

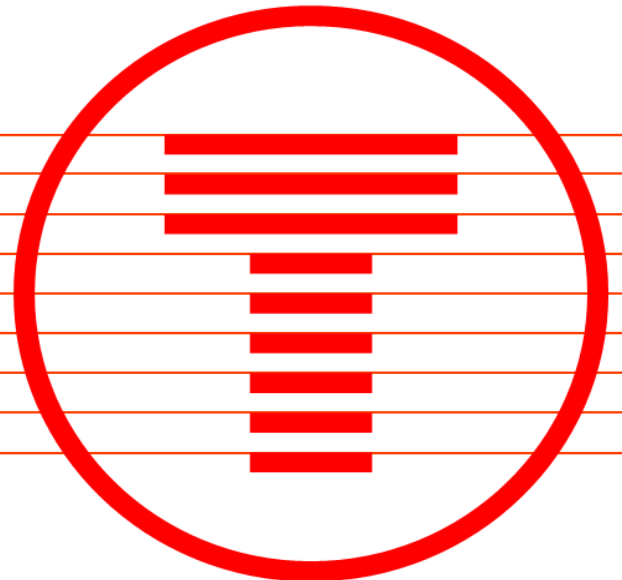


TRAFNIDIAETH CYMRU
TRANSPORT FOR WALES

Default 20mph speed limit on restricted roads

Phase 1

Interim monitoring report



Revision

Final

Issue Date

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Contents

| | |
|---|-----------|
| 1. Introduction..... | 3 |
| 1.1. Background | 3 |
| 1.2. Rationale for intervention..... | 3 |
| 1.3. Monitoring framework and reporting | 4 |
| 2. Objectives and key performance indicators | 5 |
| 2.1. Monitoring framework overview | 5 |
| 2.2. Phase 1 monitoring | 5 |
| 3. Monitoring data..... | 9 |
| 3.1. Traffic speeds..... | 9 |
| 3.2. Journey time reliability | 16 |
| 3.3. Vehicle/pedestrian Interactions | 19 |
| 3.4. Active travel..... | 21 |
| 3.5. Air quality..... | 23 |
| 4. Summary and future monitoring | 25 |



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

1. Introduction

1.1. Background

The Welsh Government is introducing a default 20mph speed limit on ‘restricted roads’ across Wales.¹ This will be the first national scheme in the UK of its kind and will come into force on 17 September 2023.

Following the recommendations of the ‘Welsh 20mph Task Force Group Final Report’ (July 2020), the Welsh Government worked with Local Authorities to implement 20mph speed limits in eight trial areas during 2021/22, in advance of the national roll-out. The trial areas are referred to as phase 1 of the 20mph programme. The eight trial areas, in implementation date order, are listed in **table 1**.

Table 1: 20mph phase 1 trial areas

| Phase 1 trial area | Local Authority | Implementation date |
|---|-------------------|---------------------|
| St Dogmaels | Pembrokeshire | 16 June 2021 |
| St Brides Major | Vale of Glamorgan | 09 July 2021 |
| Llanelli (North) | Carmarthenshire | 20 August 2021 |
| Buckley | Flintshire | 28 February 2022 |
| Cardiff (North) | Cardiff | 11 March 2022 |
| Cilfrew | Neath Port Talbot | 16 March 2022 |
| Abergavenny | Monmouthshire | 18 May 2022 |
| Sevenside (Caerwent, Caldicot, Magor, Undy) | Monmouthshire | 18 May 2022 |

1.2. Rationale for intervention

The rationale for reducing speed limits on restricted roads to 20mph is much wider than simply to reduce traffic speeds. It is intended to be a major behaviour change programme which benefits communities and therefore the well-being of people in Wales.

Introducing a lower speed limit is expected to reduce the likelihood and severity of collisions on our roads, leading to a reduction in the number of pedestrians and cyclists seriously or fatally injured. It is designed to support the Welsh Government’s vision for walking and cycling to be the natural mode of choice for short everyday journeys.²

¹ Restricted roads are defined by the Road Traffic Regulation Act 1984 as those with streetlights at least every 200 yards. Unless signed otherwise, the default speed limit on restricted roads is 30mph.

² This vision is set out in the Active Travel Act Guidance (July 2021).



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

By reducing the number of injuries and fatalities on our roads, encouraging a shift towards active travel, and reducing the negative effects of car use on the wider environment, the change to 20mph is anticipated to have wide-reaching benefits, including:³

- Increased social interaction within communities, leading to improved social cohesion.
- Improved physical and mental health outcomes, due to increased physical activity and greater social interaction.
- Reduced NHS and taxpayer costs and reduced NHS workload as a result of fewer collisions (and reduced severity of injuries and trauma) on the road network and as a result of the improved physical and mental health outcomes.
- Strengthened local economies, as result of increased footfall and therefore increased retail and hospitality service activity in settlements previously affected by traffic speed issues.
- Contributing to the aims and objectives of the Well-Being of Future Generations Act (2015), in particular to 'enable places to support the health and well-being of people and communities' within the 'healthier Wales' goal.

While these wide-reaching benefits are anticipated, they cannot easily be measured and attributed to a single policy intervention. There are many Welsh Government policy interventions directed towards achieving similar well-being benefits. To assess the impact of 20mph implementation, specific measurable objectives that will contribute towards the wider societal benefits have been proposed within a draft national 20mph monitoring framework.

1.3. Monitoring framework and reporting

A draft national 20mph monitoring framework has been prepared to provide a structured evidence-based approach to monitoring the first order effects of 20mph implementation. The final national 20mph monitoring framework will be published later in 2023. Although national implementation has not yet taken place, the draft national 20mph monitoring framework is relevant to monitoring the effects of the phase 1 trial areas.

The Welsh Government has committed to publishing an interim monitoring report (this report) for phase 1, based on data collected up until six months after the final trial area was implemented. This report therefore refers primarily to data collected by the end of November 2022. Future reports will cover data collected beyond this date.

Six months post-implementation is a short timeframe for measuring the effects of an intervention that is intended to be part of a major behaviour change programme. The trial areas are also small in geographical scale. As an example, road traffic collision analysis would need to be carried out over 3 to 5-year periods and over larger areas than covered by the phase 1 trial areas.⁴ Any conclusions drawn in this interim report are therefore tentative in nature and based on limited data.

³ This list of wide-reaching benefits is based on 'The Case for Change' set out in the Welsh 20mph Task Force Group report, July 2020

⁴ RoSPA (2002) Road Safety Engineering Manual, RoSPA: London



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

2. Objectives and key performance indicators

2.1. Monitoring framework overview

The draft national 20mph monitoring framework sets out three core objectives for implementing 20mph as the default speed limit on restricted roads:

1. Reduce injury and death.
2. Encourage a change in travel behaviour.
3. Reduce negative effects of vehicle use on the wider environment.

Nested within the three core objectives are five specific measurable objectives for 20mph implementation, as set out in **figure 1**:

- Reduce the number of pedestrians and cyclists killed or seriously injured on the road network.
- Encourage mode shift from private car to walking and cycling.
- Reduce motor vehicle dominance in vehicle/pedestrian interactions.
- Reduce carbon emissions from transport (as a result of mode shift from private car to walking and cycling for shorter journeys in built-up areas).
- Maintain or improve local air quality (as a result of smoother traffic speeds, reduced acceleration and deceleration).

Key Performance Indicators (KPIs) have been proposed to evaluate progress against the objectives. **Figure 2** presents the 12 KPIs that are proposed for the national roll-out.

2.2. Phase 1 monitoring

Based on data collected up to November 2022, the following seven KPIs are assessed for the phase 1 trial areas in this report:

- Percentage traffic compliance with the 20mph speed limit (KPI 1.1)
- Change in 85th percentile speed (KPI 1.2)⁵
- Change in mean speed (KPI 1.3)
- Vehicle journey times and journey time variation, based on the difference between the 5th percentile and 95th percentile journey times as a proxy for journey time reliability, on main through routes (KPI 1.4)
- Change in attitude to active travel use in built-up areas (KPI 3.1)
- Change in vehicle/pedestrian yield behaviours (KPI 3.2)
- Change in local air quality – NO₂ (KPI 4.1)

⁵ The speed at which 85% of drivers drive at or below under free-flowing conditions.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

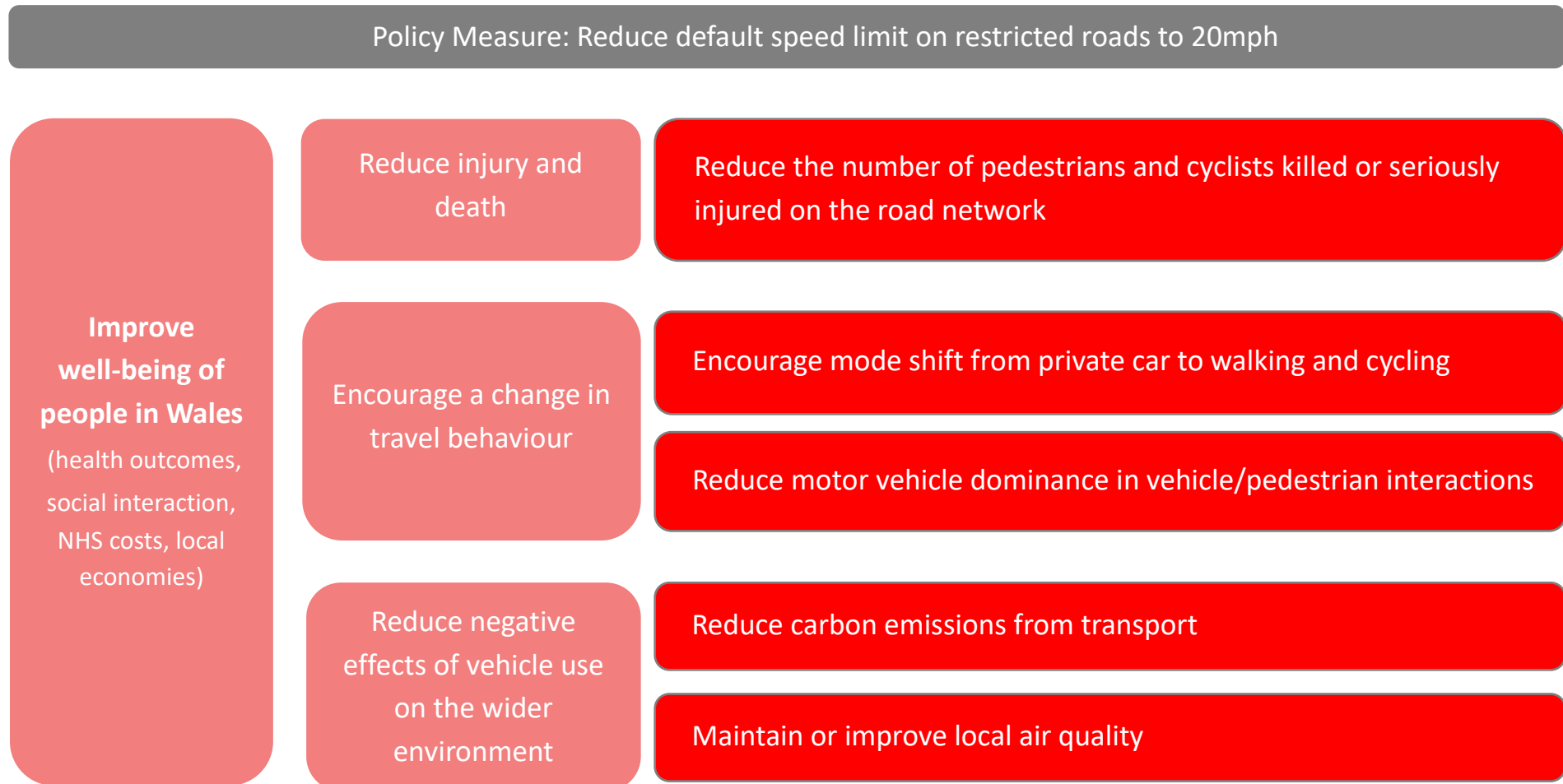
At this early stage of implementation it is not possible to report progress against the other five KPIs. This is because of the short timescales involved since implementation and the limited geographical coverage of the phase 1 trial areas. The KPIs not assessed in this report are:

- Pedestrian and cyclist casualty rates (KPIs 2.1, 2.2, 2.3), where typically at least three years' worth of collision data would be required post-implementation to allow for meaningful comparisons with at least a three-year pre-implementation period.
- Change in CO₂ emissions (KPI 4.2), which will involve analyses undertaken over a longer time period and across larger geographical areas than covered by the phase 1 trial areas.
- Change in public attitudes to 20mph speed limits (KPI 5.1), which can only be assessed as more people experience the effects of 20mph after the national roll-out.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

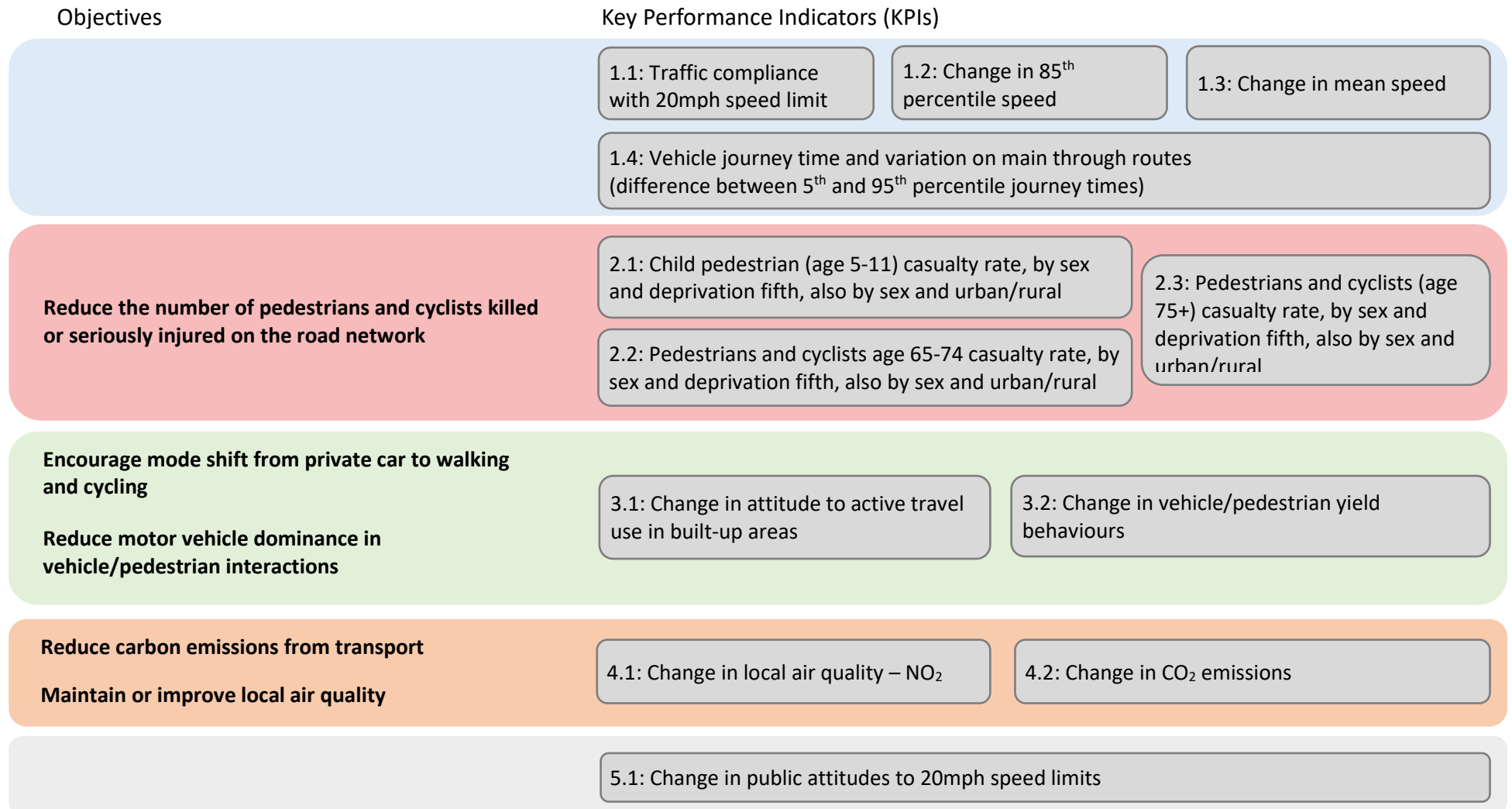
Figure 1: Objectives of default 20mph speed limit implementation





| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Figure 2: Proposed KPIs for assessing national 20mph roll-out





| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

3. Monitoring data

3.1. Traffic speeds

Locations and method

Traffic speed monitoring devices installed at 54 locations within the phase 1 trial areas are providing data for three KPIs:

- Percentage traffic compliance with the 20mph speed limit (KPI 1.1)
- Change in 85th percentile speed (KPI 1.2)⁶
- Change in mean speed (KPI 1.3)

Devices installed in four other settlements, in close proximity to phase 1 trial areas, have been used as controls. In these settlements the speed limits are still predominantly 30mph. The purpose of these controls is to identify any general background changes to traffic speeds in built-up areas which may be happening due to reasons other than a change to the speed limit.

Table 2 provides a summary of speed monitoring device locations and data availability, with specific locations shown on the maps in **appendix A**. Although devices are installed at all locations, continuous data is not always available from every device or for the full period indicated in table 2. This is due to a combination of data errors and equipment failure, repair, downtime for battery replacement and device theft.

A range of speed devices are in use across the trial and control locations, dependent on highway authority preference. These include induction loops cut into the carriageway, pneumatic tubes and column-mounted radar devices.

Table 2: Summary of speed monitoring device locations and data availability

| Phase 1 trial area | Number of 20mph speed monitoring locations | Post-implementation data available |
|---|--|------------------------------------|
| Abergavenny | 7 | 6 months |
| Buckley | 6 | 7 months |
| Cardiff (North) | 12 | 7 months |
| Cilfrew | 5 | 8 months |
| Llanelli (North) | 7 | 1 year 3 months |
| Sevenside (Caerwent, Caldicot, Magor, Undy) | 10 | 3 months |
| St Brides Major | 4 | 1 year 3 months |
| St Dogmaels | 3 | 1 year 3 months |

⁶ The speed at which 85% of drivers drive at or below under free-flowing conditions.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Changes in the mean and 85th percentile speeds within each trial area are weighted by traffic flows, which means that speeds on busier roads have a greater bearing on the calculated value than speeds on quieter roads.

Headline data – traffic speeds

Table 3 presents headline KPI assessments for traffic speeds based on data collected in phase 1 trial areas up to November 2022. The most recent six months of post-implementation data (where available) has been compared to up to six months of pre-implementation data.

Table 3: Traffic speed KPI assessments

| KPI | KPI description | Interim assessment (Nov 2022) |
|-----|--|---|
| 1.1 | Percentage traffic compliance with the 20mph speed limit | 64% travelling at or below 24mph (45% pre-implementation) |
| 1.2 | Change in 85th percentile speed | 85 th percentile speed reduced (- 2.5mph) |
| 1.3 | Change in mean speed | Mean speed reduced (- 3.0mph) |

Any speed reduction should be seen as a positive step towards achieving the wider well-being benefits of the default 20mph speed limit, as it reduces both the likelihood of collisions occurring and injury severity.⁷

Data description – speed limit compliance

Traffic monitoring devices usually provide an output where vehicle volumes are categorised into 5mph speed bands, for example 15-19mph, or 20-24mph. For the purpose of KPI 1.1 anyone driving at or below 24mph is assumed to be compliant with the new speed limit, as this matches the threshold typically used for enforcement.

Since the new 20mph speed limit was introduced, the percentage of vehicles recorded as travelling at or below 24mph within the phase 1 trial areas has increased from 45% to 64%, an increase of 42% (or 19 percentage points). **Figure 3** shows the variation by phase 1 trial area. **Figure 4** shows similar data for Buckley.

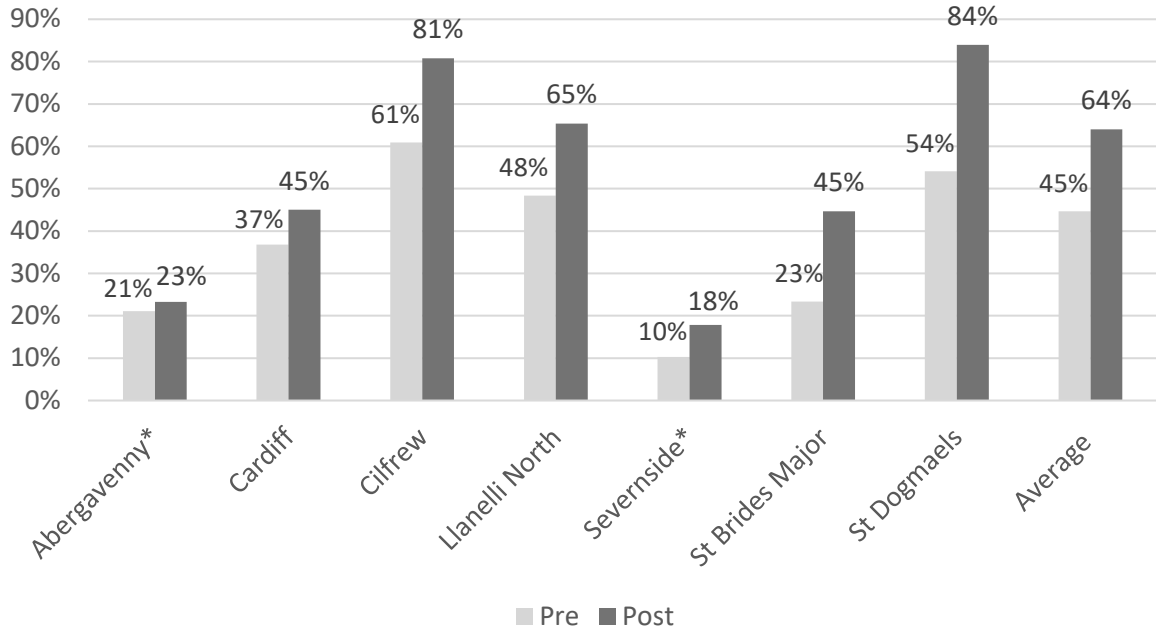
The largest change in speeds has been observed in St Brides Major and St Dogmaels. In St Brides Major there has been a change from 23% of vehicles travelling at or below 24mph to 45% travelling at or below 24mph following 20mph speed limit introduction. This is an increase of more than 90% (or 22 percentage points). In St Dogmaels there has been a change from 54% of vehicles travelling at or below 24mph to 84% travelling at or below 24mph following 20mph speed limit introduction. This is an increase of more than 50% (or 30 percentage points).

⁷ Based on earlier studies, every 1mph reduction in urban mean speeds is shown to reduce the frequency of collisions by between 2% and 7%. Source: Taylor, M., Lynam, D., Baruya, A (2000) The effects of drivers' speed on the frequency of road accidents, Crowthorne: TRL



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Figure 3: Percentage of vehicles travelling at or below 24mph



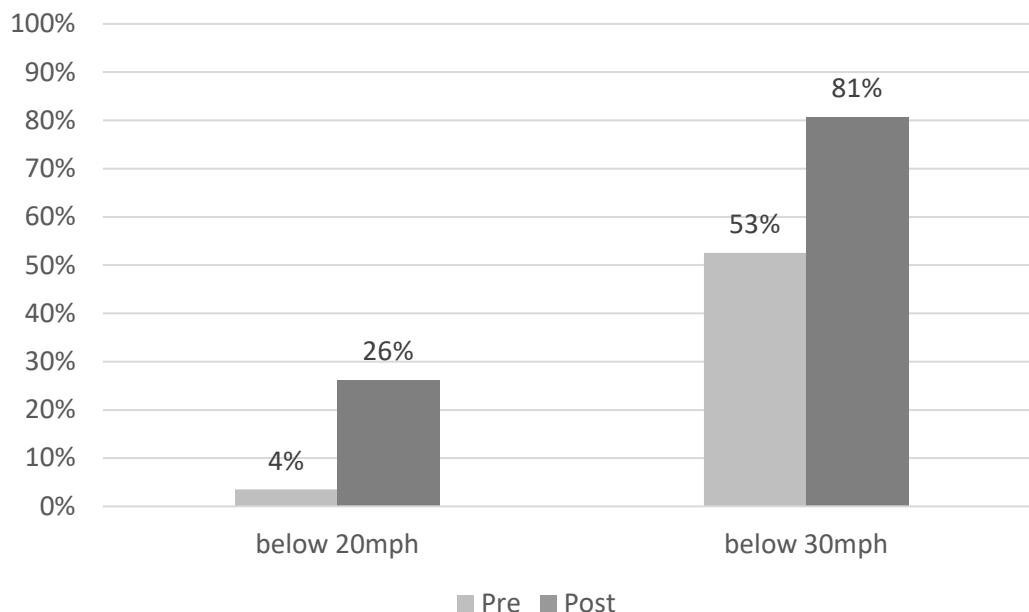
See figure 4 for speed data relating to Buckley.

* Pre- and post-implementation percentages in Abergavenny and Severnside are based on single month datasets because of monitoring equipment performance issues.

Note: The average in figure 3 excludes the Abergavenny, Buckley and Severnside datasets.

Equipment used to obtain pre-implementation data in Buckley used an alternative automatic speed categorisation (below 20mph and below 30mph), as shown in **figure 4**. The percentage of vehicles travelling below 20mph and below 30mph in Buckley has increased. Previously 53% of vehicles were travelling below 30mph, this has now increased to 81% of vehicles travelling below 30mph.

Figure 4: Percentage of vehicles travelling below 20mph and 30mph in Buckley

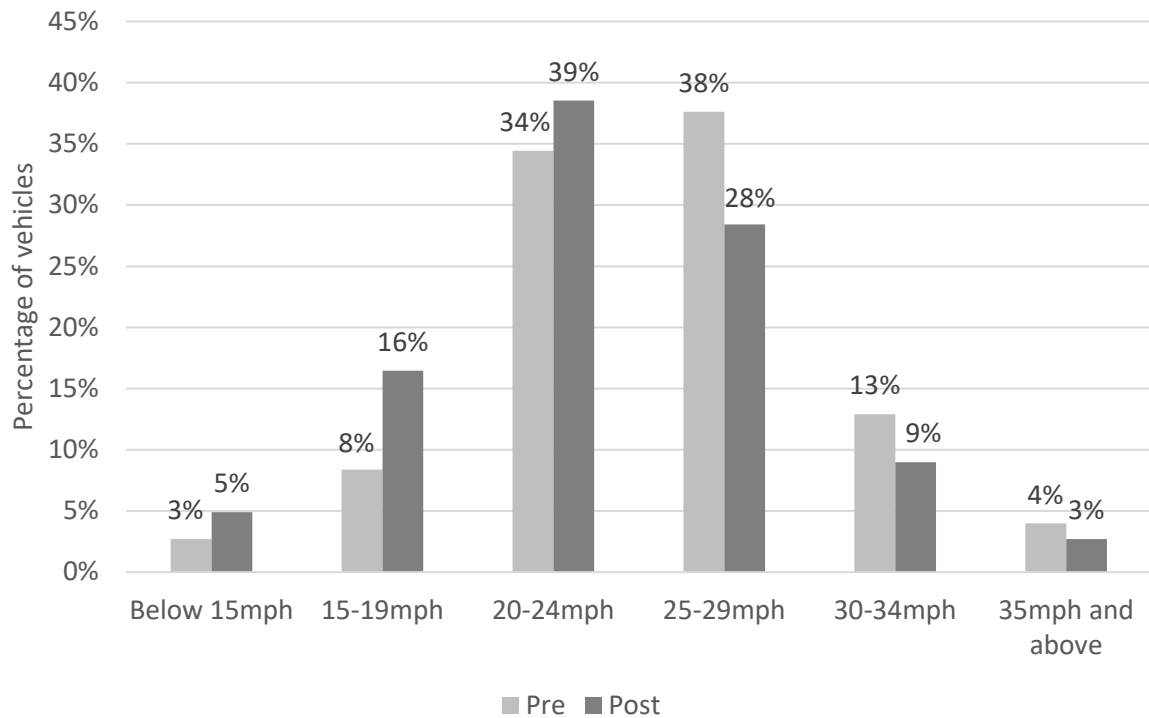




| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Following 20mph speed limit implementation, the percentage of vehicles travelling at higher speeds has reduced. The speed distribution pre- and post-implementation is summarised in **figure 5**. The percentage of vehicles in all speed categories above 25mph has reduced.

Figure 5: Vehicle speed distribution across phase 1 trial areas



Note: Figure 5 is based on the five phase 1 trial areas where several months of speed data are available and unaffected by equipment issues: Cardiff (North), Cilfrew, Llanelli (North), St Brides Major, St Dogmaels.

The observed speed reductions have been achieved without needing to implement any new form of physical traffic calming measures.

Data description – 85th percentile speeds

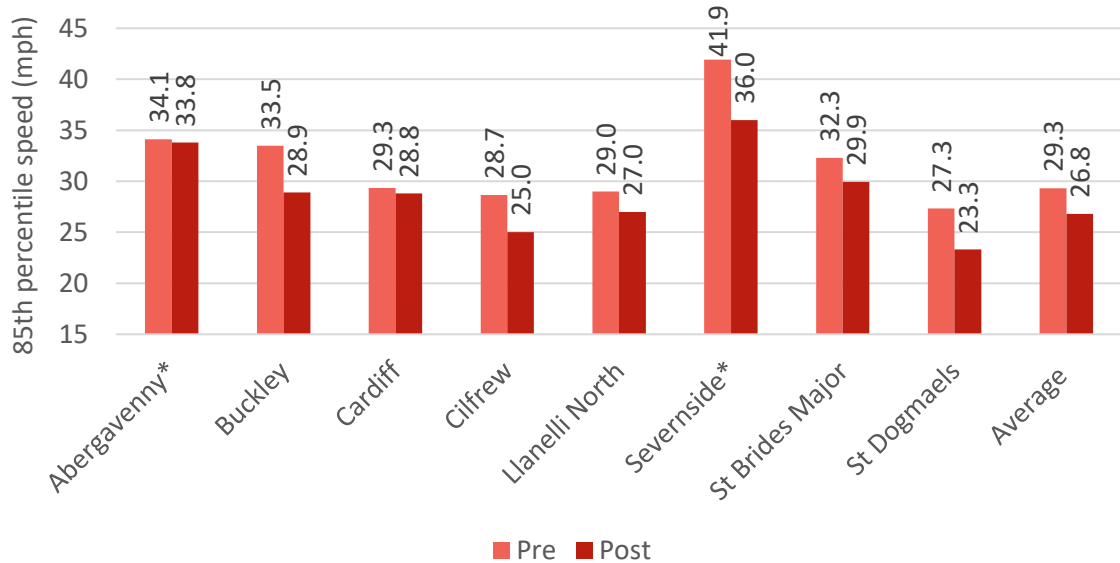
Based on data obtained up to November 2022, the 85th percentile speed has reduced in all phase 1 trial areas (see **figure 6**). The 85th percentile speed has reduced by an average of 2.5mph.

The largest reductions in 85th percentile speeds have been observed in Severnside (- 5.9mph), Buckley (- 4.6mph) and St Dogmaels (- 4.0mph). The Buckley and St Dogmaels results are based on much larger datasets extending over several months.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Figure 6: 85th percentile speeds in phase 1 trial areas, pre- and post-implementation

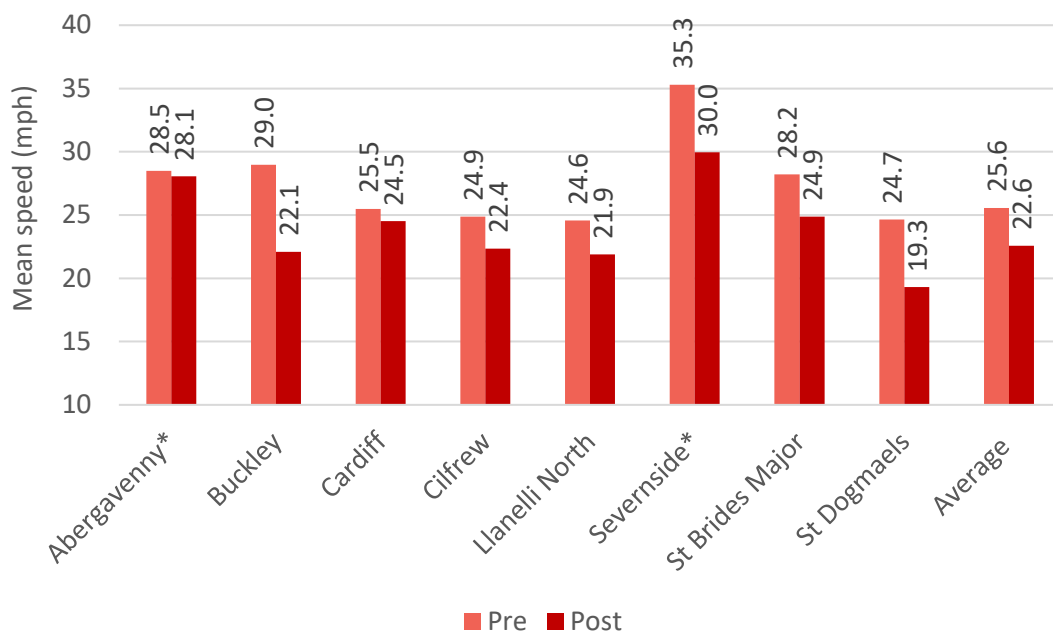


* Pre- and post-implementation speeds in Abergavenny and Severnside are based on single month datasets because of monitoring equipment performance issues.
 Note: Figure 6 average excludes Abergavenny, Buckley and Severnside for consistency across KPIs.

Data description – mean speeds

Speed data recorded up to November 2022 shows mean speeds have reduced by an average of 3.0mph. This is based on calculating a mean of the trial area weighted averages for the pre- and post-implementation speeds, a method which avoids phase 1 trial areas with the greatest traffic flows dominating the overall statistics. The level of speed reduction across the phase 1 trial areas varies, as shown in **figure 7**.

Figure 7: Mean speeds in phase 1 trial areas, pre- and post-implementation



* Pre- and post-implementation speeds in Abergavenny and Severnside are based on single month datasets because of monitoring equipment performance issues.
 Note: Figure 7 average excludes Abergavenny, Buckley and Severnside for consistency across KPIs.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

All phase 1 trial areas had mean speeds of at least 24.6mph before the new 20mph speed limit was introduced. The greatest reduction in mean speeds has occurred in Buckley (-6.9mph) and St Dogmaels (-5.4mph), with a new post-implementation mean speed of 19.3mph in St Dogmaels, the lowest of all trial areas.

Traffic speed trends

Since the new 20mph speed limits came into force in the phase 1 trial areas, mean speeds have continued to decline in some of these areas (such as Cardiff North and St Dogmaels). In other areas (such as Buckley and St Brides Major) speeds showed a larger initial drop but have not continued to reduce over time.

Control locations

Control locations are being used to observe any general background trends in vehicle speeds in built-up areas. Mean speeds have remained consistent across the control locations up to November 2022. Key points to note from **table 4** are:

- The percentage of vehicles travelling at or below 24mph averages 25% in the 30mph control locations compared to 64% in the 20mph phase 1 trial areas (see figure 3).
- Mean speeds in control locations are higher than the post-implementation mean speeds recorded in the nearest 20mph trial area.

Table 4: Control location observed speeds comparison

| Control Location (30mph speed limit) | Mean Speed (mph) | Mean speed in nearest trial area (mph) | % travelling at or below 24mph |
|--------------------------------------|------------------|--|--------------------------------|
| Mold (near Buckley) | 25.6 | 22.1 | 47% |
| A466 Chepstow (near Severnside) | 34.5 | 30.0 | 4% |
| Ogmore-by-Sea (near St Brides Major) | 34.1 | 24.9 | 8% |
| Bryncoch (near Cilfrew) | 25.8 | 22.4 | 39% |
| Average | 29.9 | 24.9 | 25% |



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Enforcement and engagement activities

By the end of November 2022, approximately 257 hours of traffic speed enforcement and engagement activities had taken place in the phase 1 trial areas since the new 20mph speed limits came into force. Enforcement and engagement activities have included Community Speed Watch (in Cardiff), GoSafe speed van presence (in Cilfrew, Llanelli, St Brides Major and St Dogmaels), and engagement/education sessions organised with the fire and rescue service (in Cilfrew, Llanelli and St Brides Major). Enforcement and engagement activity durations are summarised in **table 5**.

Table 5: Enforcement and engagement activity durations by end November 2022

| Phase 1 trial area | Total Time (hh:mm) |
|--|--------------------|
| Abergavenny | 24:00 |
| Buckley | 00:00 |
| Cardiff (North) | 01:10 |
| Cilfrew | 10:15 |
| Llanelli (North) | 51:20 |
| Severnside (Caerwent, Caldicot, Magor, Undy) | 06:00 |
| St Brides Major | 113:00 |
| St Dogmaels | 51:30 |
| Total | 257:15 |

Data was collected for a substantial proportion of the periods shown in **table 5**. During these periods mean speeds were reduced further by an average of 1.6mph and 85th percentile speeds reduced by a further 2.1mph at the speed monitoring locations closest to where enforcement activities were taking place. Speeds tended to return back to pre-enforcement levels shortly after the enforcement period had ended.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

3.2. Journey time reliability

Locations and method

Journey time reliability relates to how predictable any variations in journey time are for the person travelling. Unpredictable journey times are usually caused by traffic congestion and will mean that the same journey at the same time of day will take an unexpectedly different length of time to complete from one day to the next. While changing the speed limit to 20mph in built-up areas could lead to slight journey time increases for cars, the journey time should remain as predictable as it was before the speed limit change.

We have established a KPI to check whether the new speed limit has led to any change in journey time reliability for all road traffic and separately for scheduled bus services. For all road traffic this KPI is based on assessing the time difference between the slowest 5% of trips and the fastest 5% of trips along a route.⁸

Vehicle telematics data, sourced through an existing Welsh Government contract with INRIX, has been used to determine the extent to which 20mph implementation may have resulted in a change to journey time reliability. Data has been obtained for main routes through the phase 1 trial areas.

Punctuality data for the full length of a sample of scheduled bus services passing through Abergavenny, Buckley, Cardiff (North) and Severnside has been extracted from the CitySwift system, sourced through an existing Transport for Wales contract. Bus service punctuality is defined as the percentage of on-time stop departures, where on-time is within 1 minute early and 5 minutes late. Bus service punctuality data is not readily available for the other four phase 1 trial areas, partly due to the limited number of bus services operating through these areas.

Journey times, journey time variations and bus punctuality data along routes through each phase 1 trial area have been obtained for a pre-implementation and post-implementation period. Data is based on Tuesday to Thursday averages for the peak morning (AM, 0700-0900) and afternoon (PM, 1600-1800) periods.

⁸ Calculated from INRIX data as the difference between the 5th and 95th percentile journey times.



| | |
|--|----------|
| Document name | Revision |
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Headline data – journey time reliability

Table 6 presents the headline KPI assessment for vehicle journey time reliability based on data collected in phase 1 trial areas up to November 2022. Post-implementation data has been compared to a similar period of pre-implementation data.

Table 6: Journey time reliability KPI assessments

| KPI | KPI description | Interim assessment (Nov 2022) |
|-----|---|---|
| 1.4 | Vehicle journey times and journey time variation, based on the difference between the 5 th and 95 th percentile journey times as a proxy for journey time reliability, on main through routes | <p>All traffic combined – minor changes in journey time variation, some positive and some negative. Marginal increase in journey times.</p> <p>Scheduled bus services – mixed, improved punctuality in some locations / worse in others. Too early to conclude.</p> |

Data description – all traffic combined

Mean journey times and journey time variations on routes through the phase 1 trial areas, based on data obtained from INRIX, are summarised in **table 7**.

Mean journey time increases, during the morning and afternoon peak periods on routes through the phase 1 trial areas, are minimal and generally not more than one minute. The main exception is on the 8.9km route along the B4245 through the Severnside area, where mean journey times increased by up to 3 minutes. However this is slightly lower than the journey time increase you would expect if all vehicles had been travelling at the speed limit both before and after 20mph implementation.

The increased mean journey time of approximately 2 minutes northbound in the afternoon on the A469 in Cardiff may be due to a variety of factors including the roadworks and temporary traffic lights that were present from September to November 2022. Increased traffic flows as result of a post-Covid return to work in Cardiff may also have had an impact in this location.

Journey time variability has increased marginally, except in Abergavenny and Cardiff (North) where journey time variability has generally reduced.

The largest increase in journey time variability has occurred on the B4245 through the Severnside area, with an increase of approximately 1 minute in the difference between the 5% slowest and 5% fastest journeys. Data obtained from INRIX shows that this is not due to increased levels of traffic congestion. It's therefore likely that it's due to people choosing to drive at different speeds along this 8.9km stretch of road. Some people will choose to drive within the speed limit, while others will choose to drive at higher speeds. This leads to an increase in journey time variation.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Table 7: Change in mean journey times and journey time variability for all traffic

| Phase 1 trial area | Route | Time period | Change in mean journey time (mm:ss)* | | Difference between 5 th and 95 th percentile journey times (mm:ss)* | |
|---|---|-------------|--------------------------------------|-------------|---|-------------|
| | | | Direction 1 | Direction 2 | Direction 1 | Direction 2 |
| Abergavenny | A40 Nevill Hall to Hardwick Roundabout (4.3km) Direction 1: Eastbound / Direction 2: Westbound | AM | 00:03 | 00:06 | - 00:27 | - 00:24 |
| | | PM | - 00:40 | - 00:01 | - 02:14 | - 01:03 |
| Buckley | B5128 Liverpool Road and Mill Lane (1.7km) Direction 1: Southbound / Direction 2: Northbound | AM | 00:15 | 00:17 | 00:05 | 00:17 |
| | | PM | 00:27 | 00:09 | 00:25 | 00:02 |
| Cardiff (North) | A469 Thornhill to Gabalfa (3.5km) Direction 1: Southbound / Direction 2: Northbound | AM | 00:09 | 00:31 | - 03:51 | - 00:17 |
| | | PM | 00:24 | 02:09 | - 00:29 | 02:07 |
| Cardiff (North) | A4054 Coryton to Llandaf (4.0km) Direction 1: Southbound / Direction 2: Northbound | AM | 01:46 | 00:41 | 01:12 | - 00:24 |
| | | PM | 00:37 | 00:33 | - 01:00 | - 00:01 |
| Llanelli (North) | Dafen Road (1.8km) Direction 1: Westbound / Direction 2: Eastbound | AM | 00:08 | 00:11 | 00:30 | 00:35 |
| | | PM | 00:08 | 00:00 | 00:05 | 00:43 |
| Llanelli (North) | Capel Isaf Road and Frondeg Terrace (1.1km) Direction 1: Westbound / Direction 2: Eastbound | AM | 00:07 | 00:18 | 00:18 | 00:17 |
| | | PM | 00:12 | 00:22 | 00:20 | 00:27 |
| Severnside (Caerwent, Caldicot, Magor, Undy) | B4245 Magor to Portskewett (8.9km) Direction 1: Eastbound / Direction 2: Westbound | AM | 02:03 | 02:31 | 01:11 | 01:06 |
| | | PM | 03:04 | 01:26 | 01:03 | 01:25 |
| St Brides | B4265 through village (2.6km) Direction 1: Southbound / Direction 2: Northbound | AM | 00:32 | 00:24 | 00:13 | 00:10 |
| | | PM | 00:36 | 00:21 | 00:22 | 00:04 |

Source: Based on data obtained from INRIX *Note: Minus (negative) signs indicate reduced journey times or reduced variation post-implementation.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Data description – scheduled bus services

The change in bus service punctuality has been mixed, with bus routes passing through some phase 1 trial areas seeing improvements and bus routes passing through other areas worsening. Change in bus service punctuality is summarised in **table 8**, although the extent to which this is due to 20mph implementation cannot be confirmed.

Bus service punctuality varies by time period and by area and the changes are inconsistent even within the same trial area. With limited bus services through many of the phase 1 trial areas and inconsistent findings from the available data, clear conclusions on how 20mph implementation affects bus service punctuality cannot be drawn at this stage.

Table 8: Bus route punctuality on routes passing through phase 1 trial areas

| Phase 1 trial area | Percentage point change in on-time* bus stop departures for the full length of sampled services passing through | |
|-----------------------------------|---|----------------|
| | AM (0700-0900) | PM (1600-1800) |
| Abergavenny | -13.0% | 4.6% |
| Buckley | -5.7% | -13.0% |
| Cardiff North (A469 Thornhill Rd) | -3.7% | -2.7% |
| Severnside | 4.2% | 0.2% |

Source: Based on data obtained from the CitySwift system.

* On-time: Percentage of on-time stop departures, where on-time is within 1 minute early and 5 minutes late. Minus (negative) signs indicate where bus punctuality has worsened.

3.3. Vehicle/pedestrian Interactions

Locations and method

Vehicle/pedestrian interaction assessments consider how drivers react in response to pedestrians intending to cross or already crossing the road. Transport for Wales commissioned VivaCity to install camera equipment to monitor vehicle/pedestrian interactions. VivaCity has combined this equipment with specialist artificial intelligence software to analyse interactions.

Camera equipment has been installed at a pedestrian crossing point in three phase 1 trial areas (Abergavenny, Buckley and Cardiff) and at a pedestrian crossing point in three control locations outside the trial areas (Gilwern, Queensferry and north-east Cardiff).

Data from each pedestrian crossing point has been processed for two reporting periods following 20mph speed limit implementation: 6-19 June 2022 and 12-15 September 2022. Data obtained from phase 1 trial areas has been compared to data obtained from control locations.



| | |
|--|----------|
| Document name | Revision |
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Each observed vehicle/pedestrian interaction has been assigned to one of five separate yielding categories:

- Vehicle slowed or stopped, to allow a pedestrian to cross.
- Vehicle maintained speed, despite pedestrian detected in the waiting area.
- Vehicle maintained speed, despite pedestrian detected in the crossing area.
- Vehicle sped up, despite pedestrian detected in the waiting area.
- Vehicle sped up, despite pedestrian detected in the crossing area.

Headline data – vehicle/pedestrian interactions

Table 9 presents the headline KPI assessment for vehicle/pedestrian interactions based on post-implementation data collected in three phase 1 trial areas and three control locations.

Table 9: Vehicle/pedestrian interaction KPI assessment

| KPI | KPI description | Interim assessment (Nov 2022) |
|-----|---|---|
| 3.2 | Change in vehicle/pedestrian yield behaviours | Tentative conclusion – more vehicles slowing for pedestrians in trial areas |

Data description – vehicle/pedestrian interaction

The following key points have been identified from the analysis undertaken by VivaCity:

- Vehicles speeding up (both with and without a pedestrian in the crossing area) make up only a minor proportion of total vehicle/pedestrian interactions.
- Vehicles speeding up is least likely at crossing points where pedestrians have right of way (such as a zebra crossing).
- Interactions involving vehicles speeding up were less common at pedestrian crossing points where a 20mph speed limit is present, although it is unclear to what extent the speed limit change has contributed to this reduction.
- ‘Maintained speed’ was the most common category for vehicle/pedestrian interactions at all camera locations.

‘Maintained speed’ does not necessarily mean that any dangerous behaviour has occurred. VivaCity has suggested that vehicle speed and exact pedestrian location would need to be considered. Therefore, there is a tentative conclusion that slower speeds have led to more interactions where vehicles slow down for pedestrians.

VivaCity has noted that driver behaviour is dependent on the road layout as well as the speed limit. Further data from the six camera locations will be needed over the next 1-2 years before any firm conclusions can be drawn. Over this time period, the three control locations will become subject to the new default 20mph speed limit, providing ‘before’ and ‘after’ data for those locations.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

3.4. Active travel

Locations and method

The Welsh Government commissioned Living Streets to work with primary schools within the phase 1 trial areas and in control locations during the 2021-22 academic year to better understand travel behaviours and attitudes towards active travel (walking, wheeling and cycling). Control locations involved primary schools that are not currently fully surrounded by 20mph speed limits. Through this commission, Living Streets were able to monitor the early effects of the new 20mph speed limits on journeys to school.

Schools involved within the phase 1 trial areas were:

- Llanfoist Fawr Primary School, Abergavenny
- Ysgol Mynydd Isa, Buckley
- Coryton Primary School, Cardiff (North)
- Ysgol y Felin, Llanelli (North)
- Durand Primary School, Caldicot (Sevenside area)
- St Brides Major Church in Wales Primary School
- Ysgol Llandudoch / St Dogmaels Community Primary School

Schools involved as control locations were:

- Llysfaen Primary School, Cardiff
- Bryn Primary School, Llanelli
- Ysgol Bryn Gwalia Community School, Mold

Living Streets delivered two main activities as part of the commission:

WOW - the Walk to School challenge: An incentive-based scheme to encourage children to walk or cycle to primary school. The WOW tracker is used as part of classroom activities to monitor school travel behaviour. Schools were given resources to promote the challenge and log journeys with 3,036 children taking part.

Qualitative data gathering: Surveys to identify ongoing barriers to active travel to school and to assess whether traffic speed might stop being identified as a barrier following 20mph implementation. 884 surveys were completed and 12 focus groups were undertaken.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Headline data

Table 10 presents the headline KPI assessment for attitude to active travel use based on comparing journey to school data collected in phase 1 trial areas with data collected in control locations that are not part of the phase 1 trial. As WOW is an incentive-based scheme and as the weather improves towards the end of the academic year, it is to be expected that active travel use increases at all participating schools.

Table 10: Attitude to active travel use KPI assessment

| KPI | KPI description | Interim assessment (Nov 2022) |
|-----|---|--|
| 3.1 | Change in attitude to active travel use in built-up areas | 51% increase in active travel use on journeys to school in phase 1 trial areas, compared to 37% increase in control locations. Sample size: 3,036 children |

The method by which this KPI is assessed as part of the national roll-out will change, widening beyond primary school children to other vulnerable groups.

Data description

Living Streets used survey data from the first part of the 2021-22 academic year to provide a baseline estimate for the percentage of journeys to school made by active travel. Survey data showed that 49% of children in the phase 1 trial area schools and 49% of children in the control location schools either walked or cycled to school.

Table 11 shows that there was variation between schools. The variation will be due to their differing locations and nature of their catchment areas.

Over the remainder of the academic year, the proportion of journeys made by active travel increased at all schools. This is due to the incentive-based nature of WOW and the improving weather. However, the increase was greatest at schools within the phase 1 trial areas, with active travel use increasing from 49% of journeys to 74% of journeys to school. This is a 51% increase in journeys or a 25 percentage point increase in the mode share for active travel.

At schools in control locations, active travel use increased from 49% of journeys to 67% of journeys to school. This is a 37% increase in journeys or an 18 percentage point increase in the mode share for active travel.

Survey data shows that most of the switch to active travel occurred from children who were previously driven by car for the full journey to school.

The key data challenges and limitations were:

- The 20mph speed limit was already in place in three of the phase 1 trial areas (St Dogmaels, St Brides Major and Llanelli) before surveys began, which may have increased the baseline percentage slightly.
- Active travel numbers included 'park and stride', where children walk part of the journey to school.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Table 11: Change in active travel use at primary schools

| Primary school location | Active travel baseline | Active travel % over 2021-22 academic year | Launch of WOW |
|-------------------------|------------------------|--|---------------|
| St Dogmaels | 58% | 85% | Mar-22 |
| St Brides Major | 44% | 93% | Feb-22 |
| Llanelli North | 54% | 61% | Feb-22 |
| Buckley | 48% | 77% | May-22 |
| Cardiff North | 56% | 74% | Jan-22 |
| Abergavenny | 33% | 62% | Feb-22 |
| Severnside | 48% | 69% | Jan-22 |
| Average | 49% | 74% | |
| Control Average | 49% | 67% | |

Source: Based on data provided to the Welsh Government by Living Streets

Many parents and carers who participated in the Living Streets qualitative surveys considered the 20mph speed limits to be beneficial in making active travel more attractive. However a safe speed limit is just one of many things that make people consider whether active travel is a viable option for journeys to school. Distance to school, the weather, quality of infrastructure, personal safety, and additional journeys linked to the school run are some of the other factors considered.

3.5. Air quality

Locations and method

Transport for Wales commissioned a specialist team from Jacobs to monitor air quality in three of the phase 1 trial areas. Air quality sensors were installed in May 2022 at locations alongside the A469 in Cardiff and the B4245 in Magor (Severnside area), with new installations planned adjacent to the A40 in Abergavenny in 2023. Specific locations are shown in **appendix A**. The sensors are capable of monitoring differences in pollutant concentrations of nitrogen dioxide (NO₂), and some particulate matters. The focus for this interim report is on NO₂ as concentrations of particulate matters are more heavily influenced by emissions from regional sources other than road traffic.

Pairs of air quality sensors have been installed on the same stretch of road, one within and one outside the introduced 20mph speed limit area. The purpose of installing pairs of sensors is to identify whether there is any material difference between NO₂ levels at a site where the speed limit has been reduced to 20mph and a nearby site where the speed limit has remained at 30mph.

Before installation, the sensors were calibrated against a reference station forming part of the Air Quality Wales Network, which improved the precision and accuracy of the sensors relative to the reference station and relative to the other sensor within each pair.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Data for the May-November 2022 period has been downloaded and analysed. Data from both Cardiff and Magor confirmed that measured NO₂ concentrations are strongly influenced by traffic conditions on the adjacent road. NO₂ concentrations increase when traffic volumes increase and similarly decline when traffic volumes are lower.

Particularly elevated NO₂ concentrations were noted by one of the sensors along the A469 in Cardiff during the roadworks to construct a new pedestrian crossing. This is likely to have been due to construction vehicles and increased traffic congestion close to the sensor. This finding provides additional confidence that the assessment approach being used is able to detect changes in road traffic emissions if and when they occur. The data obtained during the roadworks period has been removed for the purpose of monitoring the effects of the 20mph speed limit.

Headline data

Table 12 presents the headline KPI assessment for air quality based on post-implementation data collected in two Phase 1 trial areas.

Table 12: Air quality KPI assessment

| KPI | KPI description | Interim assessment (Nov 2022) |
|-----|---|---------------------------------------|
| 4.1 | Change in local air quality – NO ₂ | No material effect identified to date |

Data description

Table 13 summarises the data collected between May 2022 and November 2022 in Cardiff and Magor (Sevenside). The observed differences are within or very close to the average level of measurement uncertainty between sensors, so may just represent slight differences in performance between the sensors. There is no clear difference in measured NO₂ concentrations which can confidently be attributed to the new 20mph speed limit.

Table 13: Mean NO₂ concentrations recorded by air quality sensors

| Phase 1 trial area | NO ₂ concentration on 20mph road (µg/m ³) | NO ₂ concentration on adjacent 30mph road (µg /m ³) | Recorded difference within 20mph area (µg /m ³) |
|--------------------|--|--|---|
| Cardiff | 22.4 | 22.5 | -0.1 |
| Magor (Sevenside) | 28.3 | 27.7 | 0.6 |

Reducing the speed limit to 20mph in built-up areas with congested roads should lead to some air quality improvement, on the basis that vehicles are only repeatedly accelerating up to 20mph rather than 30mph after each stop in traffic or at a junction. However at this stage there is insufficient evidence to suggest that changing the speed limit from 30mph to 20mph has had a material effect on air quality.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

4. Summary and future monitoring

An assessment summary for all KPIs based on data collected in the phase 1 trial areas up to November 2022 is provided in **table 14**.

Table 14: KPI assessment summary

| KPI | KPI description | Interim assessment (Nov 2022) | Change* |
|-----|---|---|---------|
| 1.1 | Percentage traffic compliance with the 20mph speed limit | 64% travelling at or below 24mph (45% pre-implementation) | ++ |
| 1.2 | Change in 85th percentile speed | 85 th percentile speed reduced (- 2.5mph) | ++ |
| 1.3 | Change in mean speed | Mean speed reduced (- 3.0mph) | ++ |
| 1.4 | Vehicle journey times and journey time variation, based on the difference between the 5 th and 95 th percentile journey times as a proxy for journey time reliability, on main through routes | All traffic combined – minor changes in journey time variation, some positive and some negative. Marginal increase in journey times. Scheduled bus services – mixed, improved punctuality in some locations / worse in others. Too early to conclude. | - |
| 3.1 | Change in attitude to active travel use in built-up areas | 51% increase in active travel use on journeys to school in Phase 1 trial areas, compared to 37% increase in control locations. | ++ |
| 3.2 | Change in vehicle/pedestrian yield behaviours | Tentative conclusion – more vehicles slowing for pedestrians in trial areas | + |
| 4.1 | Change in local air quality – NO ₂ | No material effect identified to date | 0 |

* Change: ++ (large positive), + (slight positive), 0 (no discernible change), - (slight negative), -- (large negative).

Transport for Wales will continue to assess the KPIs for the phase 1 trial areas, gradually expanding to more extensive monitoring following national roll-out in September.

The next monitoring report is expected to be published in autumn 2023, based on data collected in the phase 1 trial areas from December 2022 through to May 2023.

National roll-out monitoring will be based on the national 20mph monitoring framework, which is to be published later in 2023.



| Document name | Revision |
|--|----------|
| Default 20mph on restricted roads phase 1: Interim monitoring report | Final |

Appendix A

Data collection locations

Provided as a separate document