

Oxford Corridor Capacity Improvement - Phase 2 Outline Business Case Strategic Case

31/07/2020

THE STRATEGIC CASE

Strategic case introduction

The purpose of this Strategic Case is to make a robust case for change and to demonstrate how rail infrastructure enhancements proposed in Oxfordshire provides a strategic fit with the wider portfolio. It will demonstrate why this scheme, which will provide an additional platform and station entrance at Oxford, highways improvements, and additional capacity north of Oxford, is needed now. It will set out the maturity of the scheme and the development work that has been completed to date in order to ensure that this intervention is appropriate and proportionate to address the problems identified.

To provide the reader with clarity on how this will be achieved the Strategic Case is structured into the following sections:

1. Strategic Context for the Scheme
2. Problem Statement
3. Options
4. The Preferred Option
5. Benefits to passengers and customers

Section 1. Strategic Context

1.1. The Oxford – Cambridge arc

Oxfordshire anchors the west of the Oxford–Cambridge Arc ('the Arc'), an area that also incorporates the counties of Buckinghamshire, Northamptonshire, Bedfordshire, and Cambridgeshire. A map of the Arc is at Figure 1. As a whole, it forms an area of 3.7 million people with a 21st century economy rich in high value engineering, science, technology, and research which generates £111bn Gross Value Added (GVA) per year.¹ Government has recognised that by building upon existing strengths in different parts of the Arc, there is the long-term potential to transform a set of overlapping labour markets with their own technology and business clusters into a world-leading economic area.² Government has therefore designated it as a key economic priority and identified that to support this vision there is a demand to deliver significantly more housing throughout the whole area. In its 2017 report 'Partnering for Prosperity: a new deal for the Cambridge-Milton Keynes-Oxford Arc', the National Infrastructure Commission (NIC) identified a need for one million additional homes in the Arc by 2050, supported by the provision of new infrastructure in advance of the creation of new communities to improve connectivity across the

¹ The Oxford-Cambridge Arc: government ambition and joint declaration between government and local partners <https://www.gov.uk/government/publications/the-oxford-cambridge-arc-government-ambition-and-joint-declaration-between-government-and-local-partners>, March 2019, p 9

² The Oxford-Cambridge Arc, p 7

Arc.³ There is also a recognition that it will be crucial to improve rather than degrade the environment alongside the proposals, to ensure that the new homes meet the Government's commitment to provide places people want to live.⁴ The Arc is at an existing advantage in that regard, containing as it does 10 world-leading universities, Blenheim Palace World Heritage Site, 205 Scheduled Monuments, 48 Registered parks and gardens, 7,321 listed buildings, 3 Areas of Outstanding Natural Beauty, and 144 Conservation Areas⁵.



Figure 1 - A map of the Oxford-Cambridge arc, outlining the 31 Local authorities that comprise the area⁶

1.2. Regional transport: England's Economic Heartland

To complement central government plans for The Arc, Local Authorities and Local Enterprise Partnerships have established a Sub-national Transport Body, England's Economic Heartland (EEH),

³ Partnering for Prosperity, National Infrastructure Commission, <https://www.nic.org.uk/wp-content/uploads/Partnering-for-Prosperity.pdf>, p 8, accessed 30/01/2020

⁴ 2019 Conservative party manifesto, https://assets-global.website-files.com/5da42e2cae7ebd3f8bde353c/5dda924905da587992a064ba_Conervative%202019%20Manifesto.pdf, p 31, accessed 30/01/2020

⁵ The Oxford-Cambridge Arc, p 10

⁶ The Oxford-Cambridge Arc, p 9

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to determine their strategy to meet the transport needs of the wider region, ranging more broadly from Swindon to Cambridgeshire and Northampton to Hertfordshire. EEH issued and consulted on their Outline Transport Strategy in 2019, which reinforced the key requirement to improve connectivity across the region, a key element of which will be to strengthen links between the regions' interchanges with the major transport corridors that radiate out from London. That approach will both improve connectivity within the region and also provide better links to the rest of the country.⁷ Together with improvements in digital infrastructure and targeted road improvements, East West Rail (EWR), the proposed new rail service from Oxfordshire to Cambridge, will help deliver that vision by creating a step change in connectivity.

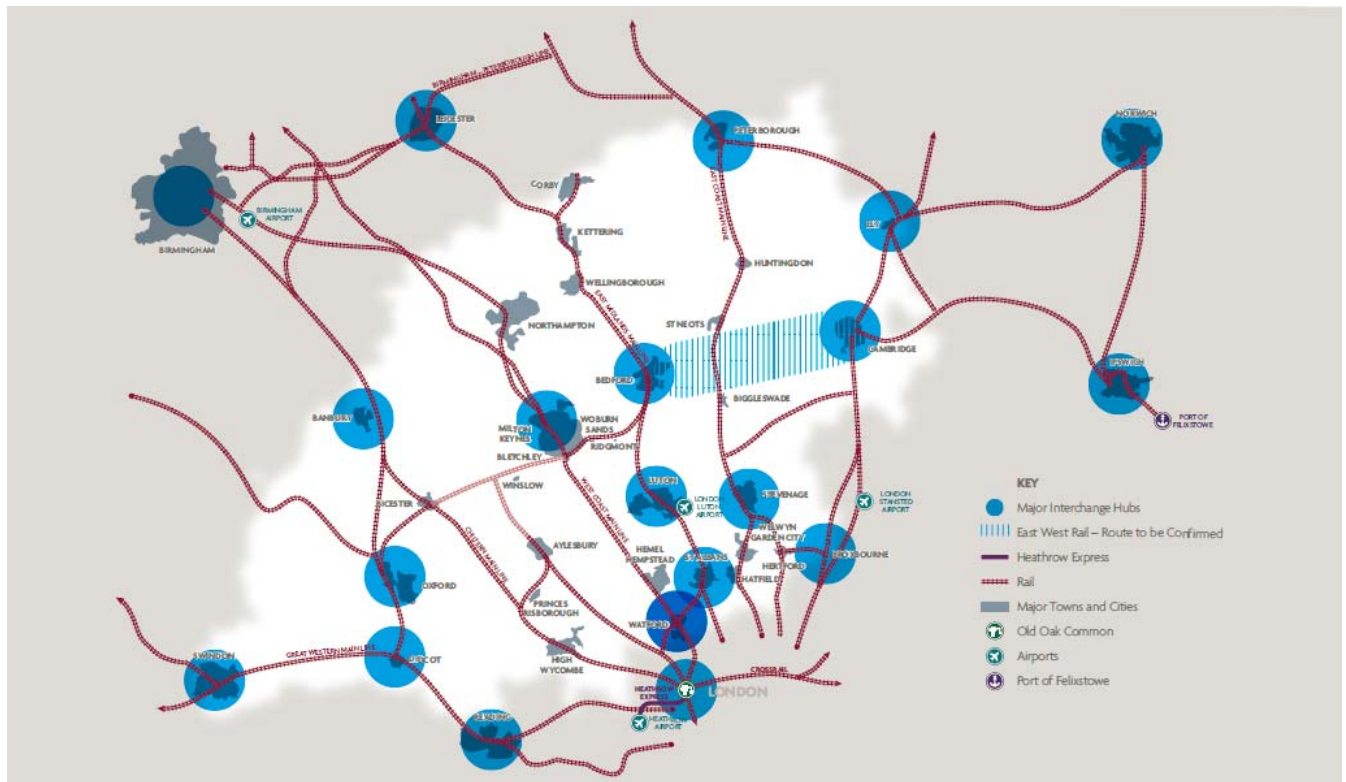


Figure 2 – The EEH rail system, including East West Rail and major interchanges⁸

1.3. Oxfordshire

⁷England Economic Heartland's Outline Transport Strategy for engagement, July 2019
[http://www.englandseconomicheartland.com/Documents/Outline % 20Transport % 20Strategy % 20Framework % 20for % 20Engagement.pdf](http://www.englandseconomicheartland.com/Documents/Outline%20Transport%20Strategy%20Framework%20for%20Engagement.pdf), accessed 18/05/2020

⁸ EEH Outline Transport Strategy for engagement, July 2019, p 49

Oxfordshire has one of the strongest economies in the UK, contributing £21bn to the UK exchequer in 2018.⁹ It has significant assets in research and development and an international brand that draws talent and investment to both the City of Oxford and the numerous science, innovation, technology and business parks located across the county. Oxfordshire's knowledge-led economy generates the highest number of university spinout companies in the UK.

Despite these strengths, Oxfordshire has low productivity relative to many peers¹⁰. Poor east-west connectivity and an exceptionally strong demand for housing means that Oxford has repeatedly headed lists of cities with the lowest levels of housing affordability. This is a problem that extends across the county, with median prices between 9.1 and 12.6 times median wages, compared to the mean for England and Wales of 7.7 times, with Oxfordshire's 5 Local Authority districts between the 65th and 91st percentiles for median earners. The barriers to home ownership are particularly high for those on lower incomes, with lower quartile house prices 10.4 – 12.82 times that of lower quartile earnings, compared to a mean for England and Wales of 7.06. Oxfordshire's 5 Local Authority districts are between the 70.5th and 88th percentiles for lower quartile affordability in England and Wales.¹¹ This increases costs for businesses and diminishes the ability of businesses to attract and retain globally mobile talent.¹²

Recognition of a need to resolve these issues, and the implementation of plans for wider devolution across the UK led to the establishment of a City Deal between Oxfordshire and Central Government in 2014 to address the historic underperformance of the county relative to its international competitors. The City Deal identified that the constraints on growth caused by insufficient public transport and an at-capacity road network, under-developed business networks and lack of critical mass to support growth and investment led to a loss of £500m GVA to the local economy between 1997 and 2011.¹³

To address this, the Local Authorities, the Oxfordshire Local Enterprise Partnership (OxLEP) and other stakeholders established the Oxfordshire Growth Board to develop a strategic approach to the generation of sustainable growth within the wider context of the Oxford-Cambridge arc. The integration of Local Plans through this framework led to the Oxfordshire Housing & Growth Deal, a ground-breaking agreement with central government, which underpinned a commitment to build 100,000 new homes in Oxfordshire by 2031. This is a step change in delivery of new housing,

⁹ONS statistical release, Regional economic activity by gross value added (balanced), UK: 1998 to 2017, Revisions triangles: regional gross value added (balanced) in current basic prices, Table UKJ14, <https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/revisionsregionalgrossvalueaddedbalancedincurrentbasicprices>, accessed 19/05/2020

¹⁰ Oxford and Oxfordshire City Deal, <https://www.gov.uk/government/publications/city-deal-oxford-and-oxfordshire>, p 3, accessed 31/01/2020

¹¹ ONS, Ratio of house price to residence-based earnings (lower quartile and median), 2002 to 2019, Table1c, 2c, 5c and 6c, <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/datasets/ratioofhousepricetoresidencebasedearningslowerquartileandmedian>, accessed 19/05/2020

¹² Oxfordshire Infrastructure Strategy (OxIS), November 2017 https://www.oxfordshiregrowthboard.org/wp-content/uploads/2018/04/oxis_stage2.pdf, p 8, accessed 31/01/2020

¹³ Oxford and Oxfordshire City Deal, p 3

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equating to 5,100 units per year against an average of 2,333 between 2011 and 2015. These plans mean Oxfordshire's population is forecast to grow by 39 % between 2016 and 2040.¹⁴

The distribution of planned housing varies significantly between districts in the county. The urban nature, very tight administrative boundaries, and almost complete absence of greenfield sites means there is limited opportunity to build large numbers of houses in the City of Oxford,¹⁵ so committed housebuilding is primarily allocated across Oxfordshire's other settlements in the Local Plans.

Employment growth is equally significant, with the primary locations in Oxfordshire along the Knowledge Spine, including the research centres at Harwell and Culham, Milton Park, and the Oxford and Begbroke science parks, as well as the City of Oxford, Bicester, Didcot, and Witney. The Oxfordshire economy is projected to double in size and create 108,000 additional jobs by 2040. Collated Local Plan data was provided to Network Rail by Oxfordshire County Council in March 2019, that details levels of housebuilding committed in the plans. Those figures on planned housebuilding and job allocations are set out from Figure 3 - Figure 5, and mapped in Figure 6.

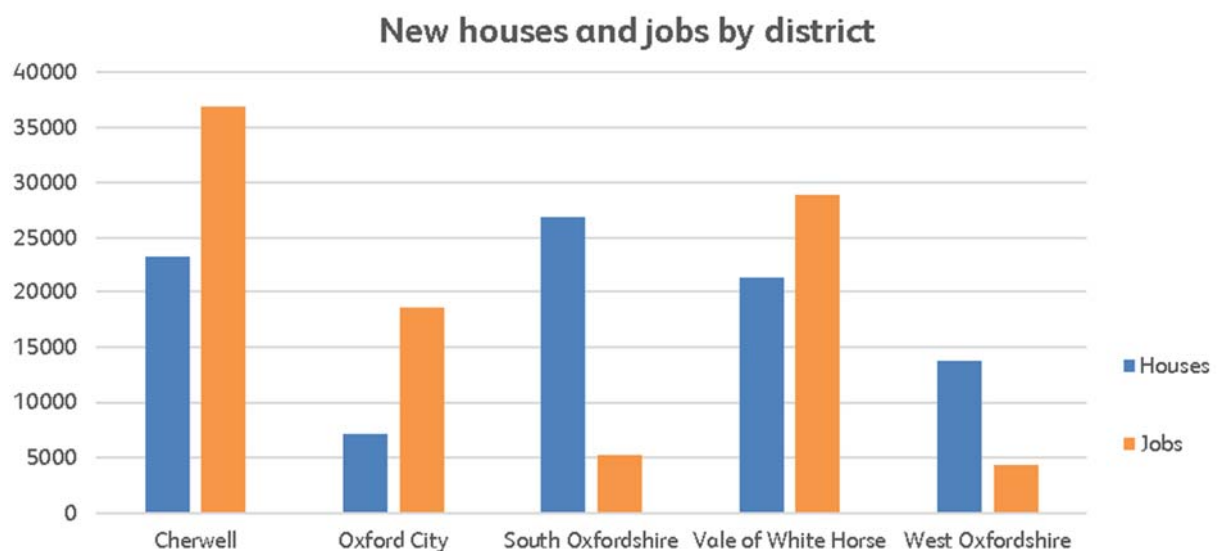


Figure 3 – Local Plan housing and employment allocations by district to 2031

¹⁴ OxIS, p10

¹⁵ Oxford City Council Local Plan 2036, Affordable Housing background paper, https://www.oxford.gov.uk/downloads/file/5108/background_paper_-_affordable_housing, p 27, accessed 31/01/2020

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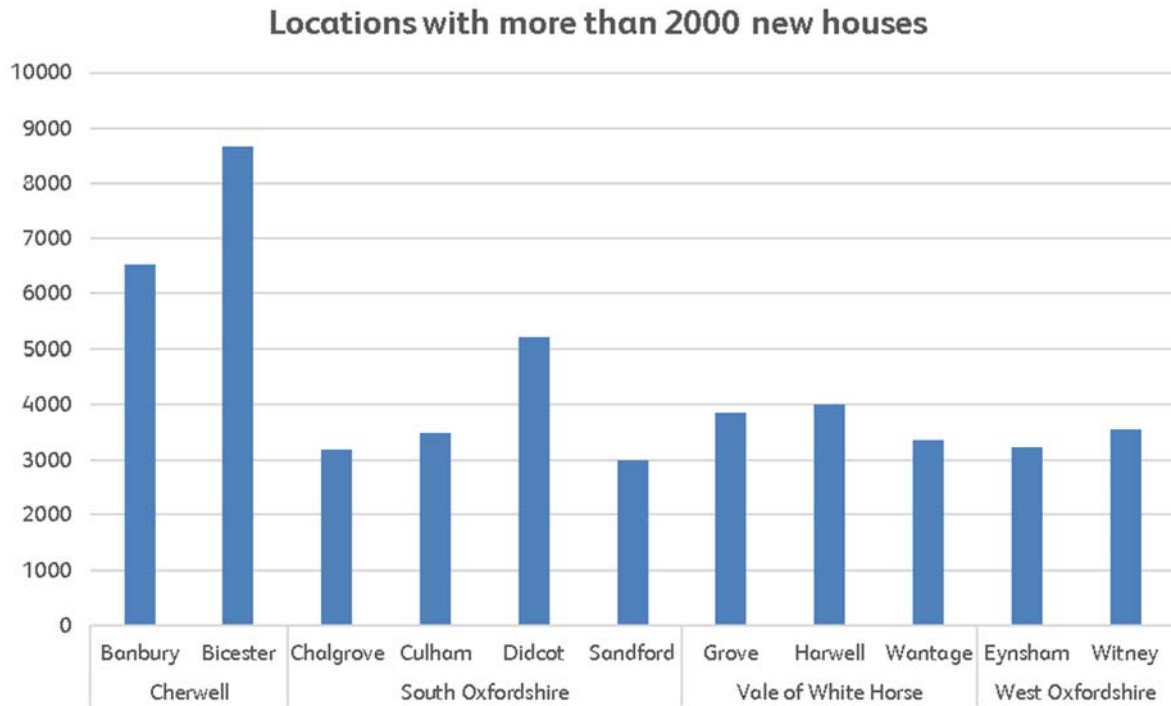


Figure 4 – Settlements with allocations of more than 2000 homes in Local Plans

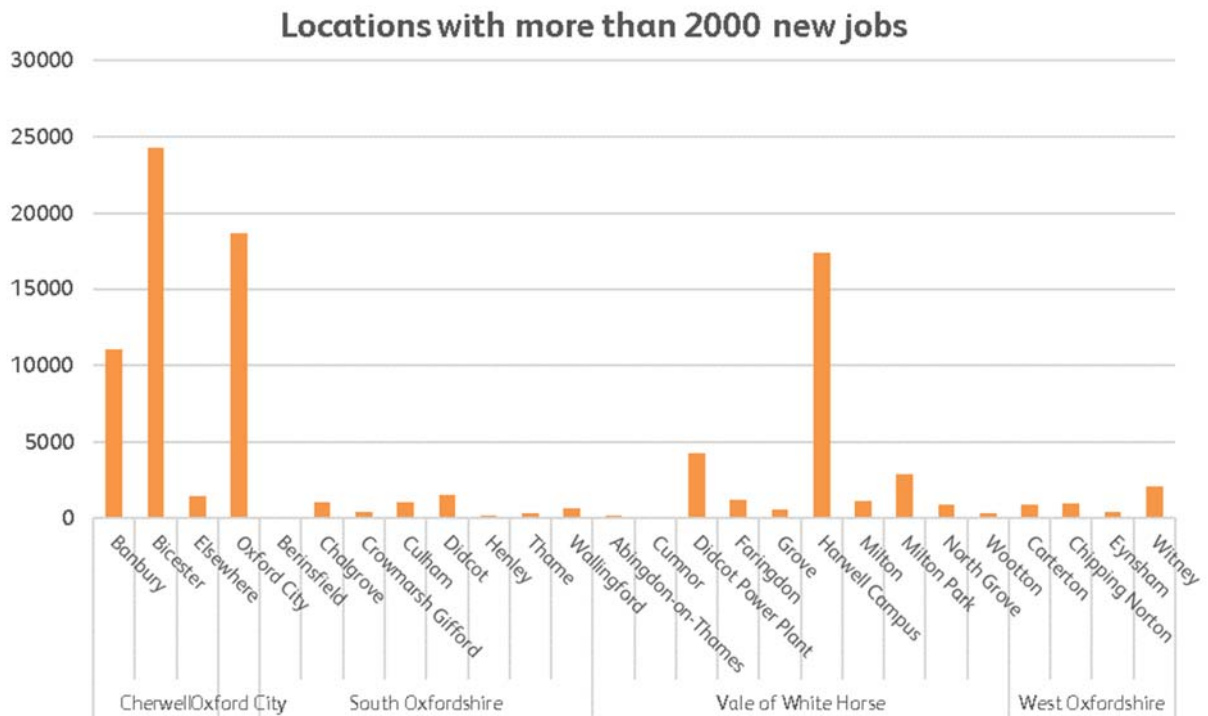


Figure 5 – Settlements with allocations of more than 2000 jobs in Local Plans

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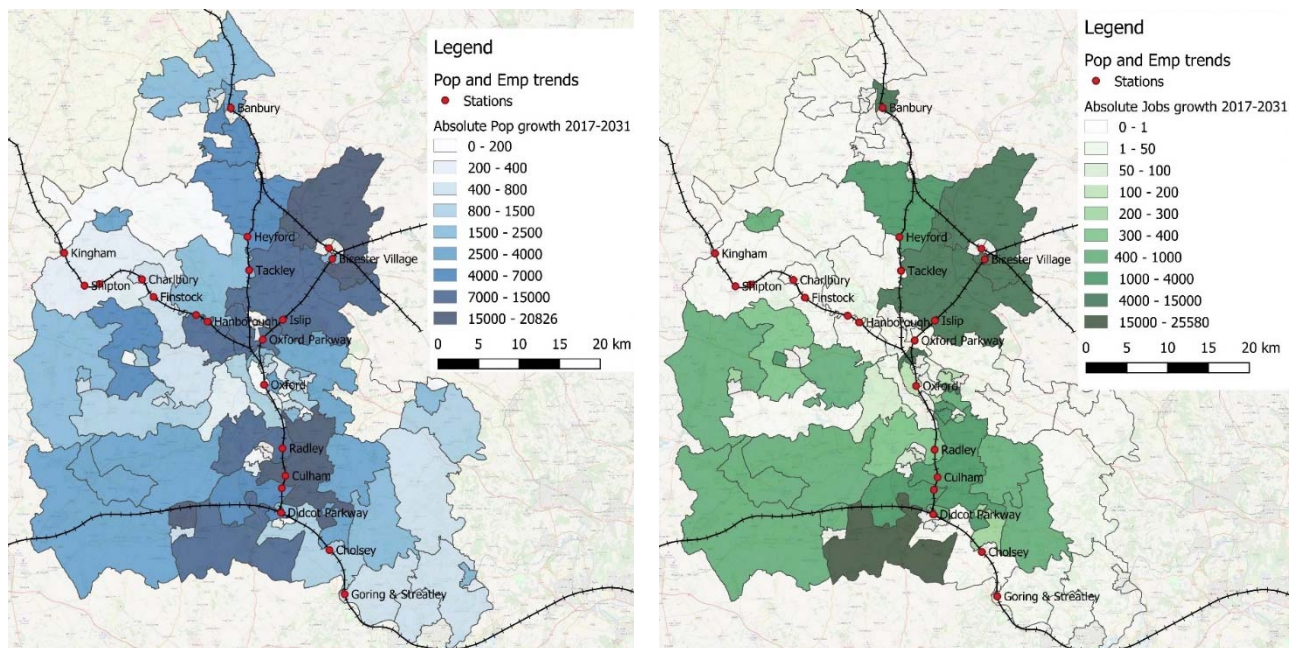


Figure 6 – Population (blue) and jobs (green) increase as a result of planned sites in Oxfordshire's five Local Plans

More specifically, the area around Oxford station, the city's 'West End,' has been identified as a key element of Oxfordshire's Local Industrial Strategy, a joint central government and OxLEP strategy published in July 2019. This redevelopment envisages the creation of a 'Global Business District' in Oxford's West End, which could attract world leading companies to the region with a spill over effect for Oxfordshire and the rest of the Arc.¹⁶ The entire redevelopment programme has been assessed by PWC to have a BCR of approximately 4, indicating High value for money.¹⁷

1.4. Transport in Oxfordshire

Oxfordshire's transport network currently has insufficient public transport and an at-capacity road network. That leads to congestion, slows bus journeys, and results in delays on important transport corridors. For example, the average speed of traffic into Oxford in the morning rush hour was 10.6mph whilst average bus speeds in Oxford have been less than 10mph since 2016.¹⁸ Furthermore, there are several Air Quality Management Areas on Oxfordshire's road network, where NO₂ levels are in breach of government targets established from World Health Organisation guidelines. Effective action plans are in place for many of Oxfordshire's AQMAs that have had significant successes in reducing NO_x levels through policies such as Oxfordshire County and Oxford

¹⁶ Oxfordshire Local Industrial Strategy, published July 2019

https://www.oxfordshirelep.com/sites/default/files/uploads/Oxfordshire-SINGLE-PAGE_1.pdf, accessed 20 May 2020

¹⁷ PWC Impact appraisal of Oxford station and the West End, Draft issued October 2019

¹⁸ *Connecting Oxford*, joint Oxfordshire County and Oxfordshire City Council consultation document, published 18 September 2019. <https://www.oxfordshire.gov.uk/sites/default/files/file/roads-and-transport-connecting-oxfordshire/connectingoxfordshire.pdf>, Accessed 20/05/2020

City's joint strategy *Connecting Oxford* and the restrictions on emissions within Oxford, to encourage a shift towards public and active modes of transport, however areas adjacent to major trunk roads are particularly challenging to control due to the large number of HGVs that use the routes. In its most recently available status report on air quality, the Vale of White Horse District council observed that the A34 is a particular challenge, with no easy solutions to the reduction of emissions.¹⁹

Without significant investment, this situation stands to be worsened by the growth detailed in Paragraphs 1.1 and 1.2. The Housing & Growth Deal does include £150m for infrastructure spending, which has largely been allocated to highway-based schemes. In its 2017 Oxfordshire Infrastructure Strategy (OxIS), the Oxfordshire Growth Board identified priority projects across all modes of transport that are needed to alleviate existing congestion and support growth to 2040. The list of highest priorities included a number of strategic rail projects, including the upgrade of the rail network through Oxford and the station. The strategy is currently in the process of being updated. OxIS is integrated with the infrastructure and transport plans for the wider region outlined in Paragraphs 1.1 and 1.2 above, with numerous members of the Growth Board represented on the Sub-national Transport Body the EEH. Specifically, this includes integration with plans for East West Rail, which will transform rail connectivity between Oxfordshire and the rest of the Arc.

1.5. Rail in Oxfordshire

Oxford is at the heart of a rail corridor that links the Great Western Mainline (GWML) at Didcot with the Midlands and the North. This corridor is vital for passenger and freight services between the north and south of the country and is joined by the London Marylebone to Birmingham line south of Banbury. The same corridor provides branches to important rail corridors through the North Cotswolds to Worcester, and to Bicester (and in future across the Arc to Bedford and Cambridge).

Oxford station is a key origin and destination for passenger services to cities including London, Birmingham, Worcester, Hereford, Winchester, and Southampton. It is also the hub of the important local rail market in Oxfordshire connecting Oxford to the major towns of Banbury, Bicester and Didcot. Didcot, plus other significant rail hubs including Banbury and Charlbury. Didcot, positioned on the GWML, is a vital node in the UK rail network and is a junction for all north-south passenger and freight traffic west of London.

Like most of the UK's mainline railway infrastructure, Oxfordshire's railway is managed by Network Rail, an arms-length body of the Department for Transport. Within Network Rail, responsibility for the management of the railway is devolved to regional organisations, made up of routes that roughly align with passenger train franchises. The majority of the railway in Oxfordshire is the responsibility of the Western Route, part of the Wales & Western Region, with the remainder the responsibility of West Coast main line south route, part of the Northwest & Central Region. The boundary between the two routes is just south of Heyford Station on the Didcot – Chester Line (at DCL 75 miles 0 chains), and between Oxford North Junction and Oxford Parkway on the Bletchley Lines (at OXD 29 miles 25 chains). The entirety of the Cotswold line (OWW) is the responsibility of Western Route.

¹⁹ Vale of White Horse District Council 2018 Air Quality Annual Status Report, accessed 19/05/2020

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This project is being managed by the Wales & Western region in a structure set out in more detail in the Management Case.

To ensure the integration of the national railway system in a regional structure, strategic planning of the network is undertaken by the System Operator, a national function of Network Rail. The strategic planning of the Oxford Corridor is led by the System Operator's team aligned with Western Route, with support from the System Operator's North West & Central team. That planning forms the core of this strategic case.

A map setting Oxfordshire in the context of the rail network is at Figure 7, Wales & Western Region is highlighted in green, with North West & Central highlighted in Red.



Figure 7 Oxfordshire's place in the rail network. Some stations outside the Oxford Corridor have been omitted for simplicity.

1.5.1. Existing demand for Oxfordshire's passenger rail services

Rail is a key element of Oxfordshire's transport system, with over 20.5 million journeys made to and from Oxfordshire stations in 2018-19. Demand for rail travel in Oxfordshire has grown rapidly and above the UK average. Journeys to and from stations in Oxfordshire have increased by 69 % in the 10 years to 2019 against a UK average of 42 %, with growth in the last 5 years particularly significant, at a compound annual growth rate (CAGR) of 5.2 % annually against a national average of 2.7 %. This is particularly remarkable given the suppression of demand in that time imposed by major engineering works at Banbury and Oxford, and across the wider region from Great Western Route Modernisation.²⁰

Oxford station is by far the busiest of Oxfordshire stations with 8.27 million journeys in 2018-19, making it the 5th busiest station in Network Rail's Wales & Western region. This is an increase of 63 % over ten years. For a large station outside of London this is extraordinary growth: amongst stations of the same size or larger, only 5 stations grew faster over the same period. Those were Birmingham New Street and Coventry, as a result of demand unlocked by the upgrade of the West Coast main line, Gatwick and Stansted airports as a result of strong demand growth for air travel, and Manchester Oxford Road, the main commuter station serving the south of Manchester's city centre.

The growth of Oxford station is reflective of its position as the hub of the county's rail network, with extensive amounts of commuting into the city from the surrounding area, as well as serving as an origin for interregional commuting. Four other Oxfordshire stations saw over one million journeys – Didcot Parkway, Banbury, Bicester Village, and Oxford Parkway.²¹ Stations towards London Marylebone, most notably Bicester Village, have also seen substantial growth since the introduction of direct services between Oxford and London Marylebone. Even when treating the two Bicester stations together to negate the abstraction of demand from Bicester North, the combined CAGR was 6.11 %, whilst Oxford Parkway station is Oxfordshire's fifth busiest station despite only opening in 2016. The use of Oxford station as an interchange has more than doubled since the Marylebone services were introduced in 2016, with half a million journeys interchanging at Oxford in 2018-19.

As described in Paragraph 1.3 above, there is a clear vision for the west end of the city centre shared by many local stakeholders in the Oxford Station promoters group, which includes Local Authorities, OxLEP, and major local landowners, which would position the station as an improved gateway to the city and a transport hub for onward journeys by public transport. A station masterplan was created in 2014 to secure the land that will be needed to allow the station to grow to meet the rising demand for rail services that will be set out in the next sections, which is being refreshed and further developed over 2020. The refreshed masterplan will be supported by its own business case, to develop an incremental delivery programme to achieve the overall redevelopment of the station. This project has been developed to be entirely consistent with the existing masterplan, and Network Rail are playing a central role in the refreshed masterplan .

1.5.2. Oxfordshire rail demand forecasts

²⁰ ORR Station usage statistics, 2018-19, <https://dataportal.orr.gov.uk/station-usage> accessed 30/01/2020

²¹ ORR Station usage

1.5.2.1. Evidence base for Oxfordshire rail demand forecasts

The ambitious plans for housing and job creation in Oxfordshire's five Local Plans represent a step change in population and employment that are well above the projected national average. This will markedly impact travel patterns and characteristics, especially for commuting flows. The distinct geographic variation in the distribution of housing and employment sites across the five Local Authority Districts set out above means that future passenger rail demand in Oxfordshire can be expected to diverge from the DfT Transport Appraisal Guidance (TAG) method of demand forecasting, which uses national population and employment assumptions instead of Local Plan data. The sustained levels of high growth of rail demand in Oxfordshire compared to the national average is a further indicator that the Oxfordshire rail system will continue to diverge from standard demand forecasts. In the Do Nothing model there is limited variation in the CAGR across different stations, when in reality CAGR can vary significantly based on local growth and service provision. For example in the ten years to 2018-19 Hanborough station saw a CAGR of 7.9 % whilst Appleford saw minus 3.6 %.

To accommodate this variation, the Department for Transport and the Oxfordshire Growth Board commissioned Network Rail to lead the Oxfordshire Rail Corridor Study (ORCS), a key output of which was the creation of the Oxfordshire Planned Growth Scenario (OPGS). The OPGS is a bespoke demand forecast that uses data on the location, size, and delivery timeframe of all planned housing and employment sites detailed in the five Local Plans collated by Oxfordshire County Council. This is added to Census data at the level of Middle Layer Super Output Areas (MSOAs) – the 87 statistical subunits of similar population that comprise the county of Oxfordshire. This provides a level of detail that is not captured in the DfT Transport Appraisal Guidance (TAG) method of demand forecasting, but which fits the Local Plan data into the recognised forecasting framework. To ensure a robust analytical approach the Oxfordshire Planned Growth Scenario demand forecast has been treated as a sensitivity, against a central case of the TAG compliant 'Do Nothing' scenario. The Do Nothing scenario uses the DfT Exogenous Demand Growth Estimation model, which predict changes in rail demand through national population and employment assumptions.

In addition to the passenger market, Oxfordshire holds a strategically vital position for rail freight, particularly for intermodal and automotive flows between the Port of Southampton and the Midlands. In 2019, Network Rail revised its freight market forecasts for 2023, 2033, and 2043, with a range of scenarios, all of which predict a significant increase in demand for rail freight through Oxfordshire.

These forecasts are the basis for identifying gaps between the capacity and connectivity levels delivered by the currently committed train service and what is required to support Oxfordshire's growth at various forecast horizons. The following sections provide further detail on the forecast growth in each market, followed by the train service specifications that will be required to accommodate the forecast in the coming decades.

1.5.2.2. Growth of the Oxfordshire passenger rail market

Both the TAG and OPGS forecasts demonstrate strong levels of continuing passenger growth in Oxfordshire. The TAG model forecasts even growth across the county, which will lead to rising numbers of local and inter-regional commuting. However, the OPGS forecast suggests that Oxfordshire's commuter travel market is due to change over the next decade, as growth in the county spreads out from Oxford to other major hubs in the county, particularly in the Didcot and

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Bicester areas. This is consistent with the pattern of the commitments in the Local Plans, which see population and employment dispersed more evenly around the county.

The OPGS shows that there are seven key growth hubs in the Oxfordshire rail system: Banbury, Bicester (with strong growth across both Bicester stations), Culham, Didcot Parkway, Hanborough, Oxford, and Oxford Parkway (Figure 8). These seven key hubs see growth that is higher than other Oxfordshire stations and significantly higher than in the Do Nothing scenario. Accommodating growth in demand at these seven key hubs is central to the role of the rail system in supporting economic growth.

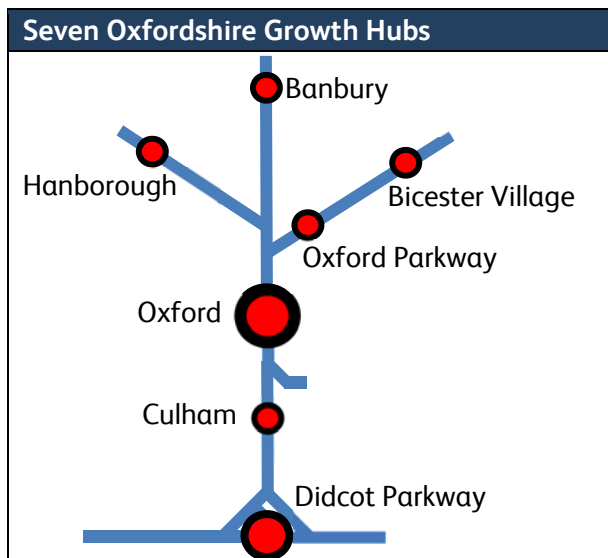


Figure 8 – The seven key growth hubs in Oxfordshire's rail system

Figure 9 shows the CAGR for the seven key hubs in Oxfordshire. In each case the growth rate is not only high but significantly higher than in the Do Nothing scenario.

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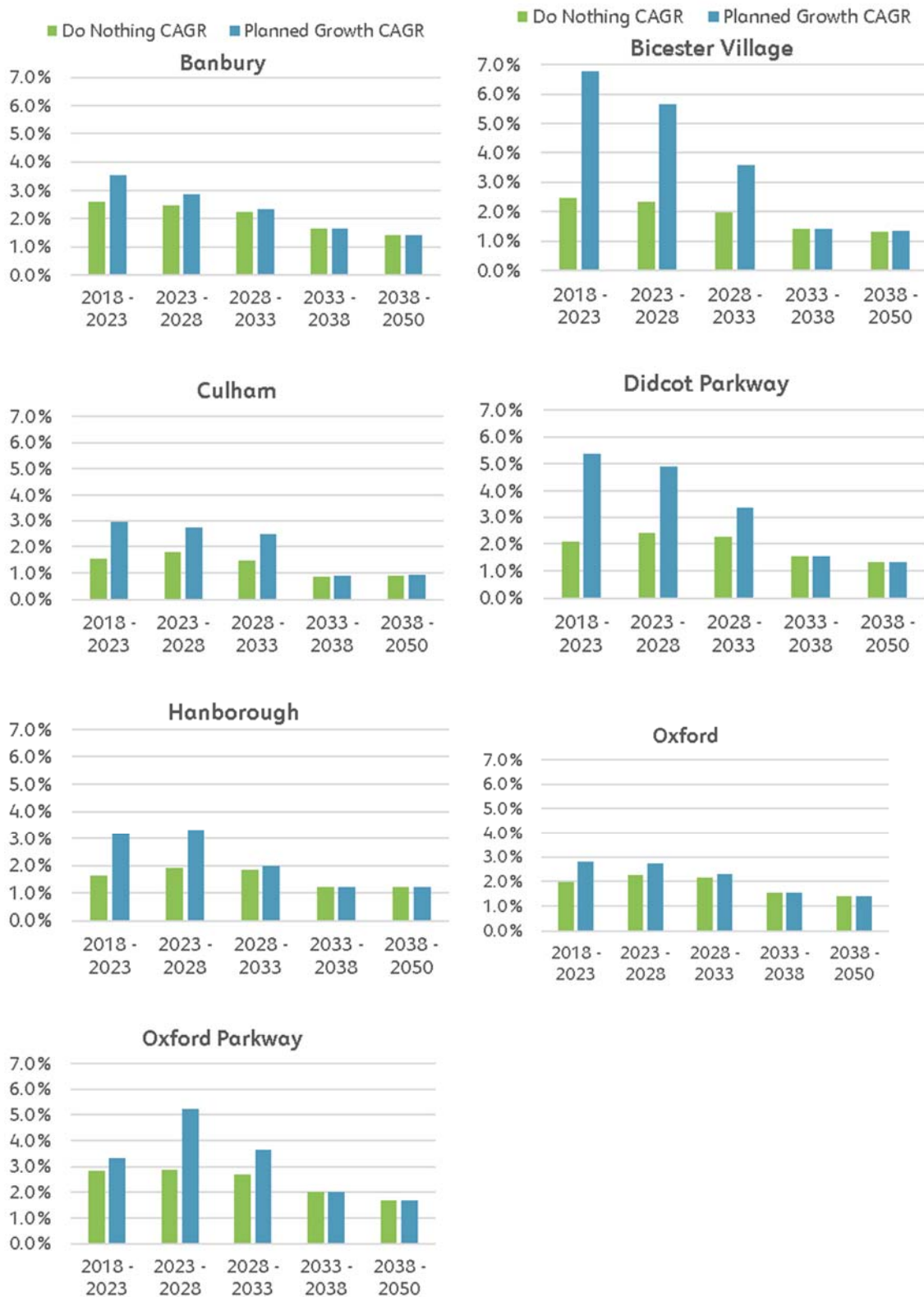


Figure 9 – Compound Annual Growth Rates at Oxfordshire growth hubs – OPGS vs Do Nothing

In both scenarios, Oxford station continues to show more than 2 % annual growth over the next 15 years. Whilst this is a lower headline growth rate than other stations in the county, this growth will be the hardest to accommodate in the short term, because Oxford starts from a far higher base.

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That means that the highest absolute increase in passenger numbers will come at Oxford, with the forecast ranging from 861,000 – 1.22 million additional passengers by 2023.

This increase will be made against a backdrop of historic sustained growth that has already seen very large increases in the numbers of passengers travelling into Oxford. At the start of the ORR data series on station usage in 1997, Oxford station saw 3.1m journeys. 2 years later, the first year with interchange data, it saw 81,000 interchanges. This compares with 8.27m journeys and 503,000 interchanges in 2018/19. Both the TAG Do Nothing and OPGS growth forecasts would result in more than 9m journeys to and from Oxford by 2023, and more than 10m by 2028. The OPGS forecast would see nearly 11m journeys by 2028.

The historic and forecast passenger demand for Oxford station are set out in

Table 1 and Figure 10.

Table 1 – Passenger growth at Oxford Station

| Year | TAG CAGR | OPGS CAGR | TAG Journeys | OPGS Journeys |
|------|-------------|--------------|-----------------|------------------|
| 1997 | NA | | 3,064,352 | |
| 2002 | 3.6 % | | 3,648,550 | |
| 2007 | 5.3 % | | 4,712,647 | |
| 2013 | 5.5 % | | 6,505,093 | |
| 2018 | 4.9 % | | 8,270,486 | |
| 2023 | 2.0 % | 2.8 % | 9,131,285 | 9,495,036 |
| 2028 | 2.3 % | 2.7 % | 10,230,811 | 10,847,979 |
| 2033 | 2.1 % | 2.3 % | 11,351,121 | 12,154,217 |
| 2038 | 1.5 % | 1.5 % | 12,228,382 | 13,093,544 |
| 2044 | 1.4 % | 1.4 % | 13,108,674 | 14,036,117 |
| 2050 | 1.4 % | 1.4 % | 14,448,556 | 15,470,796 |

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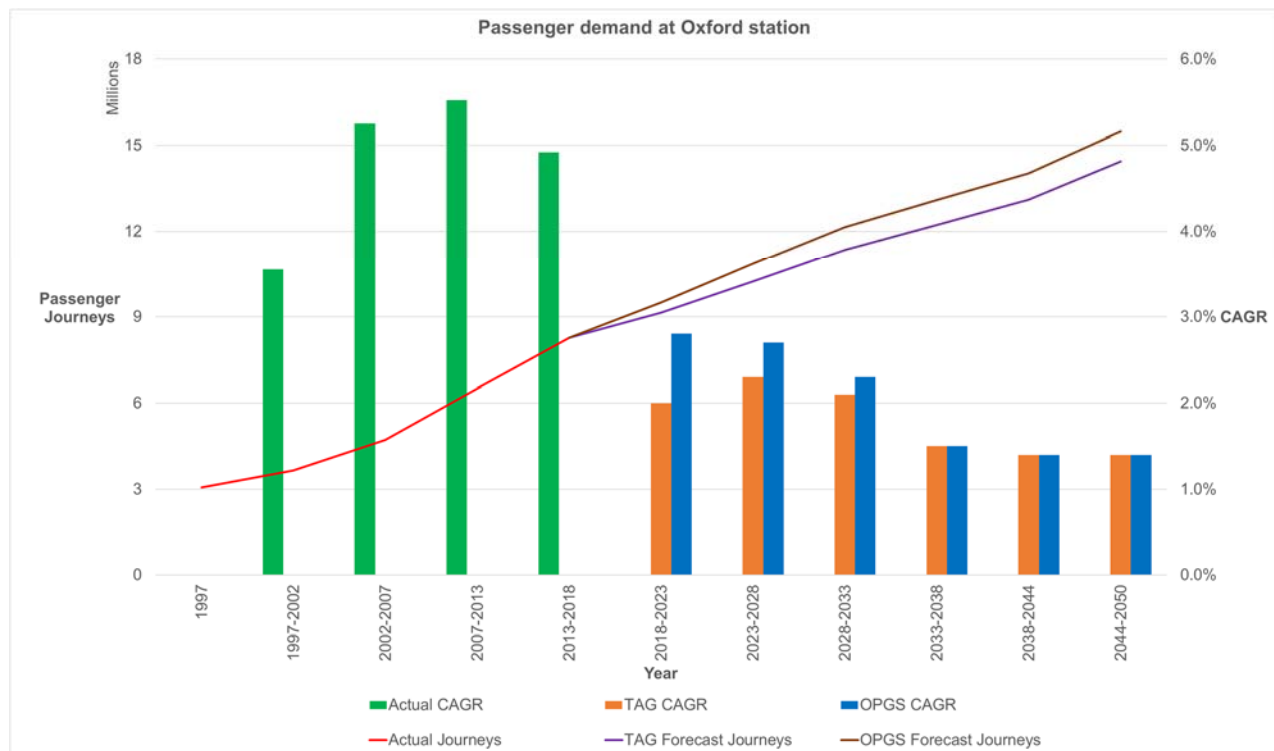


Figure 10 - Passenger demand and growth rates at Oxford station

1.5.2.3. The rail freight market in Oxfordshire

Market context

Oxfordshire hosts one of the most significant freight routes in the country. The route between the Port of Southampton and terminals and markets in the West Midlands and North runs directly through Oxfordshire and is a strategically vital freight route, critical to the UK economy. Therefore, the needs of rail freight are a crucial consideration in any strategy for the rail system in Oxfordshire.

The principal commodities through Oxfordshire are intermodal and automotive flows. The rail freight market has changed significantly in recent years. Coal traffic has declined massively whilst intermodal freight has substantially increased to become the largest single commodity sector conveyed by rail. The changes in freight volumes moved are set out at Figure 11 below. This further increases the strategic importance of the route through Oxford from Southampton, which handles 19 % of the lift on-lift off intermodal containers transported through the UK's ports, the 2nd largest after Felixstowe.²² The national intermodal rail freight market has seen significant growth since the start of the data set in 1999/2000 to 6.8 billion tonne kilometres, at a CAGR of 3.1 %.²³

²² DfT Port and domestic waterborne freight statistics, Table PORT0203, 21/08/2019 update <https://www.gov.uk/government/statistical-data-sets/port-and-domestic-waterborne-freight-statistics-port>

²³ DfT Rail Freight Statistics, Table TSG0422 (RAI0401), 17/12/2019 update <https://www.gov.uk/government/statistical-data-sets/rai04-rail-freight>

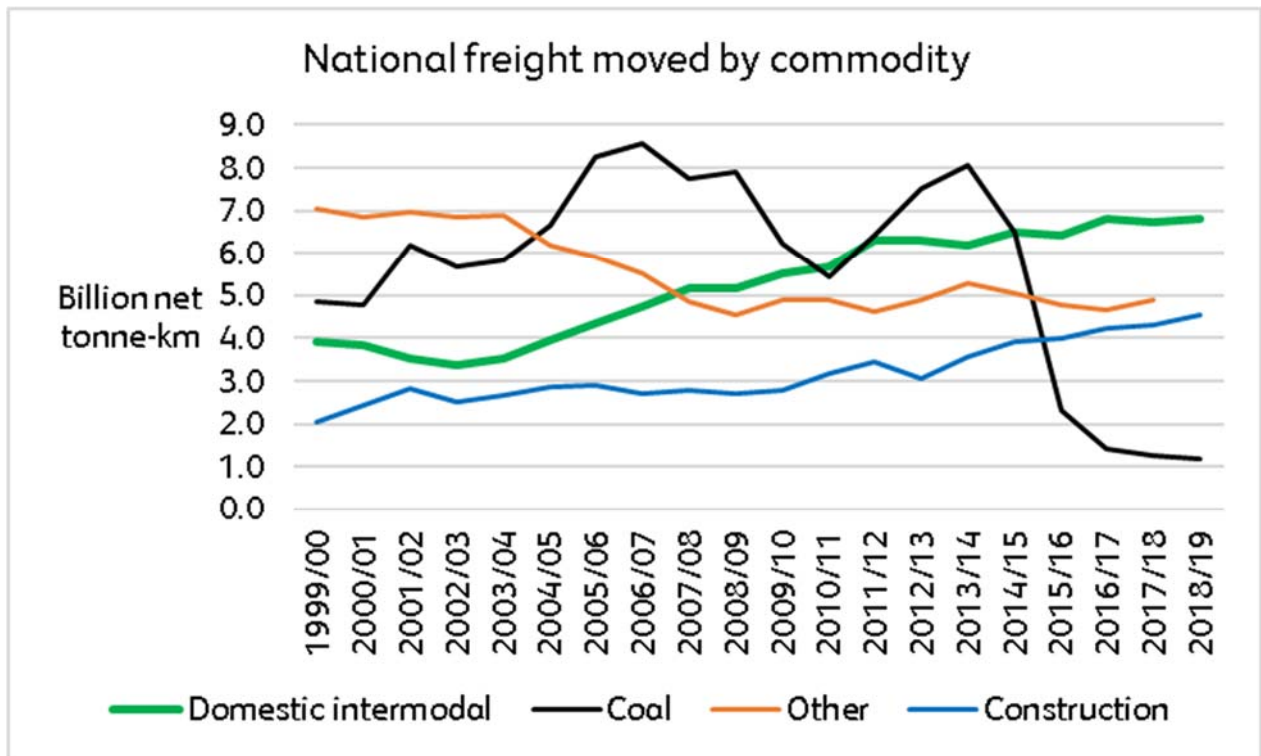


Figure 11 – Freight moved by commodity

Rail freight in Oxfordshire is not limited to intermodal flows passing through the county. There are significant and strategic sources and terminals in Oxfordshire that drive automotive, aggregates, military, and rail industry freight traffic (Figure 12).

| Oxfordshire role | Location | Type of flow |
|---------------------------|---------------------------------------|-------------------------|
| Source of freight flow | BMW Cowley | Automotive |
| | MOD Bicester | Military |
| Terminal for freight flow | Appleford sidings | Aggregates |
| | Banbury Reservoir | Aggregates |
| | Banbury Road | Aggregates |
| | Hinksey Yard | Rail industry logistics |
| Through freight flows | South coast - Midlands & the North | Intermodal, automotive |
| | South Wales – London ports | Steel |
| | Mendips – London | Aggregates |
| | S Wales / Bristol to London / S Coast | Intermodal |

Figure 12 – Freight sites and flows in Oxfordshire

Each of the freight sites within Oxfordshire has and is expected to retain strategic value. Therefore, the sites and the capability of the rail system affording access to them must be retained as part of the strategy for rail in Oxfordshire.

Cumulatively the roles described in Figure 12 equate to substantial demand for capacity for freight services in Oxfordshire that must be accommodated alongside passenger services.

Freight demand forecasts

Network Rail has recently revised its freight market forecasts for 2023, 2033, and 2043. The new forecasts present different scenarios considering the relative value of rail versus road haulage and

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macro-economic growth. These yield high, medium, and low growth scenarios. In all scenarios demand for rail freight increases, but by varying degrees (Figure 13).

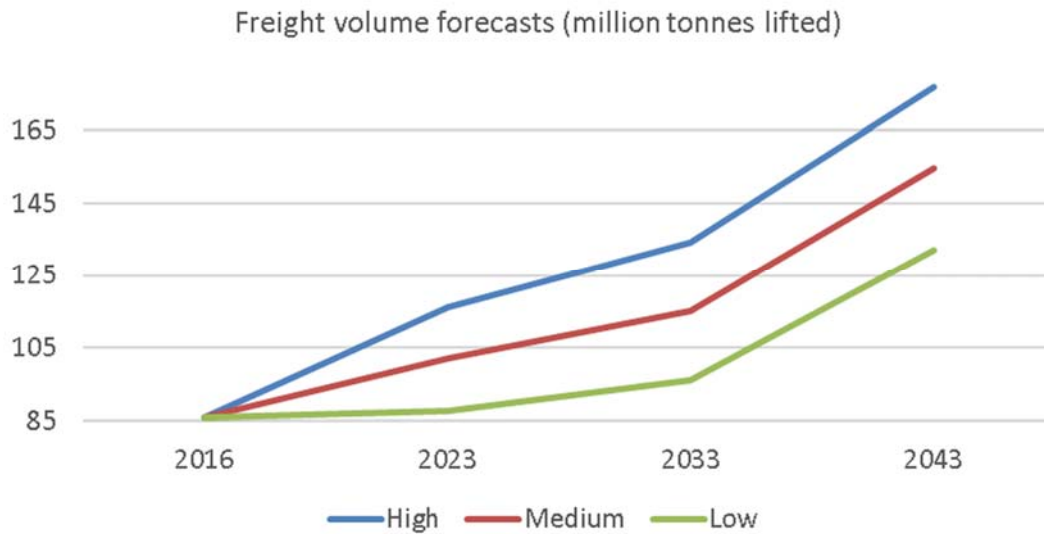


Figure 13 – Forecast freight tonnes lifted through Oxford (m), Network Rail Freight Market Studies 2019

These new forecasts provide the ideal basis for identifying what the freight market requires from the rail system in Oxfordshire. However, they do not include additional freight demand flowing from the route options introduced by East West Rail, which should be included in the freight capacity requirement for Oxfordshire.

The introduction of East West Rail is likely to increase demand for rail freight through Oxfordshire. Oxfordshire will gain direct connections to the West Coast Mainline at Bletchley (EWR Western section) and the Midland Mainline at Bedford (EWR Central Section). Each offers significant routing benefits for freight. The western section offers shorter journeys between the south coast and some intermodal terminals in the Midlands, whilst the central section offers comparable journeys between East Coast ports and Oxfordshire, the South West and South Wales whilst avoiding London.

ORCS forecasts for freight capacity required in Oxfordshire combine the updated market studies and Network Rail forecasts on the usage of East West Rail for rail freight to identify a capacity requirement for freight services on the network in Oxfordshire. This is identified both in terms of

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freight trains paths per day (Figure 14) and freight train paths per hour (

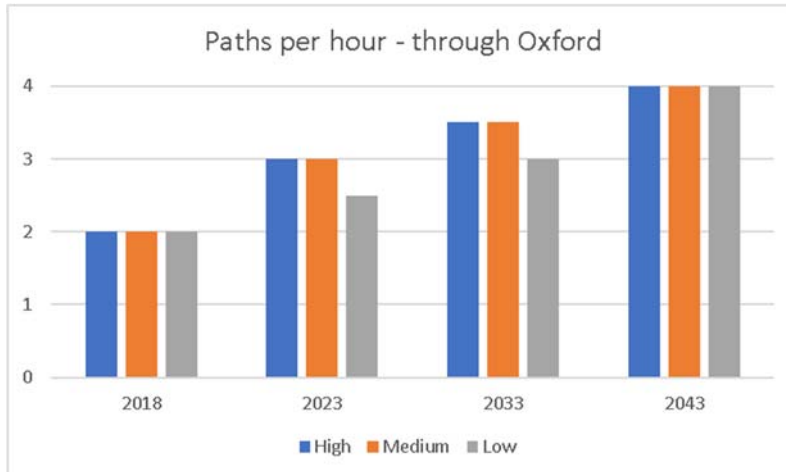
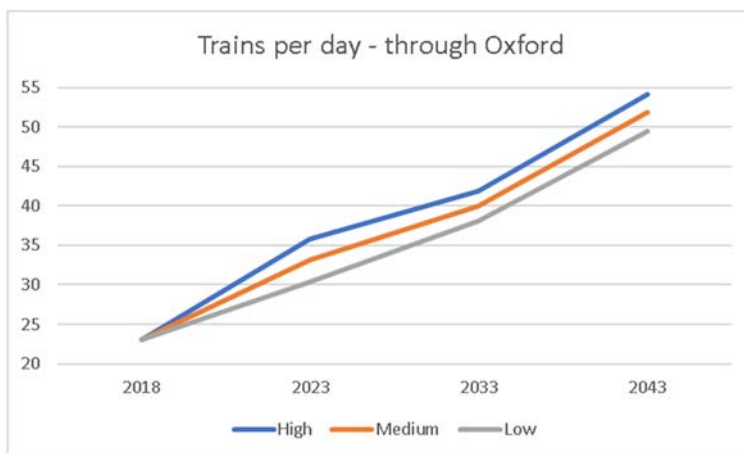
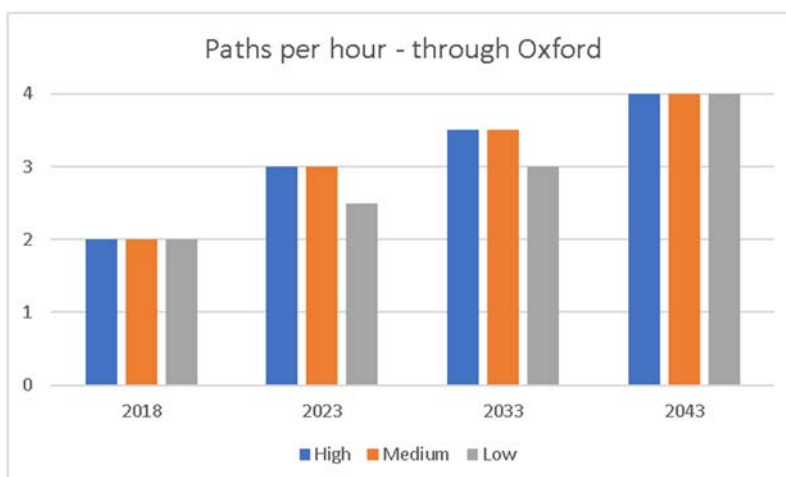


Figure 15), both of which are set out in a single direction. When converted to hourly paths, which are the basis of timetable development, the requirement is the same in the medium and high growth scenario, whilst the 2043 forecast is the same in the low growth scenario, with the increase simply deferred.



| | High | Med | Low |
|------|------|-----|-----|
| 2018 | 23 | 23 | 23 |
| 2023 | 36 | 33 | 30 |
| 2033 | 42 | 40 | 38 |
| 2043 | 54 | 52 | 49 |

Figure 14 – Forecast freight trains paths per day through Oxford – one direction only



| | High | Med | Low |
|------|------|-----|-----|
| 2018 | 2 | 2 | 2 |
| 2023 | 3 | 3 | 2.5 |
| 2033 | 3.5 | 3.5 | 3 |
| 2043 | 4 | 4 | 4 |

*Figure 15 – Forecast freight train paths per hour through Oxford (one direction only)***Freight industry developments**

Beyond providing sufficient capacity for growth the key issues for freight concern the capability of infrastructure in the rail system, and access to it.

Many capability requirements are driven by the inevitable conflicts with passenger services, which will increase as demand for each grows. The ability to loop freight trains so that other services can pass is a crucial feature of the rail corridor through Oxford and must remain so. Similarly, the capability of the junctions used by freight is crucial, since slower and more restrictive junctions consume scarce capacity.

Capability requirements are also driven by changes in the industry. The move towards longer, heavier trains, which offer efficiency benefits for haulage and capacity usage, drives enhanced infrastructure capability requirements that Oxfordshire's rail system must accommodate.

Rail freight also has an important environmental role, both as a source of emissions and as a means of inducing modal shift from road haulage, which is relatively a far greater source of emissions. Supporting rail freight growth is therefore instrumental to improving environmental outcomes, but the capability of the system can lessen the environmental impact of rail freight, for example by conversion from diesel to electric traction. At the same time industry trends towards more environmentally efficient freight rolling stock must continue.

The freight industry requires frequent, predictable, and reliable access to the rail network. Both the intermodal and automotive markets demand high levels of service continuity as goods cannot be stockpiled easily. Conflict with passenger services in the day and with maintenance requirements overnight constrains the ability of the system to support freight growth, and this constraint will be exacerbated as freight demand increases.

There is increasing demand for longer operational hours and better mitigation of impacts where access is degraded. Closures – whether routine or special – of part or all of the railway for maintenance or construction projects disproportionately impact freight. Diversionary routes are also required so that when routes must be closed alternatives with the right capability exist.

1.5.2.4. Oxfordshire Train Service Specifications

To meet the forecast demand set out above, a series of Oxfordshire Train Service Specifications (TSS) were developed up to 2033 as part of the Oxfordshire Rail Corridor Study. These specifications are an outline of the timetable that will be provided, so have been constructed to align with the frequency and type of trains needed to accommodate the growth forecasts set out above. This was carried out through the determination of a series of 'conditional outputs' required of the train service, which broadly align with the following categories:

- Passenger seating capacity
- Local and inter-regional connectivity and journey times
- Capacity for freight trains
- Freight train capability (predominantly train length, loading gauge, and access to the rail network and freight terminals)

As the outline of the future timetable, the train service specification is the key link between the future needs of passengers and freight customers, and the level of service that the rail network will

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be able to provide in the future. Accordingly, the ability of the infrastructure to accommodate the train service specification reliably and safely is the railway's key objective, and the way in which it fulfils government transport and rail policies.

The first additional services proposed to be introduced to the Oxford Corridor are East West Rail services from 2024, along with 2 additional freight paths per hour. The proposed 2024 Oxfordshire TSS is set out in Figure 16 below.

2019

| Service | From | To | Runs |
|---------------|----------------------------|--------------------|--|
| GW Fast | Oxford | Paddington | All day |
| GW Fast | Hereford/ Great Malvern | Paddington | All day |
| GW Fast | Oxford/ Banbury | Paddington | Peak only |
| GW Fast | Worcester FS | Paddington | Peak only |
| GW Slow | Banbury/ Oxford | Didcot | All day. Extends to Banbury every other hour |
| GW Slow | Oxford | Reading/ Didcot | All day |
| Chiltern | Oxford | Marylebone | All day |
| Chiltern | Oxford | Marylebone | All day |
| Chiltern | Oxford | Marylebone | Peak only |
| Cross-country | Midlands / North | South Coast | All day |
| Cross-country | Midlands / North | South Coast | All day |
| Freight | Oxford North Jn | Didcot North Jn | All day |
| Freight | Oxford North Jn | Didcot North Jn | All day |

2024

| Service | From | To | Runs |
|---------------|----------------------------|--------------------|--|
| GW Fast | Oxford | Paddington | All day |
| GW Fast | Hereford/ Great Malvern | Paddington | All day |
| GW Fast | Oxford/ Banbury | Paddington | Peak only |
| GW Fast | Worcester FS | Paddington | Peak only |
| GW Slow | Banbury/ Oxford | Didcot | All day. Extends to Banbury every other hour |
| GW Slow | Oxford | Reading/ Didcot | All day |
| Chiltern | Oxford | Marylebone | All day |
| Chiltern | Oxford | Marylebone | All day |
| Chiltern | Oxford | Marylebone | Peak only |
| Cross-country | Midlands / North | South Coast | All day |
| Cross-country | Midlands / North | South Coast | All day |
| Freight | Oxford North Jn | Didcot North Jn | All day |
| Freight | Oxford North Jn | Didcot North Jn | All day |

| | | | |
|----------|-----------------|-----------------|---|
| Chiltern | Birmingham MS | Oxford | All day. In the Offpeak this is the alternate hour to the Banbury extension |
| EWR | Milton Keynes | Oxford | All day |
| EWR | Milton Keynes | Oxford | All day |
| Freight | Oxford North Jn | Didcot North Jn | Off peak only |

Figure 16 – Oxfordshire Train Service Specification

In future years, it is envisaged the following service enhancements would satisfy forecast demand growth in Oxfordshire:

- 2tph Hanborough – Didcot/ London Paddington, proposed by North Cotswold Line Task Force for introduction by 2028.
- 2tph Oxford – Bedford/ Cambridge, proposed by East West Rail for introduction in 2026.
- 2 tph Birmingham Moor Street to Bristol/ Oxford, proposed by Midlands Engine Rail for introduction by 2028.
- Extension of services to Cowley, proposed for introduction by 2028.

Section 2. Problem Statement

2.1. Problem Identified

Investment delivered through the Great Western Route Modernisation programme led to significant improvements to rail capacity in the Oxford corridor in CP5 through 3 separate projects. The combined outputs of Oxford Corridor Phase 0 and 1, East West Rail Phase 1, and Southampton Freight Train Lengthening (STFL) led to the provision of a passenger connection between Oxford and the Chiltern Mainline at Bicester, an additional bay platform at Oxford for Chiltern Railways services to London Marylebone, additional track to allow the extension of freight trains, and re-signalling works to maximise the potential of the existing track layouts. The London Marylebone services have already proved extremely popular, unlocking latent demand for an alternative route into the capital, however the full benefits envisaged in the Oxford Corridor programme business case, which covered phases 0-3 have not yet been realised. Elements of the scheme were deferred, along with electrification between Didcot and Oxford, which have meant the creation of a railway fit for the needs of the 2020s and 2030s is yet to be completed

The central problem identified through capacity analysis of the existing rail infrastructure is that the Oxford corridor cannot accommodate the 2024 Oxfordshire Train Service Specification. That means that Oxfordshire's rail network is unlikely to be adequate to support the Oxfordshire Housing & Growth Deal nor the Oxford-Cambridge arc, both of which have been agreed with central government. It will also be unable to accommodate demand for rail freight, which will exacerbate the increase in freight transported by road, particularly between the south coast and the Midlands.

That central problem of a lack of capacity is created by a series of subordinate problems and constraints across the Oxford corridor which will be set out in more detail below, grouped around three main issues. The rest of this section will then set out the impact of not changing in more detail, before the specific objectives that will rectify the problem are set out.

2.2. Issue 1 - Oxford station

With the introduction of the December 2019 timetable, Oxford station has reached full capacity and cannot robustly accommodate the further service enhancements set out in the 2024 train service specification. Furthermore, the infrastructure in the station area is restricting the transition of journeys from private car to public and active modes of transport.

2.2.1. Present situation

The Oxford station facilities are based around those provided during the last major rebuild of Oxford station in 1990, at a time when passenger numbers and anticipated growth was at a historical low. Passenger numbers at Oxford are set out in detail in Section 1 above, but are forecast to grow from 3.1m in 1997-98 to more than 10m by 2028 in the central case, and nearly 11m in the OPGS forecast to 2028. Interchanges are not forecast quantitatively, but the historic increase in interchanges is equally significant, rising from 81,000 in 1999-00 (the first year with data) to 503,000 interchanges in 2018/19. These forecast passenger numbers are equivalent to the passenger numbers handled by a station like Bristol Temple Meads, despite having a level of facilities in no way comparable. The service pattern allowed by the current infrastructure does not allow connectivity across the county, so will either result in larger numbers of people changing trains at Oxford or will act as a disincentive to travel by rail, leading to additional car journeys.

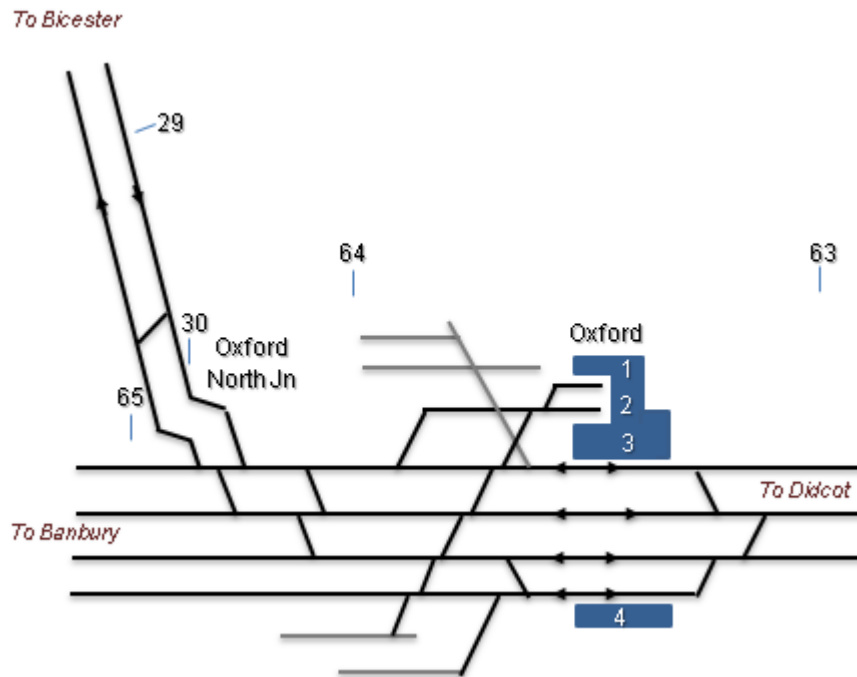


Figure 17 - Existing Oxford station layout

Network Rail has undertaken capacity analysis and pedestrian flow modelling that investigates the ability of the existing station layout to accommodate the expected growth in passenger numbers, and additional services set out in the 2024 train service specification. This analysis work has demonstrated a number of key issues.

Firstly, Oxford station has insufficient platform capacity for the 3 additional passenger trains per hour above the 2019 December timetable.²⁴ In the existing timetable trains are often held outside the station waiting for a through platform to become available, and services have long turnaround times in the bay platforms until paths become available on the Chiltern Main Line.

Secondly, pedestrian flows in Oxford station are forecast to become non-compliant before 2024. With the forecast increased demand, the footbridge between Platforms 3 and 4 will exceed its peak capacity and lead to unacceptable crowding at the foot of the stairs. A 2020 Network Rail station capacity assessment indicated that by 2024, as well as being contrary to industry safety standards this extends the time before a new train can reoccupy the platform, further limiting the available platform capacity. It also leads to door-to-door journey time penalties as people wait on platforms rather than continuing with their journeys. The limit of footbridge capacity is aggravated by the limited canopy provided on Platform 4. Currently only a third is covered by a canopy, which encourages people to wait for their trains in the area at the bottom of the footbridge rather than spreading evenly along the platform. Further to this, the time for the platforms at Oxford to clear in an emergency is currently non-compliant. This is based on the time for the platforms to clear with all available exits open, to model an urgent evacuation of the station.

²⁴ Oxford CMSP 2024 Technical note
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At the southern end of Oxford station, an underbridge carries the railway over the A420 Botley Road. This bridge restricts the maximum permitted speed of the line that exits Platform 3 towards the south and forces all the tracks into an alignment that is difficult to maintain. Public consultation undertaken by Oxfordshire County Council has identified the bridge as a major disincentive to cycling into the railway station, bus station, and wider city centre from the west due to the narrow width of the highway and footpaths, particularly on the north side. This is reflected in a very high concentration of negative comments under the railway bridge. The council is creating a segregated cycleway on the rest of the route to the west, however the restricted width available below the existing rail bridge prevents the continuation of this segregation, so cyclists must cycle on the main carriageway. Furthermore, road clearances are currently too tight to enable standard height double-decker buses to travel under the rail bridge, so the local authority has to procure special buses for this route. A photo of Botley Road bridge, looking west is at Figure 18.



Figure 18 - Botley Road looking west

The increased use of Oxford as an interchange following the introduction of London Marylebone services is also notable, as there has been no increase in waiting rooms or retail offer in the revenue protected area, leading to additional waiting on platforms. This will expand further following the introduction of East West Rail services, which are currently specified to terminate at Oxford.

The combination of these issues contributes to low levels of passenger satisfaction with Oxford station. The 2018 National Rail Passenger Survey, undertaken by the passenger group Transport Focus, found that amongst the 56 stations with more than 100 respondents, Oxford was ranked third worst. Funding has been committed to redevelop both stations that scored worse in that survey, with work nearing completion at Glasgow Queen Street and due to start at Gatwick airport in Spring 2020.

For these reasons, improvements have been identified as an urgent priority by Oxfordshire's local authorities, to ensure the station can form part of plans for a regional transport hub and an international gateway to the city. As discussed above, the Oxford station area masterplan has been

developed to identify future land use requirements to ensure land is kept available for planned expansion. The masterplan will allow the expansion of the railway through the eventual addition of two new through platforms, one on each side of the station. A station layout of 4 through platforms with one north facing bay has been tested and shown to accommodate the 2028 train service specification set out in the Oxfordshire Rail Corridor Study.

2.2.2. Constraints

The provision of additional platform capacity at Oxford station is severely constrained by the surrounding land which means that only a narrow strip of land to the west and the existing station footprint to the east are available for the construction of a new platform. A map of the area detailed below is included at Figure 19. A labelled aerial photo with more detail of Oxford station is included at Figure 20.

The options for the location of the station have been very limited since its original construction. The River Thames flows around the railway at Oxford station by a number of branches to the west (the main channel), north (Sheepwash channel), and east (Castle Mill stream), and Botley Road, a main route into the city, runs immediately to the south. Further constraints have been added over time. To the east of the station housing and roads have been built right up to the railway boundary in places, with university buildings and a bus terminus also limiting the ability of the station to expand beyond its existing footprint. The Rewley Road swing bridge further constrains options to the east of the station. This rail bridge once carried the railway across the Sheepwash channel to a former station on the site of Oxford University's business school. It was designed by Robert Stephenson and is a scheduled monument.

To the west of the station, Roger Dudman way runs parallel to the railway boundary from Botley Road and over the Sheepwash channel. This road bridge formerly carried a line to sidings and a bay platform to the west of Platform 4, but now forms the only viable access for vehicles (including emergency services) to reach student accommodation north west of the station and so must be retained as a road. South west of the station, adjacent to Botley Road, is a 3-storey youth hostel with 203 beds. To the south of Botley road, housing is built up to the western railway boundary, with a cemetery immediately south of that housing. To the east of the railway is the station car park.

The tight constraints on expansion of the station listed above mean that any expansion of Oxford station will include a requirement for a Transport and Works Act Order (TWAo), which will extend the duration of the design and planning stage of a construction project. However, these constraints are well understood, and have been reflected in the design of the Oxford station masterplan.

The construction of the east platform will be highly disruptive to the operation of the station, as it would involve the demolition of the existing station building, which contains most passenger facilities, including the ticket office, retail units and the revenue protected entrances. There is a non-revenue protected gate on Platform 4 that is opened during morning and evening peaks to alleviate crowding on the station footbridge, however this is unsuitable for the high volumes of passengers that would need to use the entrance during construction works.

Funding for highways improvements at Botley Road underbridge have been secured by the Local Authority, through the Local Enterprise Partnership, to correct this issue. £500k have been provided Through the Oxfordshire Housing and Growth Deal for design and development, with a further £10m agreed to support the delivery of a scheme, which needs to be spent before 2025.

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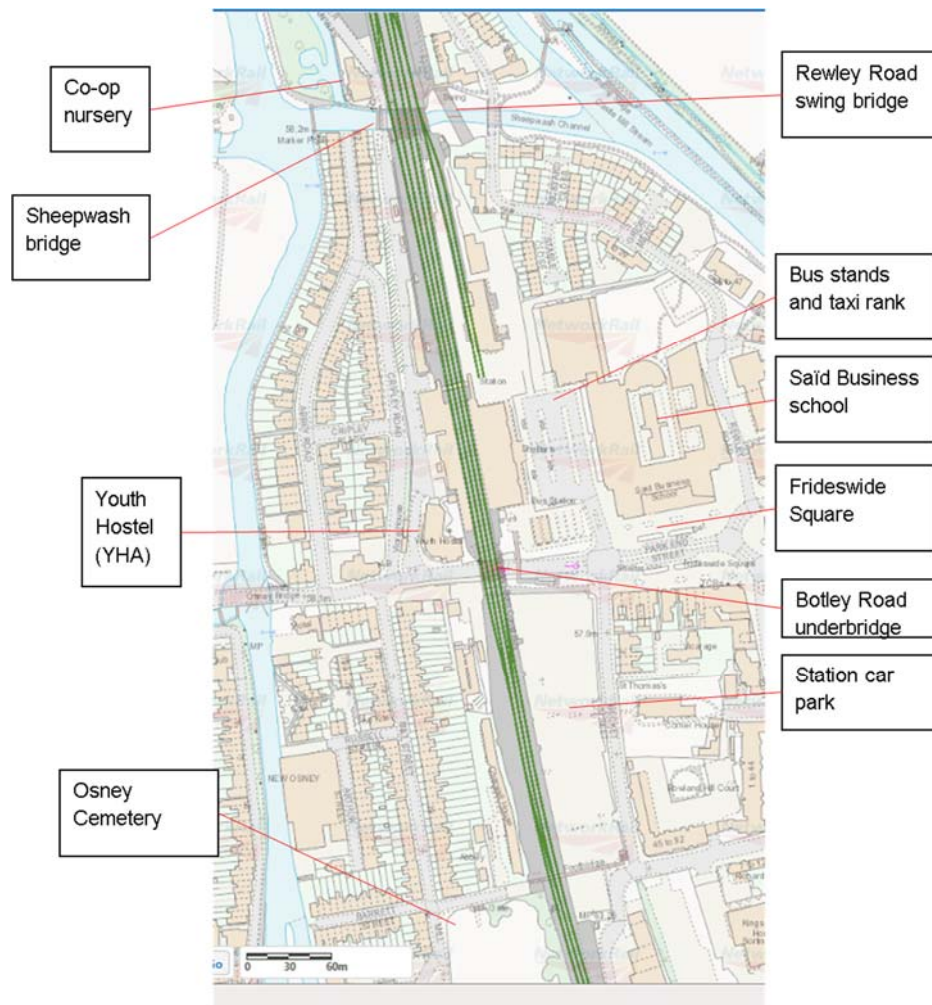


Figure 19 - Oxford station area map

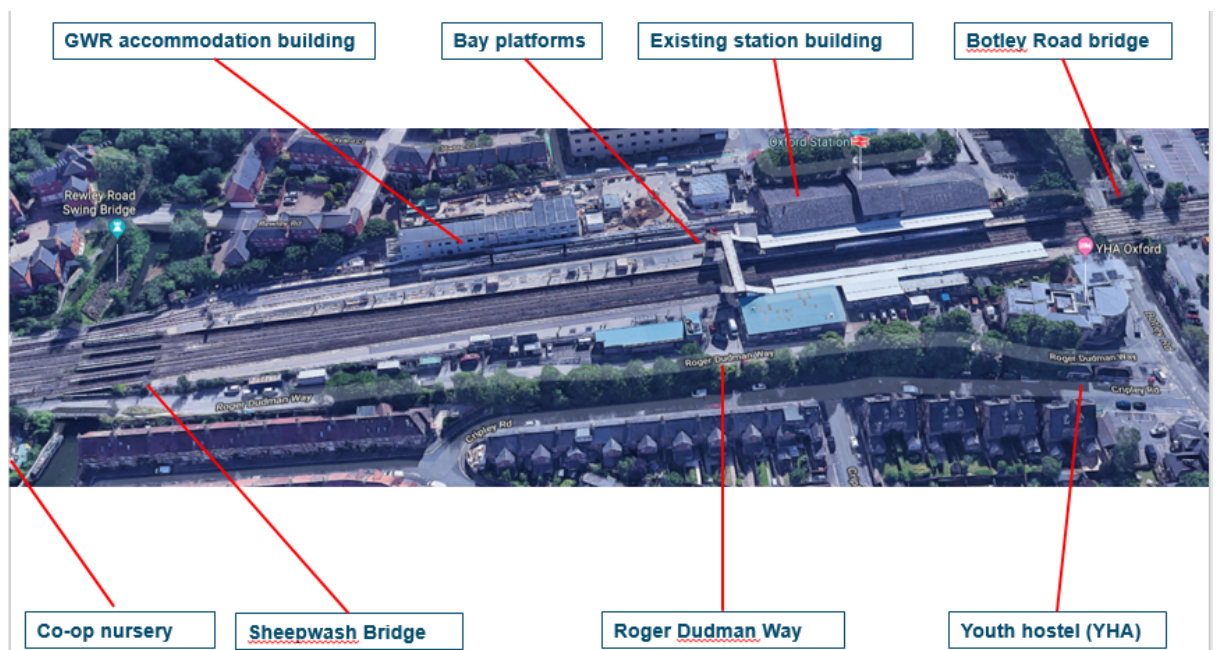


Figure 20 – Oxford Station aerial photo

2.3. Issue 2 - Oxford North Junction

With the introduction of the December 2019 timetable, Oxford North Junction has reached full capacity and cannot accommodate the further service enhancements set out in the 2024 train service specification.

2.3.1. Current situation

Oxford North Junction is where the lines to Bicester and Bletchley meet the lines to Banbury and Worcester, and thus is the point at which East West Rail services will join the Oxford corridor. Oxford North Junction and the Bletchley lines were redoubled as part of Oxford Corridor phase 0+1, which allowed the introduction of passenger services towards London Marylebone. That project provided switches and crossings (S&C) that allowed trains travelling to and from Bicester to join the Up Oxford Relief at 75mph, the same speed as the plain line track. However, the S&C that allows trains to move across the other lines at the junction were not upgraded from 25mph. This means that trains travelling from the Down Oxford main line and Down Oxford Relief (i.e. Platform 4) at Oxford towards Bicester, and vice versa, must slow down to cross the junction, and therefore increase the amount of time that they block the junction. This then prevents other trains from travelling south through the Oxford corridor, as shown at Figure 21.

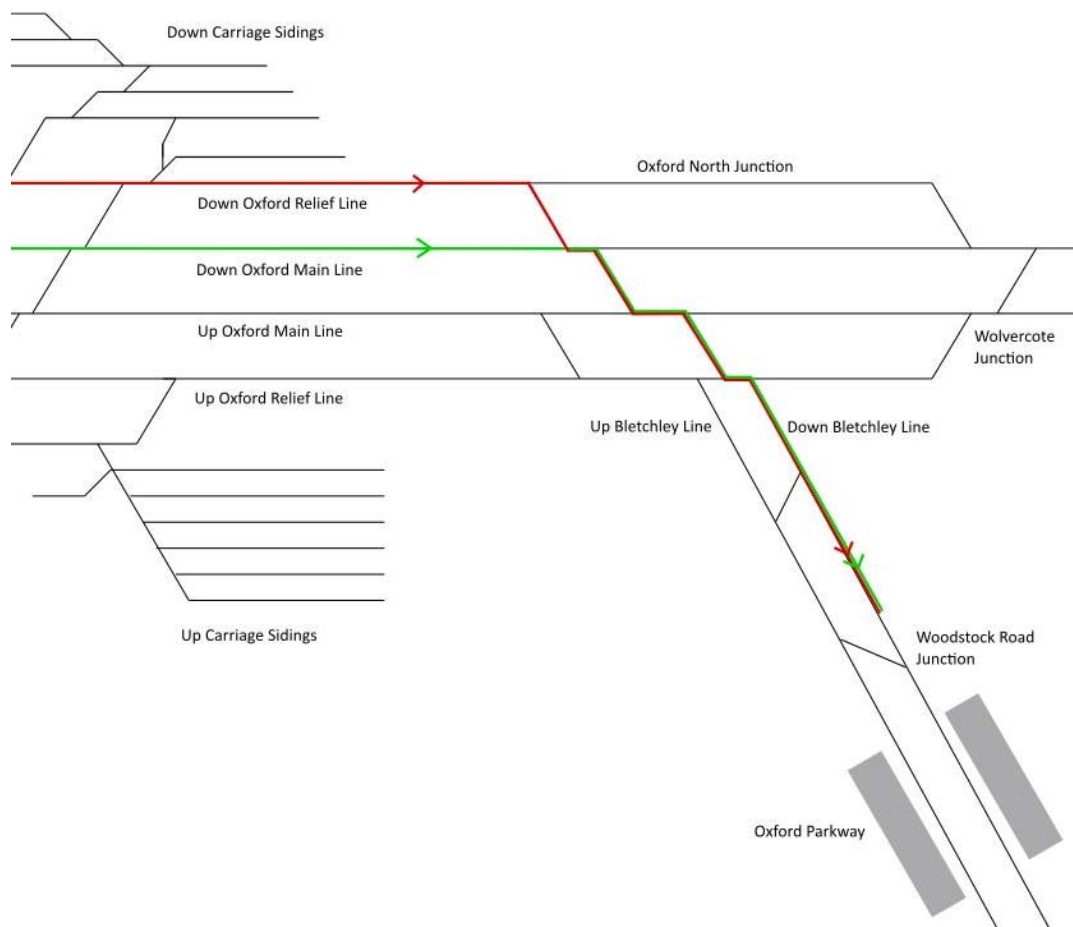


Figure 21 - Example of crossing moves at Oxford North Junction

Network Rail has undertaken capacity modelling that demonstrates that Oxford North Junction is unable to accommodate the enhanced service provision set out in the 2024 train service specification, principally because there are insufficient windows of opportunity for additional East West Rail services to cross the junction reliably. The timetable modelling has demonstrated that whilst it is theoretically possible to accommodate two additional East West Rail trains, this will significantly increase the number of moves made across the junction with no spare time to account for running behind schedule (known as a minimum margin). This increases the performance risk associated with a timetable, as late running trains will more regularly delay other services. The performance risk associated with introducing two East West Rail services on the existing infrastructure will mean it is likely that train paths for new services cannot be offered in the timetable at Oxford. This will also prevent the diversion of freight paths via East West Rail that would reduce journey times to some freight terminals in the Midlands, and provide a path between east coast ports, south Wales, and the west of England which avoids London.

2.3.2. Constraints

The railway line at Oxford North Junction is in close proximity to a conservation area and is within a view of Oxford over the Thames floodplain that is protected in Oxford's Local Plan. Port Meadow, which borders the railway line to the west, also serves as extensive flood storage for the city of Oxford and is indicative of the high water table in the area. Taken together, these constraints make it unfeasible to remove all conflicts between trains by grade separation of Oxford North Junction, either through a flyover or dive under.

The critical position of the Oxford corridor in the rail network means that delays in this area are felt across the entire network. This will increase further when East West Rail and services through the Crossrail Central Operating Section commence, as delays in Western Route will be more readily transferred to North West & Central and Eastern Regions. Adding additional services into the timetable without additional infrastructure would worsen this situation and lead to additional delays on all service groups that interface with EWR. This has been assessed by EWR to be equivalent to a 1.5% reduction in the Public Performance Measure (PPM - the rail industry key performance indicator for delays) on all service groups, indicating very significant additional delays.

2.4. Issue 3 - Wolvercote North Junction – Aynho Junction

The plain line track is at full capacity and cannot accommodate the further service enhancements set out in the 2024 train service specification.

2.4.1. Current situation

On the track between Wolvercote North Junction and Aynho Junction, trains are only permitted to pass every 7 minutes in each direction (i.e. a 7-minute headway) because of the risk associated with level crossings between Wolvercote North Junction and Tackley. The signalling system was upgraded during Oxford Corridor Phase 1 to allow trains to pass every 4 minutes, however this functionality could not be enabled because of the unacceptable increase in risk that a greater frequency of trains would present at 3 level crossings. Network Rail Western Route's Level Crossing managers have stated that no additional train paths will be permitted until the level crossing are closed. A time-limited 'mask' was therefore applied to downgrade the signalling system until the risk is reduced at those level crossings. As trains do not turnback in the section between Wolvercote

North Junction and Aynho Junction, this localised restriction imposes a constraint on the entire section. The ‘mask’ cannot remain indefinitely, as it will lead to additional safety and performance risks due to mixing of signal aspect sequences, and the amount of redundant (i.e. new) equipment in location cases. To prevent an increase in the risk at these crossings, the Level Crossing managers have also indicated that they would object to any planning applications that would be expected to increase the traffic across the crossings. This includes an existing application for 2000 homes near Begbroke, which would require the closure of Sandy Lane level crossing to proceed.

Capacity modelling has demonstrated that the 2024 train service specification cannot be accommodated without a reduction in the signalling headways from 7 minutes to 4 minutes in this section. Specifically, this restriction applies to the introduction of additional freight paths as the additional flexibility provided by lower headways increases the likelihood that train paths in this section align with available capacity at other constrained parts of the Oxford corridor, such as at Oxford North Junction or Oxford Station. 7-minute headways would also preclude the introduction of further service enhancements in this area, such as the proposed Midlands Engine Rail service to Birmingham Moor Street stations and the third-party aspiration for a station at Begbroke.

The application of a mask to the Oxford Corridor Phase 1 signalling system in this area also prevents the realisation of other benefits. The existing levels of demand for rail freight mean that an extremely high overall weight of traffic is transported on the track through the Oxford corridor, much of it at night when paths are available in the timetable. This creates a significant issue, as it increases the rate of wear on the infrastructure and the required maintenance frequency, whilst at the same time reducing the time available to carry out maintenance. Increasing demand for freight will lead to a further increase in annual tonnage which will mean the only access available, on Saturday nights, will be insufficient to maintain the railway. The masked signalling system has a provision for bi-directional running on both lines between Wolvercote North Junction and Tackley, so commissioning of bi-directional signalling will allow one track to be closed to traffic overnight during the week for engineering works whilst the other track remains open.

This will also reduce the necessity for engineering staff to work on the railway whilst trains are running, by providing more regular, safer opportunities to access the track. There would still be a need to undertake some work with the line open to traffic, but it would enable more work to be completed in safer working environments.

Bi-directional signalling will also give greater operational flexibility between Wolvercote North Junction and Tackley in the event of an incident. Should one line be blocked, trains can continue to pass on the other line, which will allow the railway to return to normal operation more quickly after an incident. The controls of the level crossings in this area are also very unreliable, so closing the crossings will improve reliability through this section.

2.4.2. Constraints

The constraints in this section are particular to each level crossing:

Sandy Lane (DCL 67m 79ch)

This crossing is on a minor, but busy road that provides an alternative to the major road network for journeys between the large town of Kidlington and the village of Yarnton. It is the 6th highest risk crossings on Network Rail’s Western Route and is approached by a 90-degree bend in the road

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to the west of the railway. Any evidence that indicates that the risk at this level crossing has heightened, such as an accident or near miss, the only available solutions would be either closure or the crossing converted to a full barrier crossing, as the use of staff to supervise the crossing would potentially introduce a further risk rather than providing a mitigation. An aerial photo of the level crossing is at Figure 22, and a map of the wider area is at Figure 24.



Figure 22 - Sandy Lane Level Crossing aerial photo

Yarnton Lane (DCL 67m 41 ch).

This level crossing provides the only metalled road access to a house to the east of the railway from the nearby village of Yarnton. Beyond the house, an untarmacked lane runs for 1km before joining a metalled road in Kidlington. To the west, the crossing is bordered by a sports field. The signalling controls for this crossing are interlinked with Sandy Lane, so both crossings would need to be closed at the same time. An aerial photo of the level crossing is at Figure 23, and a map of the wider area is at Figure 24.



Figure 23 - Yarnton Lane level crossing aerial photo

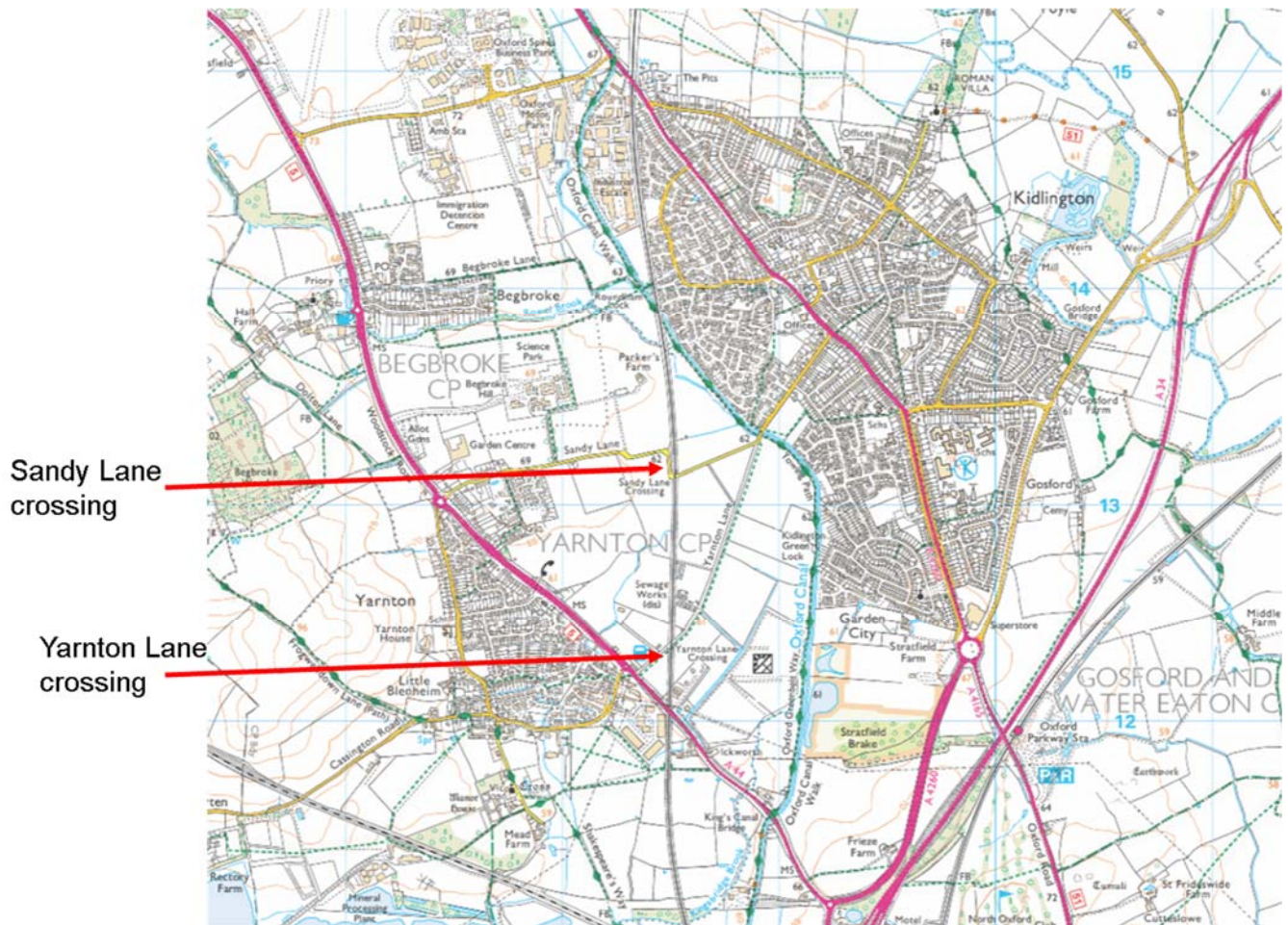


Figure 24 - Map of Yarnton Lane and Sandy Lane level crossings, including Kidlington and Yarnton.

Tackley Station Crossing (DCL 72m 48ch).

This crossing carries a brideway across the railway to the south of Tackley station, providing access to the platform for trains from Banbury towards Oxford and a brideway that links the village with Kirtlington and the Oxford Canal. An aerial photo of the crossing and station is at Figure 25 with a map of the wider area at Figure 26. A fatality occurred at the crossing in 2008, which is ranked in the 10 riskiest crossings on Network Rail's Western route and is a priority for closure. A temporary footbridge is currently planned to be installed to allow the closure of the crossing on a temporary basis. As the crossing is for a brideway, a route suitable for horses will need to be provided to allow the permanent closure of this crossing. An incident was narrowly avoided at this crossing in October 2019, which has resulted in Network Rail positioning a person near the crossing on a permanent basis to reiterate its safe use until the temporary footbridge can be constructed.

Funding has been identified for the closure of this crossing as part of the route's plans to reduce risks at level crossings, so the cost of closure of this crossing has been excluded from the cost detailed in the economic and financial cases.

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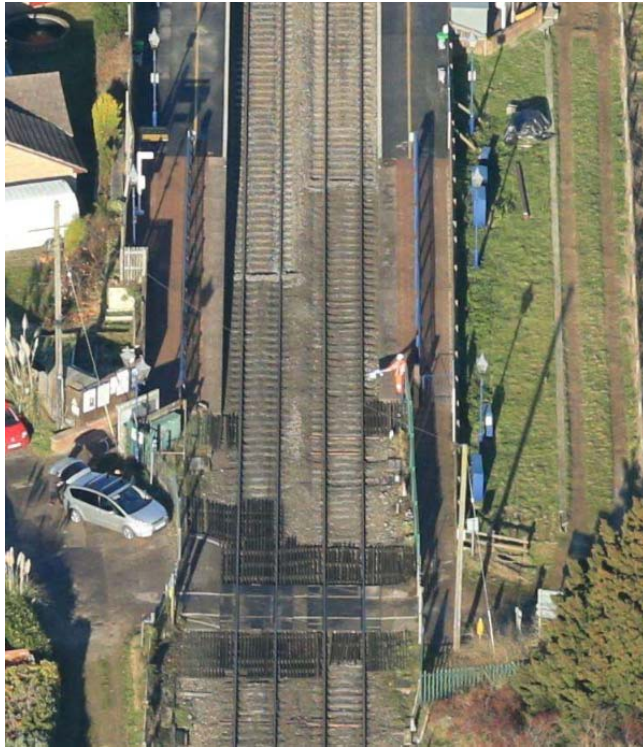


Figure 25 - Aerial photo of Tackley Station and crossing



Figure 26 – Map of Tackley station and surrounding public rights of way

2.5. Impact of not changing

In Section 1, the Strategic Context, the forecast growth in demand for rail services was laid out, along with the additional services that will be required to accommodate it up to 2033. Without the correction of all 3 issues outlined in paragraphs 2.2, 2.3, and 2.4 the 2024 train service specification cannot be accommodated, so services will remain as per the December 2019 timetable. The service enhancements that could not be accommodated are:

- 2 train per hour (tph) East West Rail Milton Keynes to Oxford
- 0.5 tph Chiltern Railways Birmingham Moor Street – Oxford
- 2 freight train path per hour (ftpph) Oxford North Jn – Didcot North Jn (off peak only)

Beyond 2024, further infrastructure works will be necessary prior to 2027 to accommodate planned new services, however they will also be reliant on infrastructure proposed in Oxford Corridor Phase 2.

It is key to recognise that the additional EWR services set out above have been identified as the requirement to meet central government and Local Authority plans for growth across the whole of the Oxford-Cambridge arc. East West Rail has recently received a Transport and Works Act Order from the Secretary of State for Transport to enable construction to commence on the western section of the route, which will enable the introduction of passenger services to Bletchley and Milton Keynes. Without the correction of the issues identified above the following outcomes will result:

- Overcrowding will worsen at Oxford station, particularly in peak time. This will require an infrastructure intervention to alleviate congestion. The station will be non-compliant across four areas:
 - Platform clearance time
 - Station entrance congestion
 - Vertical transportation queueing onto the station footbridge
 - Emergency evacuation
- Slow and unreliable road journey times in the area, particularly on the A34 and routes into Banbury, Bicester, and Oxford. As an example, the Oxfordshire Local Transport plan forecasts 25 % more commuter trips into the city by 2031 under a do-nothing approach.
- Additional complexity of the delivery of the Oxford Station masterplan, which requires a western entrance to deliver the improvements to the east
- Reduced accessibility and connectivity to Oxford's West End, a major area of city centre regeneration, which has the potential to support 9,700 net additional jobs county-wide
- Perpetuation of suppression of economic growth in Oxfordshire caused by road and rail transport networks that are at, or above, capacity.
- Additional lorries on the strategic road network between Southampton and the Midlands, with an associated negative impact on air quality along the route.
- A need to remove future proofing from the signalling system between Wolvercote North Junction and Heyford.
- Enduring level crossing risk between Wolvercote North Junction and Tackley
- Enduring lack of maintenance access leading to accelerated asset degradation.
- Continued delay awaiting platforms at Oxford

2.6. Objectives

To solve the problems identified above, the following objectives have been identified that a scheme in the Oxford corridor must resolve:

- Provide platform capacity at Oxford to accommodate an additional 3 trains per hour by 2024. This is to allow the introduction of East West Rail and Chiltern Railways services and provide improved connectivity to Banbury, Birmingham, and through the Oxford-Cambridge Arc in support of planned housing growth.
- Provide pedestrian flows through the station that are compliant to industry standards for existing and forecast demand growth to 2043, to reduce the safety risk in the station to acceptable levels and support the attractiveness of rail as a transport mode.
- Support the future redevelopment of the east side of the station by providing an additional entrance in 2024, along with additional pedestrian flow capacity and passenger amenities to support the attractiveness of rail as a transport mode.
- Catalyse major adjacent development opportunities in Oxford's West End, alongside the station development including Oxpens, Osney Mead Innovation Quarter, Island site and Beckett Street car park.
- Provide segregated cycleways through Botley Road underbridge and improved bus clearance, delivered prior to 2025 to align with available LEP funding, to enable a modal shift from cars to active and public modes of transport from West Oxford.
- Provide capacity at Oxford North Junction to accommodate an additional 3 tph in each direction by 2024, to allow the introduction of additional services in support of planned housing growth. The performance risk associated with the junction should not increase.
- Improve freight train path utilisation between Southampton and the West Coast main line by removing barriers to growth between Wolvercote North Junction and Tackley.
- Provide capacity between Wolvercote North Junction and Aynho junction to accommodate an additional 3 tph in each direction by 2024, to provide connectivity improvements from the south of Oxfordshire to Banbury and Birmingham.
- Provide end-to-end journey time improvement by 2024, to support the attractiveness of rail as a transport mode and encourage a modal shift to public transport.
- Reduce level crossing risk between Wolvercote North Junction and Tackley station, to improve safety and reduce instances of misuse of railway crossings.

Section 3. Options

The following options are considered in this business case:

- Do nothing - continue to maintain the existing asset
- Do minimum
 - Renewal of life expired assets
 - Completion of elements deferred from CP5
 - Signalling headway reductions and level crossing closures between Wolvercote North Junction and Aynho Junction
- Enhancement – a project to deliver:
 - Additional platform and station entrance at Oxford
 - Completion of elements deferred from Oxford Corridor Phase 1

- Signalling headway reductions and level crossing closures between Wolvercote North Junction and Aynho Junction
- Speed increase across Oxford North Junction
- Highway improvements under Botley Road bridge
- Improved connectivity between the station and the creation of nearly 10,000 new jobs in Oxford's Global Business District and surrounding county, allowing the possibility of at-scale car-free commuting

3.1. Do-nothing – Continue to maintain the existing asset

In this option, no work will be carried out in the Oxford Corridor. This reflects the impact of not changing set out above, and will have the following implications:

Asset reliability

Much of the infrastructure in the Oxford area remains within its design life so does not require immediate renewal. Oxford North Junction was last renewed in the mid-2000s, so would not be scheduled for renewal until CP9. It is therefore feasible to continue to maintain the asset in its current state with acceptable levels of performance with the existing timetable.

The exception to this is 9139 points, a crossover between the Down Oxford Relief and Down Oxford Main at the north end of Platform 4 which is beyond the end of its normal asset life. If this crossover is retained it would be expected to require an enhanced level of maintenance and more frequent asset failures. This is the only existing crossover that allows trains to move from Platform 4 to the Bletchley Lines, and any failures will impact on one of only 2 through platforms at Oxford.

The level crossings at Sandy Lane and Yarnton Lane are scheduled for renewal between 2028 and 2033. Due to the high safety risk at these crossings, if they cannot be closed at the time of renewal they would require an upgrade to MGB-OB type crossings.

The 'masking' of the signalling system north of Wolvercote North Junction will need to be addressed, with the underlying system returned to a system to support 7-minute headways. Leaving the enhanced functionality will not be acceptable, as it will lead to additional safety and performance risks due to mixing of signal aspect sequences and the amount of redundant (i.e. new) equipment in location cases.

The high volume of traffic and limited opportunities for maintenance will mean the condition of the track will steadily worsen, leading to additional failures, the imposition of temporary speed restrictions, and poor performance.

Operational flexibility

Improvements to operational flexibility provided by an additional platform would not be achieved, so trains would continue to be held outside of Oxford station whilst waiting for a platform to become available.

Future service enhancements

As set out in Section 2, no future service enhancements will be achievable under this option, including East West Rail services from Milton Keynes to Oxford.

Journey time improvement

No journey time improvement through the station will be achieved and will likely worsen along with the increase in passenger numbers.

Platform overcrowding

Forecast growth in passenger numbers will lead to increasingly unsafe levels of overcrowding in Oxford station. Platform 4 already breaches the emergency evacuation time limits and overcrowding in normal use will become unacceptable. Passengers will continue to bunch near the footbridge on Platform 4 due to the lack of a full canopy, leading to extended dwell times to allow passengers to board.

3.2. Do Minimum – Renewal of life expired assets and correction of non-conformances

Work that could be considered for funding through Network Rail's determination for Operations, Maintenance, and Renewals will be delivered, alongside the close out of non-conformances from previous phases of work funded through the CP5 enhancement determination. This option will differ from the Do Nothing in the following ways:

Asset reliability

The performance risk and enhanced maintenance required on 9139 points will mean that the crossover will need to be renewed in its existing location at the same speed. The benefit of this option over the Do-nothing option is that new, modern standard infrastructure would be installed which would reduce the risk of asset failures, performance impacts as well as reducing the costs (both time and monetary) of having to maintain the crossover.

Level crossings will be closed between Wolvercote North Junction and Tackley to enable the removal of the time limited 'mask' and commissioning of the signalling system between Wolvercote North Junction and Heyford. This will remove the restriction on freight growth imposed by safety concerns at the Level crossings.

Platform overcrowding

A tactical intervention will be required on Oxford station Platform 4 to alleviate unsafe levels of overcrowding. This is likely to take the form of the extension of the canopy along the entire platform, an additional gate line to Roger Dudman Way, which would then be removed at a later date should Platform 5 be built. This would be after an anticipated increase in passenger numbers so would make overcrowding more difficult to manage during the construction of a new platform.

Completion of CP5 works

A number of items of scope will be delivered that were deferred to CP6 following the Hendy review into the deliverability of CP5 enhancements. These include the removal of the now redundant Oxford panel signal box, completion of platform works on Platform 4.

The following benefits will remain unrealised under this option:

- Improved operational flexibility will not be provided
- No improvement to the crossing speed between the Down Oxford Relief and Down Oxford Main.

- No journey time improvement will be available through the station
- No service enhancements will be possible

3.3. Preferred option – Enhancement

The interconnected nature of the railway system in the Oxford Corridor means that to solve the central problem of insufficient capacity for the required growth across Oxfordshire and the Oxford-Cambridge Arc, all three core issues identified in Section 2 must be resolved. The preferred option will address these issues in full, delivering the benefits set out in full in Section 5 below. These include, but are not limited to:

- Journey time improvements
- Additional services
- Greater operational flexibility
- Reduced overcrowding.

The proposed scope is:

- A new downside platform at Oxford station to form a second face to the existing Platform 4, including additional waiting facilities, toilets, and retail units and construction of a new canopy along the platform length.
- New track connections to the Down Oxford Relief Line from Platform 5, including the renewal of 9139 points, which will allow trains to leave both Platform 4 and 5 at the same time.
- A new western station entrance from Roger Dudman Way, off Botley Road.
- Develop a new span over Botley Road to accommodate the additional downside platform. This will incorporate highways improvements to provide a segregated cycleway and footpaths and improve the road gradient and clearances below the bridge to allow the use of normal height double decker buses and passive provision for an additional span to the east. These works are partially funded by OxLEP, as a part of the wider redevelopment of Oxford's west end, which has an overall BCR of 4.²⁵
- Speed increase of 3 crossovers at Oxford North Junction. The existing 9169 and 9165 crossovers will be remodelled close to their existing locations, whilst a new crossover from the Down Oxford Relief to the Down Oxford Main will be provided 550m north of 9139 points, to allow trains departing Platform 4 to accelerate prior to crossing the junction.
- Closure of level crossings between Wolvercote North Junction and Tackley.
- Commission 3-aspect signalling between Wolvercote North Junction and Heyford, with bidirectional signalling between Wolvercote North Junction and Tackley.

Artist's impressions of the proposed western station entrance and Botley Road underbridge are included at Figure 27 and Figure 28.

²⁵ PWC Impact appraisal of Oxford station and the West End, Draft issued October 2019

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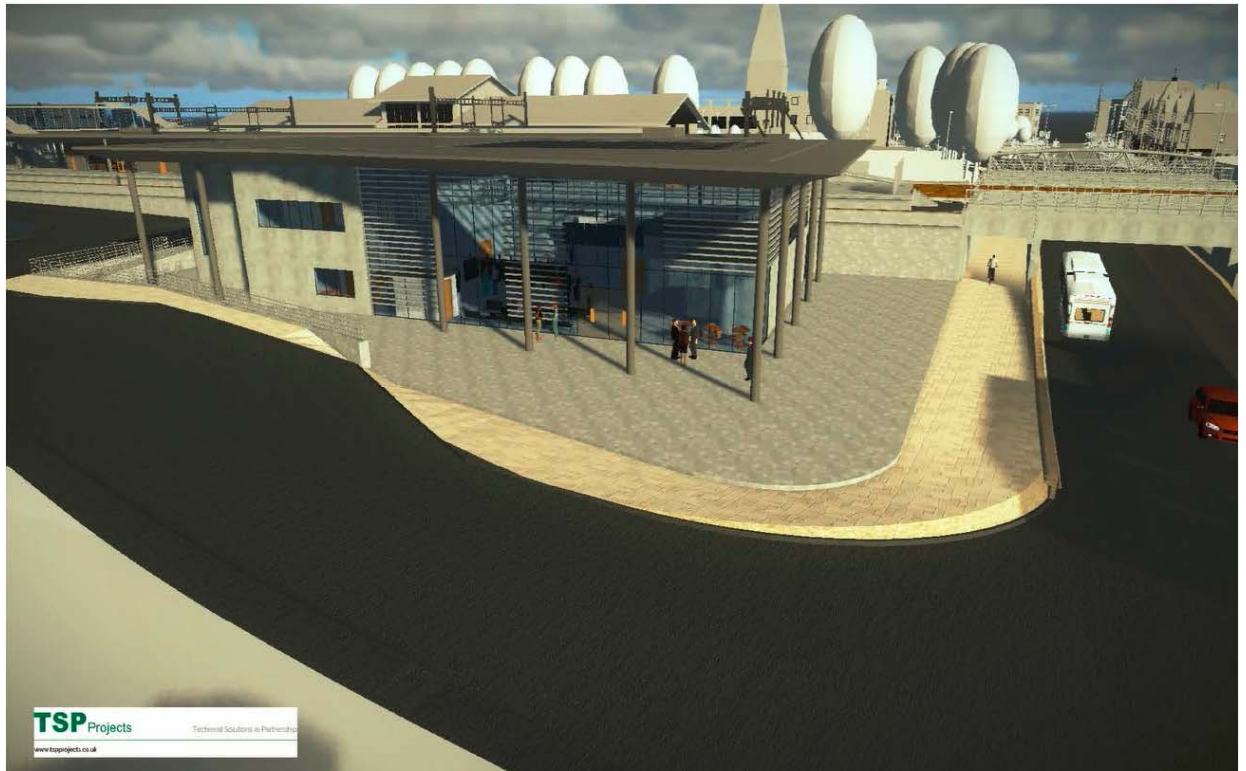


Figure 27 - Western entrance looking east



Figure 28 - Botley Road bridge looking east

3.4. Options Comparison

Table 2 below sets out a detailed comparison of the three options .

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Table 2 - Option comparison

| Option | Scope | Not in Scope |
|---|--|--|
| Preferred option: Enhancement | <ul style="list-style-type: none"> • A new downside platform at Oxford station to form a second face to the existing Platform 4, with associated renewal of 9139 points. • A new western station entrance from Roger Dudman Way, off Botley Road. • Develop a new span over Botley Road to accommodate the additional downside platform. This will incorporate highways improvements to provide a segregated cycleway and footpaths and improve the road gradient below the bridge • Speed increase of 3 crossovers at Oxford North Junction. The existing 9169 and 9165 crossovers will be remodelled close to their existing locations, whilst 9139 points will be replicated around 550m north, away from its current position at the north end of Platform 4, to allow trains departing Platform 4 to accelerate to line speed. • Closure of level crossings between Wolvercote North Junction and Heyford. • Commission 3-aspect signalling between Wolvercote North Junction and Heyford, with bidirectional signalling between Wolvercote North Junction and Tackley. • Completion of CP5 works to demolish Oxford Panel signal box and complete platform works on Platform 4. | All items of scope are delivered in this option |
| Do-Minimum: Renewal and correction of non-conformances | <ul style="list-style-type: none"> • Renewal of 9139 points in existing location • Intervention to alleviate impact of overcrowding on Platform 4, including platform canopy extension and new gateline to Roger Dudman Way. • Completion of CP5 works to demolish Oxford Panel signal box and complete platform works on Platform 4. | <ul style="list-style-type: none"> • A new downside platform at Oxford station to form a second face to the existing Platform 4. • A new western station entrance from Roger Dudman Way, off Botley Road. • Develop a new span over Botley Road to accommodate the additional downside platform. This will incorporate highways |

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| Option | Scope | Not in Scope |
|----------------------------|---|---|
| | <ul style="list-style-type: none"> Closure of level crossings between Wolvercote North Junction and Heyford. Commission 3-aspect signalling between Wolvercote North Junction and Heyford, with bidirectional signalling between Wolvercote North Junction and Tackley. | <p>improvements to provide a segregated cycleway and footpaths and improve the road gradient below the bridge</p> <ul style="list-style-type: none"> Speed increase of 3 crossovers at Oxford North Junction. The existing 9169 and 9165 crossovers will be remodelled close to their existing locations, whilst 9139 points will be replicated around 550m north, away from its current position at the north end of Platform 4, to allow trains departing Platform 4 to accelerate to line speed. |
| Do-Nothing: Maintenance | <ul style="list-style-type: none"> Enhanced maintenance of 9139 points Responsive crowd management on Platform 4 | <ul style="list-style-type: none"> A new downside platform at Oxford station to form a second face to the existing Platform 4, with associated renewal of 9139 points. Neither a new western station entrance from Roger Dudman Way, off Botley Road nor an intervention to alleviate impact of overcrowding on Platform 4, including platform canopy extension and new gateline to Roger Dudman Way. Develop a new span over Botley Road to accommodate the additional downside platform. This will incorporate highways improvements to provide a segregated cycleway and footpaths and improve the road gradient below the bridge Speed increase of 3 crossovers at Oxford North Junction. The existing 9169 and 9165 crossovers will be remodelled close to their existing locations, whilst 9139 points will be replicated around 550m north, away from its current position at the north end of Platform 4, to allow trains departing Platform 4 to accelerate to line speed. Closure of level crossings between Wolvercote North Junction and Heyford. Commission 3-aspect signalling between Wolvercote North Junction and Heyford, with bidirectional signalling between Wolvercot North Junction and Tackley. Completion of CP5 works to demolish Oxford Panel signal box and complete platform works on Platform 4. |

3.5. Options Assessment

These options have been assessed against the following factors to provide clear reasoning as to why the chosen option has been selected:

- New journey options
- Built environment
- Reliability
- Connectivity to jobs and housing
- Reduced platform congestion

| Option | New journey options | Built environment | Reliability | Connectivity to jobs and housing | Platform overcrowding alleviated | Overall number of Yes |
|--|---|--|--|--|--|-----------------------|
| Preferred option: Enhancement | Yes – provides additional capacity which allows the introduction of additional services beyond the December 2019 timetable | Yes – contributes to highways improvements and the Oxford station masterplan, improving the built environment | Yes – renews life expired assets which present a performance risk | Yes – new services enabled aligned with Oxfordshire H&G plan and Ox-Cambridge Arc | Yes – existing forecast of overcrowding and additional services | 5 |
| Do-Minimum: Renewal and additional gate line | No – new journeys across the Oxford Corridor and Oxford-Cambridge arc cannot be accommodated | No – Oxford station access and Botley Road remain unimproved | Yes – renews life expired assets which present a performance risk | No – no new services can be introduced with existing layout. Overcrowding on trains will act as an increasing disincentive to rail travel | Yes – interventions completed on Platform 4 to alleviate overcrowding | 2 |

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| | | | | | | |
|----------------------------|---|---|--|--|--|---|
| Do-Nothing: Maintenance | No – new journeys across the Oxford Corridor and Oxford-Cambridge arc cannot be accommodated | No – Oxford station access and Botley Road remain unimproved | No – enhanced maintenance required on 9139 points to maintain performance, with a heightened risk of failures. Unreliable level crossing controls will remain. | No – no new services can be introduced with existing layout. Overcrowding on trains will act as an increasing disincentive to rail travel | No – Levels of overcrowding on the platform and stairs will reach unacceptable and increasingly unsafe levels, particularly in the morning peak, together with non-compliant platform evacuation times. | 0 |
|----------------------------|---|---|--|--|--|---|

Section 4. The Preferred Option - Enhancement

4.1. Outcomes delivered by the preferred option

As set out above, the Enhancement option has been selected as the most appropriate solution to the capacity issues identified in this document. The outcomes delivered by this option are:

- Establish 50 % more through platform capacity at Oxford, enabling future service introductions through East West Rail and greater operational flexibility.
- Estimated 3-minute journey time improvement for passengers using Platform 4 travelling west on Botley Road. This has been estimated as 10 % of passengers using the station.
- Reduce sectional running time by 2 minutes through Oxford North Junction, providing additional capacity and reduced junction reoccupation times.
- Extensive public realm improvements aligned with the Oxford Station master plan, to act as an enabler for a move from cars to active and public modes of transport.
- Reduction in level crossing risks at 3 level crossings north of Oxford, including 2 crossings in the top 10 riskiest crossings on Western Route.
- Support electrification through Oxford station, by rebuilding a canopy on Platform 4 that would be non-compliant which includes OLE stanchions.
- Provide sufficient track capacity to enable further service enhancement north of Wolvercote North Junction when other constraints are removed. This would include the proposed Midlands Engine Rail service to Birmingham Moor Street and a third-party aspiration for a station at Begbroke
- Providing connectivity and accessibility to Oxford's West End, accelerating the creation of thousands high value, productive growth in the city centre and wider county.
- Enabler for development of the east side of the station by provision of an additional station entrance for use during construction works.

This scheme is Phase 2 of a scheme that was originally planned for completion in CP5, as part of the Oxford Corridor project. This element of the scheme was deferred to CP6 in the Hendy Review and to align with the introduction of East West Rail at Oxford. The previous business case, at the end of GRIP 2 identified a standalone BCR of 1.5 for Phase 1 and 2 of the Oxford Corridor Capacity Improvement Scheme. Following consultation with the ORR and DfT it was agreed to create a portfolio business case to capture benefits from this scheme that are attributed to other schemes. Due to the degree of flux within the EWR scope and business case at the time it was not possible to include EWR within the portfolio business case. The benefits and costs of the Oxford Corridor scheme were amalgamated with the SFN CP5 train lengthening project and due to the high socioeconomic value of freight paths achieved a BCR in excess of 4.0. The BCR for the Phase 2 scheme as it currently stands sits between 2.85 and 3.39, therefore representing a High VfM business case under DfT criteria.

4.2. Other scope

In addition to the core scope outlined in Paragraph 3.3 there are smaller requirements and packages of work that are not detailed, such as associated asset discipline work which enables the core scope that is included in this business case. However, the cost for this work is included in the AFC for the scheme.

Chief amongst these other requirements is the integration with a new subway proposed in the Oxford Station Masterplan promoted by Oxford City Council that will deliver long term station capacity improvements. A stub connection has been provided as part of the new western entrance design which aligns with the architectural plans for the Masterplan full length subway.

Negotiations have also taken place with a development partner for the provision of a commercial development in conjunction with the new western station entrance, to take the opportunity to maximise the potential of the area without relying on public funding. The commercial development built alongside the western entrance is intended to incorporate the relocation of the youth hostel.

4.3. Project maturity

The preferred option has progressed through the required stages of Network Rail's project lifecycle, "Governance of Rail Investment Projects" (GRIP), and other associated governance set out in further detail in the management case. This includes the completion of Cabinet Office Gateway Papers at the appropriate stages of the procurement process.

To date, the project has completed GRIP Stage 3 Option Selection. and is nearing the completion of GRIP Stage 4 Single Option Development and will continue into the remaining stages should a Joint Decision to Deliver be made. This will start with GRIP 5 Detailed Design.

4.4. Delivery timescale

As part of the detailed development work completed as part of GRIP 4, a planned delivery programme has been established in the Engineering Access Statement, subject to routine ongoing negotiations with train and freight operating companies.

The proposed level crossing closures and headway improvements will be completed in 2022, with Oxford North Junction scheduled for 2023. Works at Oxford Station are due to be completed in 2024 following a 4-day closure in July 2023, which will incorporate a closure of Botley Road during the bridge reconstruction. This has been scheduled during the summer following discussions with the operators and the local authority to minimise disruption to road users, rail passengers, and freight customers, and to ensure that the infrastructure in Oxford is ready for the introduction of East West Rail services in the December 2024 timetable.

This track access has been deconflicted with disruption that would be caused by other major engineering works expected on Western route such as the proposed Western Rail Link to Heathrow and the construction of an interchange station with HS2 at Old Oak Common. If construction is delayed the engineering access would need to be planned around the proposed access for those projects in 2024.

4.5. Key risks and mitigations

The risks associated with the delivery of the preferred option are set out in further detail in the Management case, along with the processes by which these are controlled. However, there are several key issues that impact on the strategic viability of the project which are set out here:

4.5.1. Integration with East West Rail

Whilst not the sole factor, a key driver for the enhanced service specification set out in this strategic case are the additional services proposed by East West Rail across the Oxford-Cambridge Arc, which at the time of writing are subject to a separate business case submission. If the proposals for East

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West Rail do not proceed, the business case for the Oxford Corridor Phase 2 may need to be revisited, with the likelihood being that an alternative scheme would be required. However, the constraints around Oxford station set out above mean that any future scheme would be unlikely to differ to a great extent. It should be noted that the economic case for the scheme does not include direct East West Rail benefits.

The integration between the two business cases is being managed by the Department for Transport, who will monitor progress across both proposals.

4.5.2. Consents

The tight constraints on the expansion of Oxford station detailed in paragraph 2.2.2 above mean that an application will be made to the Secretary of State for Transport for a Transport and Works Act order, to give powers to construct the additional platform and station entrance, make compulsory purchases of the land occupied by the youth hostel and other land strips (if not agreed by negotiation earlier), to allow diversion of Roger Dudman way, and to provide planning permission for the whole scheme.

If the TWA order is not accepted or causes the delay of the proposed implementation date the infrastructure will not be ready for the introduction of East West Rail services. Funding to seek acceptance of the TWA order is being sought through this business case, so the timescales for sign off is being managed jointly between the Department for Transport and Network Rail.

4.5.3. Availability of additional funding

The works to Botley Road bridge and the associated highways improvements are part funded by OxLEP, with a requirement to deliver works before 2025. Should delivery of the project be delayed a new funding request will be required, potentially leading to funds being unavailable for the proposed highway improvements, which are integral to the wider design solution.

Similarly, funding for the commercial development associated with the new station entrance is linked to the proposed delivery date so may not be available should the programme be delayed. The scheme would revert to an entrance without this commercial development, which will miss the opportunity to maximise the potential of this land. The central scenario analysed in the economic case excludes this development, and therefore represents an opportunity for the scheme.

Network Rail are working closely with the Department for Transport and the local authority to mitigate the risk of delay to the scheme. As is set out in paragraph 4.6 below, stakeholders are supportive of the proposals outlined in this business case.

4.6. Stakeholder views of option

The full detail on stakeholder management is included in the management case, however at this stage it should be noted that the proposals align with key strategic priorities of national, regional, and local stakeholders.

Wider government priorities have been established in the Conservative Party 2019 General Election manifesto, which recognised that we need to make sure homes are built in a way that makes sense for the people already living in the area and for the families moving in: ***“Infrastructure first. We***

will amend planning rules so that the infrastructure comes before people move into new homes.”²⁶ The Conservative Party manifesto also set out a plan for an English Devolution White Paper in 2020 which will set out plans for further devolution of power across England, to give towns, cities and communities of all sizes across the UK real power and real investment to drive the growth of the future and unleash their full potential.²⁷ Without Oxford Corridor Phase 2, the 100,000 homes planned by Oxfordshire’s local authorities as part of a forecast million new homes in the Oxford - Cambridge arc to drive growth will not be supported by rail services through the Oxford corridor and will lack the connectivity to join the separate areas of the Arc into a coherent whole.

Oxford Corridor Phase 2 also contributes to the objectives of various DfT strategies:

- Single Departmental Plan
 - support the creation of a stronger, cleaner, more productive economy
 - help to connect people and places, balancing investment across the country
 - make journeys easier, modern and reliable
 - make sure transport is safe, secure and sustainable
- Transport Investment Strategy
 - Create a more reliable, less congested, and better-connected transport network that works for the users who rely on it.
 - Build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities.
 - Enhance our global competitiveness by making Britain a more attractive place to trade and invest
 - Support the creation of new housing.
- Rail Network Enhancements Pipeline
 - Keeping people and goods moving smoothly and safely;
 - Offering more: New and better journeys and opportunities for the future
 - Delivering the benefits from committed programmes and projects already underway

The proposal aligns with the policy of the Office of Rail and Road, the rail industry’s safety regulator, which has enforcement powers under the Health and Safety at Work Act 1974 equivalent to those of the Health and Safety Executive. Their policy on level crossings recognises that *“Great Britain’s level crossing safety record is among the best in the world, but every incident has the potential for significant human and economic loss. Level crossings are the single biggest source of railway catastrophic risk, but overall the risks are well managed... Risk control should, where practicable, be achieved through the removal of level crossings and replacing them with bridges, underpasses or diversions.”*²⁸

Oxford Corridor Phase 2 aligns with the priorities that Network Rail’s Western Route has identified as its stakeholders’ priorities for CP6, to grow the economy through rail, to reduce journey times, and to invest in stations. It also aligns with the Network Rail’s overarching safety vision of Everyone

²⁶ Conservative Party Manifesto 2019, pp 31

²⁷ Conservative Party Manifesto 2019, pp 29

²⁸ ORR Level Crossing policy, <https://orr.gov.uk/rail/health-and-safety/infrastructure-safety/level-crossings/level-crossings-policy>, accessed 30/01/2020

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Home Safe Everyday, by reducing level crossing risk and improving the availability of track access. It has broad support by all the Train and Freight operating companies who use the Oxford Corridor.

At a local level, the scheme enjoys broad support from local stakeholders, who recognise the importance of the additional services and public realm improvements that will be delivered by the scheme. The scheme features high on the list of schemes established by the Oxfordshire Growth Board in its Oxfordshire Infrastructure Strategy, included at Table 3 (with rail schemes highlighted in bold). The implementation of the Oxford station masterplan, including the elements included in this scheme are 6th on the list (highlighted in amber).

Table 3

| OxIS Assessment – Top 20 Oxfordshire Schemes | OxIS Score |
|---|------------|
| Didcot to Oxford Capacity Improvement | 25 |
| Didcot Garden Town – Central Didcot Corridor | 25 |
| Science Vale Cycle Network | 25 |
| A40-A44 Link Road | 24 |
| A34 Short Term Upgrades (Botley & Peartree junctions and Traffic Management) | 24 |
| Oxford station redevelopment Phases 2 and 3 (including replacement of the Botley Road Bridge) | 23 |
| Didcot Parkway Station Upgrade | 23 |
| Science Vale, Didcot – new Science Bridge & A4130 Capacity | 23 |
| Culham to Didcot Strategic Link | 23 |
| Science Transit Rapid Transit Network Line 3 including new Sandford Park & Ride | 22-29 |
| Upgrade Cowley Rail Line to provide passenger services including new stations at Oxford Business & Science Parks | 22 |
| Didcot East Junction Grade Separation | 22 |
| A34 Lodge Hill P&R and Lorry Park | 22 |
| Cotswold Line Upgrade Phase 1 (including Hanborough Station) | 21 |
| Culham Station Redevelopment | 21 |
| A40 Corridor Stage 2 (Witney to Eynsham) | 21 |
| Bicester Western Perimeter Route | 21 |

| | |
|--|-------|
| Wantage/Grove Station and new inter-regional service | 20 |
| Science Transit Rapid Transit Network Line 1 including new A44 P&R | 19-22 |
| Science Transit Rapid Transit Network Line 2 including Thornhill P&R expansion | 19-23 |

Section 5. Benefits to passengers and customers

5.1. Measures for success

The key measure for the success of Oxford Corridor Phase 2, on which the realisation of the benefits identified below are predicated, is the offer of paths in the December 2024 timetable that align with the 2024 train service specification set out in Figure 16.

5.2. Railway benefits realised in the short-term

The following table sets out the short-term benefits of implementing the preferred option. Short-term is defined as being the realisation of the benefits within 1-3 years of the infrastructure being commissioned

| Benefit | Description |
|--|--|
| Journey Time Improvements | <p>The provision of an additional through platform and station entrance enables a journey time improvement of 3 minutes for 5 % of passengers walking between Platform 4 and 5 and the west of the station. This will apply to nearly a million passengers a year by 2024.</p> <p>Separately, the speed increase through Oxford North Junction will provide a 2 minute journey time improvement on 3 trains an hour throughout the day.</p> |
| Enable increase in utilisation of existing freight paths | The closure of level crossings north of Oxford will allow additional trains to make use of available freight paths. |
| Enable EWR service enhancement | Timetable analysis has demonstrated that additional capacity is required to enable the introduction of East West Rail services. Implementing the preferred option will act as a key enabler for this, also for future service enhancements including additional services to Birmingham and the North Cotswolds. |
| Resilient performance | <p>The combined impact of the proposals in Oxford Phase 2 will improve the operational flexibility of the Oxford corridor, and therefore performance against the timetable by allowing recovery from incidents.</p> <p>An additional through platform at Oxford station will reduce the occasions on which trains are held outside the station waiting for a platform and will allow greater options to recover from incidents that prevent the use of one of the existing through platforms.</p> <p>The increased line speed at Oxford North Junction will reduce the number of moves through the junction that are timetabled at a minimum margin, which import significant risk into the timetable.</p> |

| Benefit | Description |
|--------------------------|---|
| | <p>Signalling upgrades north of Wolvercote North Junction will allow single line working in response to asset failures between Oxford and Tackley, and will allow trains to be pathed closer together, which will improve the recovery from incidents. This will particularly benefit long distance CrossCountry services, mitigating the spread of delays to Scotland, the North, and the South Coast.</p> <p>Level Crossing closures will reduce the levels of disruption associated with incidents at level crossings with significant economic impact, from both misuse of the crossings and infrastructure failures related to unreliable assets.</p> |
| Maintenance improvements | The introduction of bidirectional signalling between Wolvercote North Junction and Tackley will allow routine engineering works to be scheduled in predictable time periods during the working week. This allows more efficient scheduling of maintenance tasks, by reducing the amount of work that needs to take place at weekends. This is particularly important because of the very high tonnage transported on this section of railway. |
| Safety improvements | <p>Closure of three level crossings, particularly the 2 high risk crossings, will lead to a safer railway. Level crossings are the single biggest source of catastrophic train accident risk, accounting for nearly half the total risk.²⁹</p> <p>The ability to undertake maintenance work midweek will reduce the requirement to inspect and maintain the railway whilst lines are open to the passage of trains.</p> <p>Alleviation of overcrowding in Oxford station, which is forecast to reach unacceptable levels in normal operation 2022 and already exceeds acceptable levels for emergency evacuation, will lead to a safer station environment for passengers and staff.</p> |

5.3. Railway benefits realised in the longer term

The following table sets out the long-term benefits provided by the preferred option:

| Benefit | Description |
|---|--|
| Enabling further service enhancement beyond the introduction of EWR | <p>Oxford Phase 2 is a key enabler for further service enhancements that will support housing and economic growth in Oxfordshire, which have been identified in the strategic study of rail in Oxfordshire outlined in the Section 1, above.</p> <p>Without these enhancements the forecast levels of growth will lead to increased levels of overcrowding and constrain the potential for passenger growth, particularly on services across Oxfordshire following the implementation of district council Local Plans.</p> |

²⁹ ORR Level crossing, <https://orr.gov.uk/rail/health-and-safety/infrastructure-safety/level-crossings>, accessed 30/01/2020

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| Benefit | Description |
|---|---|
| Enabler for electrification from Didcot to Oxford | Provision of platform canopies compliant with electrification which include canopy supports which double as electrification stanchions. |
| Passive provision for station masterplan | <p>The new station entrance at Oxford will include provision for a connection with a subway identified in the Oxford Station Masterplan.</p> <p>Oxford Phase 2 will also provide passive provision for an additional platform line across Botley Road to the east of the existing lines.</p> <p>Enables construction of another platform on the east of the station, through provision of an additional station entrance for use during construction works.</p> |

5.4. Wider benefits

The following sets out the wider benefits that Oxford Phase 2 would provide, beyond those directly associated with the railway system.

| Benefit | Description |
|---|---|
| Reductions in road congestion | <p>By encouraging a modal shift away from road freight to rail a proportion of HGVs can be removed from the entire strategic road network from Southampton to the Midlands.</p> <p>Within Oxfordshire and the Oxford-Cambridge Arc, better connectivity and end to end journey times will encourage a modal shift for commuting away from private cars, which will reduce levels of congestion on both local roads and the strategic road network.</p> |
| Enabler for proposals for Oxford's West End | Through enabling the provision of an additional platform to the east of the station, Phase 2 will also enable a wider redevelopment of the station area and the wider West End of Oxford, which has been assessed to have a BCR of 4. |
| Enabler of housing and employment growth | <p>Central government recognised in its City Deal with Oxfordshire that pressure on the transport system is inhibiting wealth creation and economic growth. The NIC have identified that if infrastructure improvements are not carried out across the Oxford-Cambridge Arc, then the new homes that are required will not have the capacity and connectivity to public transport to maximise the economic benefit of providing additional housing.</p> <p>The enhancement of the Oxford corridor is a key enabler for the future service improvements that will ensure that new housing developments and employment locations across the county have the enhanced connectivity they require, which will in turn drive economic growth and improved productivity.</p> |
| Encourage switch to active transport modes | Improved highways and footpath provision will encourage more people to cycle and walk into the centre of Oxford, including associated health benefits. |
| Air quality improvement | The enabling of reduction in road congestion and number of vehicles on the roads will improve air quality across Oxfordshire. |

Oxford Corridor Phase 2 Strategic Case
Version 0.04

| Benefit | Description |
|-----------------------|---|
| | This will support local authority plans for the reduction of emissions in the City of Oxford. |
| Decarbonisation | By acting as an enabler for other rail proposals, Oxford Phase 2 will contribute to decarbonisation, and government's target of net zero by 2050 by encouraging the move away from private cars, the most energy inefficient mode of transport. |
| Improved road safety | The segregation of cyclists from motor vehicles under Botley Road bridge together with the widening of the dangerously narrow northern pavement will reduce accidents under the bridge. |
| Local Authority buses | The ability to use standard height double decker buses will reduce procurement costs for buses on this route and allow more efficient use of the fleet through interworking between routes. |