



## UNIVERSAL DESTINATIONS & EXPERIENCES UK PROJECT

Former Kempston Hardwick Brickworks and adjoining land, Bedford

### Appendix 5.1 Transport Assessment Annex 14 - Wixams Station Analysis

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# Wixams New Station: Operational & Demand Assessment

April 2024



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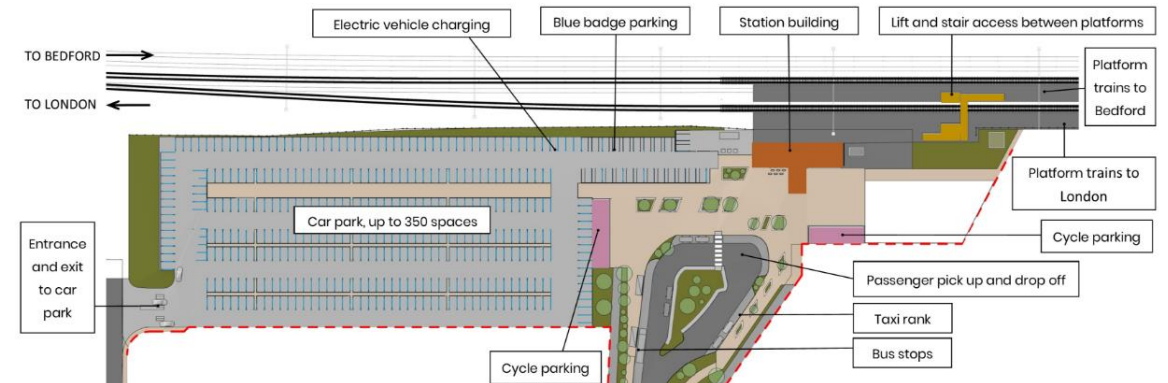
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# Introduction



# Introduction

- AtkinsRéalis have been requested by the Department for Transport to undertake high-level passenger demand and operational analysis, principally to provide an indicative assessment of the potential impact of passenger demand expected to be generated by the proposed Universal Studios theme park on rail services / capacity on the Midland Mainline, and Wixams station in particular which will serve the site.
- The former is currently expected to open in 2030 (phase 1, with a second phase planned for opening in 2050), while construction of the latter, we understand, is expected to commence during 2024. The analysis will, inter alia, assess the capacity requirements for forecast passenger demand at Wixams, i.e., the demand generated by the theme park in addition to background passenger growth and demand associated with Wixams Garden Village, and operationally assess the extent to which the theme park promoter's train service aspirations can be realised.
- Wixams Station will be located at the western boundary of Wixams, on the Midland Main Line c.5km south of Bedford station. We understand that the current planning assumption is that it will be served by up to four Thameslink trains per hour in each direction; based on the current timetable journey times between Wixams and London St Pancras will be c.60mins.
- Planning for the station appears to be at an advanced stage, with the current design comprising two platforms located on the slow lines enabling the station to be served by Thameslink stopping services.



# Introduction

## Background

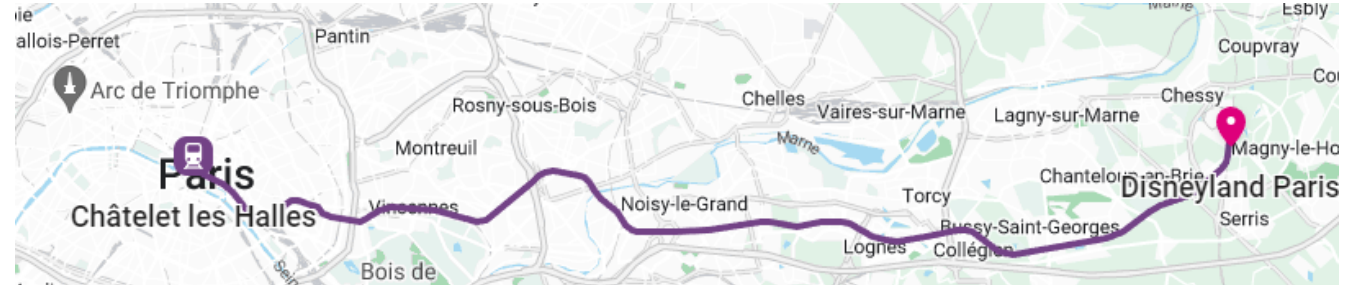
- From our discussion with the Department, we understand that the Theme Park promoter has the following aspirations for the train service provision at Wixams on opening in 2030, which our analysis is required to consider:
  - 2 trains per hour with journey time of 30mins from London St Pancras;
  - 2 trains per hour with journey time of 45mins from London St Pancras, including stops at Luton Airport Parkway; and
  - All passengers to have a seat.
- Current journey times on MML services to Bedford are as follows:
  - EMR 'fast' services – 35mins (passing Bedford, non-stop from STP);
  - EMR 'Connect' services to Corby – 41mins; and
  - Thameslink services – c.60mins.
- Given the above current journey times, the Promoter's aspirations would appear to be based on serving Wixams with EMR fast and semi-fast services (to achieve the desired journey times) rather than the Thameslink services as currently planned, which would potentially require platforms to be provided on the fast lines, necessitating a station redesign.

# Scope of Work

- In summary, the scope of our analysis considers the following aspects:
  - The extent to which future demand (including Theme Park traffic) can be accommodated on the current assumed train service proposed for Wixams, i.e., 4tph Thameslink in 2030 and (indicatively) 2050. This effectively represents a Do Minimum / low-cost baseline option for meeting the demand requirements for the Theme Park if met by the service as currently assumed. We will assess the capacity requirements (seats per hour) and, if exceeding current capacity provision, assess the quantum of additional seats that will be needed to meet projected demand.
  - In parallel, consider the extent to which [operationally] the Theme Park promoter's service aspirations can be delivered, changes to existing services required to meet this, potential constraints and any trade-offs that may need to be considered.
  - Following on from the operational analysis, reassess capacity requirements based on the proposed train service emerging from the operational analysis in should this differ from the assumed baseline service provision.
  - Provide high-level qualitative comments on implications for Wixams station design / sizing if the train service identified as meeting all or part of the Theme Park Promoter's aspirations in (2), necessitates changes to the existing design to be delivered (e.g., provision of platforms on the fast lines).

# Benchmark – Disneyland Paris

- **Marne-la-Vallée–Chessy Station:** Station located close to entrance of Disneyland Paris and opened in conjunction with the theme park. Serves both commuter and high-speed railway.
- **Train Service:** Customers for Disneyland Paris who wish to travel to Disneyland Paris from Paris, would need to use the RER A line, and most likely alight from Châtelet les Halles to Marne-La-Vallée Chessy (Which is the station that services Disneyland Paris).
- **Distance:** 35 km.
- **Journey time:** 40-45 minutes.
- **Rolling Stock:** Currently serviced by MI 2N/MI 09 5-car double decker rolling stock, with a max speed of 75mph. The rolling stock age varies between 10 to 30 years approx. Each 5-car set has a capacity of around 2,600 seated and standing passengers.





# Operational Analysis

# Overview

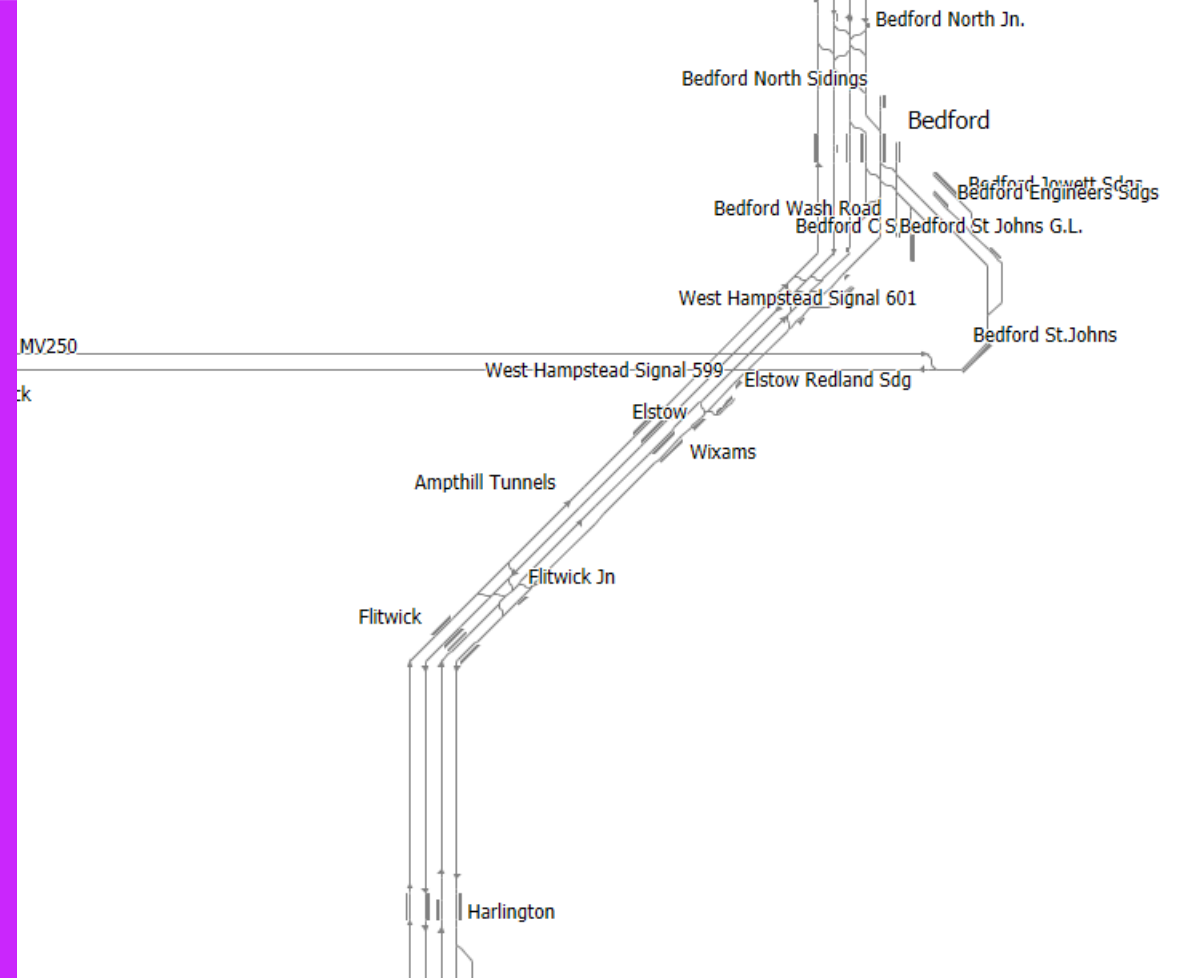
- The timetable analysis considers a range of options to deliver sufficient capacity between London and Wixams. This ranges from providing a 15 minute interval Thameslink service, which is known to fall short of the journey time aspirations, through to providing up to 4 faster services per hour, closer to the journey time aspirations, by introducing calls in EMR services.
- The run time impact of new station at Wixams was calculated using RailSys.
- The impact of a range of different means of serving Wixams based on Network Rail's December 2023 timetable was determined using ATTUNE timetable planning software in. The analysis set out in the following slides considers:
  - Monday to Friday, Saturday, and Sunday.
  - The morning peak (07:30 – 08:30), off peak (12:00 – 13:00 and 19:00 – 20:00) and evening peak (17:00 – 18:00), as well as bespoke peak periods relevant to the expected demand profile at Wixams.
  - The primary infrastructure constraints and timetable structure of the Midland Main Line south of Corby.
  - Any requirement to flex/move other services to accommodate station calls at Wixams and quantify the direct and consequential journey time impact. The geographic scope of this analysis is between Corby and St Pancras International. Any impact to timings north of Kettering North Junction is noted but resolution through to destination will need to be considered separately as part of future work.
  - The impact on turnaround times on services proposed to call at Wixams to understand whether the services are still compliant with the timetable planning rules or will break their diagrams. As stated above, the impact on turnaround times north of Kettering North Jn cannot be fully determined.
  - The impact of any regular Engineering Access requirements

# Assumptions

- Wixams station will be located as per the Bedford Borough Council Planning Application: [edrms.bedford.gov.uk/SearchResults.aspx?appNumber=22/01954/MDC3](https://edrms.bedford.gov.uk/SearchResults.aspx?appNumber=22/01954/MDC3) which shows two Slow line platforms. If platforms are also required to be constructed on the Fast lines, these will be at the same location.
- The December 2023 timetable was used as the base for this analysis. LDHS services are currently timed as Class 222s, but are expected to be replaced by new electro diesel units in the future which will likely affect their running times, which cannot be accounted for.
- The 1-minute performance allowance in most northbound Thameslink services approaching Bedford South is not required. It is not mandated in the Timetable Planning Rules (TPR) and is assumed to be an allowance to mitigate the timetable impact of a future call at Wixams when the timetable was designed.
- The 1-minute adjustment in most southbound Slow line Thameslink services approaching Flitwick, and the ½ minute performance allowance approaching Leagrave Jn are not required. They are not mandated in the TPR and are assumed to be an allowance to mitigate the timetable impact of a future call at Wixams when the timetable was designed.
- 2024 TPR V4 were used.
- The geographic extent of this analysis is St Pancras – Kettering North Junction on the MML, and the branch to Corby. Where trains need to be retimed north of Kettering North Junction, these have been noted in the slides, but the paths have not been validated through to origin / destination. It is assumed that it will be possible to retime the affected services, **but the feasibility of this remains a risk.**

# OVERVIEW OF INFRASTRUCTURE AND TIMETABLE

- The following sections present an overview of the timetable and infrastructure between London St Pancras and Wixams.





# Current infrastructure and timetable overview

- The Midland Main Line is a 4-track electrified railway between London and Kettering North Junction (the northern limit of this study). It handles LDHS services operating in and out of St Pancras, semi-fast EMR electric commuter services, a mix of semi-fast and stopping Thameslink commuter services, and freight.
- At London, trains using the MML either start / terminate at St Pancras, which has four platforms, or run via the Thameslink core to / from St Pancras, Farringdon, City Thameslink, Blackfriars and routes south of London.
- The MML has a lower throughput of trains compared to some of the other main lines serving London. This is a result of the following constraints imposed by the infrastructure and train service:
  - The lines are paired by purpose, with the Fast lines on the west side of the corridor and the Slow lines on the east side. At grade crossing moves are made at Carlton Road / West Hampstead at the southern end of the route (to enable Thameslink services to reach the FL), and at numerous junction further north, with Harpenden Junction being the most commonly used. Any move to or from the Down Fast line will need to cross the Up Fast line.
  - Most crossovers between the Fast and Slow lines are single lead, preventing parallel moves occurring.
  - Fast line Thameslink services generally call at St Albans, eating up more Fast line capacity than would otherwise be the case.
  - The track layout at Bedford requires Up Fast line service calling there to cross to the Slow lines then back again, interacting with terminating Thameslink services and freight.
  - The Slow lines between Bedford and Wellingborough have a significantly lower line speed than the Fast lines. This results in stopping passenger services using the Fast Lines to Wellingborough or Kettering South which imposes a constraint on the timing of non-stop LDHS services.

# Current infrastructure capability

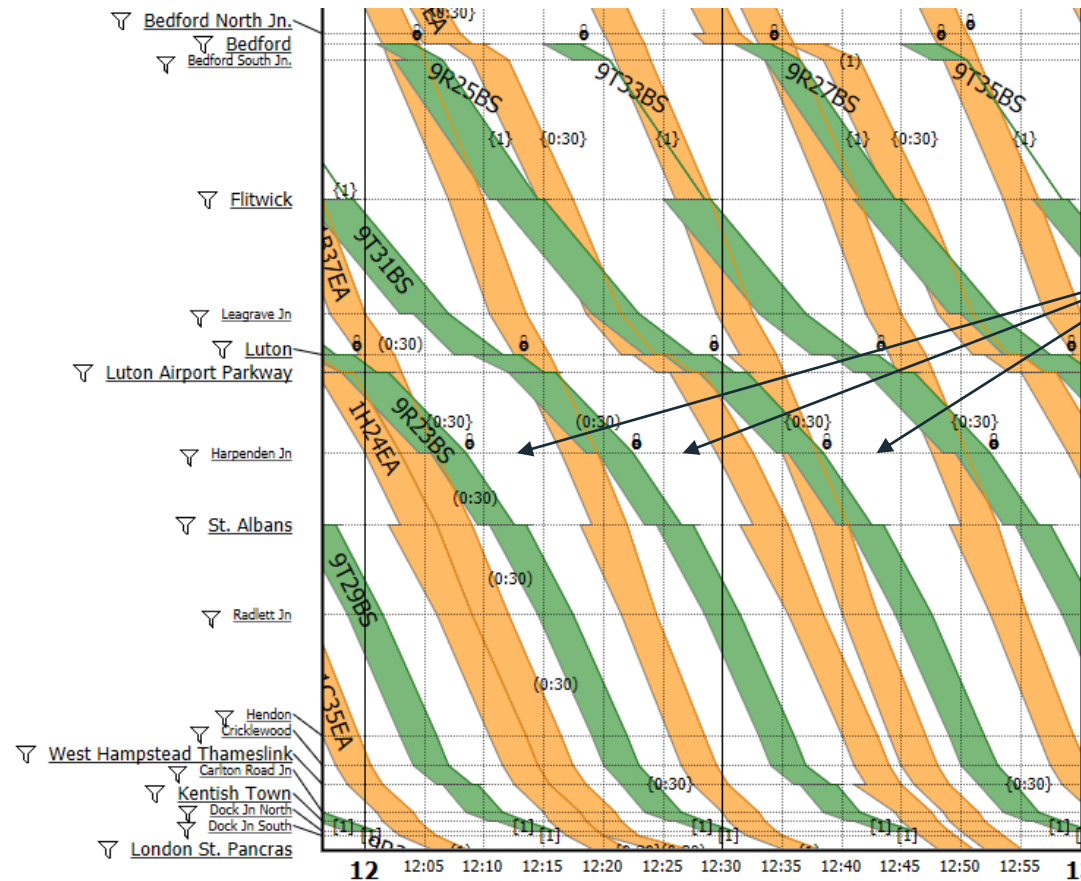
- Minimum signalling headways are stipulated in the Timetable Planning Rules, denoting the minimum number of minutes that must separate trains following each other on the same line.
- In theory, for the route between St Pancras and Wixams, there is a maximum capacity of between 15 to 20 trains per hour. However, the constraints listed on the previous slide (including capacity at St Pancras, varying speed of trains and at-grade crossing moves) reduces the available capacity.
- There is no pre-defined total utilisation of available capacity, with each route in the UK network being different. As a guide, a report by the European Commission entitled assessed that recommended maximum value for infrastructure occupation should be around 75%-85% depending on the mix of traffic. The Up Fast at Harpenden Junction is 80% utilised at peak times.
- The maximum number of trains that can be timetabled over the Fast lines is 6tph from St Pancras and 8tph Thameslink, as envisaged in the May 18 timetable recast. However, operating more than 6 Thameslink services per hour has an impact on EMT journey times and the 7<sup>th</sup> and 8<sup>th</sup> peak Thameslink paths do not currently operate.

LN3201 ST PANCRAS TO TAPTON JN (VIA DERBY)			
TIMING POINT	DOWN	UP	NOTES
St. Pancras to Carlton Rd Jn (Inclusive) (All Lines)	3	3	
Carlton Rd Jn (Exclusive) to Bedford (All Lines)	3 Non-Stop 4** Stopping 4^ Freight	3 Non-Stop 4** Stopping 4^ Freight	*May be reduced to 3 minutes behind a train calling at West Hampstead Thameslink and/or Cricklewood, where the driver will see double yellows. ^May be reduced to 3 minutes between Bedford South Jn and Bedford
Bedford to Wigston North Jn	4½ (b)* Fast Line	4½ (b)* Fast Line	(b) may be reduced to 3 minutes following a non-stop passenger service *3½ minutes required following a non-stop passenger service at Wellingborough and Market Harborough
Bedford to Harrowden Jn	4 Slow Line	4 Slow Line	
Harrowden Jn to Kettering North Jn	4 following passenger Slow Line  4½ following freight Slow Line	4 Slow Line	

Source: Timetable Planning Rules (Version 2 – 2025)

# Current timetable structure

- EMR operates 6tph. Northbound, the Sheffield and Nottingham services are flighted in pairs (dep St Pancras xx:02, xx:05, xx:32, xx:35), with the Corby path operating in the gap (dep St Pancras xx:16 and xx:46). Southbound, the pattern changes, with the Corby and Nottingham service flighted in pairs, and the Sheffield path running roughly 15 minutes before and after the flighted pairs.
- Northbound, the Corby service crosses to the Slow lines at Wellingborough North or Kettering South Jn a few minutes before the Sheffield service passes. Southbound, the Corby service crosses to the Fast line at Wellingborough South a few minutes after the Sheffield service passes.
- Thameslink operate 4tph on FL south of Harpenden Jn. At peak times, a further 2tph operate on the FL which cross to / from the SL at a range of different locations.



Gap every 15 minutes is used by a northbound service crossing at-grade at Harpenden Junction

Off peak southbound train graph showing trains that use the Fast lines, with EMR services shown orange and Thameslink services (which run Slow line north of Harpenden) shown green. The shaded area behind each line represents the minimum signalling headway.

# Current infrastructure & timetable

## Turnround times

- When modifying existing services, it is important to consider the turnround time of services at their origins and destinations. Adding in additional journey time to services will reduce the turnround time of services at their destination. For example, an EMR St Pancras to/from Corby has minimum turnround time requirements of 8 minutes for an 8-car train, and 10 minutes for a 12-car train.
- If the Turnround time is reduced below the minimum requirement there will be a requirement for an additional train set to carry out the service, unless services are re-diagrammed.

## Minimum Turnround times at St Pancras

Minimum Turnround	
180/222	10 If inward is ECS from Cricklewood 20. May be reduced to 15 minutes provided that the previous/next turnround is not less than the normal minimum for the location concerned.
360	8 – 8-car 10 – 12-car

## Minimum Turnround times at Corby

Minimum Turnround	7
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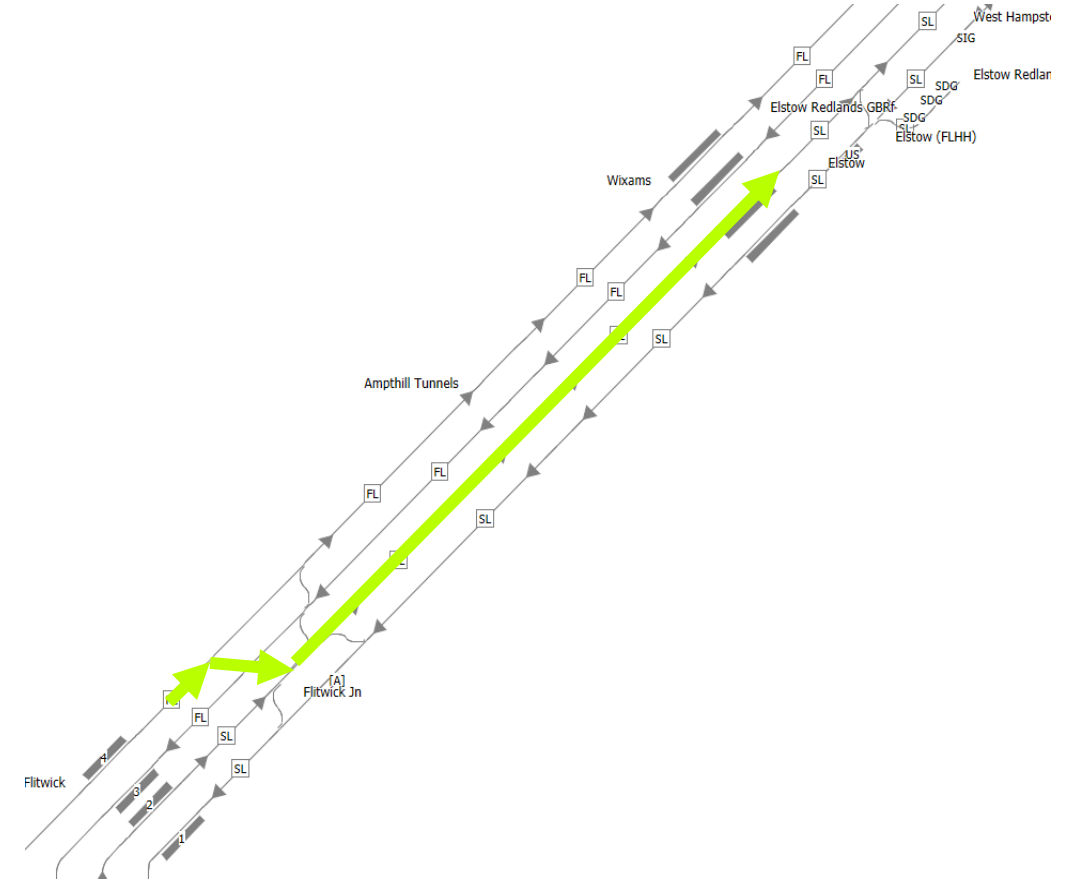
## Standard minimum Turnround times

Minimum Turnround	
DMU*	4
Class 700	8 (8-car) 10 (12-car)
EMR 180/222/810	10



# Platform requirements at Wixams

- Currently all stations between London St Pancras and Wixams have four platform faces, with two on the Slow lines and two on the Fast lines.
- To meet the journey time aspiration of c.35 minutes for fast services to Wixams will require the fast lines to be used. In this scenario, the station will need to be expanded to four platform faces to allow services on the fast and slow lines to stop at Wixams.
- If only two platforms were provided at Wixams, either on the slow lines or fast lines then services would need to swap from fast to slow, or slow to fast at Flitwick Junction. This would result in conflicting moves and would likely create performance issues on this part of the network, as a large amount of capacity would be used to perform these crossing moves.
- It should also be noted that the Engineering Access Statement currently sees either the slow or fast lines closed between Flitwick Jn – Bedford South Jn closed for the period of approximately 23:00 Sat – 12:00 Sun. This means that the railway will operate as a 2-track railway for this period, either on the slow or fast line. So, if there are only two platform faces for Wixams, services will not be able to call here on some Sundays before 12:00.



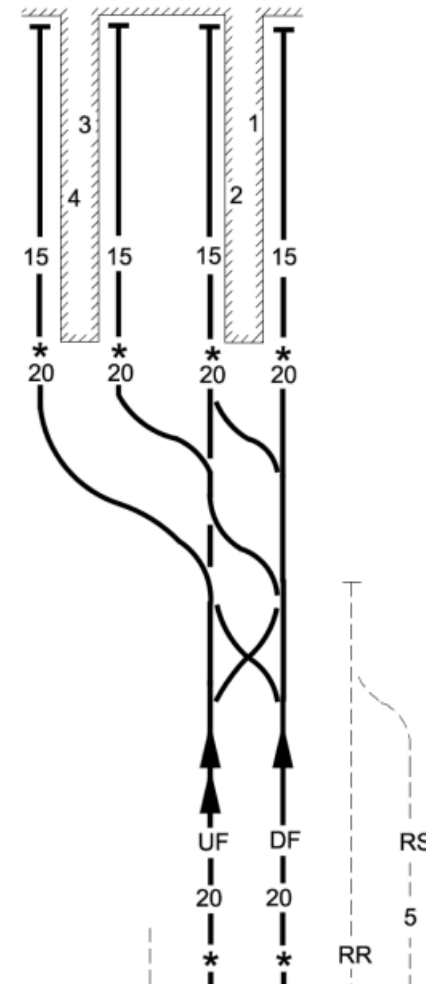
# Platform lengths

- Currently on the route between St Pancras and Bedford, platforms on the slow lines typically have around 245-250 metres of useable length, which is suited to any type of current rolling stock that runs on this route. The fast lines tend to have shorter useable platform lengths of around 170 metres, in which case if a Thameslink services was to stop at a shorter platform, it would need to use Selective Door Operation, which may result in dwell times being extended beyond 30 seconds.
- Example of platform lengths on this route:
  - Flitwick – all platforms have a useable length of 245m
  - Luton – all platforms have approximately 250m of useable length
  - Luton Airport Parkway – all platforms have a useable length of 245m
  - Legrave – platforms on the fast lines have a useable length of 175m, and on the slow lines 245m
  - Harlington – platforms on the fast lines have a useable length of approximately 168m, and on the slow lines 245m

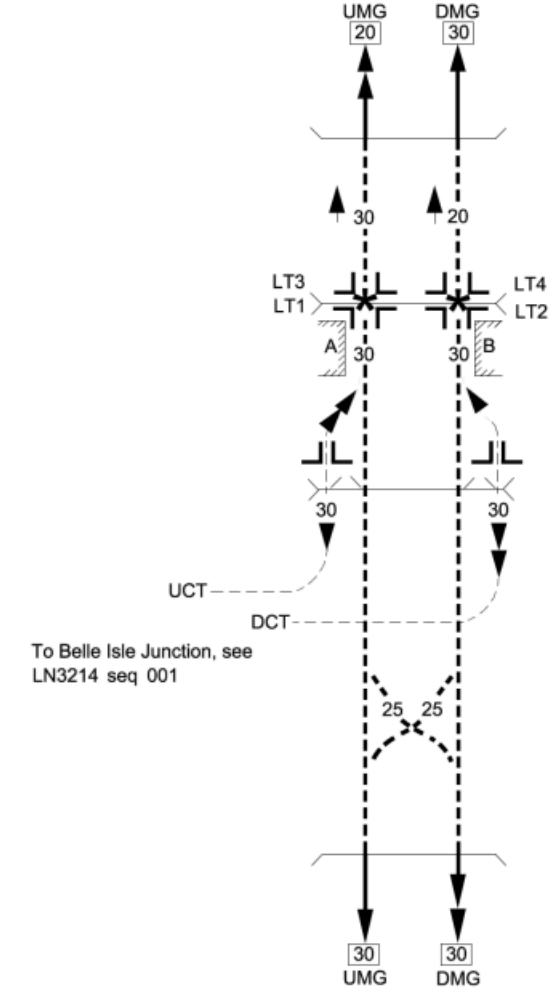
# Platform capacity at St Pancras

- Thameslink and EMR services both use different areas of St Pancras, with Thameslink services using the St Pancras 'Low Level' platforms, and the EMR services using platforms 1 to 4. Images from the Sectional Appendix are shown to the right, which demonstrate the platform layout of the 'Low Level' platforms and platforms 1 to 4.
- When considering increasing the number of Thameslink services; platforming is not a main consideration when it comes to capacity as these services do not terminate at St Pancras. Consideration needs to be given to the EMR services though, as these terminate at St Pancras, and can occupy a platform for 20 minutes to over 60 minutes.
- **Currently EMR services fully utilise the platform capacity available to them at St Pancras, and it would not be recommended to add more services.** The timetable is constructed in a way that results in EMR services occupying the platforms longer than the minimum turnaround time, and reducing this turnaround time would result in the timetable being required to be significantly changed.
- The slide on the next page shows a platform plan for a standard hour on a weekday, which helps visualise the occupied capacity of platforms 1 to 4.

## Platforms 1 to 4



## Low Level Platforms

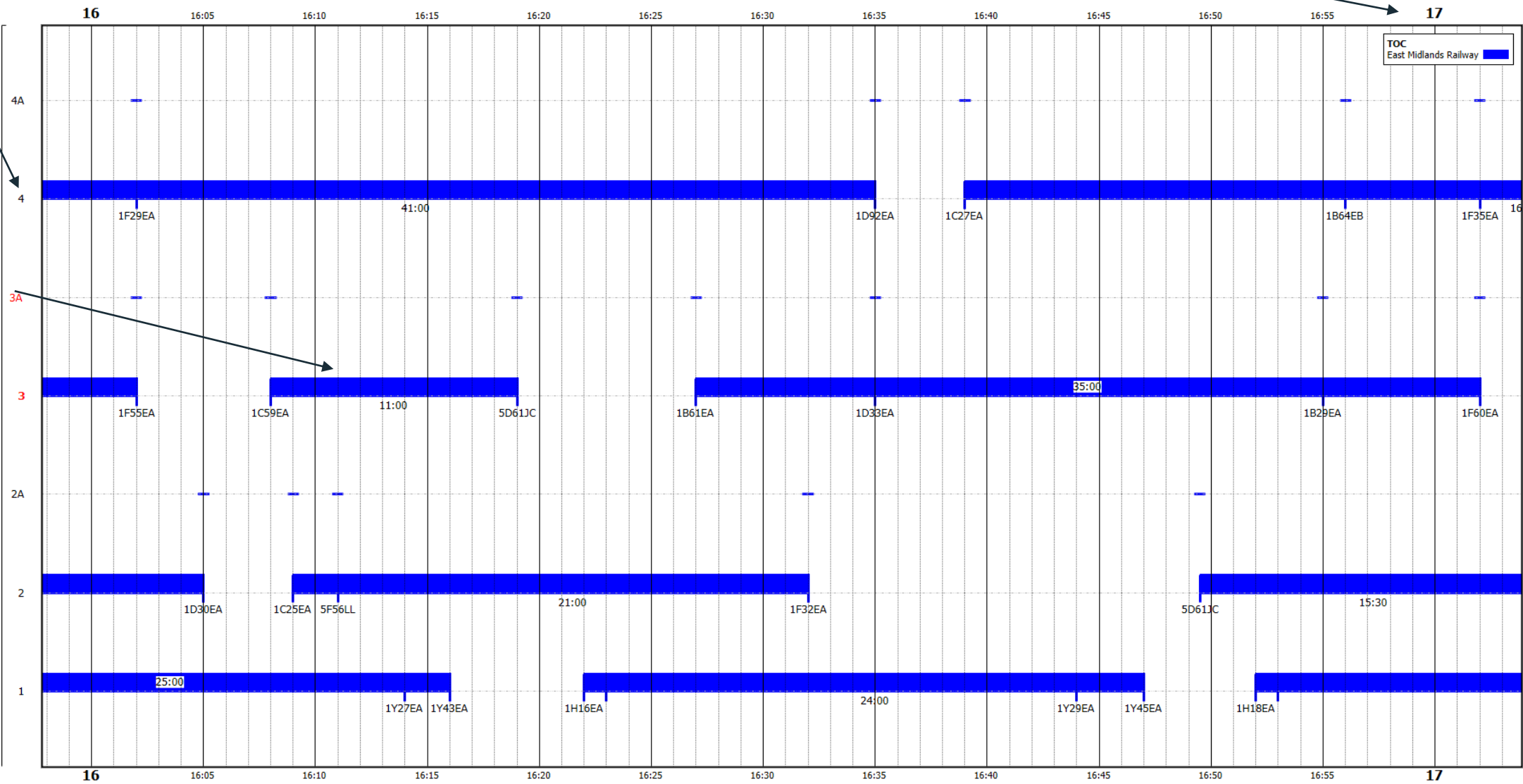


# Platform capacity at St Pancras

16:00 to 17:00 timeline

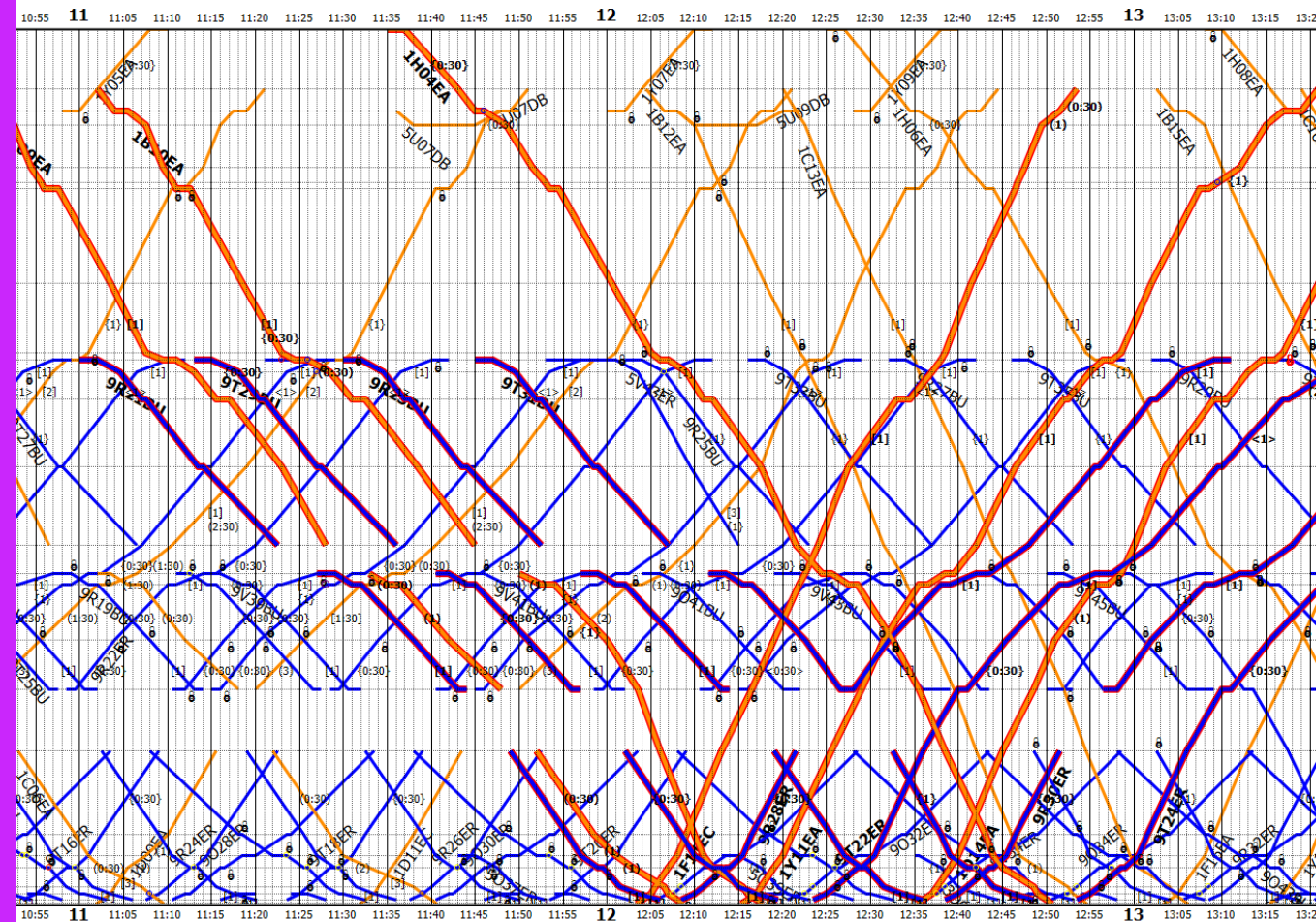
Platform  
Numbers

Train  
occupying  
platform





- The following sections present the timetable analysis carried out for Monday-Friday, Saturday and Sunday timetables.



# Journey time impact

- Stopping a service at Wixams Station will incur a journey time impact for two reasons: 1) due to the deceleration & acceleration penalty of stopping a service and 2) the dwell time impact of stopping at the station.

## Deceleration & Acceleration Penalty

- RailSys has been used to calculate the journey time impact of stopping a train at Wixams. The Network Rail National Infrastructure Model was used to calculate this journey time impact.
- The calculated time for stopping a Slow Lines service at Wixams station is 1.5 minutes for both directions (Excluding dwell time).
- The calculated time for stopping a fast service at Wixams station is 2 minutes for both directions (Excluding dwell time).
- The table to the right shows the journey times that have been used in the timetable planning work.

## Dwell Time

- For the purpose of the study, a dwell time of 30 seconds has been used for Thameslink services, and 60/90 seconds for EMR Corby services based on the rolling stock type and the precedent set at other stations. However, the peak volume of passengers boarding and alighting at Wixams may require longer dwells and the potential impact of this is discussed in the timetable analysis.

New Proposed Running Times				
From	To	Line	Pattern	Run time
Flitwick	Wixams	SL	S/S	6.00
Wixams	Bedford S	SL	S/P	3.00
Flitwick	Wixams	FL	P/S	4.50
Wixams	Bedford S	FL	S/P	2.50
Bedford S	Wixams	SL	P/S	2.50
Wixams	Flitwick	SL	S/S	6.00
Bedford S	Wixams	FL	P/S	2.00*
Wixams	Flitwick	FL	S/S	5.50

\*S/S = Start/Stop, S/P = Start/Pass, P/S = Pass/Stop

## Standard Rules – Dwell Times

Dwell Time	
158	1
180/22x/810	1½
DMU	45 seconds; to be shown as alternate 1 and ½ stops
DMU reversing through services	3 <sup>s</sup> ¼ applies to CrossCountry services
EMU	½
LH	1½

# Monday to Saturday Timetable Analysis (1)

## General Overview of Monday to Saturday Timetable

- The analysis of the Monday to Saturday timetable found that it is possible to add a call at Wixams in four Thameslink services per hour to provide a 15-minute interval service with a St Pancras – Wixams journey time of 55-57 minutes for most of the day. At peak times Monday – Friday, the timetable structure differs, and the service intervals change to a 10 / 20-minute interval pattern in the peak flow direction. In addition to the underlying 15-minute interval Thameslink pattern, the analysis demonstrated that three northbound Monday – Friday morning Thameslink services could call at Wixams with a journey time of around 45 minutes. These are expected to coincide with the opening time of the park. In the late evening, the Thameslink service reduces to half hourly, but could be maintained at 4tph by extending Three Bridges services that terminate at Luton after around 19:30.
- Calling **Thameslink services** at Wixams introduces minimal trade offs for other rail users. The primary risk associated with calling Thameslink services at Wixams is whether a longer dwell than 30s needs to be provided and the impact this could have on turnarounds.
- The analysis of the Monday to Saturday timetable found that it may be possible to add a call at Wixams in four EMR services per hour, with 2tph taking 30 – 33 minutes (Nottingham service) and 2tph taking 37 – 40 minutes (Corby service). In the northbound direction, these would operate at roughly 15 minute intervals. In the southbound direction, departures would be bunched at 10/20 minute intervals from Wixams, arriving at St Pancras with 4/26 minute intervals.
- Calling **EMR services** at Wixams introduces significant trade offs for other rail users. Long-distance passengers travelling on all EMR services north of Wixams would experience journey time extensions, which are expected to be in the 2 – 4 minute range. This includes passengers on the Sheffield service, despite this train not calling at Wixams. The journey time extensions imposed on EMR Sheffield and Nottingham services introduces significant timetable risks outside the geographic scope of this study. It will be necessary to retime these services through to destination and there is a risk that this will not be feasible or can only be achieved with further journey time extensions to EMR or other services.
- It is not feasible to introduce new EMR services to Wixams owing to lack of platform capacity at St Pancras, unless these are specifically required in the late evening (after 22:00) to allow passengers exiting the venue to return to London.

# Monday to Saturday Timetable Analysis (2)

## Saturday all day and Monday – Friday off-peak

- **Thameslink:** A 15 minute interval Thameslink service could be provided with a 1 minute journey time penalty at Bedford based on a 30s dwell. If necessary, a 1 minute dwell could be provided in the southbound direction. A 1 minute dwell in the northbound direction would require the existing dwell time at Luton or Legrave to be reduced by 30s.
- **EMR:** It may be possible to add a call at Wixams in four EMR services per hour, with 2tph taking 30 – 33 minutes (Nottingham service) and 2tph taking 37 – 40 minutes (Corby service). In the northbound direction, these would operate at roughly 15 minute intervals. In the southbound direction, departures would be bunched at 10/20 minute intervals from Wixams, arriving at St Pancras with 4/26 minute intervals owing to the structure of the timetable. The following journey time extensions are expected.
  - St Pancras – Sheffield services will be slowed by 3 minutes
  - St Pancras – Nottingham services will be slowed by 4 minutes
  - St Pancras – Corby services will be slowed by 3 minutes. In the northbound direction, the penalty reduces to 2 minutes north of Kettering (enabled by reducing the Kettering dwell). In the southbound direction, the penalty reduces to 2 minutes north of Bedford (enabled by removing non-mandated performance time).

Note that these journey time extensions have not been validated to / from destination / origin. Conflicts also arose in some hours at Bedford with southbound services from Corby and these have not been validated for the whole day. Both these issues raise a significant risk to deliverability of an EMR service at Wixams.



# Monday to Saturday Timetable Analysis (3)

## Monday – Friday AM peak

- **Thameslink (northbound):** the off-peak 15 minute interval service could be provided. Also, additional Thameslink services arriving from the south continue through the Thameslink Core onto the MML and generally run limited stop. The May 18 timetable was envisaged with 4 such services per hour (from East Grinstead and Littlehampton) in addition to the 4 Thameslink services that operate on the MML FL throughout the day. However, the full Dec 18 timetable does not currently run; only a small number of East Grinstead services operate, and no Littlehampton services. The operation of the East Grinstead services enables the express counter peak services tabulated below to be provided. If peak services south of London are expanded further in the future, more such express services will be possible.

	9T80	9T82	9T84
St Pancras	07:51	08:21	08:51
Wixams	08:35	09:05	09:38

- **Thameslink (southbound):** 4tph can be provided, but intervals would be 10 / 20 minutes rather than every 15 minutes.
- **EMR:** The impact is similar to the off-peak but with a slower journey time and the penalty reduces by 1 – 2 minutes in most cases.

# Monday to Saturday Timetable Analysis (4)

## Monday – Friday PM peak

- **Thameslink (southbound):** the off-peak 15 minute interval service could be provided. Also, three additional southbound services could be provided (departing 16:02, 16:32 and 17:02) with a journey time of 52 minutes.
- **Thameslink (northbound):** 4tph can be provided, but intervals would be 10 / 20 minutes rather than every 15 minutes.
- **EMR:** The impact is similar to the off-peak but with a slower journey time and the penalty reduces by 1 – 2 minutes in most cases.

## Evenings (after 19:00)

- **Thameslink:** The Dec 23 Thameslink services reduces to 2tph after around 19:30 as the Three Bridges – Bedford service is curtailed at Luton. This could be extended to Bedford into the evening as per the daytime pattern to provide a 15 minute evening Thameslink service at Wixams up to 22:00 to meet demand requirements for visitors leaving the park up to the expected closing time.
- **EMR:** After 22:30, platform capacity becomes available at St Pancras and consideration could be given to running the following fast services from Wixams to St Pancras to cope with late evening demand if needed. It is not clear at this stage who would operate such a service, nor is it clear what northbound working would form these services and what they would form at St Pancras, but they have been timed as Class 700s. After this time, the MML becomes a 2-track railway and additional services are more challenging.

	1Z01	1Z02
Wixams	22:10	22:40
St Pancras	22:49	23:23

# Sunday Timetable Analysis (1)

## General Overview of Sunday Timetable

- Although Sunday's do not have the same peak period as weekday timetable, the same periods were analysed for consistency, with some additional analysis on periods outside of those noted in the methodology.
- The analysis of a Sunday timetable found that it is possible to add a call at Wixams for Thameslink services, although there is more difficulty in adding stops for EMR services, and flexing of services would be required to resolve conflicts.
- Services do not start to ramp up until past 10:00, with only 5 services timetabled towards Wixams from London prior to 10:00. The first service that arrives after 10:00, would be a Thameslink services at approximately 10:20 from St Pancras, followed by a further 2 Thameslink and 2 EMR services within the 10:00-11:00 hour. Service levels start to ramp down past 22:00, with the last train that could stop at Wixams being timetabled through the area at approximately 23:45.
- There is timetable capacity to include up to 4 Thameslink services during the morning period where fewer trains run, it is assumed that there are fewer services at this time of the day due to demand.
- A general constraint of the Sunday timetable is that the slow or fast lines are blocked for possession opportunities approximately between 23:00 Saturday to 12:00 Sunday (depending on the time of the year). This means that only two lines can be used to timetable services between St Pancras and Wixams. The timetable plan would also be based on the slow lines, even if a possession is made on the fast lines, as the possession opportunity is for either the fast or slow lines.

# Sunday Timetable Analysis (2)

## Morning peak (07:30 – 08:30)

- **Thameslink:** There are only two Thameslink trains per direction during this period and no timetabling issues were found when adding a stop for these services.
- **EMR:** There no EMR services timetabled during this period.

## Off peak (12:00 – 13:00)

- **Thameslink:** A stop at Wixams has been tested on four Thameslink services per direction during this period. It was found that there are no significant conflicts when adding a stop. There is a conflict present at Bedford South Jn, which can be resolved by removing dwell 0.5-1 minute of dwell time at previous station (where the dwell time is in excess of the Timetable Planning Rules), or a service will need to be flexed by 0.5-1 minute.
- **EMR:** A stop at Wixams has been tested on three EMR services per direction during this period, with a mixture of services being tested: 1) Nottingham – St Pancras, Sheffield – St Pancras, Corby – St Pancras. It was found that adding a stop at Wixams creates conflicts for the EMR Corby services that would require either the EMR Corby service or conflicting service to be flexed by 1-2 minutes. For the Sheffield and Nottingham EMR services, no conflicts were present within the geographic boundaries of the study, but conflicts were present towards the Sheffield and Nottingham end of the line.

# Sunday Timetable Analysis (3)

## Evening peak (17:00 – 18:00)

- **Thameslink:** A stop at Wixams has been tested on four Thameslink services per direction during this period. The same conclusions can be made for the Off peak (12:00 – 13:00) period.
- **EMR:** A stop at Wixams has been tested on three EMR services per direction during this period, with a mixture of services being tested: 1) Nottingham – St Pancras, Sheffield – St Pancras, Corby – St Pancras. The same conclusions can be made for the Off peak (12:00 – 13:00) period.

## Off peak (19:00 – 20:00)

- **Thameslink:** A stop at Wixams has been tested on four Thameslink services per direction during this period. Similar conclusions can be made for the Off peak (12:00 – 13:00) period, with there being potential turnaround time issues at Bedford, where two services now fall below the minimum turnaround time due to the additional journey time.
- **EMR:** A stop at Wixams has been tested on three EMR services per direction during this period, with a mixture of services being tested: 1) Nottingham – St Pancras, Sheffield – St Pancras, Corby – St Pancras. Similar conclusions can be made for the Off peak (12:00 – 13:00) period with there being potential turnaround time issues at Corby, where one service now falls below the minimum turnaround time due to the additional journey time.

# Summary & next steps

- The run time impact was based on RailSys modelling between Luton and Bedford. A more refined estimate should be produced over a longer distance with a fully validated model. This may have already been done by others in the industry.
- If a Thameslink-only option is pursued, the next step is to produce a fully validated timetable for the full week, including any extended or new late evening and Sunday morning services. A plan needs to be developed to resource the extended / additional services.
- If an EMR option is pursued, then the next step is to explore the timetable impact on the whole MML through to Sheffield. Also, the timetable impact of the new MML rolling stock should be evaluated when known to see whether its improved performance creates any opportunities. Any additional services, such as on Sunday morning, or train length extensions, will need to be diagrammed to inform operating cost modelling.



# Demand Analysis - Introduction

# Overview

- The demand analysis considers Northbound and Southbound patronage on the Midland Mainline to Wixams station travelling on Thameslink and East Midlands Railway (EMR) services on an hourly basis.
- The theme park promoter has provided scenarios estimating demand for 2030 - the proposed opening date of the park, and 2050, when a second phase of the park will potentially open.
- DfT provided expected demand from the existing nearby committed development Wixams Garden Village, and Green Book passenger counts for both Train Operators, which generally identified the Critical Load Point as London St Pancras.
- The following analysis initially examines how demand is accommodated on today's service using the count data. Subsequently, the analysis iteratively overlays demand estimates from exogenous growth, the housing development and forecast trips to the theme park onto today's Thameslink service pattern (the only operator currently proposed to call at Wixams) to understand the Do Minimum / baseline option for meeting the requirements.
- The analysis then examines the demand impact of meeting the Promoter's aspirations with calling faster EMR services at Wixams.
- Scenarios were then considered for 2050 and for a Sunday timetable when engineering access on the Midland Mainline restricts service levels on the route during the early part of the day.

# Methodology:

- Establish the demand forecast for 2030:
  - Used 2022/23 Green Book passenger counts as a base normalised for strikes to establish a profile for train loading and identify Critical Load Point on a service-by-service basis.
  - Applied exogenous growth using EDGE forecast developed for ongoing MMLE business case development which AtkinsRéalis are currently undertaking for DfT.
  - Added forecast demand for the proposed development at Wixams and proposed Theme Park to the assumed Do Min service pattern (i.e. Thameslink services).
- Assess capacity requirements based on unconstrained growth for the Do Min service pattern, and requirement for any additional capacity over and above this to accommodate the projected demand.
- Analysis focused on the high peak scenario initially to examine the extent to which the 'worst case' scenario passenger volumes to the park can be accommodated.
- Repeat steps (2) and (3) for the proposed train service emerging from the operational analysis which delivers all or part of the Promoter's desired service pattern.
- Repeat above for 2050.

# Assumptions

- 2030 exogenous growth is based on DDG EDGE outputs – specifically Midlands Central scenario January 2024.
- 2050 exogenous is as above for 2044 scaled to 2050 levels using population growth from TAG Nov-23.
- Committed development demand sourced from 'Central Case Footfall at Station' at 458,910 on annual basis.
- As overleaf demand for the theme park is assumed to be a worst-case peak scenario.
- The promoter aspires for:
  - 2 trains per hour with journey time of 30mins from London St Pancras.
  - 2 trains per hour with journey time of 45mins from London St Pancras, including stops at Luton Airport Parkway.
  - All passengers to have a seat.
- Capacity for Thameslink services is assumed at 2023 levels throughout.
- Capacity for EMR services is initially examined at 2023 levels, then for the 2030 and 2050 scenarios Class 222s are replaced by 810s in the analysis, with 360s continuing at 2023 levels.
- Green Book data for Thameslink dated Sep-Dec 2023 and Dec 23 for East Midlands Railway.

# Promoter Demand Scenarios

#	Promoter scenario	Reference	Assumed comparison	2030 Max Hr NB Demand	2030 Max Hr SB Demand	Total Two-way Daily Demand
1	Base	Peak	Special event e.g. Halloween	3009	1902	18,458
2	Spread 0800-1000 Demand Evenly Across 2 hour period 0800-1000	High	School Summer Holidays	2280	1902	18,401
3	Reduce Visitor Demand By 20% (staff numbers remain the same)	Medium	Normal Weekend	2388	1528	14,871
4	Reduce London International Visitor Demand By 30% (redistribute 5% to Oxford, 5% to Cambridge, 20% to North of Wixams)	Less International	Less International	2504	1470	17,258
5	Combined	Low	Winter Mid-Week School Day	1541	1182	13,864

In 2030 the promoter expects a maximum high-peak daily demand of c.9,200 visitors to the site accessing via rail from the south, resulting in a total two-way daily rail demand of 18,458 passengers via Wixams; we have used this in our modelling.

- The promoter has supplied 5 demand scenarios which detail by hour the demand that they expect will travel to/from Wixams station to visit the park.
- The demand is disaggregated between EWR and trips arriving at Wixams via the MML from the North and South; we have focused our analysis on the latter i.e. demand from stations to the south of Wixams on the MML.
- The 5 scenarios step down in volume from a 'Base' scenario. The Base scenario represents a 'high-peak' demand position.
- We have included a broad reference on what we have assumed these scenarios to relate to – e.g. the scenario with the highest volume of traffic, the 'Base' is assumed to be a Peak such as can be seen on a special event as Halloween.
- We have used the 'Base' scenario for the purpose of our analysis, detail further on the next slide.

# Promoter Demand Profile 2030 – ‘Base Profile’

Time	Arrivals Wixams from the South	Arrivals at Wixams from the North	Departures at Wixams to the South	Departures at Wixams to the North
06:00 - 07:00	23	3	8	1
07:00 - 08:00	551	29	8	1
08:00 - 09:00	2 1,516	77	0	0
09:00 - 10:00	3,009	189	0	0
10:00 - 11:00	1,817	114	6	1
11:00 - 12:00	789	41	18	2
12:00 - 13:00	441	47	68	3
13:00 - 14:00	117	3	80	4
14:00 - 15:00	211	3	160	8
15:00 - 16:00	109	6	283	18
16:00 - 17:00	52	5	495	32
17:00 - 18:00	48	5	3 823	60
18:00 - 19:00	48	5	1,284	106
19:00 - 20:00	9	6	1,658	124
20:00 - 21:00	9	6	1,797	86
21:00 - 22:00	9	1	1,902	90
22:00 - 23:00	0	0	4 25	3
23:00 - 24:00	0	0	6	1
Total	1 8,757	541	1 8,621	539

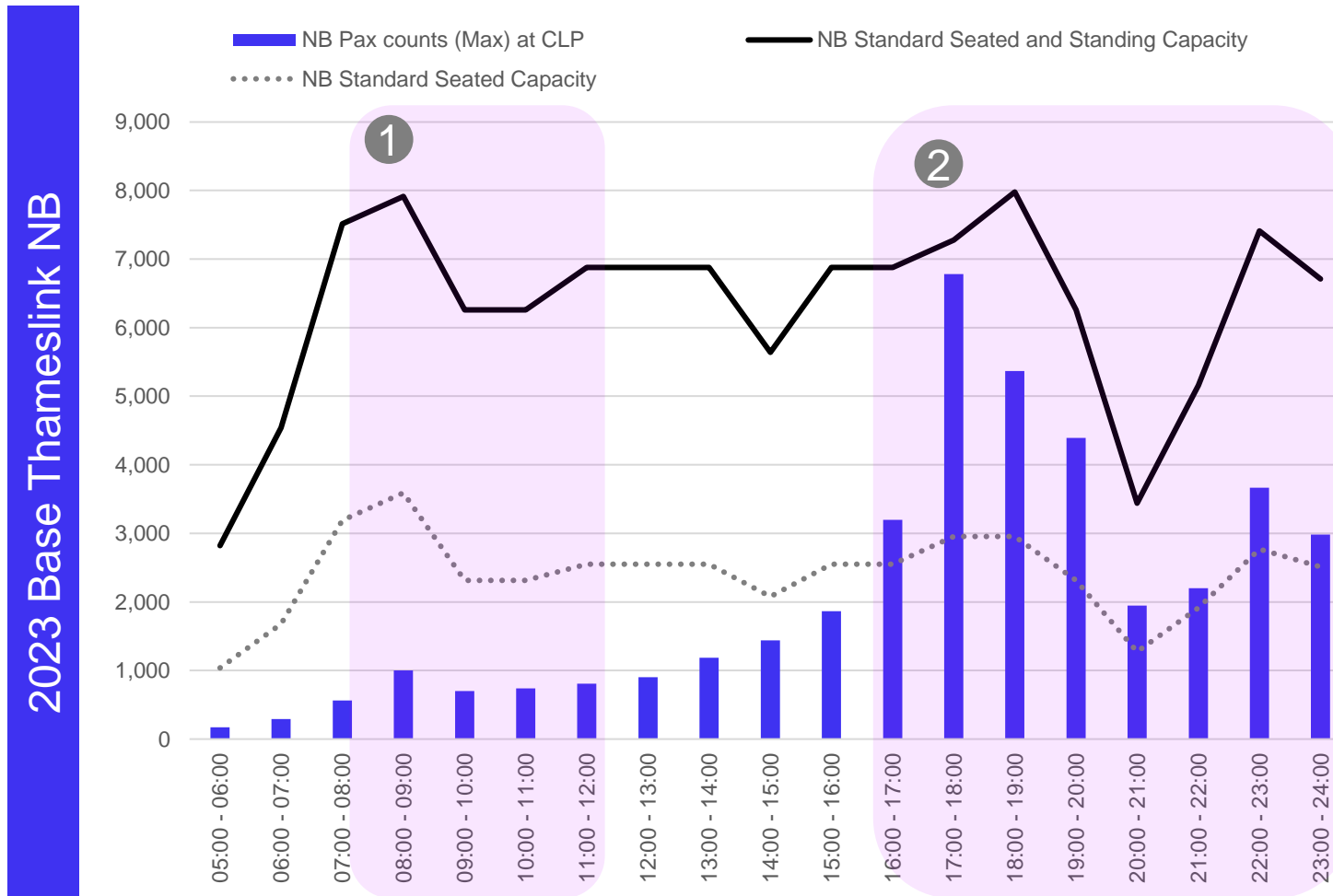
Promoter expects demand via Wixams to be contra-peak i.e. going against the typical peak flows on this route

- 1 94% of arrivals and departures from South
- 2 Demand to the park is concentrated within a fairly tight window in the AM peak to arrive when the park opens, with 72% of arrivals from both directions falling between 08:00-11:00
- 3 Demand returning in the evening peak is more dispersed over a 4–5-hour period with 87% of departures in both directions falling between 17:00 – 22:00
- 4 Demand profile indicates that services will need to be provided up to 23:00 to accommodate demand departing the site up to closing time



# Demand Analysis – Baseline (Thameslink)

# 2023 Base Weekday – Thameslink NB



## Spare capacity in the AM peak available for demand to the park

- This graph shows the maximum passenger counts at the critical load point (typically St Pancras) for Thameslink services
- Blue bars represent passenger counts by hour of day, the dotted line represents Standard Class Seated capacity, with the solid line representing the addition of standing capacity.
- All data is phased to reflect when the service will reach Wixams

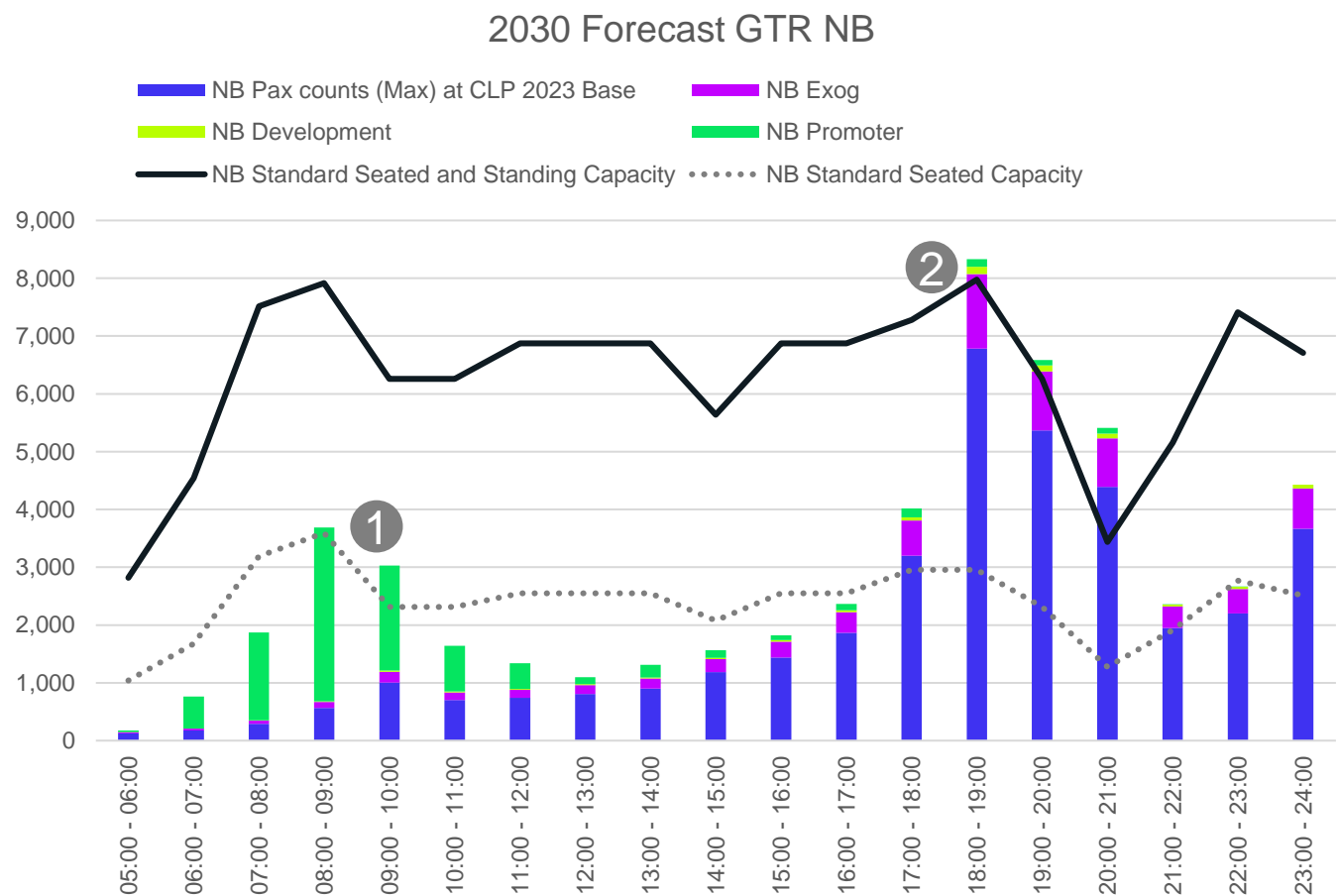
1 As per previous slide, the promoter expects 72% of demand in a North Bound direction to fall between 08:00-11:00, in which there is spare capacity to accommodate on Thameslink services

2 PM peak services exceed seated capacity, but large volume of standing capacity caters for the demand

- Therefore, with the expected profile of demand to the park there is a low risk of exacerbating crowding

# 2030 Forecast Weekday – Thameslink NB

2030 Forecast Thameslink NB



NB: Thameslink assumes off-peak is services arriving in London later than 10:00 and services leaving London after 19:01

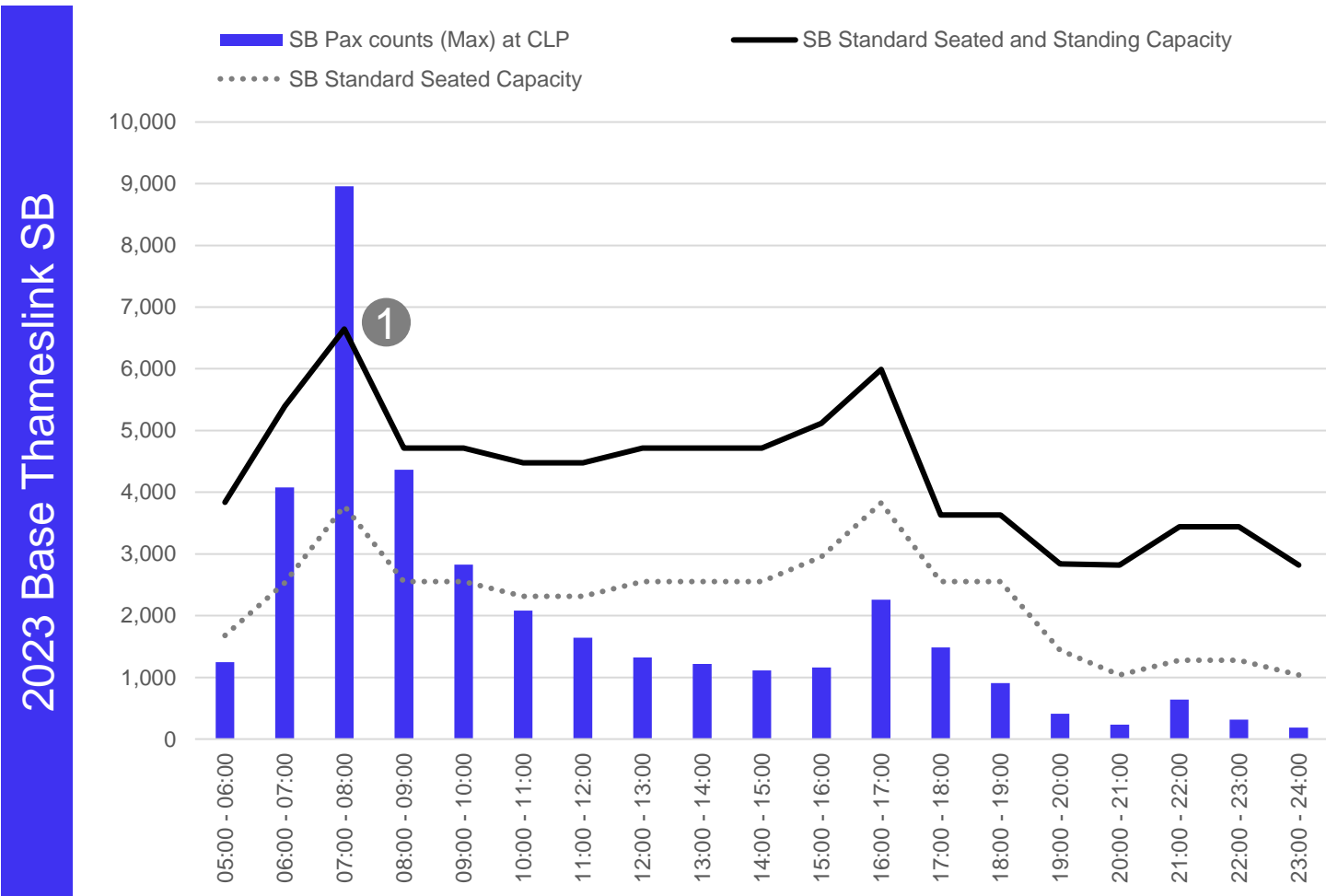
## Peak demand scenario can be accommodated in Do-Min scenario

- Exogenous growth, demand associated with Wixams village and expected demand to the park has been incrementally added
- Exogenous demand is broadly apportioned across services based on existing demand profile, assuming popular times to travel remain due to structural commuting patterns
- Capacity is assumed as per 2023 timetable

- 1 When adding demand for the park, seated capacity is slightly exceeded
- 1 In general capacity will meet the peak 08:00 – 09:00 demand as this scenario of 3,690 seats being required is a rare max special event
- 2 Standing capacity is exceeded in the PM peak but minimal impact from park traffic



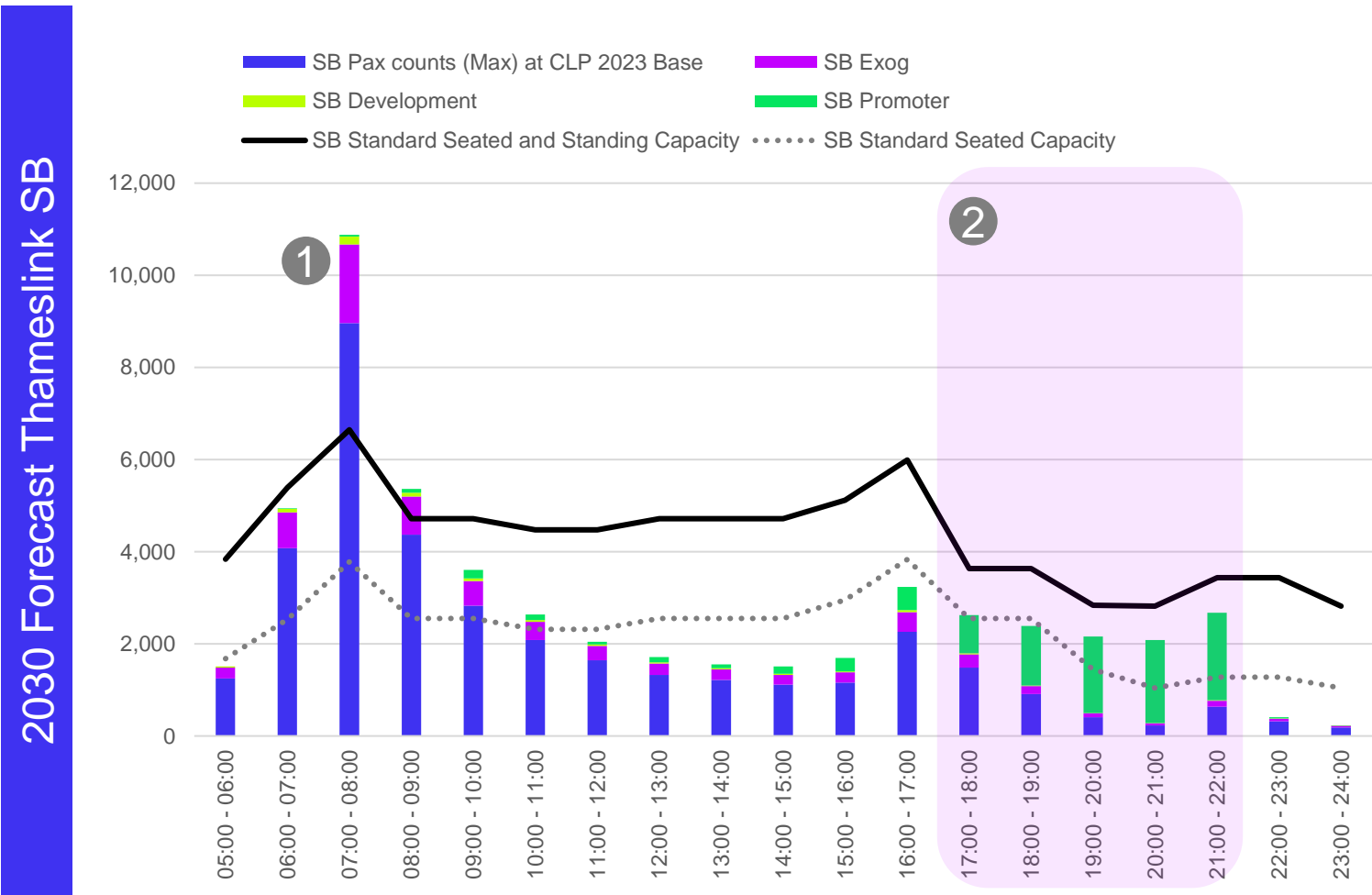
# 2023 Base Weekday – Thameslink SB



## Southbound services see the highest peak and exceed standing capacity

- 1 SB services peak 07:00 - 08:00 with a max passenger count of 10,876 and 6,643 standard seating and standing capacity available at the Critical load Point
  - Assume operator manages this demand as best they can
  - We expect the bulk of incremental demand in a southbound direction to be between 17:00 – 22:00 as customers leave the park, so we would not expect to exacerbate this crowding issue

# 2030 Forecast Weekday – Thameslink SB



## Demand for park in SB direction can be accommodated on Thameslink

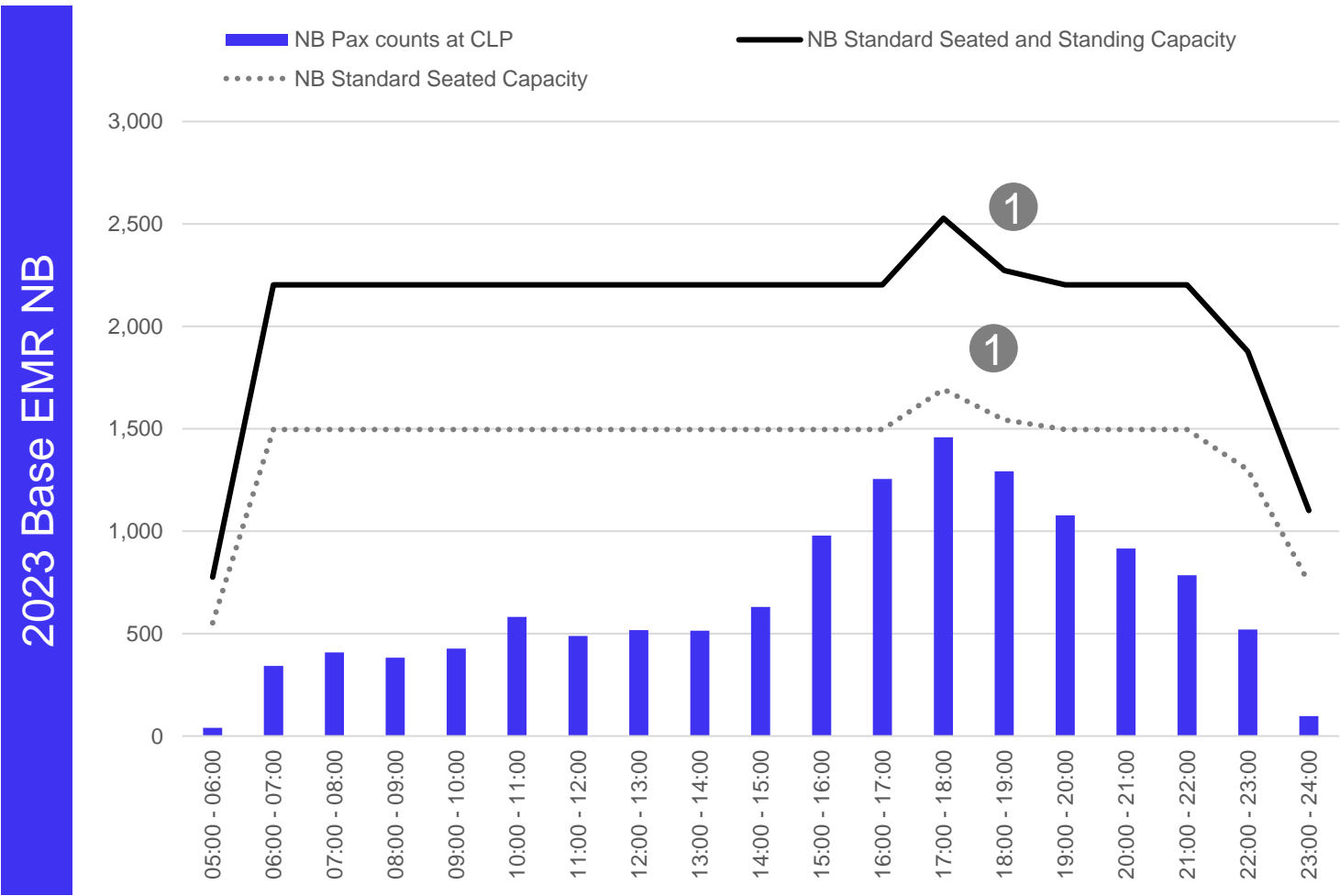
- 1 Exogenous spread proportionally and capacity assumed as at 2023 - exacerbates existing crowding in AM peak
- 2 Demand for park broadly within 17:00 – 22:00 period, all accommodated within standing capacity
- 2 Additional GTR services can be operated in the evening. GTR drops to 2tph in the evening, so extending the operation of 4tph post 7pm should be sufficient to meet high-peak demand requirements. This could be flexed as required depending on seasonal demand requirements.



# Demand Analysis – EMR Scenario



# 2023 Base Weekday – EMR NB



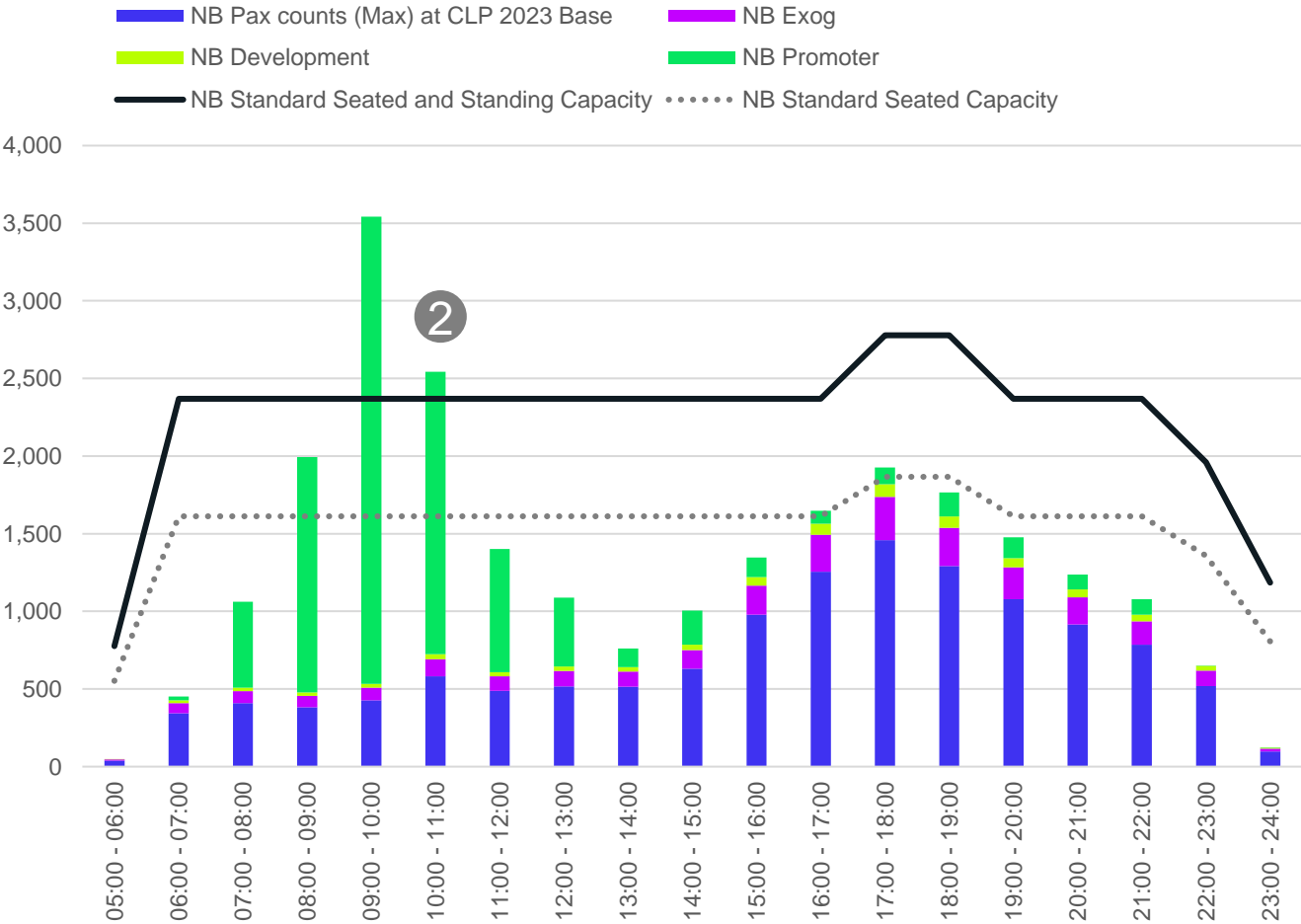
## Capacity available in AM when demand is expected for park

- As with Thameslink we have used the Green Book Data for EMR (Dec-23)
  - Current demand is accommodated on services all getting a seat
- 1 Strengthened 222 adds extra capacity



# 2030 Forecast Weekday – EMR NB

2030 Forecast EMR NB



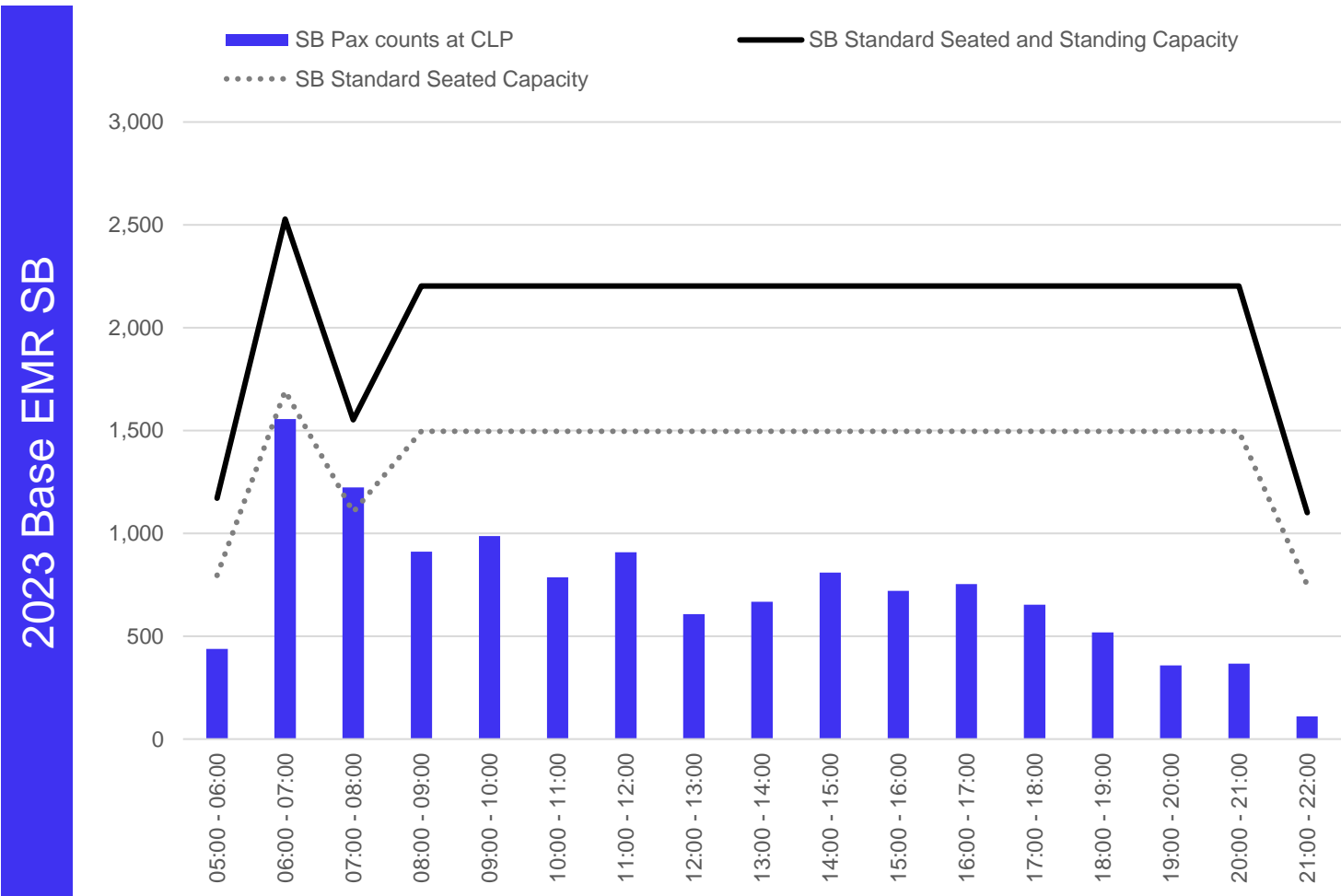
## Demand from park significantly exceeds capacity on EMR services

- Assume full development and promoter demand travels on EMR services only (i.e. Thameslink services do not call at Wixams)
- 1 EMR 222 fleet replaced by new 810 rolling stock on intercity routes
- 1 360 fleet operates the connect services
- 2 Due to the clustered nature of NB demand to the park, the bulk of demand cannot be accommodated on EMR without strengthening

1	Class of vehicle/unit	# of Vehicles in unit	Standard Seats	Standing	Standard + Standing
	222 - intercity service	5	196	129	325
	222 - intercity service	7	244	151	395
	810 - intercity service	5	254	155	409
	360 - connect service	4	203	137	340



# 2023 Base Weekday – EMR SB



## Capacity available PM when demand for the park can be expected

- EMR accommodates all demand today with its standing capacity however not all patrons get a seat in the AM peak
- As we expect incremental demand from the park in the PM this should not exacerbate the issue

## 2030 Forecast EMR SB



- Assume full development and promoter demand travels on EMR services
  - EMR 222 fleet replaced by new 810 rolling stock on intercity routes
  - 360 fleet operates the Corby connect services
- 1 Demand for the park exceeds capacity without strengthening

# Demand Analysis – Combined GTR & EMR 2050 Demand Scenario

# Promoter Demand Profile 2050 – ‘Base Profile’

Base scenario	Time	Arrivals Wixams from the South	Arrivals at Wixams from the North	Departures at Wixams to the South	Departures at Wixams to the North
	06:00 - 07:00	28	4	10	1
	07:00 - 08:00	987	30	10	1
	08:00 - 09:00	2,742	78	0	0
	09:00 - 10:00	5,404	195	0	0
	10:00 - 11:00	3,267	117	8	1
	11:00 - 12:00	1,440	42	22	3
	12:00 - 13:00	723	47	141	3
	13:00 - 14:00	260	3	154	5
	14:00 - 15:00	490	3	304	8
	15:00 - 16:00	251	2	503	18
	16:00 - 17:00	124	1	863	33
	17:00 - 18:00	119	0	351	61
	18:00 - 19:00	119	0	2,049	106
	19:00 - 20:00	10	1	2,841	124
	20:00 - 21:00	11	1	3,561	83
	21:00 - 22:00	10	1	3,995	71
	22:00 - 23:00	0	0	30	4
	23:00 - 24:00	0	0	7	1
	Total	15,984	525	15,849	523

Promoter expects arrivals to increase by 78% in the peak 2050 scenario, but demand via Wixams remains contra-peak i.e. going against the typical peak flows on this route

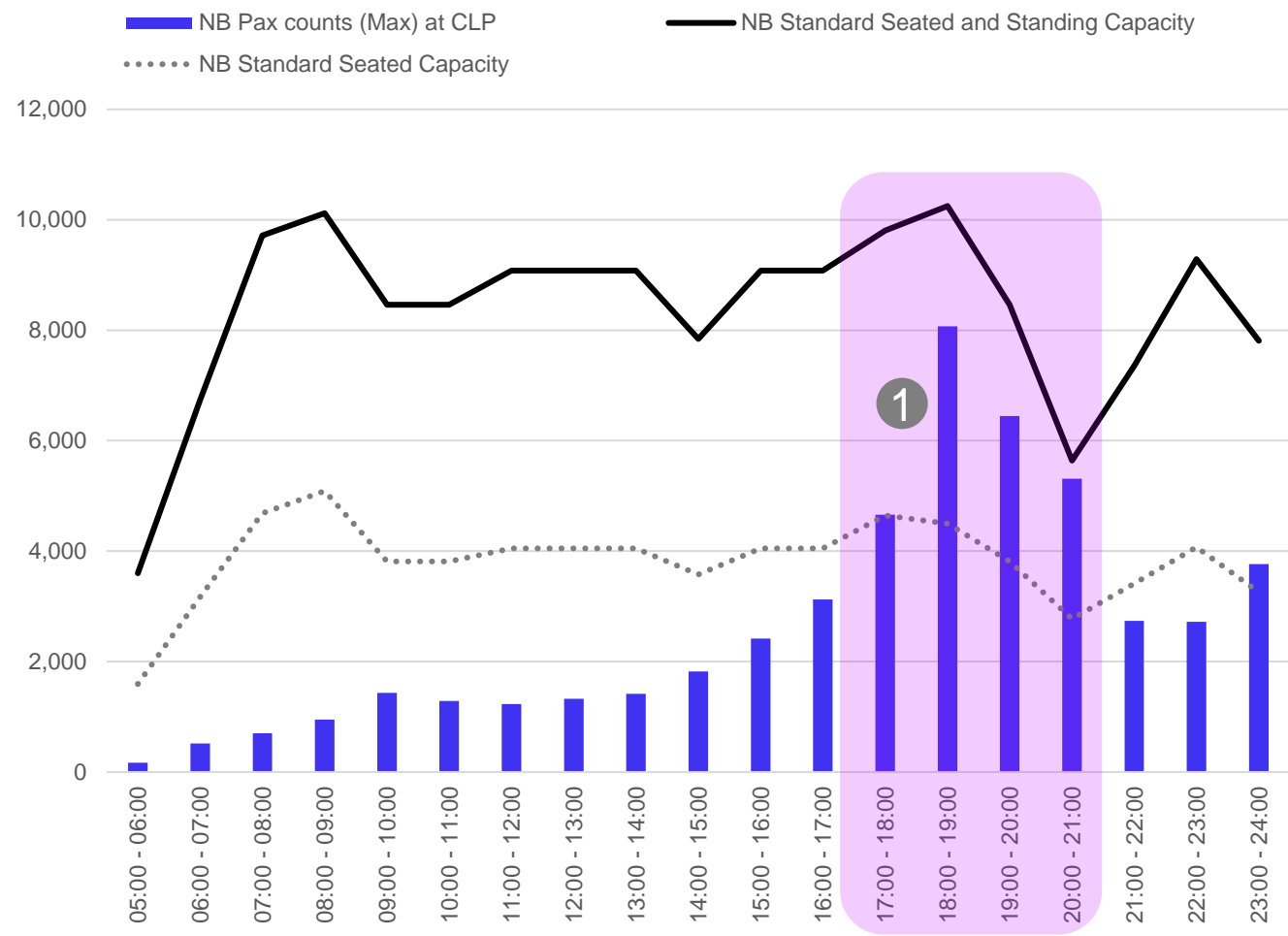
- Overall traffic to/from the North has decreased -3%, while to/from the South increases 83%

- 97% of arrivals and departures from South (previously 94%)
- Demand to the park remains concentrated within a tight window in the AM peak to arrive when the park opens, with 71% (72% previously) of arrivals from both directions falling between 08:00-11:00
- Demand returning in the evening peak is more dispersed over a 4–5-hour period with 87% (same as before) of departures in both directions falling between 17:00 – 22:00
- Demand profile indicates that services will need to be provided up to 23:00 to accommodate demand departing the site up to closing time



# 2023 Base Weekday – GTR + EMR NB

2023 Base GTR + EMR NB



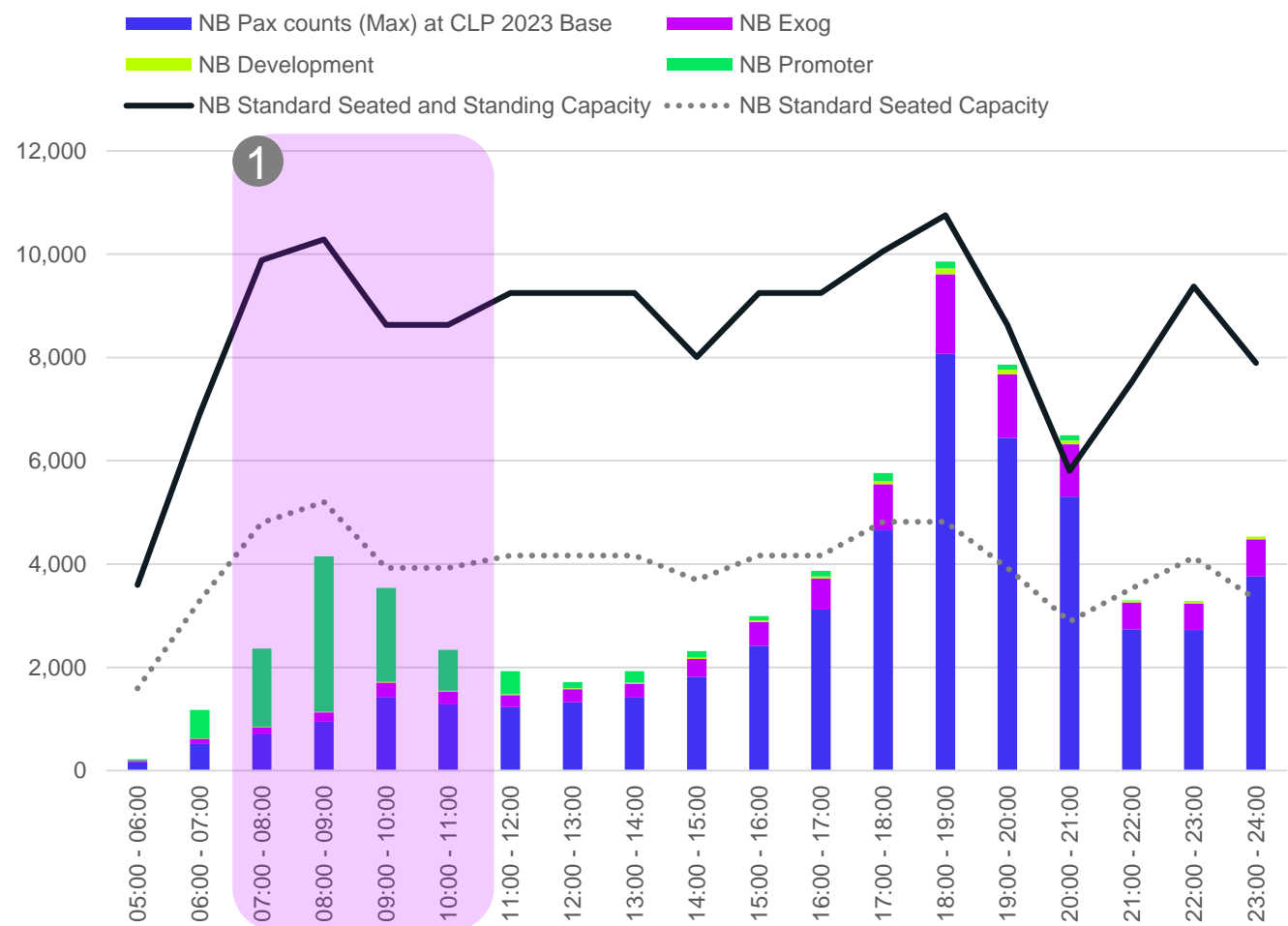
**Demand can be accommodated within standing capacity across the day**

- 1 Demand exceeds seated capacity PM peak
  - As with above disaggregated scenarios - the service pattern broadly assumes with some slight variations:
    - 2 EMR Long Distance High Speed (STP<>NOT)
    - 2 EMR Corby Connect services
    - 4 Thameslink services



# 2030 Forecast Weekday – GTR + EMR NB

2030 Forecast GTR + EMR NB

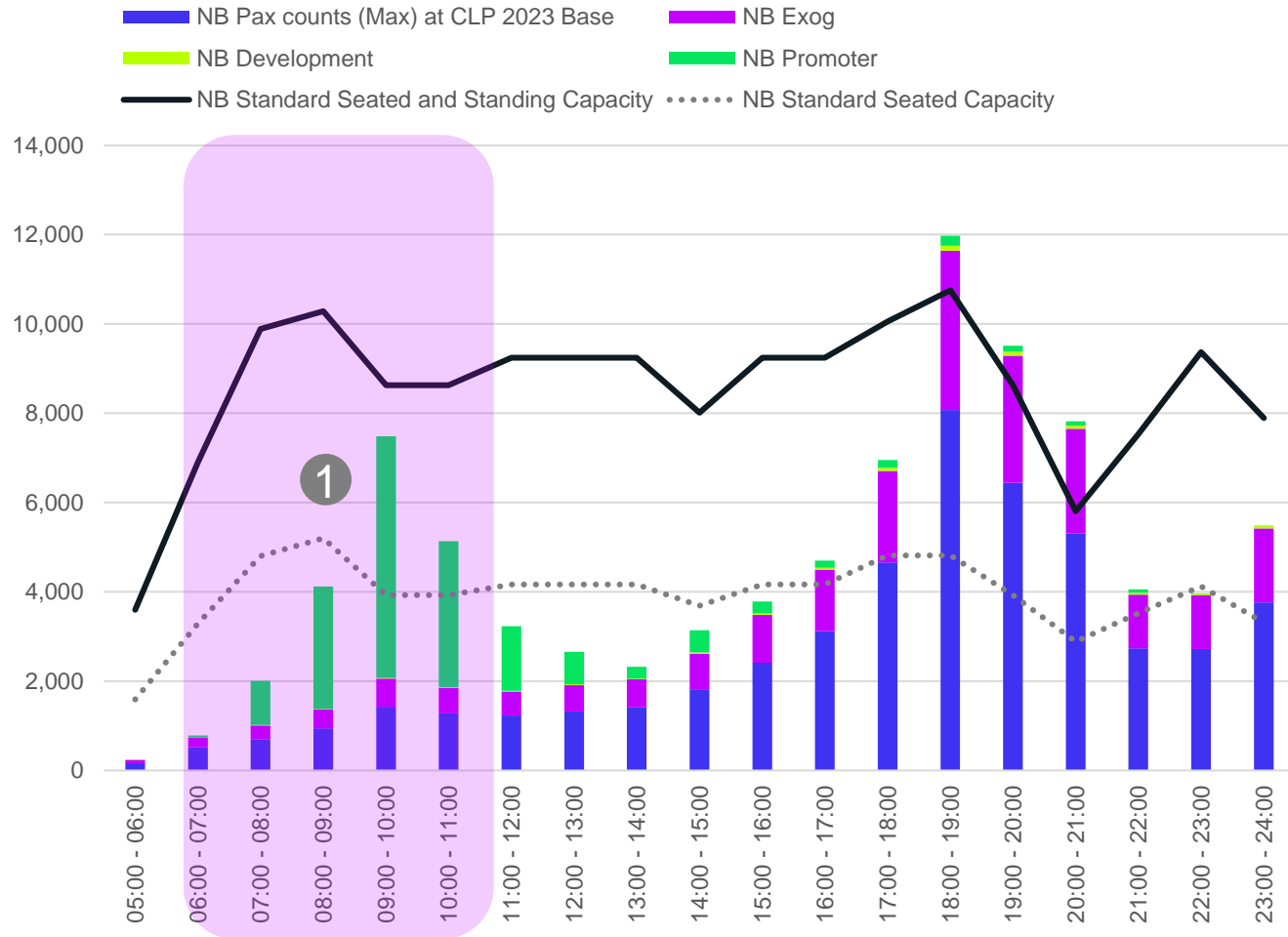


**2030 ‘high’ AM peak demand can be accommodated well within existing seated capacity when combined across both GTR and EMR services.**

- Assumes full development and promoter demand travels on GTR and EMR services
- EMR 222 fleet replaced by new 810 rolling stock on intercity routes
- 1 EMR 360 fleet operates the connect services
- Demand arriving at the park is deliverable within combined seated capacity in the AM peak

# 2050 Forecast Weekday – GTR + EMR NB

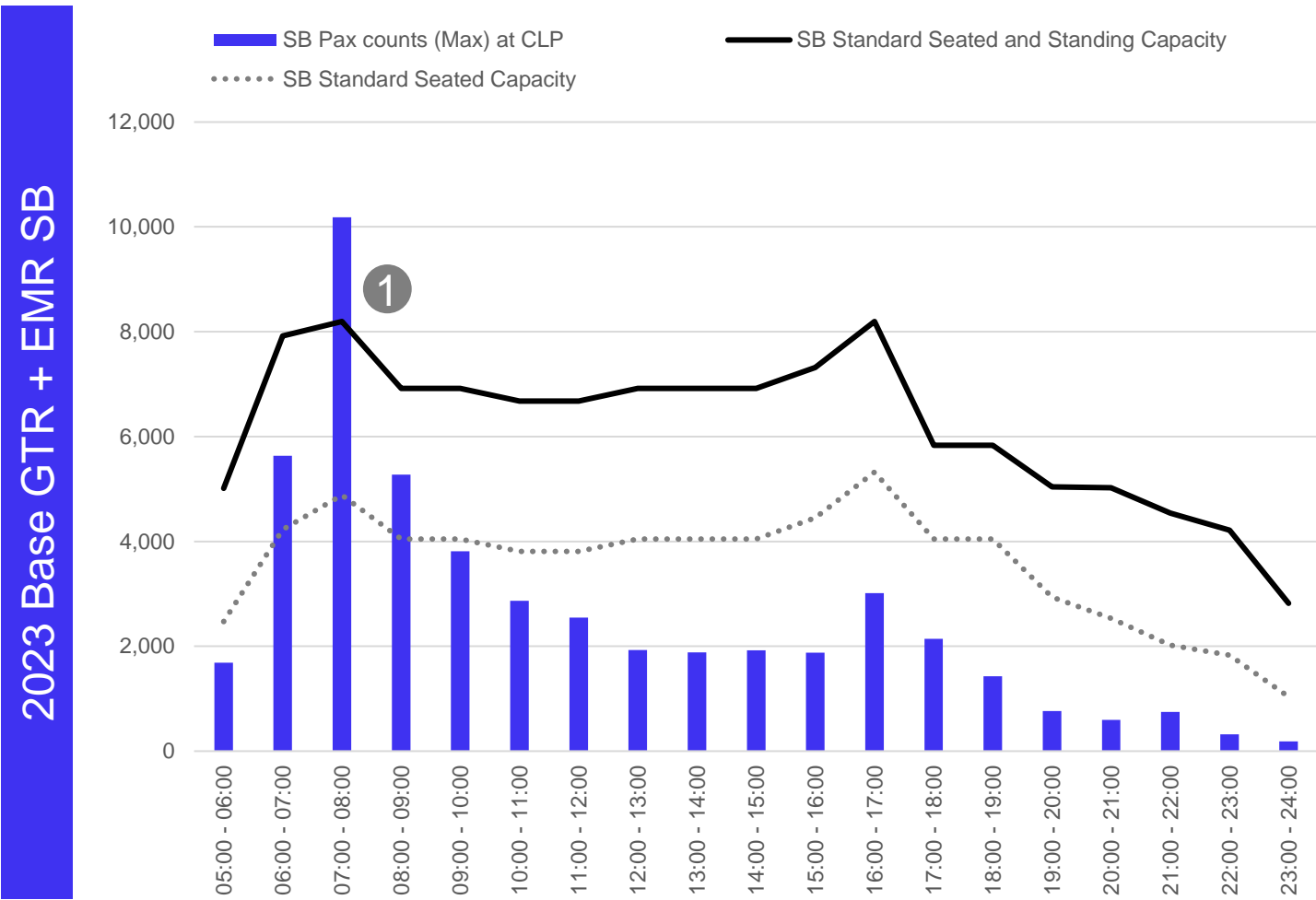
## 2050 Forecast GTR + EMR NB



**Demand to park broadly deliverable but some passengers would be required to stand**

- Projected passenger volumes in 2050 exceeds combined seated capacity but does not exceed total capacity. A substantial number of passengers would be required to stand for the full extent of their journey which would breach PiXC standards.
  - Capacity assumed at current levels with EMR CI.810s replacing CI.222s, i.e. service pattern broadly assumes per hour with some slight variations:
    - 2 EMR Long Distance High Speed
    - 2 EMR Corby Connect services
    - 4 Thameslink services
  - The analysis indicates that c.2,300 additional seats would be required to ensure that all passengers had a seat.
  - Under a 'typical' demand scenario (20% less demand), additional seating capacity would be required (c.1,500 seats).
  - Potential mitigations could include calling additional EMR services (i.e. STP<>SHF) at Wixams but would need to verify whether this is operationally feasible. This would provide around 500 extra seats, but there would still be a significant shortfall. By 2050, both the CI.360 and TL fleets will have been replaced (TL likely reaching life-expiry) so future demand requirements should be considered in the rolling stock specification.

# 2023 Base Weekday – GTR + EMR SB



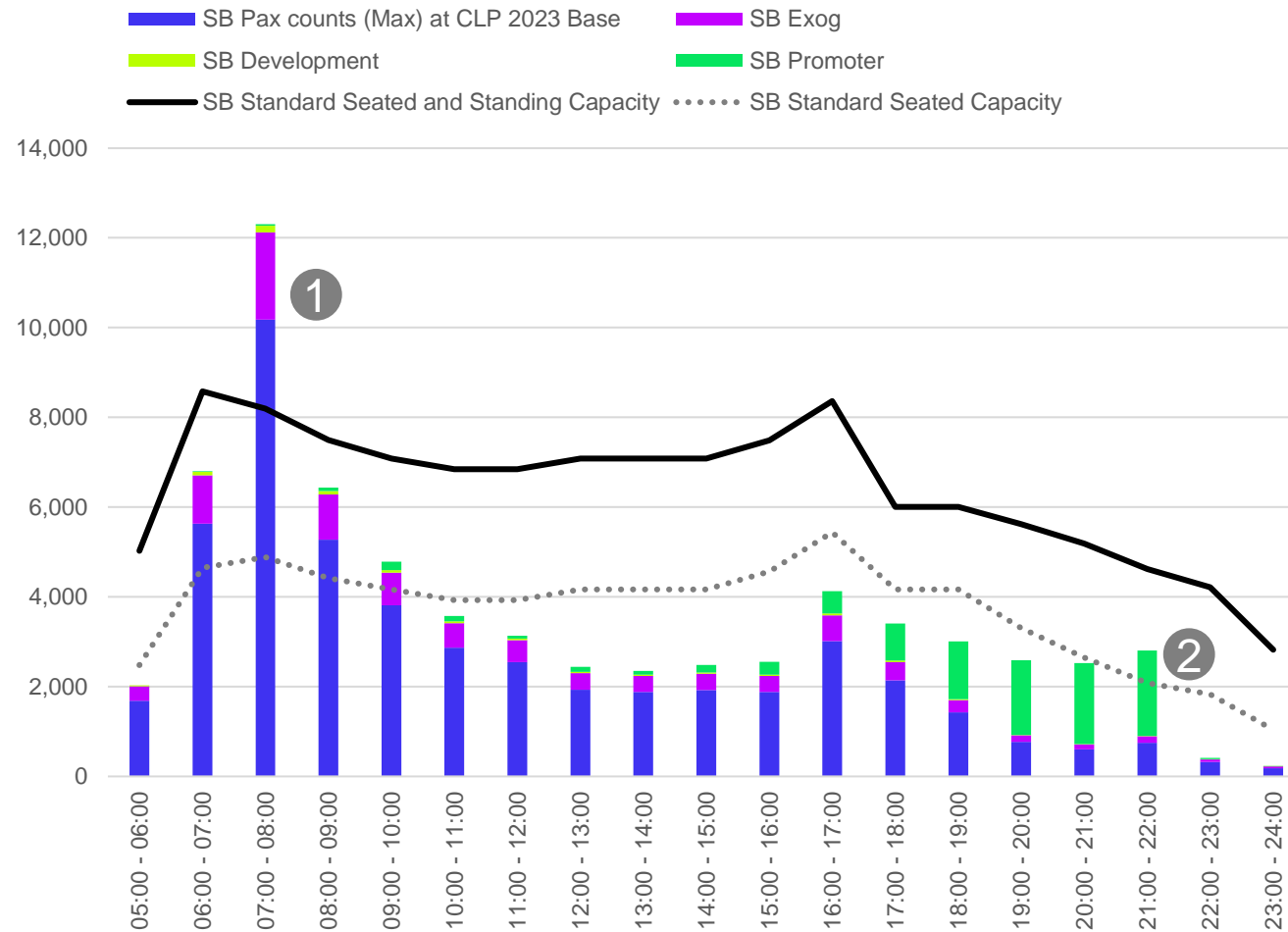
## Southbound services see the highest peak & exceed capacity in AM

- 1 Demand exceeds standing capacity AM peak
  - As with above disaggregated scenarios - the service pattern broadly assumes per hour during the peak with some slight variations:
    - 2 EMR Long Distance High Speed
    - 2 EMR Connect services
    - 4 Thameslink services



# 2030 Forecast Weekday – GTR + EMR SB

2030 Forecast GTR + EMR SB

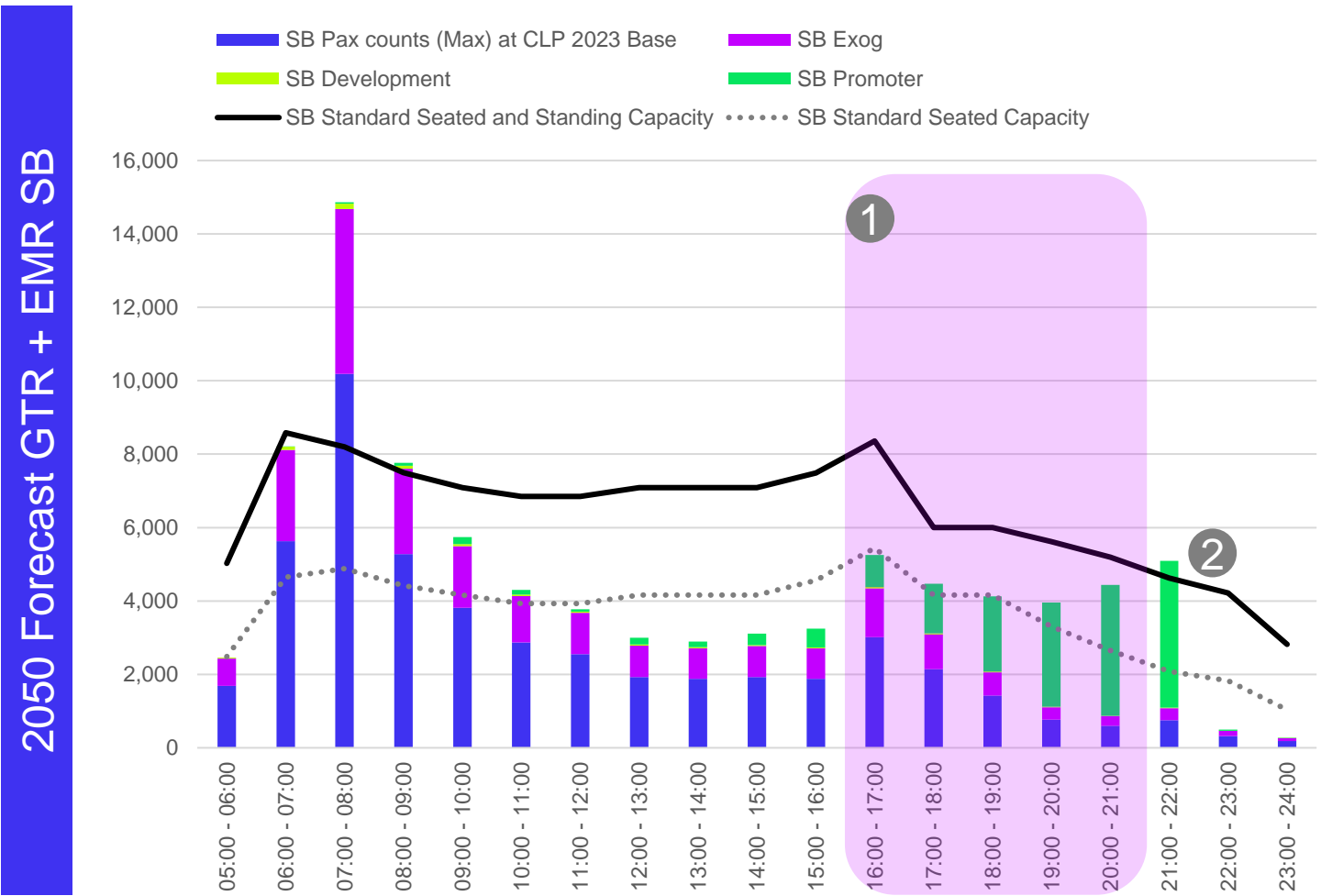


## Demand from park deliverable within standing capacity

- Assume full development and promoter demand travels on all services
- EMR 222 fleet replaced by new 810 rolling stock on intercity routes
- EMR 360 fleet operates the connect services

- Exogenous growth exacerbates existing crowding issue in AM peak
- Demand derived from park is deliverable within total available capacity but would require some passengers to stand.
  - As noted previously, there is the flexibility to operate additional GTR services in the evening (GTR service pattern drops to 2tph in the evening). Running an additional service would mitigate the standing issue. This could be operated as required (seasonal demand variations mean that this may not need to run all year round).

# 2050 Forecast Weekday – GTR + EMR SB



## Demand from park exceeds capacity slightly in PM without strengthening

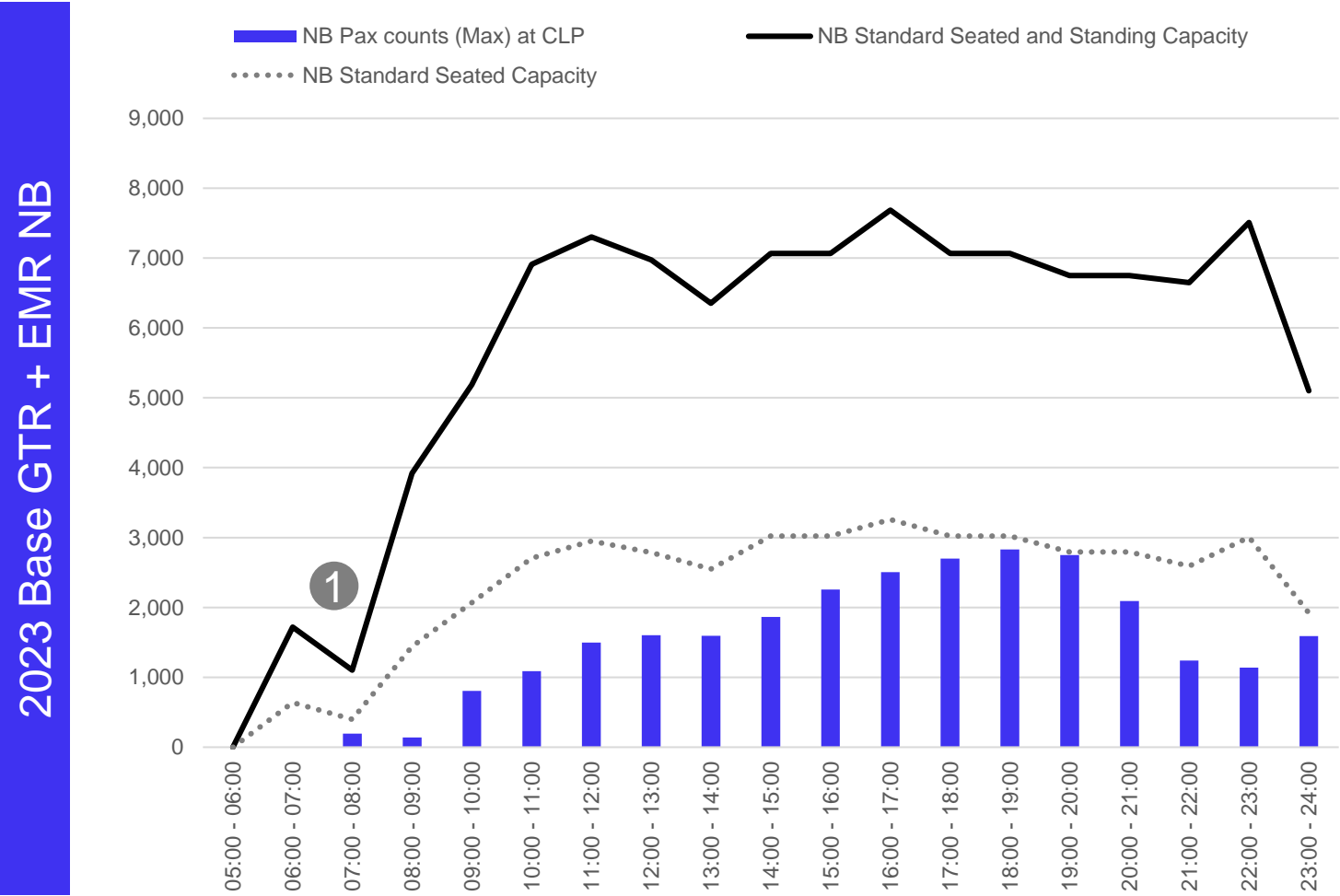
- 1 Demand for park at 2050 levels broadly deliverable, although passengers in the late evening would be required to stand based on current timetable specification.
- As with previous scenarios we assume full development and promoter demand travels on all services
  - Extending operation of 4tph GTR services beyond 7pm would mitigate most of the crowding issues. Potential for calling additional EMR services could offset the remaining excess demand and mitigate the shortfall in seats.

2



# Demand Analysis – Sunday GTR & EMR to 2050

# 2023 Base Sunday – GTR + EMR NB

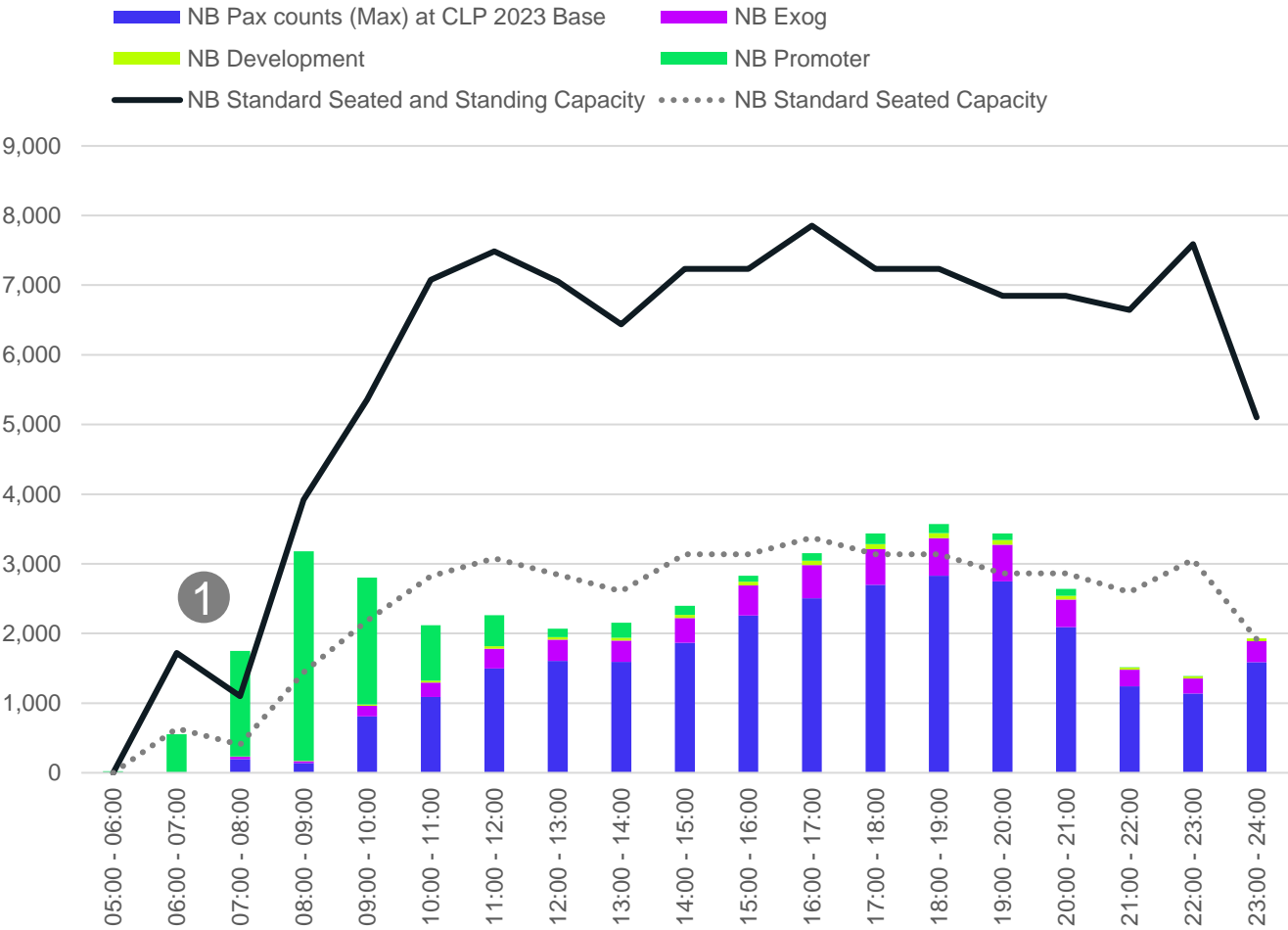


## Sunday service level significantly below weekday but demand all seated

- Lower demand is accommodated throughout the day – all with seats
- 1 Sunday engineering access requirements mean services cannot start to call at Wixams until later in the day

# 2030 Forecast Sunday – GTR + EMR NB

2030 Forecast GTR + EMR NB



## Demand to park exceeds capacity on current timetable in AM

- 1 With the reduced timetable and delayed calling at Wixams demand for the park exceeds capacity in AM but is broadly deliverable
- Assumes full development and promoter demand travels on GTR and EMR services
  - EMR 222 fleet replaced by new 810 rolling stock on intercity routes
  - EMR 360 fleet operates the connect services



# 2050 Forecast Sunday – GTR + EMR NB

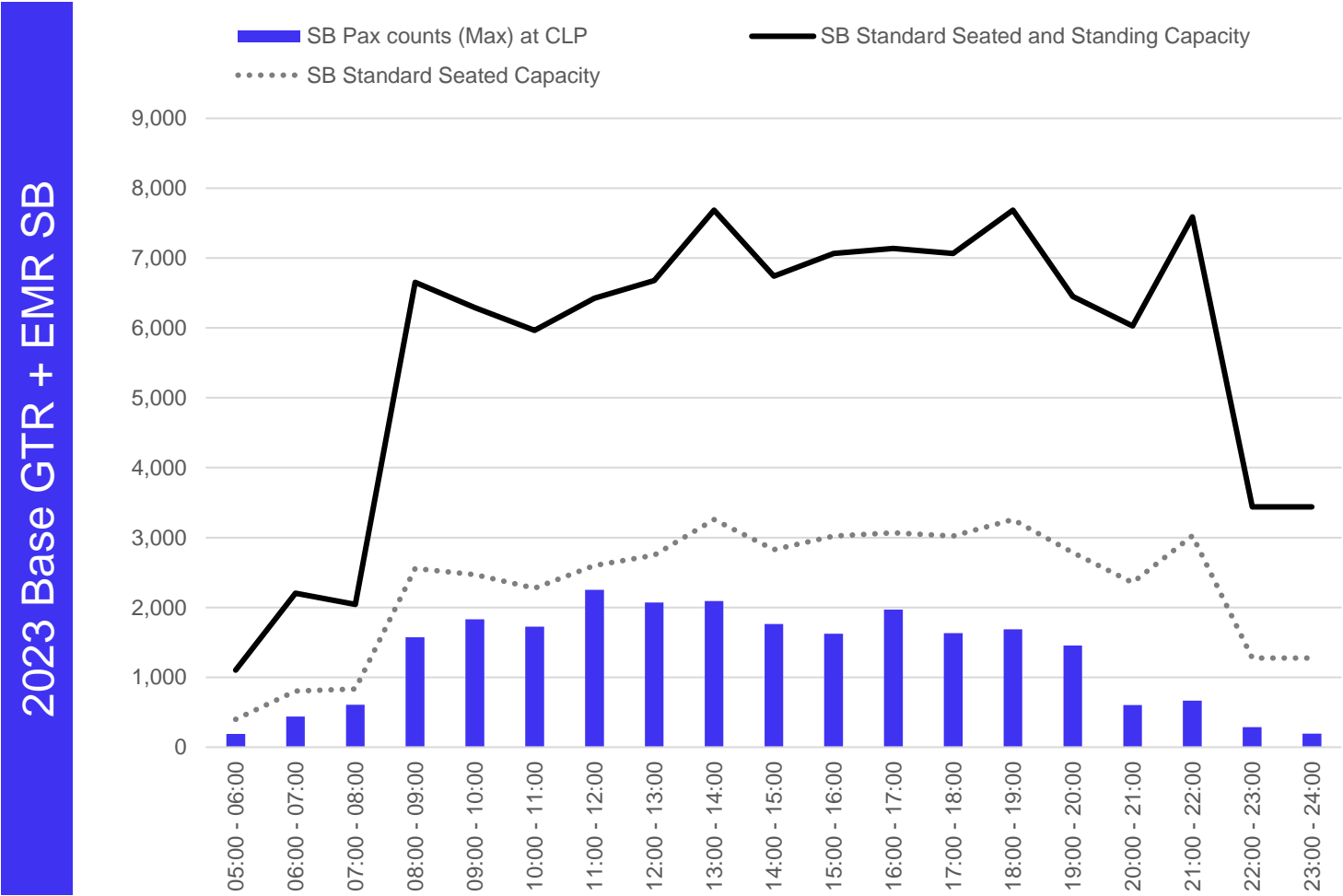
2050 Forecast GTR + EMR NB



## Demand to park exceeds capacity on current timetable in AM

- 1 With the reduced timetable, demand for the park exceeds capacity in AM but is broadly deliverable
  - Assumes full development and promoter demand travels on GTR and EMR services
  - EMR 222 fleet replaced by new 810 rolling stock on intercity routes
  - EMR 360 fleet operates the connect services

# 2023 Base Sunday – GTR + EMR SB



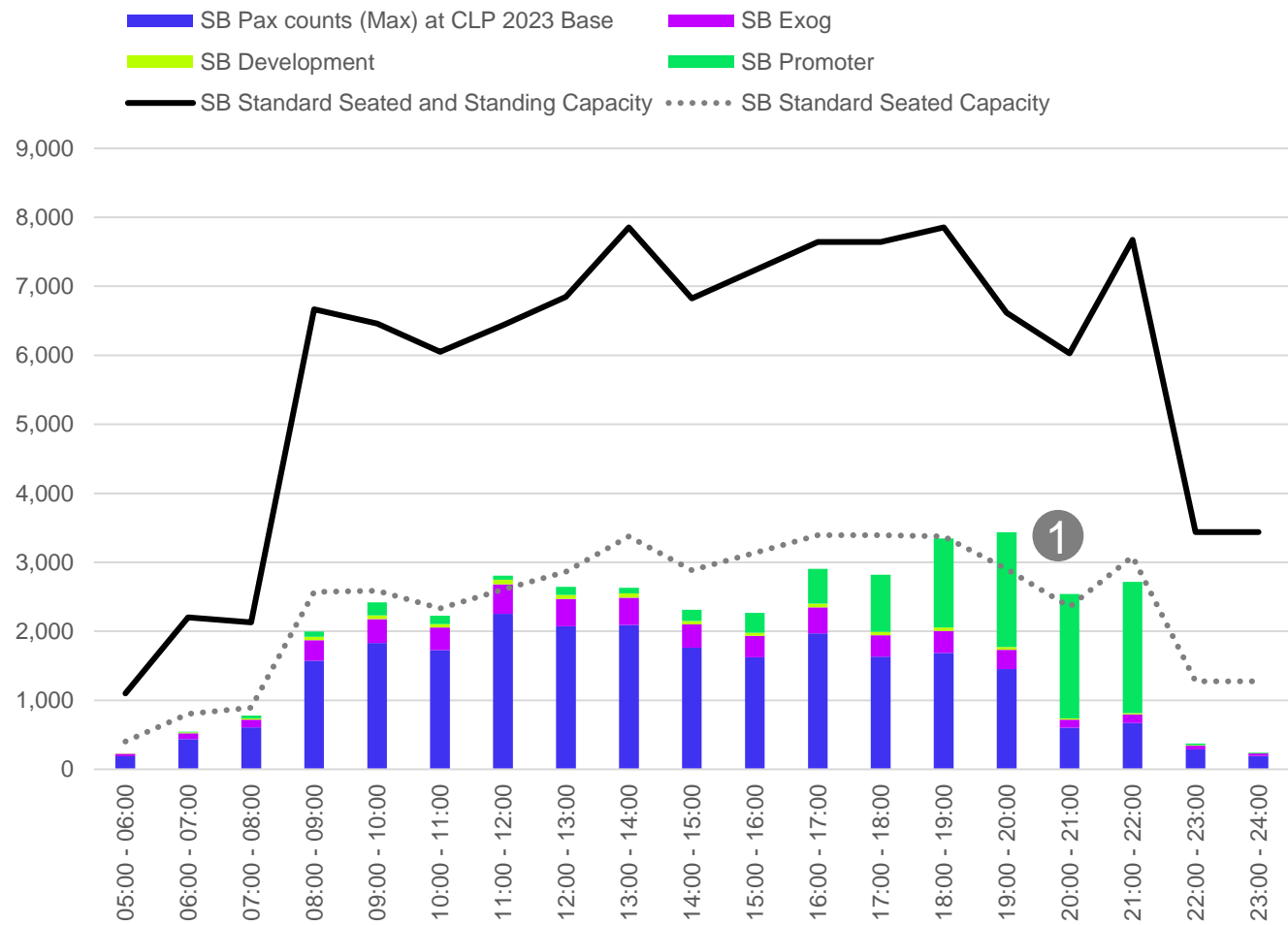
## Sunday service level below weekday but demand all seated

- Lower demand is accommodated throughout the day – all with seats
- Sunday engineering means services cannot start to call at Wixams until later in the day



# 2030 Forecast Sunday – GTR + EMR SB

2030 Forecast GTR + EMR SB



## Demand for park deliverable within standing capacity

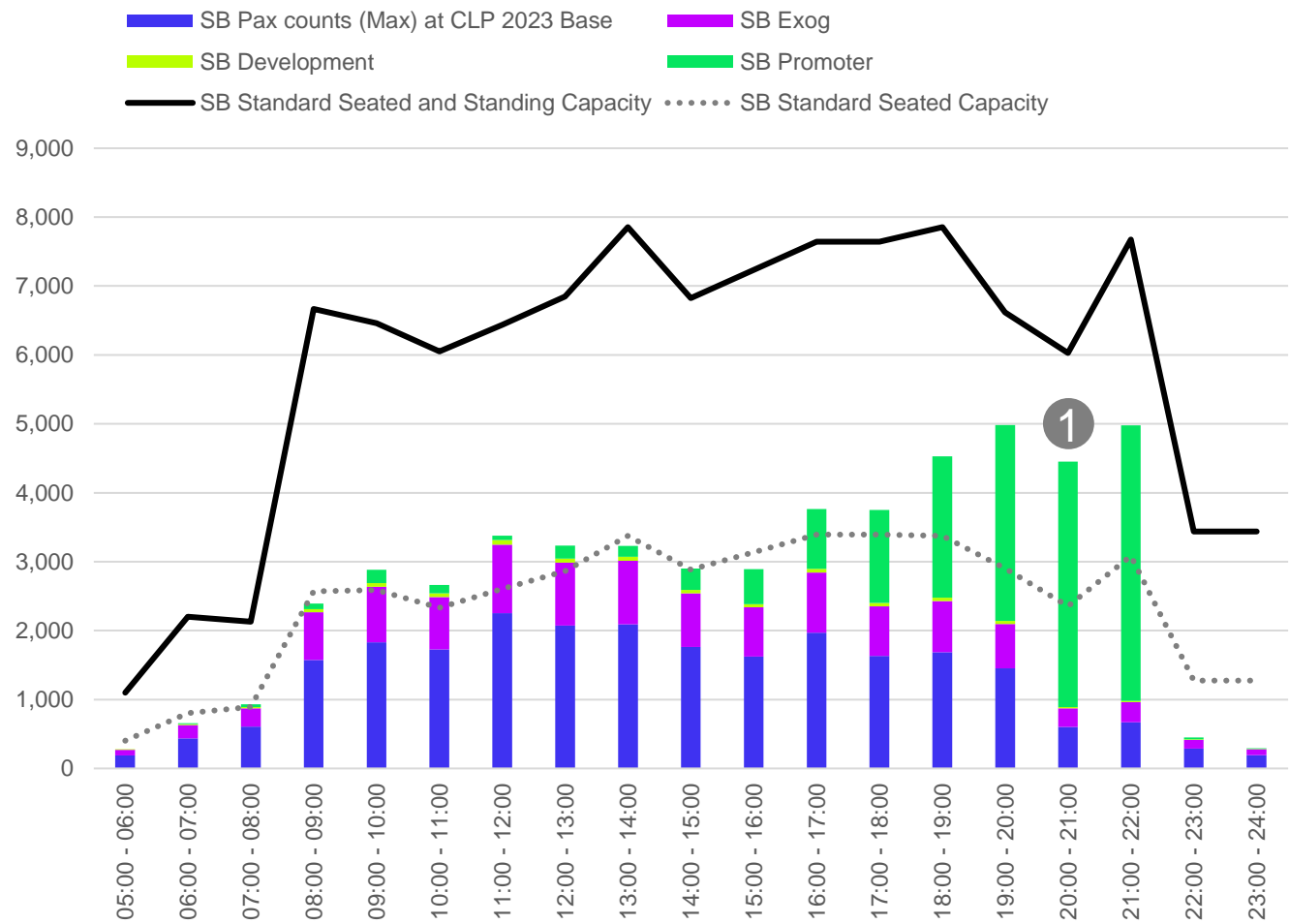
- Assume full development and promoter demand travels on EMR services
- EMR 222 fleet replaced by new 810 rolling stock on intercity routes
- 360 fleet operates the connect services

1 Demand for the park exceeds seated capacity without strengthening



# 2050 Forecast Sunday – GTR + EMR SB

2050 Forecast GTR + EMR NB



## Demand for park continues to be deliverable within standing capacity

- Assume full development and promoter demand travels on EMR services
- EMR 222 fleet replaced by new 810 rolling stock on intercity routes
- 360 fleet operates the connect services

1 Demand for the park exceeds seated capacity without strengthening





# Summary & Conclusions

# Summary of Timetable Findings

Timetable Period	Operator	Are service conflict free?	Can services meet their turnaround times	Do they meet journey time aspirations	Timetable commentary
Monday – Friday	Thameslink	Services can be timetabled to be conflict free	Yes, unless extended dwells are required to cope with crowds	No, services are above 45 minutes, and are on average around 55 minutes	
	EMR	EMR services require other services to be flexed	Yes at Corby, but unknown at Nottingham and Sheffield	No, but journey time is close to aspiration	Introduces trade offs to LDHS journey times
Saturday	Thameslink	Services can be timetabled to be conflict free	Yes, unless extended dwells are required to cope with crowds	No, services are above 45 minutes, and are on average around 55 minutes	
	EMR	EMR services require other services to be flexed	Yes at Corby, but unknown at Nottingham and Sheffield	No, but journey time is close to aspiration	Introduces trade offs to LDHS journey times
Sunday	Thameslink	Services can be timetabled to be conflict free	Yes, unless extended dwells are required to cope with crowds	No, services are above 45 minutes, and are on average around 55 minutes	
	EMR	EMR services require other services to be flexed	Yes at Corby, but unknown at Nottingham and Sheffield	No, but journey time is close to aspiration	Introduces trade offs to LDHS journey times

# Summary of Demand Analysis Findings

- In general, the weekday contra-peak nature of demand to the theme park would prove beneficial to an underutilised timetable offering and generate additional revenue for the railway.
- AM 'high-peak' demand in 2030 can be wholly accommodated on GTR services with minimal standing required, meaning that as a minimum existing GTR capacity can meet capacity requirements for theme park-related demand. On a 'typical' day, with c.20% less demand, all park patrons should be able to have a seat (meeting the promoter's aspiration). In the evening, there is an opportunity to flexibly extend the current off-peak 4tph GTR service pattern to meet late-evening demand requirements (current GTR service pattern drops to 2tph post-19.00).
- EMR services do not provide sufficient capacity for Wixams to be served by EMR services only. With the theme park, demand would materially exceed total capacity.
- Calling both East Midlands Railway (EMR) and GTR services at Wixams in 2030 would meet the promoter's aspirations for both headline journey times and seats. It would also help to relieve the pressure on GTR services (the analysis indicates that in a GTR only scenario all seats would be fully occupied). Demand management would be required to ensure loadings were balanced across all services, particularly on high demand days.
- The impacts on long-distance passengers on EMR services could be mitigated by calling northbound EMR services at Wixams in the AM peak only (up to 11.00) and inserting additional calls into southbound EMR services post-19.00 in the evening to meet the promoter's journey time aspirations. This would minimise the number of long-distance passengers impacted by the additional time added to services calling at Wixams. The demand profile for visitors to the park indicates little justification for calls to be provided all-day (in both directions) as, for example, arrivals demand drops off after 11am in the morning. Conversely, rail demand from visitors leaving the park does not start to ramp-up until after 17.00 in the afternoon.

# Summary of Demand Analysis Findings

- In 2050 combined seating capacity would be exceeded, although all passengers could be accommodated but would require a large number of passengers to stand for the full journey between London and Wixams.
- Between c.1,500-2,300 additional seats would be required to meet the promoter's seating aspiration. More significant strengthening and demand management collaboration with the park operator [to spread demand more evenly across services] would therefore need to be considered to ensure all passengers getting a seat on their journey.
- Potential mitigations could include calling additional EMR services (i.e. STP<>SHF) at Wixams but would need to verify whether this is operationally feasible. This would provide around 500 extra seats, but there would still be a significant shortfall. Future demand requirements should be considered within the capacity specification for future fleet replacement programmes for the Cl.360s and Thameslink fleets at the appropriate time.
- Current engineering access requirements present a particular challenge for meeting demand requirements on **Sunday mornings**. The demand analysis has identified a significant capacity shortfall due to the reduced service on a Sunday morning, with only two GTR services operating per direction in this time-period. No EMR services operate at this time.
- There is timetable capacity to include up to 4 Thameslink services during the morning period where fewer trains run on a Sunday. This would meet the demand requirements **in 2030** but would not meet the journey time aspirations at the start of the day. Meeting the capacity shortfall **in 2050** will be a significant challenge given the additional weekday requirements noted above, and the restriction on the number of services that can be operated on Sunday mornings currently.