirements set out in the updated LMS benefits management and evaluation framework. This includes reporting on all required topics, data collection including baseline, one- and 3-year data, and the use of proportionate methods to evaluate scheme outcomes and impacts.

The updated framework has been designed to help address challenging aspects of LMS evaluation, including updated guidance on the selection and design of evaluation approaches in a LMS context, new guidance on evaluation of outturn VfM, suggested metrics to promote consistent data collection, and resources such as report templates to support standardisation.

Annex A: Tables - Accessible content

This Annex provides content which complements the alt-text of figures and tables presented in the rest of the document in a format accessible to reading support software. References to each table below are provided directly in the alt-text.

Data Table 1: Outturn and forecast 1YA scheme costs

Scheme	Scheme Type	Approved budget (£million)	Outturn total cost (£million)
A2300 Corridor Improvements West Sussex	Highways	22.2	22.9
Newhaven Port Access Road	Highways	23.0	23.2
Wokingham Arborfield Cross	Highways	25.4	24.7
A630 Lower Don Valley	Highways	36.4	42.1
Congleton Link Road	Highways	89.6	83.5
Lincoln Eastern Bypass	Highways	94.6	133.9
Stockport Town Centre Access Plan	Multi modal	73.2	74.7

Data Table 2: Outturn and forecast 5YA scheme costs

Scheme	Scheme Type	Approved budget (£m)	Outturn total cost (£m)
Bristol metrobus	Bus & Rapid Transport	200.0	230.7
Portsmouth Northern Road Bridge	Highways	12.6	9.2
Elmbridge Transport (Phase 1)	Highways	14.7	13.5
Todwick Crossroads	Highways	14.7	15.0
Thornton to South Westitch Island	Highways	19.6	20.8
Taunton	Highways	22.1	25.5
Crewe Green Link Road	Highways	24.0	25.8
Leeds Inner Relief Road	Highways	25.0	25.0
Walton Bridge	Highways	32.6	32.6
Kingskerwell Bypass	Highways	118.0	116.3
Heysham-M6 Link Road	Highways	124.0	139.2
Norwich NDR	Highways	179.0	205.0
Mansfield PT exchange	Multi-Modal	8.5	8.4
Rochdale Interchange	Multi-Modal	11.5	11.7
Loughborough town centre improvement	Multi-Modal	18.5	17.7
Worcester Intergrated Transport	Multi-Modal	19.7	18.8
Ipswich Transport Fit for the 21st Century	Multi-Modal	21.6	21.5
Luton Town centre	Multi-Modal	24.2	23.7
Tipner Interchange	Multi-Modal	28.2	27.1
Lincoln Transport Hub	Multi-Modal	29.0	29.0
Nottingham Tram Extension	Rail	538.0	536.2

Data Table 3: Travel demand intervention and target area 1YA

Scheme	Scheme Type	Outturn change, 1YA-Baseline (Absolute Change AM flows)	Outturn change, 1YA-Baseline (% Change)	Outturn change, 1YA-Baseline (Absolute Change PM flows)	Outturn change, 1YA-Baseline (% Change)
Congleton Link Road	Highways	-97.0	-7.6%	-183.0	-14.2%
Wokingham Arborfield Cross	Highways	-232.0	-22.6%	-286.0	-27.9
Overall average for all schemes		-164.4	-0.2%	-234.4	-0.2%

Data Table 4: Travel demand intervention and target area 5YA

Scheme	Scheme Type	Outturn change, 5YA-Baseline (Absolute Change AM flows)	Outturn change, 5YA-Baseline (% Change)	Outturn change, 5YA-Baseline (Absolute Change PM flows)	Outturn change, 5YA-Baseline (% Change)
Darlaston Access Improvement	Highways	98	4.0%	-162.2	-6.5%
Portsmouth Northern Road Bridge	Highways	/	/	-107.0	-5.4%
Overall average for all schemes		98.0	0.0%	-134.3	-0.1%

Data Table 5: Travel demand AM intervention and construction area

Scheme	Scheme Type	Outturn change, 5YA-Baseline (Level)	Outturn change, 5YA-Baseline (% Change)
Darlaston Access Improvement	Highways	-1266	-24.5%
Portsmouth Northern Road Bridge	Highways	53	3.5%
Overall average for all schemes		-607	-10.5%

Data Table 6: Travel demand PM intervention and construction area

Scheme	Scheme Type	Outturn change, 5YA-Baseline (Level)	Outturn change, 5YA-Baseline (% Change)
Darlaston Access Improvement	Highways	-483	-9.3

Data Table 7: Travel demand AM intervention and target area

Scheme	Scheme Type	Outturn change, 1YA-Baseline (Level)	Outturn change, 1YA-Baseline (% Change)
A421 Dualling	Highways	264	10.3%
A630 Lower Don Valley	Highways	-106	-4%
Congleton Link Road	Highways	-97	-7.6%
Elmbridge Transport (Phase 1)	Highways	464	24.3%
Walton Bridge	Highways	0	27.5%
Wokingham Arborfield Cross	Highways	-232	-22.6%
Average for highway schemes		49	4.6%
Nottingham Tram Extension	Rail	-19	-0.1%
Overall average for all schemes		39	4%

Data Table 8: Travel demand PM intervention and target area

Scheme	Scheme Type	Outturn change, 5YA-Baseline (Level)	Outturn change, 5YA-Baseline (% Change)
A421 Dualling	Highways	88	4%
A630 Lower Don Valley	Highways	-147.9	-6%
Congleton Link Road	Highways	-183.3	-14%
Elmbridge Transport (Phase 1)	Highways	311.8	23%
Walton Bridge	Highways	205	17%
Wokingham Arborfield Cross	Highways	-285.5	-28%
Average for highway schemes		-2.0	-1%
Nottingham Tram Extension	Rail	1549.7	5%
Overall average for all schemes		219.7	2%

Data Table 9: AADT, outturn (1YA), highway schemes target area

Scheme	Scheme Type	Outturn change, 1YA-Baseline (Level)	Outturn change, 1YA-Baseline (% Change)
Kingskerswell Bypass	Highways	-47540	-72.1%
Lincoln Eastern Bypass	Highways	-2119	-6.9%
Thornton to Switch Island	Highways	-8450	-44.7%

Data Table 10: AADT, outturn (5YA), highway schemes target area

Scheme	Scheme Type	Outturn change, 5YA-Baseline (Level)	Outturn change, 5YA-Baseline (% Change)
Kingskerswell Bypass	Highways	-53666	-81.3%
Thornton to Switch Island	Highways	-2290	-18%

Data Table 11: AADT, outturn (1YA), highway schemes construction area

Scheme	Scheme Type	Outturn change, 1YA-Baseline (Level)	Outturn change, 1YA-Baseline (% Change)
Leeds Inner Relief Road	Highways	/	0.4%
Thornton to Switch Island	Highways	25700	/

Data Table 12: AADT, outturn (5YA), highway schemes construction area

Scheme	Scheme Type	Outturn change, 5YA-Baseline (Level)	Outturn change, 5YA-Baseline (% Change)
Leeds Inner Relief Road	Highways	/	-14.5%
Thornton to Switch Island	Highways	32800	/

Data Table 13: AADT, outturn (1YA), both construction and target benefit area

Scheme	Scheme Type	Outturn change, 1YA-Baseline (Level)	Outturn change, 1YA-Baseline (% Change)
Heysham-M6 Link Road	Highways	-1130	-12.3%
Loughborough Town Centre	Highways	/	13.2%
Walton Bridge	Highways	4000	13.3%
Pennine Reach Blackburn	Bus & rapid transport	-643	-4.5%

Data Table 14: AADT, outturn (5YA), both construction and target benefit area

Scheme	Scheme Type	Outturn change, 5YA-Baseline (Level)	Outturn change, 5YA-Baseline (% Change)
A43 Corby Link Road	Highways	-6913	-51.8%
Heysham-M6 Link Road	Highways	-1358	-8.1%
Loughborough Town Centre	Highways	/	15.6%
Walton Bridge	Highways	5000	16.7%
Pennine Reach Blackburn	Bus & rapid transport	1700	-11.8%

Data Table 15: Rail demand 1YA

Scheme	Scheme Type	Intended Impact Area	Outturn change, 1YA-Baseline (Absolute change)	Outturn change, 1YA-Baseline (% Change)
Mansfield PT exchange	Bus & rapid transport	Both intervention and targeted benefit area	17048	4.9%
Worcester Integrated Transport	Multi-modal	Both intervention and targeted benefit area	132007	15%
Average for 1YA			74527.5	10%

Data Table 16: Rail demand 5YA

Scheme	Scheme Type	Intended Impact Area	Outturn change, 1/5YA-Baseline (Absolute change)	Outturn change, 1/5YA-Baseline (% Change)
Mansfield PT exchange	Bus & rapid transport	Both intervention and targeted benefit area	52016	14.9%
Worcester Integrated Transport	Multi-modal	Both intervention and targeted benefit area	0	28%
Average for 5YA			148980.5	21.5%

Data Table 17: Comparison of bus demand at baseline and outturn stage (1YA)

Scheme	Scheme Type	Outturn change, 1YA-Baseline (Level)	Outturn change, 1YA-Baseline (% Change)
Mansfield PT exchange	Bus & rapid transport	79371	3.4%
Rochdale Interchange	Multi modal	-4280	-21.0%

Data Table 18: Comparison of bus demand at baseline and outturn stage (5YA)

Scheme	Scheme Type	Outturn change, 5YA-Baseline (Level)	Outturn change, 5YA-Baseline (% Change)
Mansfield PT exchange	Bus & rapid transport	-168932	-7.2%
Worcester Integrated Transport	Multi modal	2836	519.8%

Data Table 19: Comparison of forecast and outturn AADT demand (1YA)

Scheme	Scheme Type	Outturn change, 1YA-Baseline (Absolute change)	Outturn change, 1YA-Baseline (% Change)
Congleton Link Road	Highways	/	-6.6%
Stockport Town Centre Access Plan	Highways	/	-29.3%
Heysham-M6 Link Road	Highways	/	-10.7%

Data Table 20: Comparison of forecast and outturn AADT demand (5YA)

Scheme	Scheme Type	Outturn change, 5YA-Baseline (Absolute change)	Outturn change, 5YA-Baseline (% Change)
Thornton to Switch Island	Highways	/	12.3%
Heysham-M6 Link Road	Highways	/	-2%
A43 Corby Link Road	Highways	/	1.7%

Data Table 21: Outturn variation in total collisions (1YA)

Scheme	Scheme Type	Outturn variation 1YA-baseline (Level)	Outturn variation 1YA-baseline (% change)
A421 Dualling	Highways	-8	53%
Newhaven Port Access Road	Highways	-5	50%
A630 Lower Don Valley	Highways	-1.7	-16%
Wokingham Arborfield Cross	Highways	1.3	12%
Lincoln Transport Hub	Multi-modal	-5.3	-62
Worcester Integrated Transport	Multi-modal	-2	-6%

Data Table 22: Outturn variation in total collisions (5YA)

Scheme	Scheme Type	Outturn variation 5YA-baseline (Level)	Outturn variation 5YA-baseline (% change)
Bexhill-Hastings Link Road	Highways	-56.0	-49%
Kingskerswell Bypass	Highways	-17.1	-50%
Portsmouth Northern Road Bridge	Highways	-8.0	-16%
A43 Corby Link Road	Highways	-6.4	-76%
Taunton NDIR		-6.0	-26%
Todwick Crossroads	Highways	-5.1	-56%
Walton Bridge	Highways	-5.0	-80%
Darlaston Access Improvement	Highways	-3.0	-14%
Elmbridge Transport (Phase 1)	Highways	-2.3	-30%
Crewe Green Link Road	Highways	-2.2	-40%
Thornton to Switch Island	Highways	-2.0	-42%
Loughborough Town Centre Transport	Multi-modal	-11	-49%
Mansfield PT Exchange	Multi-modal	-2.7	-49%
Tipner Interchange	Multi-modal	-0.2	-2%

Data Table 23: Outturn variation in serious collisions (1YA)

Scheme	Scheme Type	Outturn variation 1YA-baseline (Level)	Outturn variation 1YA-baseline (% change)
A421 Dualling	Highways	-1	-50%
A630 Lower Don Valley	Highways	-0.3	-14%
Wokingham Arborfield Cross	Highways	2.5	167%
Lincoln Transport Hub	Multi-modal	-1.8	-88%
Worcester Integrated Transport	Multi-modal	1	20%

Data Table 24: Outturn variation in serious collisions (5YA)

Scheme	Scheme Type	Outturn variation 5YA-baseline (Level)	Outturn variation 5YA-baseline (% change)
Crewe Green Link Road	Highways	-1.5	-64%
A43 Corby Link Road	Highways	-1.0	-14%
Darlaston Access Improvement	Highways	-0.6	-19%
Thornton to Switch Island	Highways	0.2	35%
Kingskerswell Bypass	Highways	0.4	13%
Todwick Crossroads	Highways	0.6	38%
Taunton NIDR	Highways	1	50%
Elmbridge Transport (Phase 1)	Highways	1.3	167%
Portsmouth Northern Road Bridge	Highways	2.2	19%
Mansfield PT Exchange	Multi-modal	-0.7	-67%
Tipner Interchange	Multi-modal	-0.6	-30%
Loughborough Town Centre Transport	Multi-modal	1.2	86%

Data Table 25: Outturn variation in slight collisions (1YA)

Scheme	Scheme Type	Outturn variation 1YA-baseline (Level)	Outturn variation 1YA-baseline (% change)
A421 Dualling	Highways	-6	-50%
A630 Lower Don Valley	Highways	-2.3	-28%
Wokingham Arborfield Cross	Highways	-2.3	-24%
Worcester Integrated Transport	Multi-modal	-3.5	-54%
Lincoln Transport Hub	Multi-modal	-3.0	-10%

Data Table 26: Outturn variation in slight collisions (5YA)

Scheme	Scheme Type	Outturn variation 5YA-baseline (Level)	Outturn variation 5YA-baseline (% change)
Crewe Green Link Road	Highways	-23.6	-84%
Portsmouth Northern Road Bridge	Highways	-10.8	-19%
Taunton NIDR	Highways	-7	-33%
A43 Corby Link Road	Highways	-30	-23%
Todwick Crossroads	Highways	-5.5	-73%
Darlaston Access Improvement	Highways	-10	-12%
Elmbridge Transport (Phase 1)	Highways	-18	-95%
Thornton to Switch Island	Highways	-2.2	-52%
Darlaston Access Improvement	Highways	-2.0	-58%
Loughborough Town Centre Transport	Multi-modal	-58	-61%
Mansfield PT Exchange	Multi-modal	-6	-46%
Tipner Interchange	Multi-modal	0.4	5%

Data Table 27: Average AM peak road travel time changes in target benefit areas or mix of target and construction areas (seconds), 1YA

Scheme	Scheme Type	Outturn variation 1YA-baseline (Level)	Outturn variation 1YA-baseline (% change)
Heysham-M6 Link Road	Highways	-636.9	-43%
Bexhill-Hastings Link Road	Highways	-213.0	-19%
Wokingham Aborfield Cross	Highways	-182.5	-14%
A630 Lower Don Valley	Highways	-171.5	-34%
Crewe Green Link Road	Highways	-114.0	-16%
Congleton Link Road	Highways	-100.1	-11%
A421 Dualling	Highways	-48.0	-10%
Walton Bridge	Highways	-30.5	-19%
Darlaston Access Improvement	Highways	1.3	1%
Newhaven Port Access Road	Highways	29.0	18%
A2300 Corridor Improvements West Sussex	Highways	45.0	19%
Norwich NDR	Highways	94.8	9%
Stockport Town Centre Access Plan	Multi-Modal	-39.0	-8%
Heysham-M6 Link Road	Highways	-636.9	-43%

Data Table 28: Average AM peak road travel time changes in target benefit areas or mix of target and construction areas (seconds), 5YA

Scheme	Scheme Type	Outturn variation 5YA-baseline (Level)	Outturn variation 5YA-baseline (% change)
Bexhill-Hastings Link Road	Highways	-174.0	-19%
Crewe Green Link Road	Highways	-142.0	-12%
Norwich NDR	Highways	-124.7	-37%
Walton Bridge	Highways	-59.0	2%
Portsmouth Northern Road Bridge	Highways	8.0	16%
Darlaston Access Improvement	Highways	16.3	4%
Todwick Crossroads	Highways	70.0	10%
Thornton to South Westitch Island	Highways	74.3	-16%
Loughborough Town Centre Transport	Multi-Modal	-46.7	-13%
Worcester Intergrated Transport	Multi-Modal	-30.3	-6%
Luton Town centre	Multi-Modal	7.5	9%
Tipner Interchange	Multi-Modal	99.7	14%

Data Table 29: Average PM peak road travel time changes in target benefit areas or mix of target and construction areas (seconds), 1YA

Scheme	Scheme Type	Outturn variation 1YA-baseline (Level)	Outturn variation 1YA-baseline (% change)
Heysham-M6 Link Road	Highways	-841	-52%
Crewe Green Link Road	Highways	-208	-23%
A630 Lower Don Valley	Highways	-139	-24%
Elmbridge Transport (Phase 1)	Highways	-100	-50%
Congleton Link Road	Highways	-79	-9%
A421 Dualling	Highways	-66	-12%
Newhaven Port Access Road	Highways	-27	-10%
Darlaston Access Improvement	Highways	-9	-7%
Norwich NDR	Highways	-4	0%
Wokingham Arborfield Cross	Highways	-1	0%
Walton Bridge	Highways	2	1%
A2300 Corridor Improvements West Sussex	Highways	45	18%
Bexhill-Hastings Link Road	Multi-modal	-172	-16%
Stockport Town Centre Access Plan	Multi-modal	-110	-23%

Data Table 30: Average PM peak road travel time changes in target benefit areas or mix of target and construction areas (seconds), 5YA

Scheme	Scheme Type	Outturn variation 5YA-baseline (Level)	Outturn variation 5YA-baseline (% change)
Crewe Green Link Road	Highways	-303	-34%
Norwich NDR	Highways	-232	-22%
Walton Bridge	Highways	-22	-16%
Darlaston Access Improvement	Highways	21	11%
Portsmouth Northern Road Bridge	Highways	21	5%
Thornton to Switch Island	Highways	27	4%
Todwick Crossroads	Highways	88	24%
Worcester Integrated Transport	Multi-modal	-149	-27%
Bexhill-Hastings Link Road	Multi-modal	-105	-10%
Loughborough Town Centre Transport	Multi-modal	-9	-3%
Luton Town Centre	Multi-modal	21	15%
Tipner Interchange	Multi-modal	41	6%

Data Table 31: Baseline to 1YA change in average share of services arriving on time

Scheme	Scheme Type	Outturn variation 1YA-baseline (percentage points)
Pennine Reach Blackburn	Bus & rapid transport	2
Bristol Metrobus	Bus & rapid transport	2
Mansfield PT Exchange	Multi-modal	12

Data Table 32: Baseline to 5YA change in average share of services arriving on time

Scheme	Scheme Type	Outturn variation 5YA-baseline (percentage points)
Pennine Reach Blackburn	Bus & rapid transport	6
Mansfield PT Exchange	Multi-modal	9
Worcester Integrated Transport	Multi-modal	-35

Data Table 33: Baseline to 1YA change in average carbon emissions

Scheme	Scheme Type	Outturn variation 1YA-baseline (Level)	Outturn variation 1YA-baseline (% change)
Thornton to Switch Island	Highways	-72.17	-3%
Newhaven Port Access Road	Highways	-42	-5%
A2300 Corridor Improvements West Sussex	Highways	-20	-7%
A630 Lower Don Valley	Highways	49	/
Crewe Green Link Road	Highways	62	/
Elmbridge Transport (Phase 1)	Highways	600	/
Stockport Town Centre Access Plan	Multi-modal	-499	/
Ipswich Transport Fit for the 21st Century	Multi-modal	-3	3%

Data Table 34: Baseline to 5YA change in average carbon emissions

Scheme	Scheme Type	Outturn variation 5YA-baseline (Level)	Outturn variation 5YA-baseline (% change)
Thornton to Switch Island	Highways	-393	-15%
Elmbridge Transport (Phase 1)	Highways	0	0%
Crewe Green Link Road	Highways	81	/
Tipner Interchange	Multi-modal	-1833	-9%
Ipswich Transport Fit for the 21st Century	Multi-modal	-9	-8%
Loughborough Town Centre Transport	Multi-modal	13	71%
Manchester Metrolink	Rail	-6700	/

Data Table 35: Baseline to 1YA change in noise

Scheme	Scheme Type	Unit of measurement	Outturn variation 1YA-baseline (Level)	Outturn variation 1YA-baseline (% change)
Kingskerswell Bypass	Highways	dB	-2.86	-4.8%
Stockport Town Centre Access Plan	Highways	dB (A)	-1.68	-2.7%
Lincoln Eastern Bypass	Highways	dB	-1.40	-1.9%
Bexhill-Hastings Link Road	Highways	dB	2.73	5.4%
Heysham-M6 Link Road	Highways	dB	3.93	8.1%
Tipner Interchange	Multi-modal	dB (A)	-12	-16.4%
Luton Town Centre	Multi-modal	dB	0.13	0.4%

Data Table 36: Baseline to 5YA change in noise

Scheme	Scheme Type	Unit of measurement	Outturn variation 5YA-baseline (Level)	Outturn variation 5YA-baseline (% change)
Bexhill-Hastings Link Road	Highways	dB	5.19	11%
Heysham-M6 Link Road	Highways	dB	5.31	11%

Data Table 37: Baseline to 1YA change in NO2 concentration (µg/m³)

Scheme	Scheme Type	Outturn variation 1YA-baseline (Level)	Outturn variation 1YA-baseline (% change)
Bexhill-Hastings Link Road	Highways	-12.9	-31%
Lincoln Eastern Bypass	Highways	-11.0	-34%
A630 Lower Don Valley	Highways	-9.3	-9%
Heysham-M6 Link Road	Highways	-7.6	-21%
Kingskerswell Bypass	Highways	-7.0	-43%
Darlaston Access Improvement	Highways	-3.3	-8%
Taunton	Highways	-1.7	-6%
Newhaven Port Access Road	Highways	-0.7	-17%
Bristol Metrobus	Bus & rapid transport	-0.4	-13%
Lincoln Transport Hub	Multi modal	-4.0	-41%
Stockport Town Centre Access Plan	Multi modal	-1.2	-2%
Loughborough Town Centre Improvements	Multi modal	0.1	1%

Data Table 38: Baseline to 5YA change in NO2 concentration (µg/m³)

Scheme	Scheme Type	Outturn variation 5YA-baseline (Level)	Outturn variation 5YA-baseline (% change)
Kingskerswell Bypass	Highways	-17.4	-61%
Bexhill-Hastings Link Road	Highways	-12	-29%
Taunton	Highways	-9.2	-31%
Norwich NDR	Highways	-5.3	-33%
Darlaston Access Improvement	Highways	-5.0	-12%
Lincoln Transport Hub	Multi modal	-16	-49%
Loughborough Town Centre Improvements	Multi modal	-10.7	-37%
Nottingham Tram Extension	Rail	-15.2	/

Data Table 39: Comparison of Forecast and Outturn BCR

Scheme	Scheme Type	Forecast BCR	Forecast VfM category	Outturn BCR	Outturn VfM category	Change in VfM category
Stockport Town Centre Access Plan	Highway	5.1	Very High	4.7	Very High	Same
Lincoln Eastern Bypass	Highway	10.5	Very High	8.1	Very High	Same
Bristol metrobus	Bus & Rapid Transport	22.7	Very High	17.4	Very High	Same
Bexhill-Hastings Link Road	Highway	1.5	Medium	1.5	Medium	Same
Heysham-M6 Link Road	Highway	4.4	Very High	3.2	High	Lower
Thornton to South Switch Island	Highway	13.1	Very High	12.2	Very High	Same
Portsmouth Northern Road Bridge	Highway	113.6	Very High	257.9	Very High	Same
Pennine Reach Blackburn	Bus & Rapid Transport	2.7	High	1.6	Medium	Lower
Rochdale Interchange	Multi-modal	4.2	Very High	5.6	Very High	Same
Tipner Interchange	Multi-modal	7.6	Very High	2.5	High	Lower

Data Table 40: Assessment of the strength of evidence by topic

Topic	RAG Rating	Strength of evidence
Scheme objectives	Medium	Although the analysis in this section has focused on the achievement of objectives which have been subject to M&E, scheme-level interpretation of findings varies – for example, considering local economic impacts to have been achieved even though the extent of the contribution of a scheme to observed change cannot be determined.
Scheme build	High	Relatively simple type of data to collect and analyse
Delivered scheme	High	Relatively simple type of data to collect and analyse
Scheme costs	Medium-High	Despite the guidance provided in the 2012 LMS Monitoring and Evaluation framework, schemes have often reported total costs only or have broken them down into different categories than those prescribed, in some cases affecting comparability (e.g., by omitting operating and maintenance costs).
Travel demand	Medium	Nearly all schemes monitored travel demand impacts, often (but not always) controlling for effects for both construction sites and other nearby sites. There is a large variation in the type of indicator adopted to monitor travel demand, affecting direct comparability across schemes.
Safety	Medium-high	Over half of the sample provided information on safety impacts, usually allowing to compare changes in total yearly collision numbers as a minimum (and to a lesser degree in slight or serious collisions). However, natural fluctuations in yearly data for this set of indicators means that data based on a single year of observation (as is the case for 1YA schemes) needs to be interpreted with caution (but these represent only a fraction of all reporting schemes).
Mode shift	Medium-low	Most of the reports do not make use of data and methods which allow to define the extent of changes in travel behaviour from one mode to another. An exception are rail schemes, which provided survey data to evidence shift from cars to newly introduced services.
Travel time	Medium	Several schemes monitored travel time impacts in a relatively homogeneous way. However, it was not possible to weight time savings/delays by the number of travellers experiencing them, which hampers the comparability of findings across schemes.
Reliability	Medium-low to medium-high	Data for public transport or multi-modal schemes often lacks assessments of reliability of travel on car trips, offering a partial representation of impacts. Highway schemes offer a more complete representation of impacts, although the monitoring indicators chosen are varied and not always directly comparable.
Carbon impacts	Medium-low	On top of a small sample size of schemes providing quantitative data on changes in emissions, several schemes only evaluated carbon impacts along the routes of intervention and not on the surrounding network, potentially missing increases in emissions.

Noise impacts	Medium-low	On top of noise impacts being monitored by just a third of the sample, a fraction of schemes only monitored impacts at the site of intervention. Moreover, the type of data collected across schemes varied (in some cases, it followed adjustments to reflect impacts perceived by the human ear).
Air quality impacts	Medium	Nearly half of the sample reported on these impacts, most often making use of multiple monitoring stations, though sometimes their location did not allow for benchmarking of directly or indirectly affected areas with areas unaffected by the scheme.
Local Economic Impacts	Low	With the exception of few schemes, evidence lacks attribution of impacts to the effects of the schemes.
Value for Money	Medium-low	Data comparability is challenged by several factors, ranging from the use of different base years (affecting the degree of discounting of costs and benefits), to the usage of different re-appraisal methods including simple projections of outturn benefits as well as model re-runs.
Cross-cutting comment	/	The strength of evidence appears to be higher on topics which are more directly related to transport impacts, whereas environmental and local economic impacts face more significant challenges. Value for money estimates across schemes should not be used to derive a portfolio-level estimate.