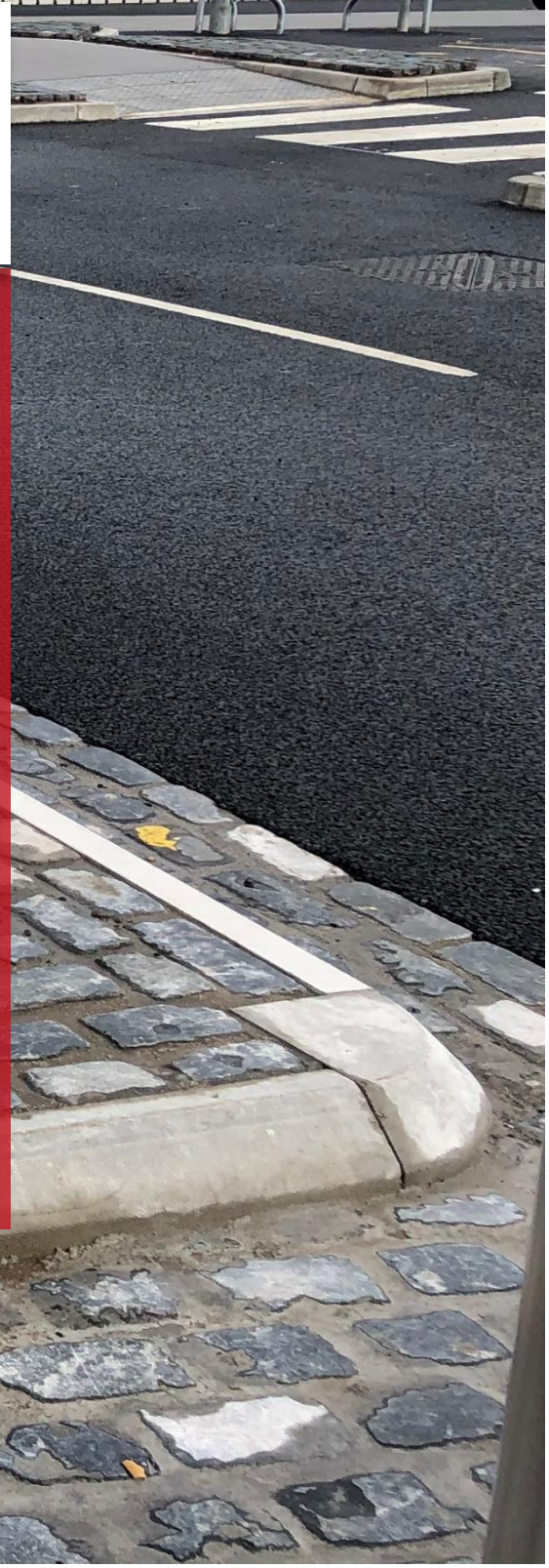




Wyre Forest District Future Rail Demand and Car Park Options Summary Report

Worcestershire County Council

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Document Control

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Executive Summary

1. Worcestershire County Council (WCC) commissioned this report to evidence rail demand, growth and station car park capacity required to support the Wyre Forest District Local Plan (2016–2036). It was implemented in three stages, across two workstreams (rail demand modelling and engineering feasibility). The report supersedes the evidence previously dated June 2019.
2. Kidderminster and Blakedown are the only two National Rail stations in Wyre Forest District; passengers from the District also use Stourbridge Junction, Hagley and Hartlebury stations, with wider strategic commuters using Birmingham International and Warwick Parkway.
3. Kidderminster Station has 226 car parking spaces, and there are 11 spaces at Blakedown Station, to a total of 237. Prior to COVID-19 both car parks were used to capacity on weekdays.
4. Kidderminster has a core service of 4 trains per hour (tph) to Birmingham, of which 2 tph are to Worcester, with some peak services to London Marylebone; Blakedown has 2 tph to Birmingham and Kidderminster, with some peak services to Worcester.
5. In 2018–2019 1.638m trips were made from Kidderminster Station, representing c. 2,550 return passengers per day, and 0.097m from Blakedown, c. 150 return passengers per day¹.
6. Commuting from Kidderminster Station grew by 30% between 2001–2011², 35% in its inner urban catchment and 17% in its wider catchment (the Wyre Forest District to the north, west and south, covering Bewdley, Stourport and the A456/A4117 corridors) and became more dependent on car-based access.
7. This lower wider catchment growth reflects demand suppressed by the District's limited station car park capacity; to cater for this a further 223 spaces at Kidderminster and 31 at Blakedown, totalling 254 spaces, would have been needed in 2019, representing 132,000 more annual trips.
8. Passenger growth between 2019 and 2036 is estimated to be 22% at Kidderminster and 29% at Blakedown³ and would require an additional 98 spaces at Kidderminster and 12 at Blakedown. Addressing historic suppressed demand and future growth would require a combined capacity for the District of 601 spaces, adding 364 spaces to the current total of 237.
9. A range of COVID-19 impacts on future passenger demand have been considered, with a 'worst-case' 30% reduction requiring lower growth of 255 spaces up to 2036, with 225 at Kidderminster and 30 at Blakedown. This is the base case minimum requirement adopted in the study.

¹ Estimates of Station Usage – Office of Rail and Roads (June 2020)

<https://dataportal.orr.gov.uk/media/1667/table-1410-estimates-of-station-usage-2018-19.ods>

² National Rail Travel Survey (NRTS) – Department for Transport (February 2013)

<https://www.gov.uk/government/statistics/national-rail-travel-survey-overview-report>

³ Estimated via use of the Passenger Demand Forecasting Handbook – Rail Delivery Group (May 2018)

<https://www.raildeliverygroup.com/pdf/about-the-pdfh.html>

10. Assessment of Local Plan spatial development and relative highway access times to both District stations from Kidderminster's further developed wider catchment indicates that c. 95 (42%) of Kidderminster's additional car-based users would divert to Blakedown.
11. In turn the base case assumes growth by 2036 of 130 spaces at Kidderminster Station to a total of 356 (226 existing +130 additional), and 125 at Blakedown to a total of 136 (11 existing +125 additional) spaces, offering a combined capacity of 492 spaces. (Noting, values have been rounded to nearest whole number).
12. Assessment of the highway network adjacent to Kidderminster Station suggests that, taken together with background growth in car use generated by the Local Plan up to 2036, an increase of 130 spaces will be within the capacity of the Comberton Road A448/station junction. Further car park growth beyond 130 spaces may exceed that highway capacity, and thus further junction modelling would be required.
13. There are two potential site options for provision of 130 new spaces at Kidderminster Station, the first on the existing Network Rail/West Midlands Trains car park and the second on the existing Severn Valley Railway car park, with capital cost estimates of £2.7 to £4.8m.
14. Provision of between 80 and 120 spaces at Blakedown is feasible on the Callow Oils site, adjacent to Station Drive/Lynwood Drive, approaching the base case requirement of 125 new spaces. Project development will require a formal traffic congestion study. An indicative layout for the site was produced comprising 111 spaces with a capital cost estimate of £1.6m.
15. A new station on the A456 between Kidderminster and Blakedown, proposed by some stakeholders as an alternative to development at Blakedown, could be feasible in engineering terms, but at a quantum of capital cost - c. £21m - significantly beyond incremental solutions at the current two stations. The study does not recommend promotion of such a scheme.
16. Development of the base case of 130 spaces at Kidderminster and 125 at Blakedown can meet the most cautious COVID-19 passenger demand growth forecast, with prospective feasible sites available at both locations, offering an increase from the existing 237 spaces provided today to 492 by 2036.
17. As well as incrementally supporting sustainable travel generated by Local Plan population and housing growth, this new capacity would reduce highway use by those who use other stations such as Stourbridge Junction, Birmingham International and Warwick Parkway.
18. If demand were to return to a pre-COVID 19 profile a further 100-plus car park spaces could be required to meet the 601 space forecast.
19. Retention of future potential expansion locations within the Local Plan, such as the development site adjacent to the A456 and Blakedown Station (currently owned by Marmaris Investments Ltd.), would make provision for such further passenger growth.

1 Introduction

Worcestershire County Council (WCC) commissioned SLC Rail (SLC) to undertake a passenger demand and car park capacity study to determine the capability and available options for railway stations in the Wyre Forest District to meet future passenger demand up to 2036 in line with the development growth timeframe set out in the Wyre Forest District Local Plan (2016–2036) ('the Local Plan').

The purpose of the Wyre Forest District Future Rail Demand and Car Park Options Summary Report ("the Report") is to summarise key information from the detailed rail demand, highway junction capacity and engineering feasibility technical papers located in Report appendices (A to E). The Report describes the three-stage approach undertaken, and key findings at each stage that support its conclusions and next step recommendations.

The work focussed on options to accommodate forecast rail passenger demand at Kidderminster and Blakedown Stations and at a suggested new station located at Hodge Hill to the east of Kidderminster. The suggested new station was included by WCC in response to representations from Blakedown stakeholders as an alternative option to the expansion of car park infrastructure at either, or both of the existing railway stations.

See Figure 1 'Definition of Study Area', below.

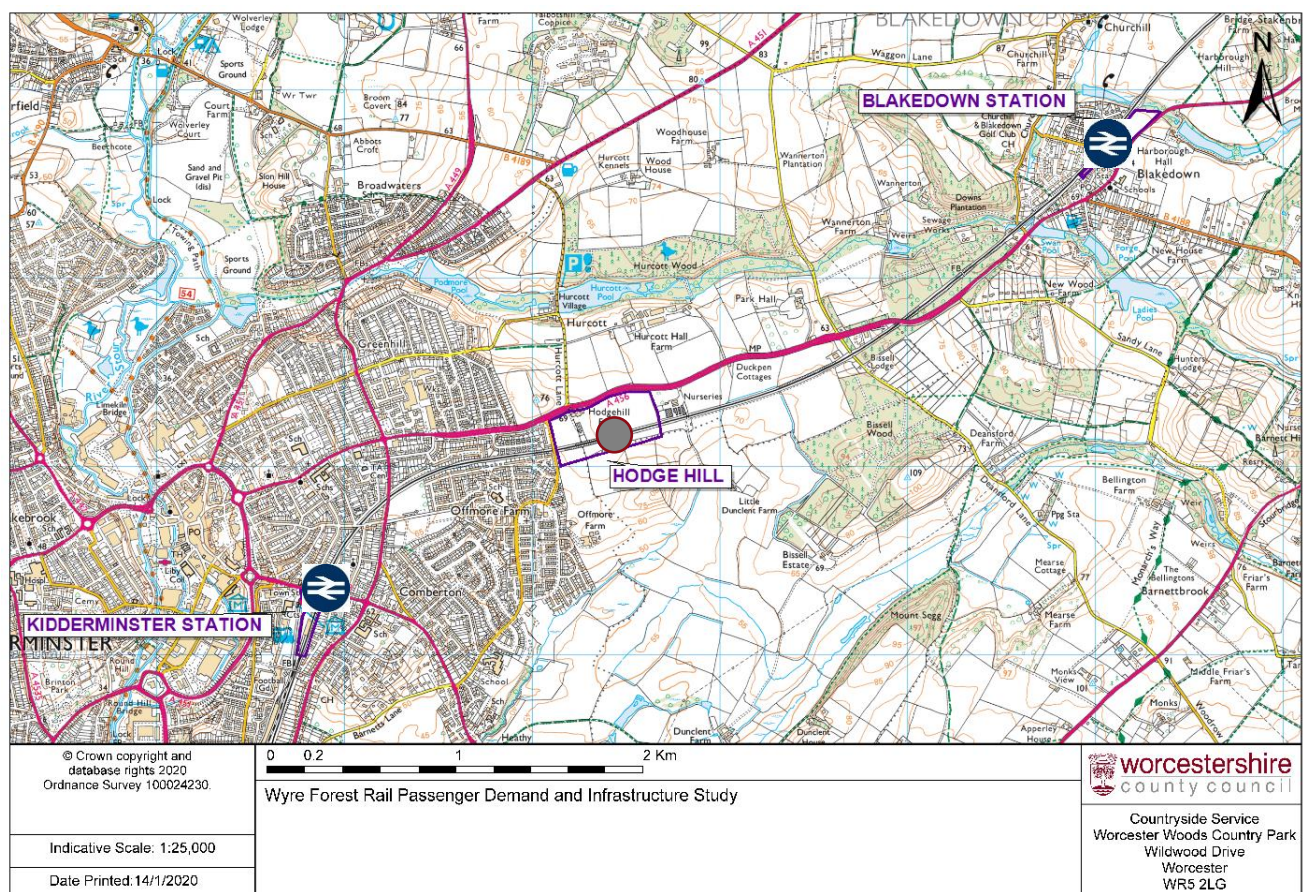


Figure 1 – Definition of Study Area

Furthermore, to provide greater context to the primary area of study focus, the Wyre Forest Rail Car Parks Engineering and Land Study, located in Appendix C, reviewed engineering feasibility and technical options at railway stations located just beyond the Wyre Forest District, including Hartlebury, Hagley and Stourbridge Junction.

The Report findings, conclusions and recommendations herein are intended to provide qualitative and quantitative information to assist Wyre Forest District Council and WCC members and officers make effective and efficient infrastructure investment decisions that will underpin sustainable economic growth to 2036, in line with the policies and development plans set out in the Local Plan.

Background

The Wyre Forest District is home to just over 100,000 residents, of which over half (55,000) live in the main town of Kidderminster, 20,000 in Stourport and 9,500 in Bewdley. To the west of the District lies the English and Welsh Marches, which is an area with good north-south rail connectivity on the Cardiff-Crewe/Chester-Manchester route but dependent to a significant degree for journeys to London or Birmingham via a range of Worcestershire, Shropshire and Herefordshire stations or extensive road journeys to Stafford, Wolverhampton, Birmingham International or Warwick Parkway.

Despite its large population, the Wyre Forest district has only two railway stations on the National Rail network at Kidderminster and Blakedown on the Birmingham-Stourbridge-Kidderminster-Worcester suburban railway line. Kidderminster serves its own direct catchment and the wider Marches area, which is thought to be an underlying reason why it ranks as the second busiest railway station in the county.

Census data identifies that significant demand to travel is generated from the Marches, which travels to and through the Wyre Forest heading for the West Midlands Conurbation and beyond. Kidderminster is the nearest station providing direct access to Birmingham and London for a significant catchment which extends well beyond the boundaries of the Wyre Forest District and Worcestershire.

Wyre Forest District Council Infrastructure Delivery Plan

Wyre Forest District Council produced the Wyre Forest Infrastructure Delivery Plan (IDP) in 2019 with the purpose of setting out the infrastructure requirements to support the proposals contained in the Wyre Forest Local Plan. Chapter 3 of the IDP explains that WCC has proposed measures to help mitigate the transport impact identified in the Wyre Forest Local Plan Review Transport Evidence (July 2019).

Table 3A in the IDP lists several strategic infrastructure schemes that could benefit Wyre Forest District residents and wider neighbouring districts including the provision of additional car parking at Blakedown (150-170 spaces) and highway improvements around Kidderminster. Furthermore, it indicates that additional car parking provision at Blakedown Station would help to mitigate the impact of forecast growth by intercepting strategic commuting trips heading towards Stourbridge, Warwick Parkway and Birmingham International and helping to alleviate the A456 congestion within Wyre Forest.

This report supersedes previous evidence dated June 2019 produced by SLC Rail. The detailed passenger demand modelling work undertaken in this report is congruent with the Wyre Forest District IDP proposals and demonstrates that even when factoring in a reduction in passenger usage due to COVID-19, there remains a need to improve car parking capacity in the District to satisfy current suppressed demand and future growth.

The Current Situation

Current passenger demand at Wyre Forest stations

Currently the two National Rail stations in the Wyre Forest District generate around 1.7m trips in aggregate annually, c. 2,700 return passengers each day. This equates to a current provision of 1 car park space to every 10 rail passengers in the District which is deemed insufficient to support sustainable long term growth. Of the two stations Kidderminster is by far the largest with c 1.638m trips per annum, c. 2,550 return passengers per day, and Blakedown 0.097m trips per annum, c. 150 return passengers per day.

Kidderminster Station is provided with a car park of 226 spaces which prior to COVID-19 was regularly full within the morning peak period, with rail users occupying available space in the surrounding streets. The rail service provided by West Midlands Trains at Kidderminster comprises four trains per hour (tph) to central Birmingham and two tph to Worcester, with some services extending to Great Malvern. These are supplemented by four trains per day to London Marylebone all of which depart in the morning peak and four services from London Marylebone in the evening, operated by Chiltern Railways. Travelling via Stourbridge, Birmingham, and Solihull these also form part of the Snow Hill Lines local service structure.

Blakedown Station at present is provided with 11 parking spaces. Prior to COVID-19 this was again insufficient for the demand at the station with the surrounding area seeing significant amounts of on street parking.

Blakedown is served by two tph in each direction running between Kidderminster and Birmingham. Both services start/terminate at Kidderminster for much of the day and as such Blakedown does not have direct service to Worcester outside of the peak. Table 1 summarises the current situation at Kidderminster and Blakedown, including train service, station usage and parking supply.

Station	Station usage 2018/19	Average daily return passengers	Train service	Current parking supply
Kidderminster	1,638,322	2,550	4 trains per hour	226 spaces
Blakedown	97,242	150	2 trains per hour	11 spaces

Table 1 – Current station key usage, rail services and car park capacity data provided by ORR⁴

Rail demand growth for Wyre Forest District stations

Over the last 15 years rail demand growth has been dramatic in the Wyre Forest District with Kidderminster increasing from 734,000 trips per annum in 2004/05 to 1,638,000 in 2018/19, whilst Blakedown has grown from 28,000 to 97,000 over the same period, as shown in Figure 2. This demonstrates that the growth in demand was strongest over the period 2004/05 and 2010/11. It is also noticeable that the rate of growth at Blakedown has been much more rapid, albeit coming from a much lower base.

⁴ <https://dataportal.orr.gov.uk/statistics/usage/estimates-of-station-usage/>

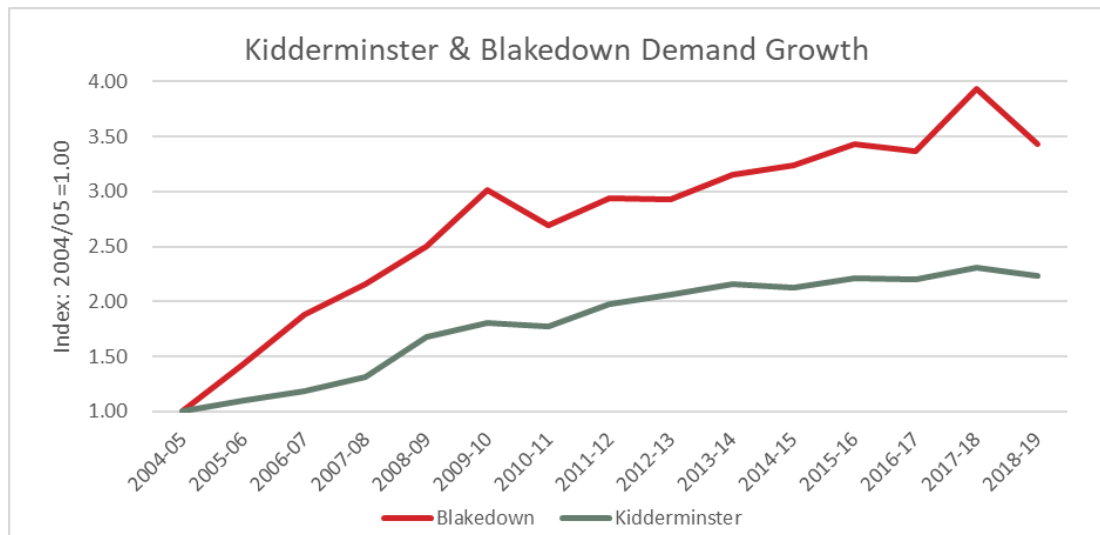


Figure 2 – Index of Demand Growth (2004 =1.00) (ORR op. cit.)

This growth has occurred despite the train service at Blakedown remaining static over the period at two trains per hour, whilst Kidderminster has increased from three to four trains per hour. It is possible that this more dramatic rise in demand at Blakedown relative to Kidderminster is linked to issues around the suppression of demand at Kidderminster over this period due to limited car park capacity, examined later in this study.

The Emergence of COVID-19

Whilst the evidence above shows a pattern of strong and consistent increases in rail demand over the last 15 years, at the time of writing demand for rail services has substantially reduced because of the COVID-19 pandemic.

As the post COVID-19 recovery continues, and ultimately the need for social distancing diminishes, demand will return to the rail network, but it must be acknowledged that this will result in some changes in rail usage, for which we have provided an initial view of in later sections when seeking to determine future demand levels and subsequent infrastructure capacity need in the Wyre Forest District.

Study Aims

The Report has two primary aims, as set out below:

- (a) To quantify the level of rail passenger demand growth that might reasonably be expected to be accommodated by the Wyre Forest Stations in the future 2020–2036 portion of the 2016–2036 Local Plan.
- (b) To evaluate technical options and provide recommendations for how the quantified level of passenger demand growth may be accommodated through the provision of new infrastructure at existing railway station facilities, potential new facilities, or a combination thereof within Wyre Forest District.

2 Study Approach

SLC Rail ('SLC') has previously undertaken studies and reports that have assessed rail passenger demand growth and infrastructure solutions at Kidderminster and Blakedown railway stations. The earlier Kidderminster study was focused on its specific local delivery and had been preceded by an indicative view of car park requirements that was undertaken in the 2017 as part of the Worcestershire Rail Investment Strategy ('WRIS'), also prepared by SLC.

The WRIS was commissioned by WCC to develop an integrated cross-county understanding of rail demand and the multiple catchments and catchment choices available to passengers. This Report is the logical 'next step' to the aforementioned studies and falls within the approach WCC is adopting in 2020 to review the WRIS, take account of COVID-19, form an updated, holistic understanding of rail infrastructure requirements across Worcestershire and target efficient investment for the future, building on recent major investments such as Worcestershire Parkway and Kidderminster Station regeneration, both completed in 2020.

This study is to be considered as an independent "fresh eyes" review, undertaken from base principles by reviewing all practicable technical options to meet future capacity requirements within the Wyre Forest District without any bias or bearing on previous studies that have been undertaken.

SLC provided project management expertise to lead the coordination and delivery of report outputs on behalf of WCC. Specialist rail demand modelling was undertaken by SYSTRA. Jacobs has undertaken highway access junction capacity modelling at the Kidderminster Station. In addition, Jacobs has also provided a review of access visibility at Blakedown and Hartlebury. SLC utilised in-house engineering, timetabling, property, and commercial advice to support production of the technical review and appraisal. Figure 3 provides an organogram of the team entities, explaining their roles and the contractual interaction with WCC.

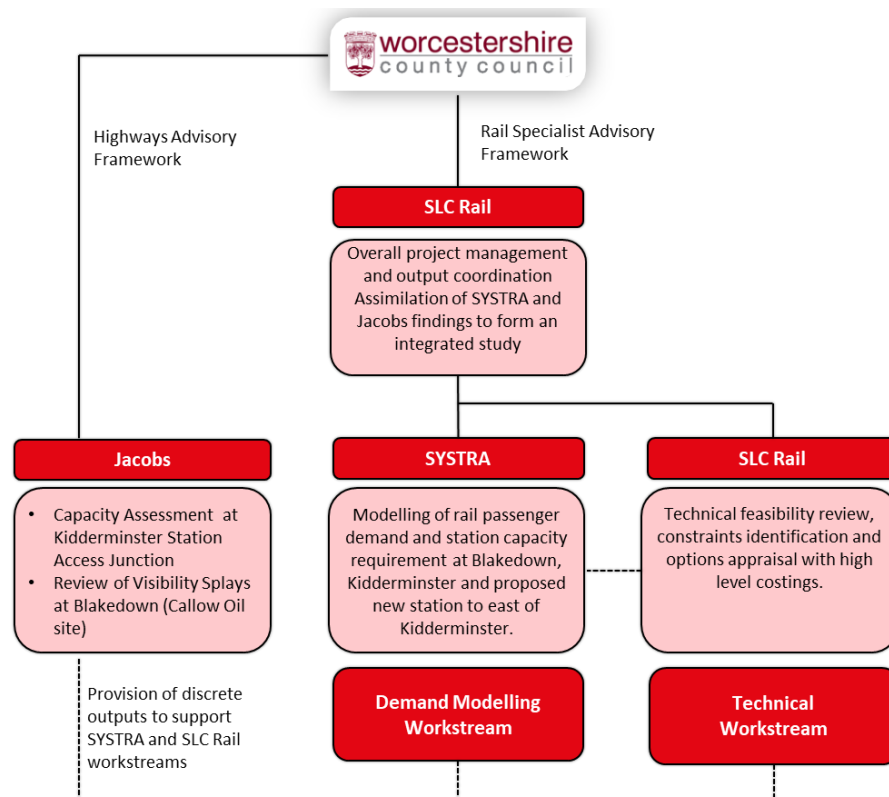


Figure 3 - Team organogram and roles

The Report is underpinned by five supporting technical studies that are included as appendices for ease of reference. Table 2 provides a list of the appendices and a summary description of contents and the specific workstream they supported.

Appendix	Description	Project Workstream	Produced by
A	Car Park Access and Capacity Report Describes rail passenger modelling approach to derive current and future demand outputs for Kidderminster and Blakedown stations.	A	SYSTRA
B	Kidderminster Station Access Report Describes traffic modelling approach to derive current and future capacity impact at Station Access to Comberton Road.	A	Jacobs
C	Wyre Forest Rail Car Parks Engineering and Land Study Identification of technical options and constraints to deliver capacity improvements at each of the Wyre Forest Station locations.	B	SLC
D	Technical Note on Timetabling – suggested new station east of Kidderminster Review capacity and potential service pattern for a new station located to the east of Kidderminster.	B	SLC
E	Blakedown and Hartlebury Proposed Parking Improvements Vehicle Access and Level Crossing Overview A desktop to the review the visibility at existing access junctions at Blakedown and Hartlebury against Highway Design Standards.	B	Jacobs

Table 2 – List of appendices and high level description of scope

The aim of the Report is to explain the overarching approach undertaken by mapping out interfaces between the two key workstreams:

- **Workstream A:** Rail demand and capacity assessment with discrete inputs from Jacobs for a Kidderminster Station highway junction access capacity assessment.
- **Workstream B:** Infrastructure options appraisal for capacity enhancements with discrete inputs from Jacobs for a highways visibility splay review at Blakedown (specifically Station Yard/Callow Oils site).

Key outputs generated from Workstream A are explained, including how they support the sifting and refinement of infrastructure options over a three-stage process (see Figure 4) leading to final conclusions and recommendations.

Cross functional project workshops were held during the process comprising team members from Workstream A and B that included engineering, rail strategy, property, demand modelling (rail and highways) and commercial expertise. This approach allowed options to be evaluated in a comprehensive manner across a wide range of disciplines, to ensure robust recommendations on next steps were being made.

This approach provided Workstream B team with direction to filter and align technical options with demand and capacity constraints quantified through modelling ultimately leading to a set of targeted infrastructure capacity improvements. Figure 4 shows the study approach and activities undertaken for Workstream A and B in a flow chart format.

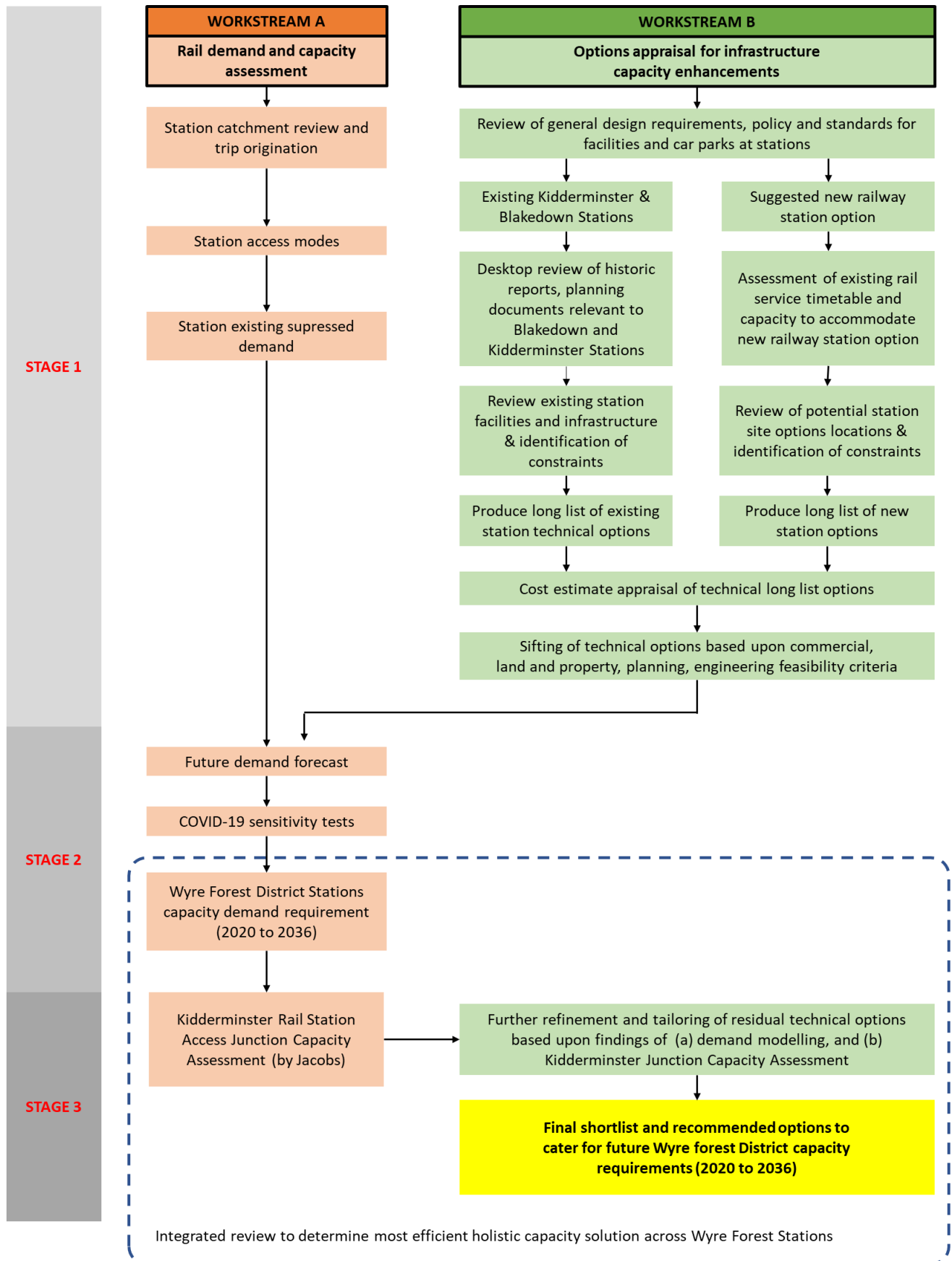


Figure 4 - Study approach overview and workstream activity interfaces

3 Stage One: Description of activities and outputs

Workstream A: Modelling existing suppressed passenger demand

Understanding station catchment areas

SLC utilised the expertise of SYSTRA and its transport economic modelling team to undertake the demand modelling necessary to provide quantitative evidence to support the study, with the Car Park Access and Capacity Report located in Appendix A.

Due to the constraints imposed by the COVID-19 pandemic it has not been practical to undertake direct passenger surveys due to the reduction in demand associated experienced during the lockdown period. Subsequently, SYSTRA has relied upon National Rail Travel Survey (NRTS) data for its assessment that is provided by the Department for Transport (DfT). NRTS is a survey of rail stations undertaken in 2005 which provides data on the true origins and destination of passengers, and thus provides, at postcode level, the catchment area for rail stations. The data also contains mode used to access stations which has been used to calculate the proportionality of car users to Kidderminster and Blakedown Stations.

The NRTS data is now quite old; however since 2005 it is noted that (i) no new stations have opened in the area which might have impacted station catchments (Worcestershire Parkway only opened in February 2020, shortly before COVID-19 lockdown) (ii) car park capacities and the frequency of railway services at Blakedown and Kidderminster have remained broadly consistent, noting an incremental increase from 3 to 4 tph at Kidderminster occurred. These points suggest that the data is valid for the purposes of modelling existing and future demand and have thus provided the comfort required to proceed with the undertaking the study.

Modelling approach to determine existing suppressed demand

The use of NRTS has the advantage of providing a perspective on what position the car parks at the two stations were in during 2005 and thus help identify the extent to which demand was and is already suppressed as a result of parking capacity issues. Understanding where demand is suppressed is important as the benefits associated with rail use are also suppressed, including access to opportunities and the promotion of mode shift from car to rail with the environmental and decongestion benefits associated with this.

Table 3 below presents rail access mode share to Kidderminster and Blakedown, where access mode was parked car and the resulting requirement for parking spaces for the 2004/05 year.

Station	2004/05 Demand	Car Mode Share	Max Daily Parking Demand	Car Park Capacity	Car Park Occupancy
Kidderminster	734,132	23%	321	226	142%
Blakedown	28,311	17%	23	11	209%

Table 3 – Kidderminster and Blakedown 2004/05 car park demand

The 2005 survey indicated that limited car park capacity at Kidderminster was already suppressing demand with 321 people recorded as driving and parking to use at the station, which is 95 above the dedicated station car park capacity. These additional cars are likely to have used surrounding car parks and residential streets, and it is understood that at some periods the adjacent Severn Valley Railway (SVR) car park may have been used. In 2005

this would have been before the SVR installed car park barrier controls into and out of its car park and restricted access after 19:00 in the evening. The analysis suggests that the car park at Kidderminster was already operating at capacity in 2005 and as such demand may have been suppressed since before 2005.

At Blakedown daily occupancy was around 70% when surveyed; however due to the small size of 11 spaces, single movements in car entry/exit in short succession (i.e. after a train arrival/departure) can present large swings in occupancy percentages. Typically, an occupancy more than 85% suggests that a car park is operating at full capacity as due to varying occupancy daily the car park may be 100% full on some occasions.

Kidderminster Station suppressed demand

The level of demand suppression at Kidderminster was explored further by reviewing growth over the period from 2005 to 2019, comparing areas where access by car to the station dominates with those where other (principally walking) modes dominate. This was achieved by defining an inner and outer station catchment area. The outer catchment has been identified as the area where car use dominates other transport modes. Figure 5 below presents the catchment areas defined.

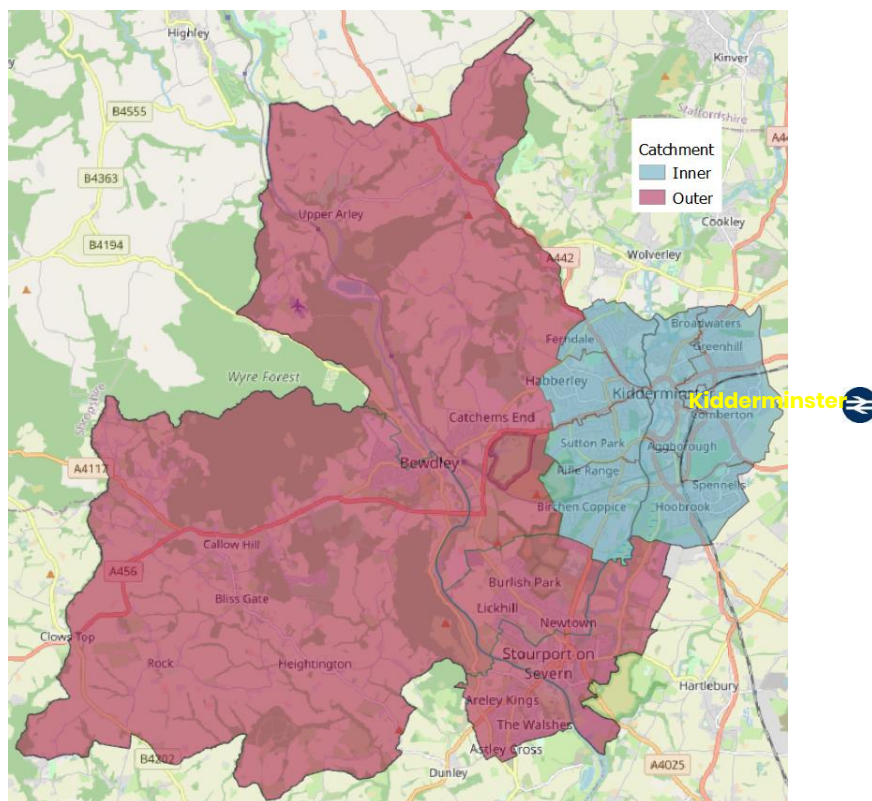


Figure 5 – Kidderminster Station Catchment (NRTS data inflated to 2019)

The inner catchment area covers the Kidderminster urban area and has a population of around 57,000 (2018). The outer area covers the areas to the west of Kidderminster not served directly by rail and includes settlements such as Bewdley and Stourport on Severn. The areas to the east of Kidderminster have not been included as this largely represents the Blakedown catchment. This area has a catchment of around 35,000 people.

To understand if there is evidence that demand suppression exists an analysis of 2001 and 2011 census data has been made looking at the rate of change in rail commuting in the inner and outer catchments. Results of this analysis are shown in Table 4.

Catchment	2001	2011	Difference	% Change
Inner	571	773	202	+35%
Outer	223	260	37	+17%
Total	794	1,033	239	+30%

Table 4 – Kidderminster Inner & Outer Catchment Change in Rail Commuting

The results show that the inner catchment saw an increase in rail commuting of 35% compared to only 17% in the outer catchment. Whilst there may be a number of reasons for this, the ceiling on availability of car parking space at Kidderminster is key with residents in the outer catchment having limited choices other than car use to access the station.

To understand the level of demand suppression SYSTRA applied the inner catchment rate of growth to the outer catchment population and extrapolated the trend between 2005 and 2019 (resulting in approximately 40% growth between the two years) to estimate the level of demand that may have been suppressed at Kidderminster Station.

Based on this analysis SYSTRA identified that were capacity available, up to an additional 223 cars would use Kidderminster Station daily in 2019. This would represent up to an additional 116,000 trips to or from Kidderminster Station per annum.

Blakedown Station car parking occupancy

As outlined in Table 5 parking demand at Blakedown in 2005 was for approximately 23 spaces. As with Kidderminster, analysis was undertaken using Census data to understand the potential growth in demand at Blakedown Station. This is summarised below.

Catchment	2001	2011	Difference	% Change
Blakedown	97	143	46	+47%

Table 5 – Blakedown Inner & Outer Catchment Change in Rail Commuting

Table 5 shows that rail commuting from the Blakedown catchment increased by 47% between 2001 and 2011. Assuming that this same increase can be applied to car access to the station this would result in a parking demand of 33 spaces in 2011. Assuming this same pattern could also be extended to 2019 then the predicted number of car drivers accessing the station would be **42 spaces** (requiring a capacity increase of 31 spaces).

Furthermore, a previous site visit carried out in 2018 by SLC for WCC observed the car parking being over capacity, with approximately 10-20 cars parked on nearby local residential streets. Further passenger growth to 2036 is likely only to exacerbate on street parking.

Workstream B: Engineering & Property Options Appraisal

In parallel with Workstream A, SLC reviewed the status of car parking infrastructure at Kidderminster and Blakedown stations and undertook a feasibility review for a suggested new railway station at Hodge Hill, located to the east of Kidderminster. The objective at Stage One was to develop an accurate baseline, and following this produce a list of technical options at each location to deliver additional car park capacity for the Wyre Forest District, noting that the SYSTRA demand work had not been completed at this point.

Kidderminster Station Review

Location

Kidderminster Station is located 0.5 miles east of Kidderminster town centre at the western end of Comberton Road which connects the eastern areas of Kidderminster to the main inner ring road (A451). The station is located south of the road immediately adjacent to the Severn Valley Railway (SVR) Kidderminster Town station and they share the same entrance. The western end of Comberton Road experiences congested traffic due to the concentration of business with shop frontages, pedestrian crossings, bus stops and the presence of the two railway stations.

Existing facilities and infrastructure

The increased footfall at Kidderminster Station over the years and the very limited nature of passenger accommodation and facilities of its 1970s building has led to its recent redevelopment. The old station building was demolished and replaced by a new larger modern building. The redeveloped station opened to the public on the 7th June 2020. The new building offers new and improved station facilities for passengers and operators, including an extensive waiting room and new toilets. A redesign of the road and station forecourt layout was also undertaken, which now includes new 'kiss and ride' system, taxi rank and improved pedestrian access to the station together with new bus stops and a signal-controlled crossing on Comberton Road.

There are currently 226 car parking spaces in total within the station demise, inclusive of 10 accessible bays. The 2020 redevelopment of the station building, and forecourt did not provide additional car park capacity given its funding parameters. Access to the car park is gained via Comberton Road.

Identification of potential infrastructure capacity improvement options

Section 4.3 of the Wyre Forest Rail Car Parks Engineering and Land Study located in Appendix C provides a full description and commentary for each of the five sites shown in Figure 6 as potential options to expand car park capacity within the existing station land boundary, or in close proximity to it (10 mins walking distance or less).

A range of engineering solutions were assessed across the five sites including; surface level alterations (involves re-surfacing and optimisation of existing at grade layout), single storey deck, split single storey deck/sunken basement variant (reduces visual impact compared to standard deck) and lastly a multi-storey deck solution.



Figure 6 – Sites investigated to provide additional car parking at Kidderminster Station

Table 6 provides a summary description of the site options identified at Kidderminster Station that could potentially provide car park capacity improvements.

Site Ref	Site Name	Description
K1	Comberton Place Car Park	Existing car park owned and operated by Wyre Forest District Council with a total of 39 at grade spaces (Inc. 5 accessible parking bays)
K2	Harriers Stadium car park	Existing car park owned by Wyre Forest District Council with a total of 152 at grade spaces.
K3	Severn Valley Railway car park	Existing car park owned by the Severn Valley Railway Company with c. 250 at grade standard spaces.
K4	Kidderminster Station car park	Existing car park for Kidderminster station, owned by Network Rail with 226 at grade spaces (Inc. 10 accessible parking bays)
K5	Network Rail compound	Not an existing car park. This site is frequently utilised by Network Rail and the Principal Supply Point (PSP) as signalling is located here.

Table 6 – Existing sites investigated for their potential to provide additional car parking to the rail station

Outcome of initial option sifting exercise

Upon identification of the long list of potential expansion options for Kidderminster Station a multi-disciplinary engineering and property technical workshop was held to review each of the five sites. At this early stage it was determined that site K5 would be disregarded from further technical analysis due to it presenting an inefficient solution with limited expansion potential (maximum of 24 additional spaces).

The high level engineering and land review identified the introduction of a car park deck on the Kidderminster Station (Site K4) may visually impact lines of sight from the Severn Valley Railway platforms to the locomotive shed

located to the east, which is an historic railway landmark. Subsequently, it was agreed to appraise a variant (Option B) for Site K4 that considered construction of a deck over the northern section of the site, thus maintaining lines of sight to the locomotive shed at the southern end.

It was agreed to produce cost estimates for engineering options at sites K1, K2, K3 and K4 for appraising at the Stage One combined site commercial review. A comparison of the four sites and the existing capacity provided alongside estimated capacity uplift generated by each engineering option is shown in Table 7.

Site Ref		Comparison of additional car park capacity provided through various engineering options			
		Existing capacity	Surface level alterations	Top decking/ Half basement	Multi-Storey
K1	Comberton Place car park	39	49	56	71
	Additional spaces provided		+10	+17	+32
K2	Harriers Sport Stadium car park	152	-	243	335
	Increased spaces provided			+91	+183
K3	Severn Valley Railway car park	250	257	405	635
	Increased spaces provided		+7	+155	+385
K4(A)	Kidderminster station car park (Option A - full footprint)	226	-	333	525
	Increased spaces provided			+107	+299
K4(B)	Kidderminster Station Car park (Option B - part footprint)	226	-	293	377
	Increased spaces provided			+67	+151

Table 7 – Comparison of infrastructure options and additional car park capacity generated at Kidderminster

Blakedown Station Review

Location

Blakedown railway station is located in between Kidderminster station (3 miles west) and Hagley station (2 miles east). The A456 Birmingham Road runs adjacent to Blakedown from Kidderminster towards Hagley. Access to the station is afforded by Station Drive which also provides access to a residential estate (Lynwood Drive). Access across its two platforms is gained via a vehicular level crossing. There is one accessible parking space and 10 standard parking spaces which are located on Station Drive, making a total of 11 spaces. The station is unstaffed without a ticket office and it is operated by West Midlands Trains.

Existing facilities and infrastructure

Blakedown Station is a basic facility with two platforms either side of the railway. The platforms are approximately 120m long and are accessed by foot via a small ramp at the south end of each platform. Access between the platforms is provided by a vehicular level crossing that includes a pedestrian walkway. A description of the track level crossing, motorcycle parking and cycle storage provisions at the station is provided in Appendix C.

Identification of potential plots for locating infrastructure capacity improvements

SLC identified two plots through the historic work undertaken in 2018/19 as shown in Figure 7. Both sites are located within close proximity to the station. Indicative drawings were produced to estimate the car parking capacity provided by each plot. A description of the plots is provided in Table 8 below.



Figure 7 – Blakedown car parking options (image obtained from Google Earth)

Land plot option	Land plot description
Plot A Referred to as "Station Yard" or "Callow Oil" site	<ul style="list-style-type: none">Plot A is a narrow strip of land located South of Station Drive that runs adjacent to Lynwood Drive.Access to the site is currently via Station Drive, passing local residents' houses as photo 1.
Plot B Referred to as "Marmaris" site (land currently understood to be owned by Marmaris Investments Ltd.)	<ul style="list-style-type: none">Plot B is located North of Station Drive. The site has an existing gate facing Station Drive that allows vehicular access. Network Rail uses this gate to gain access to the tracks for maintenance work.The land topography appears to be generally flat apart from a downward slope at the northern end, making it possible for development.The site's boundary is outlined by tall trees and a hedge wall which act as natural screen to Station Drive and the A456 Birmingham Road.

Table 8 – Blakedown proposed site plot descriptions

Description of infrastructure options and variants within Plots A and B

Table 9 provides a summary description of the site options identified within land Plots A and B at Blakedown that could potentially provide additional car park capacity improvements, alongside a high-level engineering and property commentary. Further detailed descriptions, and larger indicative layout plans for each identified option can be found in Section 5.4 of Wyre Forest Rail Car Parks Engineering and Land Study located in Appendix C.

Site Ref	Site description	Engineering and land commentary
B1	Station Yard/ Callow Oil (additional 80 to 120 spaces)	<ul style="list-style-type: none"> A high-level technical review indicated a potential capacity increase of between 80 to 120 surface level spaces could be provided depending on the arrangement SLC Rail produced an indicative general arrangement layout that generated an additional 111 spaces. This layout arrangement assumed access into the car park from Lynwood Drive which would require consultation with local transport planners. See drawing WYF-SLC-XX-DWG-CIV-0010-Blakedown in Appendix C.
B2	Marmaris site – Variant 1 (additional 69 spaces)	<ul style="list-style-type: none"> This car park expansion option on Plot B has the smallest footprint compared to other Plot B layout variants (B3, B4 and B5) An at grade solution designed by Mott MacDonald in 2017 that would add 69 spaces to the existing car park which bring its total capacity to 80 spaces. Access to the car park would be provided through a new junction located off Station Drive.
B3	Marmaris site – Variant 2 (additional 332 spaces)	<ul style="list-style-type: none"> This car park expansion option would utilise approximately half of the overall Plot B footprint. A new island roundabout would be required to provide access to the car park directly from the A456. This would provide a total of 332 at grade car parking spaces
B4	Marmaris site – Variant 3 (additional 170 spaces)	<ul style="list-style-type: none"> This design option would integrate 50 residential houses with a 170-space car park using a half basement podium deck. Access to the development site and car park would be via Station Drive, similar to Options B1 and B2. This option would use all the available land space in Plot B for a residential development combined with dedicated station parking and an open green space for mature woodland.

Table 9 – Blakedown car parking site technical options

The Marmaris site Variant 3 option was presented to local stakeholders through the Wyre Forest District Local Plan consultation process. It is understood that Parish Council and some Blakedown residents raised concerns related to additional housing stock and car park capacity potentially causing traffic congestion on the local road network. Noting that Marmaris Variants 1, 2 and 3 all relate to the same site it is anticipated the concerns raised for Variant 3 will apply to Variants 1 and 2, and thus would need to be addressed if any of these three options were developed further.

Outcome of initial option sifting exercise

Upon identification of the long list of potential expansion options for Blakedown Station a multi-disciplinary engineering and property technical workshop was held to review each of the four identified options located on both plots A and B, and at an early stage it was decided that all presented a sufficient level of feasibility to be progressed forward to develop cost estimates for consideration at the Stage One combined site commercial review.

Suggested new railway station east of Kidderminster

A high-level rail engineering, timetabling and demand study was undertaken to assess the feasibility of building a new station as an alternative to undertaking car park expansion at Kidderminster and/or Blakedown to meet the Wyre Forest District forecast growth to 2036. The optimal position of the station has been assumed to be mid-way between the c. 3-mile stretch of railway track between Kidderminster and Blakedown as shown in Figure 8. There is good highway connectivity to the area via the 50mph dual-carriageway (with some areas singled by road markings) Birmingham Road (A456) and several plots of farmland near the railway tracks.



Figure 8 – Extract of WFD map showing Local Plan Sites (WFD Local Plan review 2019)

Outcome of timetable, demand, and engineering review

Timetable Review

SLC undertook a high-level technical review (refer to Appendix D for full paper) to consider whether a call at a new station could be accommodated at the midway point between Kidderminster and Blakedown in the current timetable and on the current infrastructure. It was acknowledged retiming services through Worcester would be difficult given the restricted Worcester Area infrastructure and its 19th century signalling, and thus the study assumed that the two trains per hour currently terminating from Birmingham and starting at Kidderminster towards Birmingham would call at the new station.

However, considering these Birmingham–Kidderminster trains, in the standard pattern hour station calls can only be accommodated in the Worcester-bound ('Up') direction if the Birmingham–Worcester trains are re-timed through Kidderminster to run two or more minutes later. In the morning peak there appears to be no major problem with providing a reasonable level of service providing this also includes calls at the new station in the Chiltern services to London Marylebone. In the evening peak a reasonable spacing of services cannot be achieved unless some Worcester-bound services leaving Birmingham between 17.00 and 18.00 are retimed to call at the proposed station. Such changes would not be an insignificant challenge.

Further work looking at the Worcester area would be required to establish whether this is possible. The addition of the North Cotswold Line Task Force's proposed hourly Kidderminster–Worcester–Oxford–London–Paddington

services makes the situation at Kidderminster tighter, and would require the use of the Turnback Siding and Down Goods Loop (Birmingham-direction side of the line) at the same time to satisfy new station services. Noting that further detailed modelling work would be required to accurately quantify the operational performance impact to the network, the findings were considered sufficient to progress with a further technical engineering and land review to identify potential viable sites for building new capacity infrastructure.

Engineering and Options Assessment

The general area of the new station site was investigated to develop a high-level understanding of any fundamental land or engineering issues that would impact the successful development and delivery of a new railway station in the general area. A full description of findings is provided in Section 6.3 of the Rail Car Parks Engineering and Land Study, located in Appendix C. The review included highway access, geology, topography, flood risk, drainage, and ecology aspects. No information was obtained that could be interpreted as a showstopper risk at this stage for developing a station within this location. Further investigation would be recommended for land sensitivity, ecology, and contamination items to clarify uncertainties.

Four potential site options (A to D) were examined for a new station based on their land size, site access and access to track as shown in Figure 9. Drawing WYF-SLC-XX-DWG-CIV-0008-01 (in Appendix C) is annotated with detailed descriptions of land and engineering constraints identified within the area.

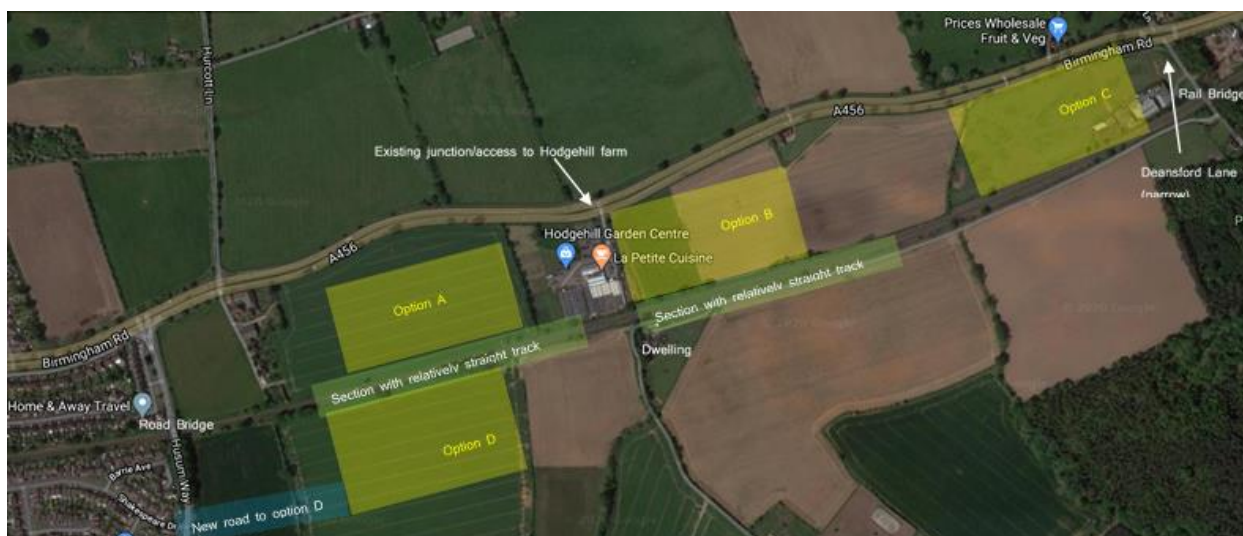


Figure 9 – Potential site option for new rail station

The site options assessment concluded that a new railway station could potentially be built at all four sites. Option A appears most favourable in terms of the track and railway embankment; however the potential risks described at the site would make it less desirable at this stage. Subsequently, Option B was selected as the most feasible and drawing WYF-SLC-XX-DWG-CIV-0009 (in Appendix C) was produced to show the layout of a possible new railway station on the site. Upon completion of a full option review of locations further design work would need to be undertaken to determine an optimal general layout that would integrate the site access, forecourt, and car park. Table 8 in Appendix C identified Option B could provide up to 557 spaces at grade, and up to 924 in a single deck solution.

Stage One: Key Findings

High Level of Existing Suppressed Demand

Demand modelling indicated there was a high level of suppression at Kidderminster station as it was operating above capacity in 2005 and since has risen further. This also occurs at Blakedown, but to a lower order of magnitude due to the difference in annual passenger numbers. The modelling quantified a requirement of 223 additional car park spaces at Kidderminster to cater for current suppressed demand (pre COVID-19). This would represent up to an additional 116,000 passenger trips to and from Kidderminster per annum. At Blakedown, relative to the size of both the village and the station car park significant on-street car parking is currently taking place totalling around 31 vehicles per day in excess of the 11 spaces available.

Stage One: Concluding remarks and next steps

After undertaking a commercial cost appraisal for each of the car park expansion options (see Table 9 in Appendix C) the following conclusions and recommended next steps were outlined:

Kidderminster Station:

- Site K1 was disregarded due to its insufficient size, and Site K2 due to the distance from the station (550m, equating to c. 10 minutes' walk). Furthermore, construction of a basement solution was disregarded due to its inefficient cost per net additional space provided.
- Expansion would not be straightforward and presents several challenges; however it was agreed to proceed with focussing on Sites K3 and K4 for Stage Three, and optimise to align with demand modelling.
- The increase in potential traffic interface at the station entrance to Comberton Road caused by further car park expansion at the station was identified. Subsequently, Jacobs was assigned to undertake a discrete highway junction capacity study for the station access.

Blakedown Station:

- The capital cost estimate for each option indicated a lower capital cost per space to deliver capacity expansion, compared to each of the other locations in Wyre Forest District.
- It was subsequently considered sensible to continue to progress all four options through to Stage Three, and optimise to align with outputs from demand modelling.

Suggested new railway station to east of Kidderminster:

- The level of suppressed demand and future growth at both Wyre Forest stations, even accounting for the impact of COVID-19 could offer a component of a strategic case for a new railway station.
- However the cost estimate for delivering a new railway station with a surface level car park at site Option B was £21m (inc. contractors overheads, preliminary, profit and 40% risk), a substantial capital expenditure of a quantum significantly in excess of the costs of car park expansion at both existing stations and not viable based upon funding to deliver Local Plan infrastructure.
- Furthermore, new railway station schemes require a long period of time to develop from a concept to a tangible outcome (typically 5 to 7 years). Such timeframes for delivering a major infrastructure project do not align with meeting the clear and present suppressed capacity demand issues in the Wyre Forest District.
- As such development of a new station east of Kidderminster is not a recommended option.

4 Stage Two: Description of activities and outputs

Workstream A – Forecasting future station passenger demand

Future demand modelling approach

Further to the recommended outcomes of Stage One to disregard a new station to the east of Kidderminster, SYSTRA focussed modelling demand at the existing Kidderminster and Blakedown railway station locations, firstly estimating unconstrained demand over the next 20 years i.e. as if there were no issues associated with the station car parks capacity.

Table 10 shows the results of this analysis. Note that ‘total demand’ refers to the overall amount of car park capacity required at the station derived through the modelling exercise, whereas ‘net demand’ equates to total demand subtracted by existing capacity already provided (i.e. 226 spaces at Kidderminster, and 11 spaces at Blakedown) to provide the physical amount of additional spaces required to meet demand.

Station	Current spaces (2020)	Growth 2019 to 2036	2018/19 Demand (TOTAL)	2018/19 Demand (NET after existing)	2035/36 Demand (TOTAL)	2035/36 Demand (NET after existing)
Kidderminster	226	22%	449	223	547	321
Blakedown	11	29%	42	31	54	43
TOTAL	237		491	254	601	364

Table 10 – Current and forecast future car parking demand at Kidderminster and Blakedown

Based on the modelled demand forecasts set out above SYSTRA estimated a change in the level of car parking requirements at the two stations. This is based on an assumption that access mode shares remained constant which for the Kidderminster outer catchment and the Blakedown catchment is likely to be reasonable; it also assumes that the existing rail service at Kidderminster remains broadly similar to that operated now and that unconstrained car parking supply could be provided.

Constrained Car Parking at Kidderminster

The technical, property, practical deliverability and highway challenges involved with the construction of a multi storey car park at Kidderminster were noted as material constraints. As such, an approach was derived to review how parking demand for the Wyre Forest District might be equitably distributed between Kidderminster and Blakedown stations. Therefore, a logic model was developed to explore the proportion of Kidderminster suppressed demand that would actively choose to use Blakedown should car park capacity be available.

The passenger choice model was used to compare the Generalised Cost for each postcode sector in the Wyre Forest area to both Kidderminster and Blakedown. The access costs to each station accounted for the following:

- Fuel and non-fuel vehicle operating costs (TAG⁵ Databook)
- Station parking cost (£4.70 all day)
- Access time (converted to cost using TAG values of time)

In addition, rail journey times (including interchange and headway penalties from PDFH⁶) and fares to both Worcester and Birmingham were added to the Generalised Cost to account for the different service levels at Blakedown and Kidderminster. Journey times were converted to cost using TAG values of time.

The whole Generalised Cost (car access cost + rail cost) was then used in the choice model to determine the likely number of passengers that would use Blakedown station. The model showed between 36% and 50% of passengers would transfer from using Kidderminster Station to Blakedown Station if parking capacity were available. The average transfer rate across all catchments derived from the model outputs was 42%.

At the time of writing the country is in the process of addressing COVID-19 related restrictions; however, it is generally accepted that the pandemic will have long term impacts on how people use rail for commuting, business and leisure. In view of this a series of sensitivity tests were prepared to consider how travel might be affected and how this will impact on the case for additional parking.

To achieve this, survey data collected by SYSTRA in 2020 as part of wider research into COVID-19 and travel has been used, and linked to 2011 census data for the Wyre Forest to understand the potential impacts. Clearly at this stage the results and assumptions are only indicative. For this purpose five tests have been examined as shown in Table 11 below.

COVID-19 Test	Description
Test A	20% reduction in rail demand by identifying all rail passengers that responded to say they would travel by train less, and assuming they do not travel by rail at all
Test B	All those who travel by train more than three times per week and work in an office (and thus could work from home) travel only two or three times per week. This generated a 30% reduction in demand
Test C	Variation of Test B but only applied to passengers who said they would travel less rather than all office workers (7% reduction)
Test D	As Test A but with impact of fear of illness as a reason not to travel removed (13% reduction in demand)
Test E	As Test C but with impact of fear of illness as a reason not to travel removed (5% reduction in demand)

Table 11 – COVID-19 demand sensitivity tests

Table 12 presents the impact of these tests on the level of parking required at Kidderminster (with an unconstrained car park) and Blakedown.

⁵ Transport Analysis Guidance ("TAG") – Department for Transport
<https://www.gov.uk/guidance/transport-analysis-guidance-tag>

⁶ Passenger Demand Forecasting Handbook – Rail Delivery Group (May 2018)
<https://www.raildeliverygroup.com/pdf/about-the-pdfh.html>

COVID-19 Test	Kidderminster	Kidderminster	Blakedown	Blakedown
	(TOTAL DEMAND)	(NET ADDITIONAL DEMAND)	(TOTAL DEMAND)	(NET ADDITIONAL DEMAND)
Base Forecast Capacity	547	321	54	43
Test A	437	257	43	34
Test B	383	225	38	30
Test C	508	298	50	40
Test D	476	279	47	37
Test E	520	305	51	41

Table 12 – Total and net demand results after applying COVID-19 tests

Based on the indicative tests developed the case for car park expansion to deal with long term growth will still exist. In the worst-case scenario (**Test B**) net additional demand would still be 225 spaces at Kidderminster and 30 spaces at Blakedown, to a total of 255 spaces up to 2036.

Forecast demand model outcomes

Modelling undertaken during Stage Two considered future demand requirements for car parking at Kidderminster and Blakedown up to 2036, in line with the Wyre Forest Local Plan timeframe, but without the COVID-19 sensitivity tests at this point in the process.

Whilst Blakedown generates a modest parking requirement of up to a total 54 spaces (43 net additional), the situation at Kidderminster is more significant with a potential need for up to 547 (321 net additional) spaces at the station if all suppressed demand were to be released.

Using the generalised journey time based, logic trip model noted above (p. 27) which indicated an average of 42% of car trips (135⁷ spaces) would choose Blakedown rather than Kidderminster if capacity was increased, a total of 178 spaces would be required at Blakedown as noted at Table 13 (top row).

⁷ Kidderminster net additional demand in 2036 is 321 spaces (see Table 12) thus 42% of 321 equates to 135 spaces re-distributed to Blakedown Station if capacity provided.

COVID-19 Test	Kidderminster	Blakedown	Transfer rate to Blakedown	Demand transferred from Kidderminster to Blakedown	Blakedown	Kidderminster
	(NET ADDITIONAL DEMAND)	(NET ADDITIONAL DEMAND)	(if capacity provided)		(REVISED NET ADDITIONAL DEMAND)	(REVISED NET ADDITIONAL DEMAND)
Base Forecast Capacity	321	43	42%	135	178	186
Test A	257	34	42%	108	142	149
Test B	225	30	42%	95	125	130
Test C	298	40	42%	125	165	173
Test D	279	37	42%	116	153	163
Test E	305	41	42%	128	169	177

Table 13 – Net demand results after applying COVID-19 tests and average logit choice model transfer rate (42%)

Stage Two: Key Findings

Confirmation of "Base Case" capacity requirements scenario

Upon completion of forecast demand modelling, a multidisciplinary workshop was held with Workstream A and B members to discuss and agree a "base case" forecast 2036 capacity requirement, specifically taking account of COVID-19 sensitivity tests. Subsequently, the following base case inputs were agreed:

- **Input 1: COVID-19 Sensitivity:** Due to the current uncertainty in terms of COVID-19 impact to rail passenger demand in the short, medium, and long term, it was agreed to apply "Test B" to forecast growth values, meaning a conservative 'worst case' 30% reduction for the complete Wyre Forest Plan timeframe to 2036.
- **Input 2: Transfer rate from Kidderminster to Blakedown:** The land options identified to expand capacity at Kidderminster require construction above the existing at-grade car parks. Elevated structures in urban environments with adjacent properties import a premium construction cost per space compared to expansion that could be provided at sites identified in Blakedown. The most effective use of public funding for delivering capacity is to thus consider the two existing stations as an integrated capacity network and apply the generalised journey time choice principle to distribute 42% of the future Kidderminster demand to Blakedown.

Applying the agreed inputs to the 2036 modelled forecast demand, leads to a net additional capacity requirement of 130 car park spaces at Kidderminster and 125 car park spaces at Blakedown as shown on Table 13, third row.

Stage Two: Concluding remarks and next steps

The Stage Two modelling outputs evidenced that even when applying the most conservative COVID-19 test which reduced forecast demand by 30%, there remains a need for car park capacity investment in the Wyre Forest District to support growth up to 2036. In Stage Three the proposed enhancement at Kidderminster Station is tested using a junction capacity model to validate if there is sufficient capacity at the localised station access junction onto Comberton Road.

5 Stage Three: Summary of activities and outputs

Workstream A – Review of access capacity at Kidderminster Station

Traffic modelling objective and study area

Jacobs was commissioned by WCC to assess the capacity of access onto the Comberton Road (A448) from Kidderminster Station based upon the work described in Stage Two of this study and produced the report located in Appendix B. The objective was to provide quantitative information to confirm the increase in car park capacity at Kidderminster was achievable from a local highway network capacity perspective. Due to project timing, a draft output from the SYSTRA demand modelling was utilised for Jacobs exercise that indicated a capacity increase of 125 spaces at Kidderminster (noting SYSTRA's final model output indicated 130 spaces).

The study area modelled by Jacobs covered the Comberton Road / Station Access / Lea Street staggered crossroads, as well as the A448 Comberton Road corridor, in Kidderminster. Junction modelling, using industry standard computer software was used to compare base traffic growth against the level of change at the station access proposed by an additional 125 car park spaces. This change has been measured using anticipated detailed metrics such as delays for drivers, the capacity of the access junction, and queue lengths on Comberton Road.

Modelling additional 2036 trips (due to increase in car park capacity)

The proposed additional 125 car park spaces at Kidderminster Station were modelled for the two AM peak hours (0700–0800 and 0800–0900). In the 0700–0800 period, results showed an additional 99 vehicles travelling to the Station Access from Comberton Road west and 19 from Comberton Road east. In the 0800–0900 period, results showed an additional 62 vehicles from Comberton Road west and 41 from Comberton Road east.

Tables 14 and 15 show the total 2036 base plus railway station development trips for the proposed 125 space car park expansion. General traffic growth at the junction was calculated using TEMPro⁸ and forecast demand specifically for the station (calculated by SYSTRA) was overlaid onto this to determine total demand at the junction by 2036. This approach avoided double counting which could skew, over or under exaggerate the results of the traffic modelling.

	Comberton Road east	Station Access	Comberton Road west	Lea Street	Total
Comberton Road east	0	101	429	0	530
Station Access	37	0	194	0	231
Comberton Road west	504	291	0	0	795
Lea Street	37	7	31	0	74
Total	577	399	654	0	1630

Table 14 – 2036 base + SYSTRA demand AM growth constrained (0700–0800) flows (125 additional spaces)

⁸ Trip End Model Presentation Program (“TEMPro”). DfT information at <https://www.gov.uk/government/publications/tempro-downloads>

	Comberton Road east	Station Access	Comberton Road west	Lea Street	Total
Comberton Road east	0	102	798	0	900
Station Access	43	0	163	0	207
Comberton Road west	549	141	0	0	690
Lea Street	86	9	81	0	176
Total	678	252	1043	0	1973

Table 15 – 2036 base + SYSTRA demand AM growth constrained (0800–0900) flows (125 additional spaces)

Workstream B – Tailoring options based on demand and junction capacity modelling

Junction capacity summary

Junction capacity at the site access was modelled using industry standard tools developed by the Traffic Research Laboratory (TRL) based on three decades of research and development by TRL. It is used for predicting capacities, queues, delays (both queueing and geometric) on the highway. The model provides three outputs: –

- **RFC:** Ratio of Flow to Capacity. Relationship between the traffic demand and the capacity of the junction. Empirical studies have detailed that an RFC of over 0.85 (i.e. 85% capacity) means the junction is operating over capacity. An increasing RFC suggests worsening traffic resulting in queueing and delays.
- **Queue:** This is the mean maximum anticipated queue length formed at the junction. The outputs below are measured in Passenger Car Units (PCUs). A PCU is a metric used in traffic analysis to assess traffic-flow rates. One PCU is the equivalent of 5.75m; and,
- **Delay:** The predicted total delay a driver is anticipated to expect at the junction (in seconds)

Kidderminster Station site is connected to the Comberton Road and The Ringway roundabout in the west (labelled 'A') and to the signal-controlled junction crossing with Chester Road to the east (labelled 'B') as shown in Figure 10.

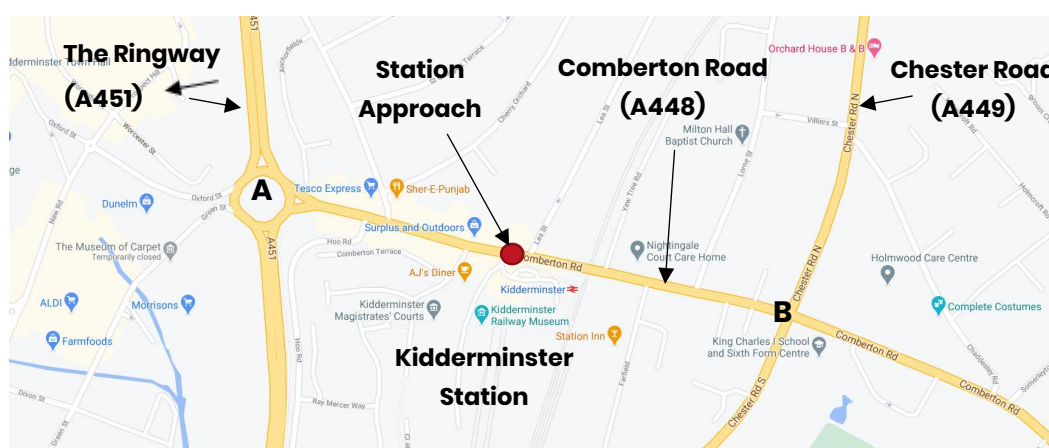


Figure 10 – Kidderminster Station local road layout and junction connections to east and west

It is important to note that this junction modelling has been undertaken in isolation and cannot account for junctions either side of the access on Comberton Road, the A451/ A448 Roundabout and Chester Road / Comberton Road signalised crossroads, which may have an impact of the efficient movement of traffic once past the access

junction. The Comberton Road / Station Access / Lea Street staggered crossroads have been modelled for the 2016 base, 2036 base and 2036 base-plus-development scenarios incorporating the proposed SYSTRA demand related to the provision of an additional 125 car park spaces.

Arm	0700-0800			0800-0900		
	RFC	Delay	Queue	RFC	Delay	Queue
Comberton Road east	0.00	0.0	0	0.00	0.0	0
Station Access, left	0.36	9.5	1	0.39	12.9	1
Station Access, right	0.18	18.9	0	0.27	28.5	0
Comberton Road west	0.77	21.6	3	0.45	11.9	1
Lea Street	0.20	11.4	0	0.58	25.8	1

Table 16 – 2036 base + development with Blakedown sensitivity (growth constrained) junction capacity results

Table 16 shows the capacity model outputs that indicate the Comberton Road access junction is operating within capacity when applying additional flows to base traffic growth related to provision of 125 new station car park spaces in 2036. The junction volume to capacity ratio was modelled to operate at 77% (RFC of 0.77) which is lower than the threshold RFC of 0.85 set by empirical studies and thus confirms the junction is predicted to operate within capacity following the demand associated with the additional 125 car park spaces.

The final SYSTRA modelled net expansion requirement at Kidderminster Station was 130 spaces by 2036 in the base case scenario. Noting that a 125-space increase led to a junction capacity ratio of 77%, it is reasonable to consider that a further 6 spaces would remain within the <85% threshold. Once further engagement with stakeholders has been undertaken and a design solution and footprint confirmed, a further review of junction capacity may be required to correlate with the final agreed number of spaces (if agreed to be above 125).

Stage Three: Key Findings

Considering the information gathered at Stage One during the technical option appraisal process, and the further demand and capacity modelling work undertaken at Stages Two and Three of the study, there remain three primary infrastructure options available to provide the additional 130 space car park capacity required at Kidderminster to meet future projected rail passenger demand growth up to 2036.

These primary options are summarised in Figures 11, 12 and 13 on the following page.

Figure 11 – SVR Car Park deck

Option K3

Construction of a single deck solution across a proportion of the existing at grade Severn Valley Railway car park that could **deliver all required 130 spaces** (noting the footprint has capacity for up to 155 spaces).

Based upon an average capex of £34,000 per additional space for this single deck solution the estimated total cost for a 130-space single deck equates to **£4.42m**



Figure 12 – Kidderminster deck layout A

Option K4(A)

Construction of a single deck across the complete Kidderminster Station existing car park footprint that could **deliver 107 additional spaces (82% of the required capacity)**

Estimated construction cost for **107 space** single deck would equate to **£2.9m**.

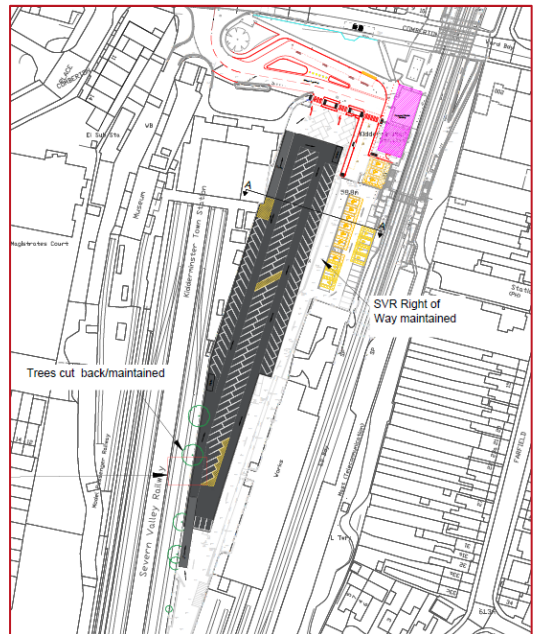
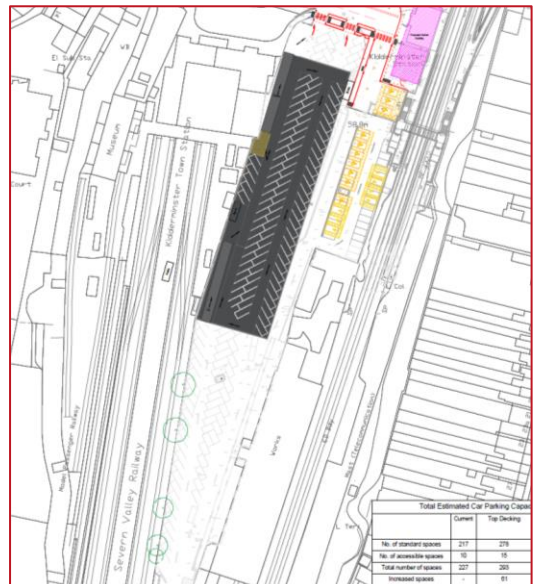


Figure 13 – Kidderminster deck layout B

Option K4(B)

Construction of a multi storey deck across a proportion of the Kidderminster Station existing car park footprint would mitigate visual impact to the SVR shed and could be sized to deliver **the required 130 additional spaces (100%)** (noting the MSCP footprint has capacity for up to 151 spaces). Based upon an average capex of £40,000 per additional space for a MSCP solution the estimated total cost for a 130-space car park equates to **£5.2m**



The capital costs referred to in this section are based upon cost principles in Table 9 of Appendix C (Estimated cost for all options) and include for contractors' preliminaries, overheads and profit, and an additional 40% risk contingency. A full description of the capital cost pricing assumptions and exclusions is provided in Section 8.1 of Appendix C.

Stage Three: Final concluding remarks and recommended next steps

The passenger modelling work has clarified that if capacity is unlocked at Blakedown, between 36% and 50% (average of 42%) of station users located within catchments to the east of Kidderminster would choose to use Blakedown rather than Kidderminster. This data and quantitative modelling-led approach allows the efficient sizing of infrastructure capacity enhancements to meet the holistic future growth needs for the Wyre Forest District that equates to a requirement of 255 additional spaces across the district by 2036 between Blakedown and Kidderminster.

The junction capacity modelling demonstrates that 125 spaces equated to 77% utilisation, within the current 'less than 85%' baseline requirement, and thus the existing access point is highly likely to have capacity to accommodate the traffic demand associated with 130 additional spaces proposed at Kidderminster Station. Note, the capacity assessment focussed on the localised station junction access and thus further work to model traffic interactions on Comberton Road may be required at the next stage.

In order to meet the future rail station capacity growth over the next 16 years in line with the Local Plan timeframe, an integrated capacity network approach is required to efficiently utilise existing station infrastructure by adding levels of capacity that highways infrastructure at Blakedown and Kidderminster can sustainably meet without extensive improvements.

Kidderminster Station:

- There are several options available to deliver the future capacity requirement of 130 spaces at Kidderminster Station. The deck options identified at Stage One of the process can be refined and optimised to align with the modelling outputs generated at Stage Three, and as described in Figures 11, 12 and 13.
- A deck or multi-storey car park on Severn Valley Railway site could have a visual impact on the immediate residential properties with windows facing the car park. It is recommended designs with variations in floor height and cladding are investigated to develop a solution that is considerate to the adjacent residential dwellings.
- This study evidences rail growth (and thus wider economic growth) has been suppressed for over 10 years, and this will further intensify even in the worst case modelled COVID-19 scenario should a solution not be found. An acceptable car park expansion solution may only be found once all key stakeholders are engaged in an equitable and transparent manner and buy in is achieved to the holistic goal.
- The next stage will involve discussion with stakeholders (West Midlands Trains, Severn Valley Railway, Network Rail, and local planners) to develop a mutually acceptable design solution either on the existing station, or the Severn Valley Railway site.

Blakedown Station:

- After considering the base case COVID-19 assumption a substantial proportion of the future capacity requirement of 125 spaces at Blakedown can be delivered by the Callow Oils/Station Yard (potential capacity varies between 80 and 120 spaces depending on layout arrangement) and therefore it is recommended this site is prioritised further with local stakeholders to facilitate Wyre Forest District meeting future passenger growth requirements.

- An indicative general arrangement drawing produced by SLC for the Callow Oils site (refer to drawing WYF-SLC-XX-DWG-CIV-0010-Blakedown located in Appendix C) indicated 111 surface level spaces could be provided on the site footprint, which would equate to meeting 89% of the forecast 125 space demand requirement by 2036. The estimated total cost for delivering a 111-space car park on the site was £1.6m, and included construction overheads, profit and 40% risk contingency. The total cost estimate for this option equates to an efficient £14k per additional space.
- A desktop traffic assessment is required at the next stage of project development to determine viability of creating new car park access points along Station Drive at Blakedown. This relates to both the Callow Oils site and also the Marmaris site. Outputs from this will inform the optimal car park solution at Blakedown.
- Should further investigation into the Callow Oils site access prove alterations to be unviable or impractical (particularly to Network Rail level crossing), traffic modelling for a new direct access point from the A456 to the Marmaris site is a secondary option to be explored. This would provide outputs to define design features of the access point (i.e. T junction, or roundabout).
- Retention of future potential expansion locations within the Local Plan, such as the development site adjacent to the A456 and Blakedown Station (currently owned by Marmaris Investments Ltd.), would make provision for further passenger growth beyond the COVID-19 reduced volume figure used in the Report.

Appendices

Appendix A	Car Park Access and Capacity Report (SYSTRA)
Appendix B	Kidderminster Station Access Report (Jacobs)
Appendix C	Wyre Forest Rail Car Parks Engineering and Land Study (SLC Rail)
Appendix D	Technical Note on Timetabling – Suggested new station east of Kidderminster (SLC Rail)
Appendix E	Blakedown and Hartlebury Proposed Parking Improvements Vehicle Access and Level Crossing Overview (JACOBS)