Appendix A OAR

Didcot Garden Town HIF1

Option Assessment Report (OAR)

Oxfordshire County Council

Final

September 2021

Quality information

Prepared by	Checked by	Verified by	Approved by
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Glossary

ANPR: Automatic Number Plate Recognition
AONB: Area of Outstanding Natural Beauty
AQMA: Air Quality Management Area
BCR: Benefit Cost Ratio
BRT: Bus Rapid Transit
CPO: Compulsory Purchase Order
CSC: Culham Science Centre
DCLG: Department for Communities and Local Government
DfT: Department for Transport
DoS: Degree of Saturation
DRT: Demand Responsive Transport
EA: Environment Agency
ETI: Evaluation of Transport Impacts
EAST: Early Assessment and Sifting Tool
GWML: Great Western Main Line
GWP: Great Western Park
GWR: Great Western Railways
HGD: Housing and Growth Deal
HGV: Heavy Goods Vehicle
HIF: Housing Infrastructure Fund
HRA: Habitats Regulation Assessment
IMD: Indices of Multiple Deprivation
LIS: Local Industrial Strategy
LSOA: Lower Super Output Area
LTN: Local Transport Note
LTP4: Connecting Oxfordshire Local Transport Plan 4
MSOA: Middle Super Output Area
NH: National Highways
NIA: Noise Important Areas
NIS: National Infrastructure Strategy
NMU: Non-Motorised User
NPPF: National Planning Policy Framework
OAR: Options Assessment Report
OCC: Oxfordshire County Council
OSM: Oxfordshire Strategic Model
OXIS: Oxfordshire Infrastructure Strategy
OxLEP: Oxfordshire Local Enterprise Partnership
PCT: Propensity to Cycle Tool
PROW: Public Right of Way
RFC: Ratio to Flow Capacity
SAC: Special Area of Conservation
SEP: Strategic Economic Plan
SODC: South Oxfordshire District Council
SVCN: Science Vale Cycle Network
TAG: Transport Appraisal Guidance
tph: trains per hour
VoWHDC: Vale of White Horse District
WCHAR: Walking, Cycling and Horse-Riding Assessment

1. Introduction

1.1 Background

1.1.1 The 'Access to Science Vale' Option Assessment Report (OAR) Part 1 was completed by Oxfordshire County Council (OCC) in March 2018 and documented Steps 1 to 6 of the Department for Transport's (DfT) Transport Appraisal Process (TAP 2018 Figure 1-2). Subsequently, 'Access to Science Vale' OAR Part 2 was produced by OCC in August 2019, to document the remaining steps (Steps 7 to 9) of the Transport Appraisal Process, address the remaining requirements for the OAR not covered in Part 1, summarise the development and assessment of the potential options suggested in Part 1, and provide a clarification of the methodology and scope for further appraisal for the scheme to be taken forward.

1.1.2 The combined OARs (Parts 1 & 2) describe the process of analysing transport challenges, defining area-specific objectives and assessing potential interventions to tackle the identified challenges.

1.1.3 OCC has continued to refine the transport elements within Science Vale and Didcot Garden Town. Given OCC's objective to set out a robust and evidence-based audit trail for the preferred options and scheme designs, OCC has commissioned AECOM to produce a new OAR, reflecting the updated evidence base and options developed more recently, including consideration of multi-modal transport options which have not been considered previously, which will replace the existing Part 1 and Part 2 OARs. The previous OARs nevertheless contain a wealth of information which will be referenced throughout this OAR; therefore this document does not fully replicate all content from the previous OARs but should be read as a standalone document.

1.2 Project Context

1.2.1 Science Vale spans both South Oxfordshire District Council (SODC) and Vale of the White Horse District Council (VoWHDC), within the county of Oxfordshire. It is home to a significant proportion of the region's scientific, research and development, and high technology businesses. The region is gaining an international reputation as a first-choice location for companies wanting to make their mark in business and research. The area has two Enterprise Zones and new businesses relocating to these areas can benefit from business rates discounts, superfast broadband, and simplified planning[1]. In future years, the Science Vale area will see extensive effort undertaken into innovative, high technology research and development. It is one of the anchors of the Oxfordshire Knowledge Spine which underpins the strategy set out in the Oxfordshire Strategic Economic Plan.

1.2.2 The area extends south from Oxford across to Didcot, clustered broadly around the A34, GWML and Oxford-Didcot railway route. Science Vale comprises the towns of Didcot (including Milton Park and Didcot Power Station), Wantage and Grove, together with the established research centres at Culham Science Centre and Harwell Campus and the area between these settlements. The area shown in Figure 1-1 includes the boundaries of Science Vale.

[1] https://www.sciencevale.com/about/

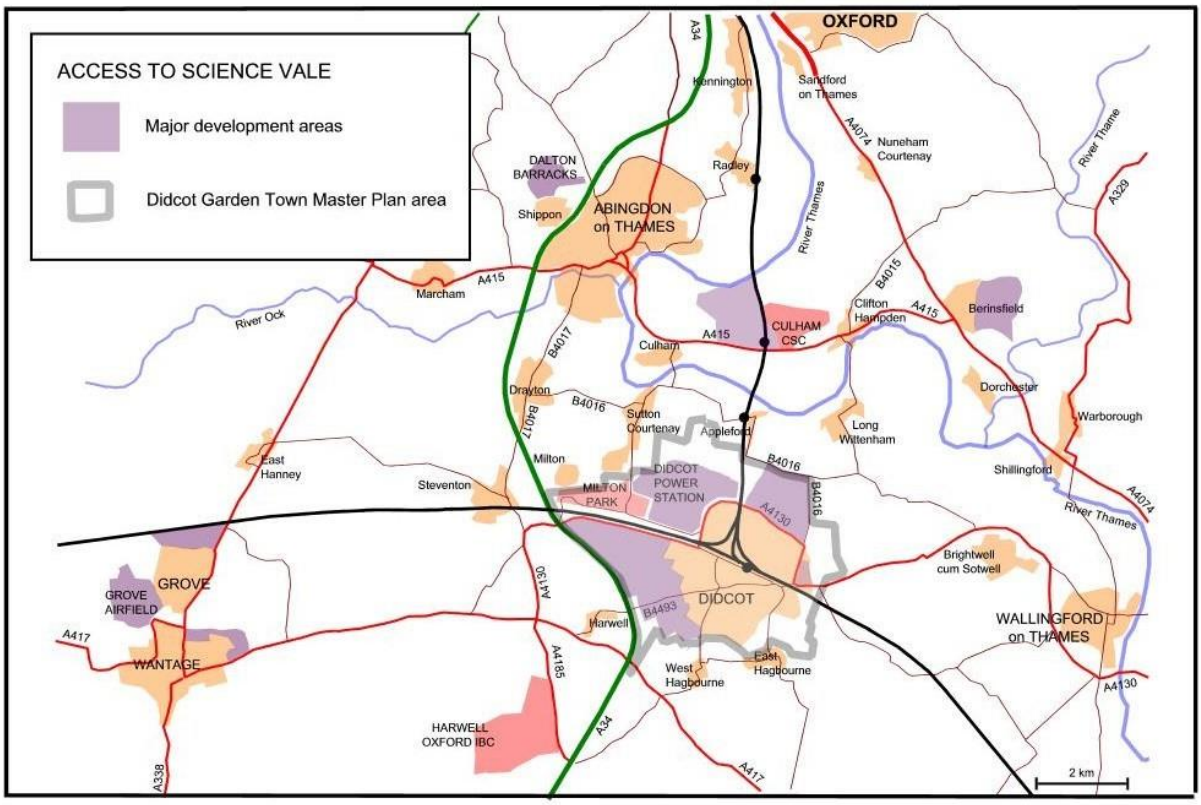

Figure 1-1 Didcot Garden Town within Science Vale

Source: Access to Science Vale OAR Part 1 (OCC, 2018)

1.2.3 At present, Oxfordshire is a prosperous and vibrant county, combining a successful and thriving economy with a high-quality environment. Oxfordshire has committed to the delivery of 100,000 new homes between 2011 and 2031, as identified within the 2014 countywide Strategic Housing Market Assessment and the five districts' Local Plans.

1.2.4 Science Vale's development is directly influenced by the development plans in South Oxfordshire and Vale of White Horse as well as the commitment to the Housing and Growth Deal by the six Oxfordshire local authorities. The SODC Local Plan 2035 covers the area between south-east Oxford, Didcot and just north of Reading. The plan was adopted in December 2020 and outlines the district's housing need of 18,600 additional homes between 2020 and 2035. Furthermore, Oxford City's unmet housing need of 4,950 additional homes leads to South Oxfordshire having to deliver a total of 23,550 additional homes within the plan period to cover for the area's shortfall in houses.

1.2.5 The VoWHDC Local Plan 2031 covers the area from north and west of Didcot including the settlements of Chilton, Wantage, Harwell, Milton, Abingdon and the A4130 corridor. Part 1 of the Local Plan was adopted in December 2016 and Part 2 was adopted in October 2019 and outlines the housing need across the district. Part 1 of the Local Plan identifies an additional 20,560 homes required within the plan period (2016 – 2031), and Part 2 of the Local Plan identifies that an extra 2,200 homes are required to assist Oxford City with meeting its housing needs, totalling to 22,760 homes delivered within the plan period.

1.2.6 The HIF Business Case submitted by OCC in 2019 identified that Didcot is a key centre of growth for enterprise locally and has been designated as a Garden Town growth area (Figure 1-1). The Business Case also recognises the existing constraints on the highway network in Didcot. If left unresolved, the business case considered these issues could pose significant barriers to the growth and prosperity of the region. Therefore, in order to support growth in Science Vale, the business case recommended that improvements are required to the transport network to enhance access to the area.

1.2.7 Several documents were produced by OCC in support of the HIF bid, including the Access to Science Vale OAR Part 1 (March 2018), as well as the Didcot Microsimulation Model: Didcot HIF Option Appraisal (February 2019). Although, this Didcot Garden Town HIF1 OAR replaces the previous Access to Science Vale OARs, references to these issued documents are made throughout this OAR .

1.3 Scheme Development

1.3.1 AECOM has been commissioned by OCC to carry out an optioneering exercise to identify possible solutions to address the current and future issues in Didcot and Science Vale.

1.3.2 This OAR presents the findings of the optioneering exercise and will include option development and sifting in accordance with the DfT Early Assessment and Sifting Tool (EAST) Guidance.

1.3.3 The COVID-19 pandemic has caused uncertainty in travel demand, with its impact shown in road-based and public transport systems, active travel (walking and cycling) mode share and others. Some of the impacts are likely to be short term, but others may alter overall travel patterns and behaviours for ever. To account for these uncertainties, relevant recent policies and literature published during the COVID-19 pandemic have been reviewed briefly and their relevance has been considered to the options, such as the DfT's Gear Change: A bold vision for cycling and walking report (2020)[2] and its implications on scheme design.

1.4 Report Purpose

1.4.1 This OAR describes the option development process, setting out the decision-making process that was used to reach the shortlisted options to be taken forward to public consultation and for further assessment.

1.4.2 This report sets out the study context; provides details of the adopted approach; discusses current and future conditions, and objectives for the study; provides details of the long list of options to address identified challenges; sets out the criteria for the initial sifting of the long list; and summarises the results of the sifting and scoring (which will be updated over time based on workshops, consideration of stakeholder views, and updated modelling).

1.5 Report Structure

1.5.1 This OAR follows the DfT Transport Appraisal Guidance (TAG), as illustrated in DfT's Transport Appraisal Process (TAP) (Figure 1-2). It provides a summary of Steps 1 to

[2] DfT (2020). https://www.gov.uk/government/publications/cycling-and-walking-plan-for-england

6 as described in Stage 1– Option Development of the appraisal process, whilst reviewing and if necessary updating or supplementing the work undertaken to date.

1.5.2 Following this introductory section, this report is structured as follows:

- Section 2: Policy Context
- Section 3: Current and Future: Context and Conditions
- Section 4: Development of Scheme Objectives
- Section 5: Option Development and Sifting
- Section 6: Phase 1: Initial Sift
- Section 7: Phase 2: EAST Appraisal and Scoring
- Section 8: Phase 3 and 4: Sub-Options
- Section 9: Summary

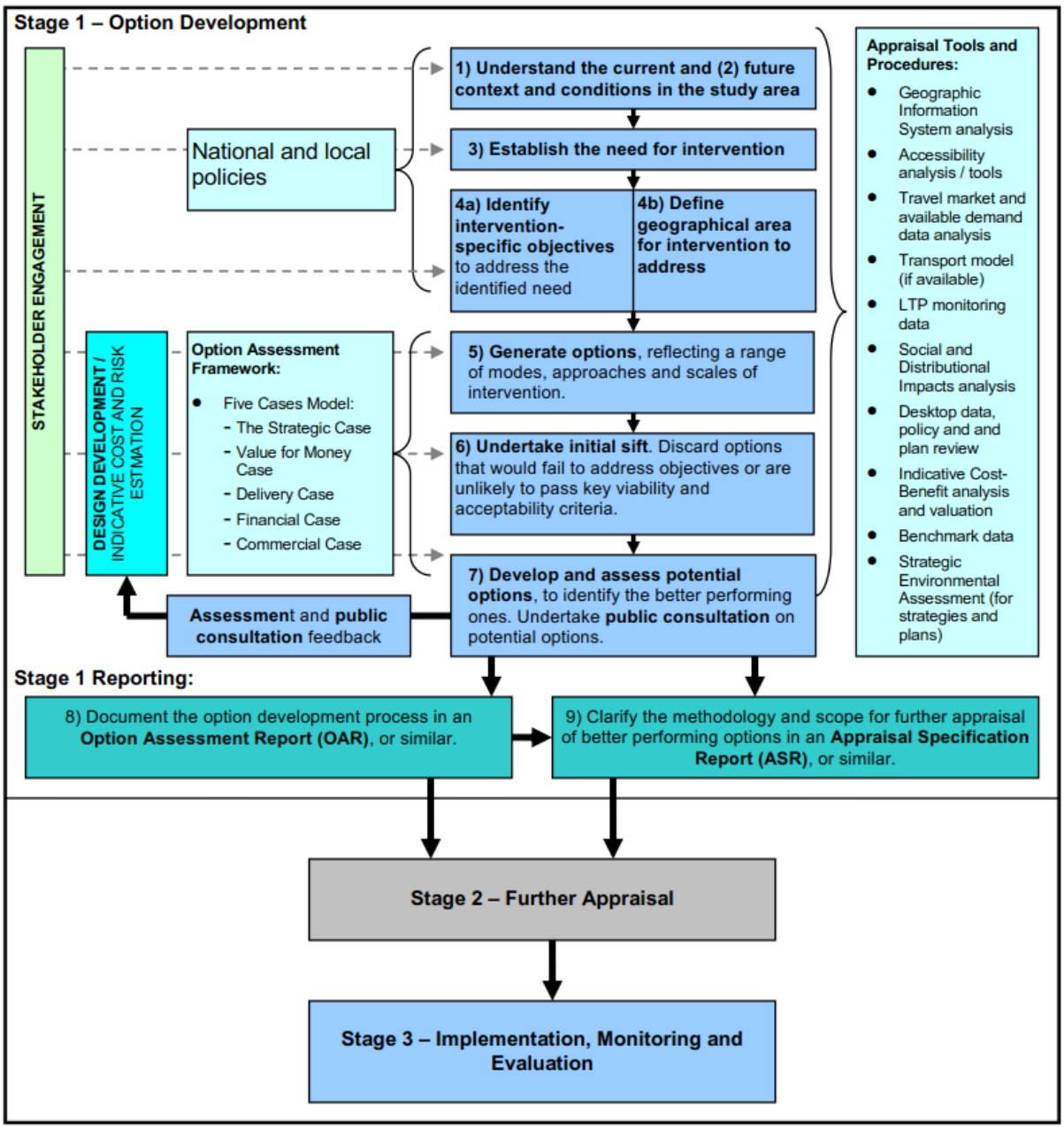

Figure 1-2 DfT's Transport Appraisal Process

Source: Transport Appraisal Process (DfT, 2018)

2. Policy Context

2.1 Introduction

2.1.1 A review of relevant national, regional and local policies (a selection of the most pertinent ones is included in Table 2-1) was undertaken to identify key policy goals for the area surrounding Didcot Garden Town and Science Vale. This review also identifies whether existing policies and programmes are in favour of interventions in these circumstances. This review has informed the development of the scheme objectives (see Section 4). The full list of referred documents can be found in Appendix A.

Table 2-1 List of reviewed key policies

National			
National Planning Policy Framework, Ministry of Housing, Communities & Local Government; Green Book; National Infrastructure Strategy, HMT	Industrial Strategy White Paper, Department for Business, Energy & Industrial Strategy	Transport Investment Strategy; Gear Change: A bold vision for cycling and walking report; A better deal for bus users; Department for Transport	Housing White Paper – Fixing Our Broken Housing Market; Climate Change Guidance, Department for Communities and Local Growth
Regional			
Strategic Economic Plan for Oxfordshire 2016, Oxfordshire Local Enterprise Partnership	Connecting Oxfordshire: Local Transport Plan 2015-2031, Oxfordshire County Council;	Oxfordshire Infrastructure Strategy; Local Industrial Strategy; Oxfordshire Investment Plan; Oxfordshire's Housing and Growth Deal, Oxfordshire County Council	
Local			
South Oxfordshire Local Plan (2015 – 2035); Vale of White Horse Local Plan (2016 – 2031); Didcot Garden Town Delivery Plan	Bus and Rapid Transit Strategy; Active and Healthy Travel Strategy; Science Vale Transport Strategy. Oxfordshire County Council	Clifton Hampden Neighbourhood Plan (draft); East Hagbourne Neighbourhood Plan (adopted); Sutton Courtenay Neighbourhood Plan (under preparation); Valley Park, Didcot; North East Didcot	

2.2 National Policies

2.2.1 At a national level, Government policy endeavours to balance the need to deliver economic growth for a growing population, increased housing demand and increasingly congested transport networks with a longer-term vision of a sustainable and carbon neutral economy, making better use of available capacity and technology. These are reflected in the National Planning Policy Framework (NPPF), Industrial Strategy White Paper, the Housing White Paper, and the Department for Transport's (DfT) Transport Investment Strategy. The objectives of these and other national policies, that are found to be complemented by the development plans for Didcot and Science Vale, are discussed next.

2.2.2 The **NPPF**[3] seeks to promote sustainable transport and states that significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. Some of the relevant NPPF objectives to Didcot and Science Vale include:

- Delivering a sufficient supply of homes and supporting development (NPPF Section 5);
- Promoting healthy and safe communities through e.g. cycle connections (NPPF Section 8); and
- Considering the presence of Air Quality management areas and clean area zones (NPPF Section 15).

2.2.3 The **Industrial Strategy**[4] states that the availability of high-quality infrastructure is essential for continued growth and prosperity. The Strategy's vision for a transformed economy is centred around productivity, and infrastructure is identified as one of the five foundations of this. Improvements to the transport network across Science Vale and Didcot Garden Town can, therefore, be assumed to align well with this objective.

2.2.4 The **Housing White Paper**[5] – Fixing Our Broken Housing Market (2017) sets out initiatives that strive to reach a step-change in housing supply in England, which also aligns with the Science Vale's development aspirations, within which lies Didcot Garden Town. The four key proposals contained within the housing strategy refer to:

- Planning for the right homes in the right places;
- Building homes faster;
- Diversifying the market; and
- Helping people now.

2.2.5 The **National Infrastructure Strategy**[6] (NIS) (2020) focuses on 'fairer, faster, greener' and the importance of "levelling up" investment across all regions in the UK. The NIS recognises the long-term impact of infrastructure, but also the short-term benefits, especially in relation to rebuilding the economy following the COVID-19 pandemic. In addition, the NIS seeks to address long-term issues which have held back infrastructure, such as insufficient funding outside of London, slow adoption of new technology and project delivery delays and overruns. As such, improvements to the transport network in Didcot will provide both short-term and long-term benefits to Science Vale and help achieve the key aims of the NIS.

2.2.6 The role of transport in supporting local growth is highlighted in the **DfT's Transport Investment Strategy**[7], which states that transport investment must seek to create a better and more reliable transport network in order to build a stronger, more balanced economy, enhance productivity and respond to local growth priorities. Its objectives are to:

- Create a more reliable, less congested, and better-connected transport network that works for the users who rely on it;

[3] NPPF (2019) https://www.gov.uk/government/publications/national-planning-policy-framework--2
[4] Industrial Strategy (2017) https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future
[5] Housing White Paper – Fixing our Broken Housing Market (2017) https://www.gov.uk/government/publications/fixing-our-broken-housing-market
[6] National Infrastructure Strategy (2020) https://www.gov.uk/government/publications/national-infrastructure-strategy
[7] Transport Investment Strategy (2017) https://www.gov.uk/government/publications/transport-investment-strategy

- Build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities;
- Enhance the global competitiveness by making Britain a more attractive place to trade and invest; and
- Support the creation of new housing (the Housing White Paper recognises transport infrastructure as one of the keys to unlocking development and delivering places where people want to live).

2.2.7 The **Gear Change: A bold vision for cycling and walking**[8] report (2020) aims to see a step-change in cycling and walking in the coming years. The report notes that increasing cycling and walking can help tackle some of the most challenging issues faced by society: improving air quality, combatting climate change, improving health and wellbeing, addressing inequalities and tackling congestion. This will help create better connected, healthier and more sustainable communities.

2.2.8 This document is accompanied by the DfT's new 'Cycle Infrastructure Design: Local Transport Note (LTN) 1/20'. Whilst the 'Gear Change' report sets out the DfT's aims and vision for the future, the more detailed LTN 1/20 document provides the practical advice to achieving the stated policy aims. The main shift between LTN 1/20 and previous design guidance is the establishment of core design principles (20 design principles). This is especially pertinent in light of the COVID-19 restrictions and its future impacts on travel pattern, which has profoundly affected the way individuals live, work and travel and increased the desire to be more active. The design of interventions on the Science Vale transport network will need to refer to these design principles.

2.2.9 **A Better Deal for Bus Users**[9] highlights the key role of buses in the transport system and sets aside £220 million to provide bus services which meet the needs and demands of the public. As part of this, bus priority is identified as a key tool to improve bus services. All new road investments in England, which receive central government funding, will now be required to either support bus priority measures or explain why bus priority is not necessary. There will be further support for local authorities to ensure they have the information they need to effectively prioritise buses.

2.2.10 It is also important to take into account the review of the **Green Book**[10] (2020). Notably, this states that "While the BCR is a useful metric for capturing quantifiable costs and benefits, there is a tendency to place an inappropriate emphasis on it". This suggests a holistic approach to assessing and identifying benefits from the scheme. In addition, the Green Book review highlights the importance to engage with the strategic context in which the proposal sits and how exactly the scheme will contribute to meeting the government's strategic goals. The specific social and economic features of the local area near to the scheme needs to be made clearer and taken into account throughout the appraisal process.

[8] Gear Change: A bold vision for walking and cycling (2020) https://www.gov.uk/government/publications/cycling-and-walking-plan-for-england
[9] A Better Deal for Bus Users (2020) https://www.gov.uk/government/publications/a-better-deal-for-bus-users/a-better-deal-for-bus-users
[10] Green Book Review (2020) https://www.gov.uk/government/publications/final-report-of-the-2020-green-book-review

2.2.11 Guidance has also been released from the Ministry of Housing, Communities and Local Government on **Climate Change**[11] (2019) which advises how to identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. This guidance outlines how the challenges of climate change can be addressed through a Local Plan, how adaptation and mitigation approaches can be integrated and how the uncertainty of climate risks can be dealt with. This is especially important as addressing climate change is one of the core land use principles in the NPPF, which then underpins both planning and decision-taking.

2.2.12 In November 2020, the Government **released The Ten Point Plan for a Green Industrial Revolution**[12], which identifies the key paths the UK can follow to invest in clean technologies and recover from the impact of Covid-19. Two of the Points relate to personal travel: Point 4 Accelerating the Shift to Zero Emission Vehicles and Point 5 Green Public Transport, Cycling and Walking. As part of Point 4, it is highlighted that by 2030 the sale of new petrol and diesel cars will be banned. In Point 5, it is highlighted the share of journeys taken by public transport, cycling and walking must be increased, through increased investment in rail and bus services, as well as in active travel.

2.2.13 Furthermore, **Decarbonising Transport: Setting the Challenge**[13] identifies that climate change is the most pressing environmental challenge of our time, and to meet the target to achieve 'net zero' greenhouse gas (GHG) emissions by 2050, transport has a vital role to play. As such, the Transport Decarbonisation Plan (TDP) will set out in detail how the significant reductions in emissions needed across all modes of transport to achieve carbon budgets and net zero emissions across every single mode of transport by 2050. There have been previous strategies to reduce GHG emissions in individual transport modes, the TDP will take a coordinated, cross-modal approach to deliver the transport sector's contribution. The report looks at both how private vehicles can achieve low emissions, but also looks at the role of freight. This is needed in parallel to the rapid development and deployment of clean technology. The TDP is to be released in Spring 2021. This policy document further recognises the importance of planning for sustainable communities and providing a transport system which promotes increased levels of sustainable and active travel.

2.2.14 All three Government documents highlight the importance of Climate Change and the Climate Emergency. It is imperative, therefore, that any improvements to the transport network within Didcot and Science Vale do not further exacerbate Climate Change.

2.3 Regional Policies

2.3.1 Oxfordshire Local Enterprise Partnership's (OxLEP's) **Strategic Economic Plan**[14] (SEP) for Oxfordshire (2016) sets out a vision for Oxfordshire to be a vibrant,

[11] Climate Change Guidance (2019) https://www.gov.uk/guidance/climate-change
[12] Ten Point Plan for a Green Industrial Revolution (2020) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf
[13] Decarbonising Transport: Setting the Challenge (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf, 2020)
[14] OXLEP SEP (2016) https://www.oxfordshirelep.com/sites/default/files/uploads/Oxfordshire%20SEP.pdf

sustainable, inclusive, world leading economy, driven by innovation, enterprise and research excellence. Whilst being strong in many areas, including innovation, enterprise and research, the SEP also refers to challenges around the lack of affordable housing, increasing congestion, sustainability and inclusion, and the need for greater resilience. The SEP is clear that the overall priority for Oxfordshire's settlements and rural areas is to plan simultaneously for both jobs and housing growth, putting in place the infrastructure required for both, whilst also protecting and, where possible, enhancing environmental quality and social inclusion. These priorities are consistent with Government policy and the objectives set out in the DfT Transport Investment Strategy but adapted to suit Oxfordshire's own socio-economic and environmental challenges.

2.3.2 In terms of connectivity, the SEP sets out key actions, a number of which are relevant to Didcot and Science Vale, in particular:

- Support for the implementation of the Oxfordshire Local Transport Plan 2015-2031 to address congestion and to identify ways to avoid exacerbating existing problems due to growth;
- Ensure, through the planning process, that connectivity improvements are linked to the scale and location of planned growth; and
- Implement the Oxfordshire Active and Healthy Travel Strategy.

2.3.3 OxLEP has also produced the **Oxfordshire Local Industrial Strategy (LIS)**[15] and accompanying Oxfordshire Investment Plan. The LIS responds to the government's UK Industrial Strategy and sets out an ambitious vision for Oxfordshire to be one of the top three global innovation systems by 2040. The LIS aims to deliver clean and sustainable transformative growth across Oxfordshire, through focussing on innovation, people (including an Oxfordshire Social Contract with investment in skills) and improvements to the physical, digital, financial, knowledge and social infrastructure.

2.3.4 The **Oxfordshire Investment Plan**[16] takes forward the ambitions set out in the LIS, translating policy ideas and commitments to a transformational programme for action and delivery. In the LIS, Didcot Garden Town is identified as a key development location within the county. In addition, the Oxfordshire Investment Plan highlights the 'Infrastructure Pillar' as critical to the success of the county. Therefore, across these two interlinked documents there is clear and consistent support for improvements to the transport network at Didcot and Science Vale.

2.3.5 The **Oxfordshire's Housing and Growth Deal**[17] is an agreement between the national government and in the Oxfordshire area councils (Cherwell District Council; Oxford City Council; Oxfordshire County Council; South Oxfordshire District Council; Vale of White Horse District Council; West Oxfordshire District Council) and OxLEP, to plan and support the delivery of 100,000 new homes between 2011 and 2031. Improvements to the transport network in Didcot and across Science Vale support

[15] Oxfordshire Local Industrial Strategy (2019) https://www.oxfordshirelep.com/sites/default/files/uploads/Oxfordshire%20Local%20Industrial%20Strategy_0.pdf
[16] Oxfordshire Investment Plan (2020) https://www.oxfordshirelep.com/sites/default/files/uploads/The%20Oxfordshire%20Investment%20Plan%20-%20August%202020.pdf
[17] Oxfordshire Housing and Growth Deal (2018) https://www.gov.uk/government/publications/oxfordshire-housing-deal

this ambition by unlocking Local Plan housing growth, which contributes to the Oxfordshire Housing and Growth Deal (HGD).

2.3.6 The **Oxfordshire Infrastructure Strategy**[18] (OXIS) recognises the need for local road interventions to alleviate congestion at hot spots and accommodate traffic generated by proposed housing and employment. It also recognises that additional active travel infrastructure will be required to support any proposed transport improvements.

2.3.7 The **Connecting Oxfordshire Local Transport Plan 4**[19] (LPT4, 2016), is the overarching local plan for transport in Oxfordshire. As part of the plan it includes the Science Transit Strategy, Rail Strategy, Bus and Rapid Transit Strategy and the Active & Healthy Travel Strategy. The LTP4 is part of the Connecting Oxfordshire series of documents. LTP4 identifies that a number of new road links and capacity improvements are necessary to accommodate the large scale of employment and residential development in Didcot. This is detailed further in the Science Vale Area Strategy, which is discussed below.

2.3.8 The **Active and Healthy Travel Strategy**[20] (2016) builds on the LTP4 with the aim to 'contribute to reducing pressure on the road network, contribute to economic growth and the reduction of emissions, improve quality of life and health, and link active travel with bus and rail options by enabling sustainable door-to-door journeys combining cycling or walking with public transport'. The strategy outlines that cycling alone cannot replace the car for long journeys but does state that the combination of cycling and public transport can create more door-to-door sustainable trips. There is also encouragement for walking and prioritisation of funding available for the best value for money investments for walking. The strategy includes consideration of the proposed cycling improvements across Science Vale, which are discussed further in Chapter 3 below.

2.3.9 In April 2019, OCC declared a climate emergency. Following this, in 2020, OCC produced the **Climate Action Framework**[21] which sets out the guiding principles and how they will tackle the Climate Emergency. This is through transforming OCC as an organisation and enabling a zero-carbon Oxfordshire. Aims include to be a Climate Active Council, with the council operating at net-zero by 2030. There is also the aim to enable a net-zero Carbon Oxfordshire by 2050, which in part is supported by a commitment to improve Transport and Connectivity within the county, through policy initiatives and also supporting and encouraging sustainable transport.

2.3.10 National Rail produces Route Strategies for the various areas of the network. The **Western Route Study**[22] (2016) includes forecasts of how demand on the rail network will change over the coming years. This shows that on the Didcot-Oxford line by 2043 the route will be over capacity, compared to the 2019 baseline, if there are no further interventions. In addition, the Route Strategy refers to OxLEP's SEP,

[18] Oxfordshire Infrastructure Strategy (2017) https://www.oxfordshirelep.com/about/our-strategies/infrastructure-strategy-oxis
[19] Oxfordshire LTP4 (2016) https://www.oxfordshire.gov.uk/residents/roads-and-transport/connecting-oxfordshire/policy-and-overall-strategy
[20] Active and Healthy Travel Strategy (2016) https://mycouncil.oxfordshire.gov.uk/documents/s33761/Annex%203%20-%20Connecting%20Oxfordshire%20vol%204%20-%20Active%20Healthy%20Travel%20Strategy.pdf
[21] Climate Action Framework (2020) https://www.oxfordshire.gov.uk/sites/default/files/file/about-council/OCC_Climate_Action_Framework2020.pdf
[22] Western Route Study (2016) https://www.networkrail.co.uk/wp-content/uploads/2016/11/Western-Route-Study-Final-1.pdf

highlighting the Oxfordshire Knowledge Spine which would provide increased opportunities to travel between Didcot and Culham. It is also mentioned that the development of East West Rail might lead to increased services between Didcot and Oxford being required.

2.4 Local Policies

2.4.1 The **Bus and Rapid Transit Strategy**[23] (2016) has been developed to complement the LTP4 and the main elements of the strategy include integration of the bus network and provision of accessible, high quality infrastructure. One of the main elements of the strategy identified is developing a new high quality premium urban and inter-urban service across Science Vale. As part of the Bus and Rapid Transit Strategy, a specific strategy, **Science Vale Strategy,** has also been produced. The following factors present challenges to the further growth of bus use across Science Vale:

- Limited bus connectivity between major settlements and employment areas;
- Traffic congestion;
- Weak car demand management policies and measures;
- Limited public transport interchange and inadequate passenger facilities; and
- Lack of integrated ticketing.

2.4.2 As such, it is identified that a significant upgrade to the existing bus network is required to support the development across Science Vale, and connect to other parts of Oxfordshire, such as the Knowledge Spine. A set of proposals are put forward, including a major new north-south highway corridor linking Didcot and the eastern side of Science Vale with east Oxford is proposed by the strategy, as well as traffic management, development of new and enhanced commercial bus services and new and better quality bus interchange facilities.

2.4.3 The **Science Vale Transport Strategy**[24] (2016) forms part of the Connecting Oxfordshire LTP4 suite of documents. The Strategy focuses on the employment and housing growth required within Science Vale as part of Local Plans (discussed further below). As such, the strategy outlines the transport infrastructure required to enable this growth and mitigate any negative impacts as a result of the scheme. In addition, there is focus on improvements within Didcot, such as good transport links to access the town centre as well as provision for active travel and sustainable travel options, to provide a high quality of life and an attractive place to live.

2.4.4 The **(SODC) Local Plan 2035**[25] was adopted in December 2020, and the plan balances the need to deliver economic and housing growth with the need to protect the greenness of the district. As part of the Local Plan, Science Vale is identified as a focus for delivering housing and employment, noting that Didcot will be both the gateway and the heart of Science Vale. The Plan states that an important part of the

[23] Bus and Rapid Transit Strategy (2016) https://mycouncil.oxfordshire.gov.uk/documents/s33705/Background%20CA_JUN2816R08%20Connecting%20Oxfordshire%20vol%202%20-%20Bus%20Strategy.pdf
[24] Science Vale Transport Strategy (2016) https://mycouncil.oxfordshire.gov.uk/documents/s33712/Background%20CA_JUN2816R13%20Connecting%20Oxfordshire%20vol%208%20part%20ii%20-%20Area%20Strategies.pdf
[25] SODC Local Plan (2020) https://www.southoxon.gov.uk/south-oxfordshire-district-council/planning-and-development/local-plan-and-planning-policies/local-plan-2035/adopted-local-plan-2035/

strategy for Science Vale is to improve and strengthen its relationship with Didcot and realise Didcot's full potential. The Local Plan has been informed by and is consistent with OCC's LTP4.

2.4.5 The SODC Local Plan also seeks to build on opportunities for sustainable travel, but there is a recognition that the rural nature of South Oxfordshire means that many residents will remain reliant on car travel for part or all of their journey. It also recognises that suitable transport infrastructure provision is central to successful and sustainable communities. Furthermore, there is a clear focus on climate change and how the Local Plan can address the declared Climate Emergency. Minimising carbon emissions and other pollutants is an objective of the Local Plan (as discussed further below). There is also a clear correlation between the policies and addressing Climate Change, and this is clearly identified in the Local Plan.

2.4.6 As mentioned in paragraph 1.2.4, the SODC Local Plan outlines the requirement of a total of 23,550 homes for the plan period, part of which will be provided by the following seven strategic allocations:

- Culham Science Centre (3,500 units);
- Land at Berinsfield (1,660 units);
- Land at Chalgrove Airfield (3,000 units);
- Land at Wheatley Campus, Oxford Brookes University (500 units);
- Land South of Grenoble Road (3,000 units);
- Land at Northfield (1,800 units); and
- Land North of Bayswater Brook (1,100 units).

2.4.7 In addition, the site allocations for Didcot have been defined totalling around 6,399 homes, and these are shown in Figure 2-1 overleaf. The sites and the respective allocations are as follows:

- Ladygrove East, H2a (642 units);
- Didcot North East, H2b (2,030 units);
- Great Western Park, H2c (2,587 units);
- Vauxhall Barracks, H2d (300 units);
- Orchard Centre Phase II remaining site, H2e (300 units);
- Didcot Gateway, H2f (300 units);
- Land South of A4130, H2g (166 units); and
- Hadden Hill, H2h (74 units).

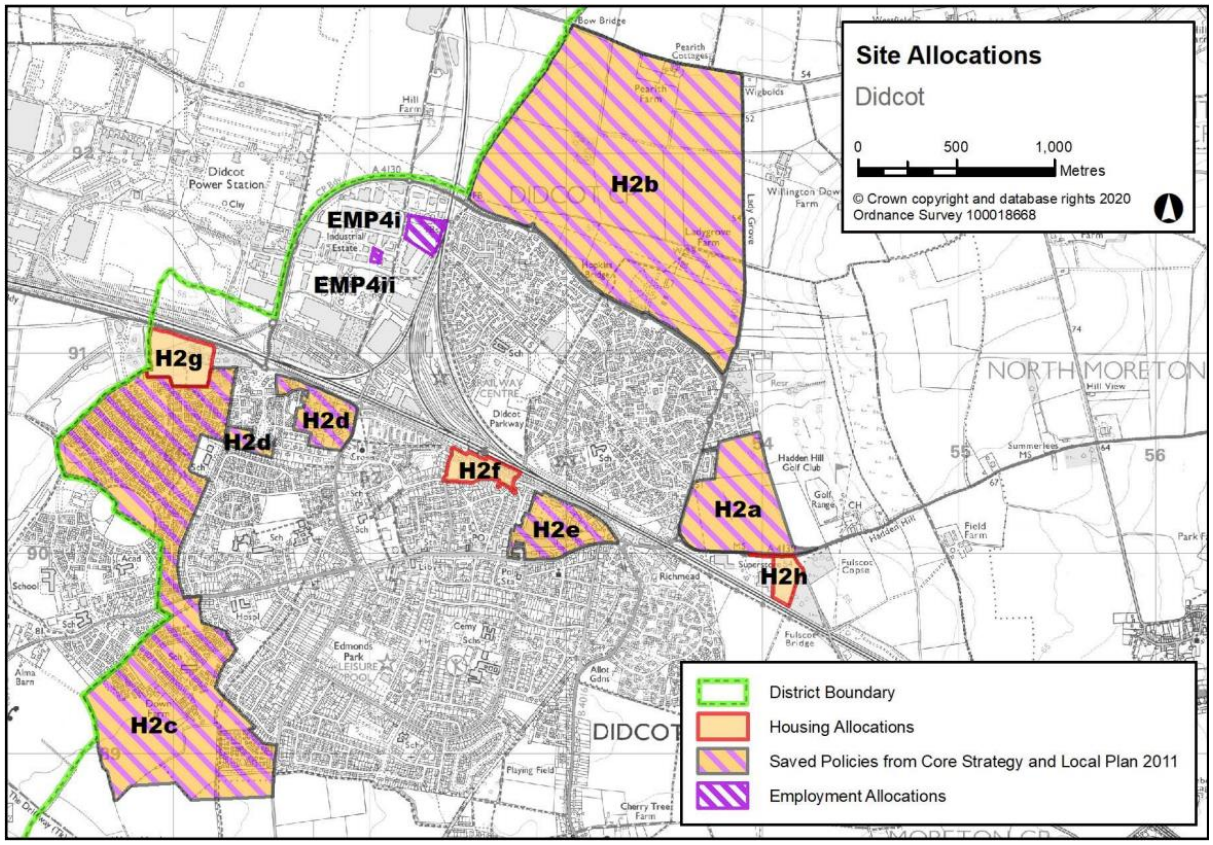

Figure 2-1 Didcot Site Allocations

Source: SODC Local Plan 2035: https://www.southoxon.gov.uk/wp-content/uploads/sites/2/2020/12/SODC-LP2035-Non-Track-Change-Version-November-2020.pdf

2.4.8 **VoWHDC**[26] adopted their **Local Plan 2031** Part 1 in December 2016 and Part 2 in October2019. Part 1 sets out the spatial strategy and strategic policies for the district to deliver sustainable development, including identifying the number of houses required. Part 2 complements the Part 1 plan and includes the policy regarding the section of Didcot Garden Town that lies within the District. At present, VoWHDC and SODC are starting work on a Joint Local Plan to 2041, which will be the first to cover both districts[27].

2.4.9 The VoWHDC Local Plan provides a policy framework for sustainable development across the district up to 2031. An emphasis is placed in the plan for the presumption of sustainable development across the district. In fact, 75% of proposed strategic growth is allocated within close proximity to Science Vale, as this is the area with the greatest employment, which therefore provides the opportunity for sustainable transport options. Overall, the approach of the Local Plan is to encourage sustainable modes of transport and a reduction in the need to travel.

2.4.10 In addition, the Local Plan also includes consideration Climate Change, and include policies to set out how VoWHDC will respond to climate change and protect the historic, built, and natural environment.

[26] VoWHDC Local Plan (2019) https://www.whitehorsedc.gov.uk/vale-of-white-horse-district-council/planning-and-development/local-plan-and-planning-policies/local-plan-2031/
[27] https://www.whitehorsedc.gov.uk/vale-of-white-horse-district-council/planning-and-development/local-plan-and-planning-policies/local-plan-2041/

2.4.11 One of the key challenges identified in the Local Plan is addressing congestion around Science Vale, noting that it is imperative that the road network operates safely and efficiently for the economic success of the district to be maximised. Additionally, any capacity issues need to be addressed to ensure new development can be adequately accommodated.

2.4.12 The VoWHDC Local Plan Part 1 highlights that the housing requirement for the plan period is 22,760 homes. Within the South East Vale sub-area a total of 9,055 homes are identified, across the eight sites as follows:

- Crab Hill, North East Wantage and South East Grove (1,500 units);
- Grove Airfield (2,500 units);
- Monks Farm, North Grove (885 units);
- Valley Park (2,550 units)[28];
- North-West of Valley Park (800 units);
- West of Harwell (200 units);
- Milton Heights (400 units); and
- East of Sutton Courtenay (220 units).

2.4.13 As part of the Part 2 Local Plan, an additional site is allocated within the Science Vale area to provide continuing support for economic growth, to support the delivery of strategic infrastructure and master planning. This site is as follows:

- North-west of Grove (400 units).).

2.4.14 Valley Park was granted permission in April 2016 for 4,254 homes and a resolution to grant for additional units in July 2021, subject to conditions and a Section 106 agreement. At present, negotiations over the S106 agreement are ongoing so building work is yet to commence. In **the Land at Valley Park Transport Assessment[29]** (2016), it is outlined that the site will be accessed via two accesses on the A4130, a signalised T-Junction to the west of the site, and a roundabout on the A4130. There will also be an additional roundabout to the south of the development on the B4493, linking to development south of the B4493, as well as numerous walking and cycling routes throughout the development.

2.4.15 As part of SODC's Development Plan, North East Didcot, which has space allocated for 2,030 homes, has been granted outline planning permission for 1,880 homes and supporting infrastructure. The remaining 150 homes, together with a further 168 dwellings, are included in a current application for which approval is pending. The **Land at North East Didcot Transport Assessment[30]** (2015) states that there will be four accesses to the development: a four-arm roundabout at A4130/Avon Way, a four-arm roundabout at A4130/Mersey Way, a priority junction at B4106 Ladygrove South and a priority junction at B4016 at Ladygrove North.

[28] Application submitted for 4,254 new homes
[29] Land at Valley Park Transport Assessment (2016) https://data.whitehorsedc.gov.uk/java/support/dynamic_serve.jsp?ID=1421371654&CODE=66064879C83996A886BE5472A995A381
[30] Land at North East Didcot Transport Assessment (2015) Environmental Statement Appendix 10.1, https://data.southoxon.gov.uk/ccm/support/dynamic_serve.jsp?ID=1421203797&CODE=34A5CA2E441F397E0F78084E8723CF72

2.4.16 Proposals also include improvements across the highway network, including signalising the A4130/Ladygrove priority junction, reducing the speed limit on the Northern Perimeter Road to 40mph and traffic calming along the B4016 at the eastern frontage of the site. Walking and cycling routes are also present across the development, including multiple pedestrian and cycle accesses to Didcot via the A4130.

2.4.17 It is also worth noting that an outline planning application for 2,500 homes and associated services and facilities at Grove Airfield north of Wantage has been granted.

2.4.18 The **Didcot Garden Town Delivery Plan**[31] (2017) outlines how the Didcot Garden Town will come forward, as well as the overarching vision for the town. Key to this is the focus on high quality physical spaces and connections, as Didcot will have easy links to science campuses and out into the surrounding countryside, as well as better connectivity within the town. The proposals as part of the plan provide the opportunity to:

- Diversify housing types and delivery methods, providing new choices, such as professionally managed private rented homes and a locally based factory-built home constructor;
- Accelerate the delivery of homes and the social and physical infrastructure required to support new residential development;
- Support economic growth generated by UK's leading cluster for commercialisation of science, building on the strengths of Harwell Campus, Culham Science Centre and Milton Park to deliver an additional £1bn of annual gross value added to the UK economy;
- Explore ways to capture value from new development, which can be channelled into the infrastructure, affordable housing and green spaces to ensure these developments benefit the wider community; and
- Establish strong local governance for the garden town. Representatives of the local community, local businesses and district, county and town councils to create a unified, democratically accountable delivery body.

2.4.19 Therefore, there is clear support from the Delivery Plan for improvements to transport infrastructure across Didcot and Science Vale to support the development of the Didcot Garden Town.

2.4.20 As part of the Neighbourhood Planning process, several Parish Councils across Science Vale have produced, or are in the process of producing, Neighbourhood Plans. Clifton Hampden, East Hagbourne and Sutton Courtenay are parishes with the furthest progression in plan preparation. Burton and Clifton Hampden Parish Council have produced a **Burton and Clifton Hampden Neighbourhood Plan**[32] **(2011-2034)** Pre-Submission Draft Plan for village consultation. This plan focusses on small-scale development within Clifton Hampden and the neighbouring village of Burcot. It also includes a planning policy review which makes reference to the land

[31] https://www.southoxon.gov.uk/south-oxfordshire-district-council/business-and-economy/garden-communities/didcot-garden-town/didcot-garden-town-delivery-plan/
[32] https://www.southoxon.gov.uk/south-oxfordshire-district-council/planning-and-development/local-plan-and-planning-policies/neighbourhood-plans/emerging-neighbourhood-plans/clifton-hampden-neighbourhood-plan/

safeguarded for transport improvements but makes no comment on the position of the Parish Council on this proposal.

2.4.21 The **East Hagbourne Neighbourhood Plan**[33] was adopted in April 2019 and sets out a plan for the sustainable future for the village, including policies to shape the future development of the parish. The plan highlights the increasing through traffic using the village on rural roads which are not designed for large volumes of traffic. It also states that the village is in close proximity to Didcot Parkway station but access via bus is limited. Three policies are proposed in relation to transport: Road Safety, Footpaths and Pavements, and Parking. These focus on equity of transport infrastructure between road users, reducing traffic speeds, encouraging use of sustainable modes of transport and reducing reliance on private vehicles.

2.4.22 Other neighbourhood plans across Science Vale, such as the **Sutton Courtenay Neighbourhood Plan 2030**[34], are currently under preparation, including compiling the evidence base and developing policies. For these parish councils a neighbourhood plan has not yet been published for either consultation or adoption.

2.4.23 Similarly to OCC, both SODC and VoWHDC declared a climate emergency in February 2019. SODC seeks to become carbon neutral within their own operations by 2025, and within the district by 2030. VoWHDC aim to become a carbon neutral council by 2030, and a carbon neutral district by 2045 at the latest. This commitment to addressing the Climate Emergency must be met by any improvements to the transport network in Didcot and Science Vale.

2.5 Summary

2.5.1 The review of key national, regional and local policies has revealed a clear link between the development of Didcot and Science Vale and these policies, especially on challenges relating to sustainable growth and climate change. On this basis, the schemes objectives for this study were developed and are discussed in Section 4.

2.5.2 Based on the analysis presented above, no weaknesses or opposing policies have been identified across national, regional and local policy documents. The strongest level of alignment is apparent at the local level where documents make direct references to local challenges and infrastructure needs.

2.5.3 At the regional level, there are less detailed references to transport improvements in Didcot and Science Vale, however overall there is still generally considered to be a good level of alignment.

2.5.4 As would be expected, policies at the national level do not make direct reference to the challenges and opportunities in Science Vale and Didcot. However, the local transport opportunities in Didcot and Science Vale are still nevertheless considered to reflect the broad themes and aims of national policies.

[33] https://www.southoxon.gov.uk/south-oxfordshire-district-council/planning-and-development/local-plan-and-planning-policies/neighbourhood-plans/emerging-neighbourhood-plans/east-hagbourne-neighbourhood-plan/
[34] https://www.whitehorsedc.gov.uk/vale-of-white-horse-district-council/planning-and-development/local-plan-and-planning-policies/neighbourhood-plans/emerging-neighbourhood-plans/sutton-courtenay-neighbourhood-plan/

Relevance to Didcot Garden Town HIF1 schemes

The policies largely focus on infrastructure investment, promoting sustainable travel, delivering homes and jobs, reducing congestion, and improving air quality and health.

Investment in transport improvements across Didcot and Science Vale will provide much needed capacity across Didcot and Science Vale and remove key pinch points on the road network. This will improve journey times and journey time reliability along the route, which in turn will support housing and economic growth across Science Vale. It is important that any improvements include high quality walking and cycling infrastructure, helping to engender modal shift.

Improvements to the transport network within Didcot and Science Vale will help achieve many of the strategic goals outlined in OCC's LTP4 and the SODC and VoWHDC Local Plans.

Local Plan allocations suggest significant development across Science Vale, which need to be planned in line with suitable transport schemes in order to avoid future transport challenges in the area.

Overall, there is considered to be alignment between all considered local, regional and national policies and improvements to the transport network in Didcot and Science Vale.

3. Current and Future: Context and Conditions

3.1 Introduction

3.1.1 This section of the report provides a summary of key contextual factors influencing the local area and a review of the current and forecast transport, travel, environment and local planning conditions. It reviews the existing data and previous work conducted in order to identify key challenges in the study area, which would help develop the scheme objectives and, subsequently, a suitable scheme to meet those objectives. The scheme objectives (see Section 4) will be critical in later stages to assess and sift options, as well as becoming a key component against which the final proposed solution will be appraised and, following implementation, evaluated.

3.1.2 Appendix A lists the existing studies, strategies and data that have been used to understand the local context. Given the significant amount of work already undertaken to understand and assess current and future issues in the area, as well as potential solutions, only a summary of the most pertinent points are presented in this section.

3.2 Geographic Context

3.2.1 Science Vale is the name given to an area of southern Oxfordshire centred on the settlements of Didcot and Wantage & Grove, the Milton Park Business Park, Didcot Power Station and the established research areas of Culham Science Centre and Harwell International Business Centre. Beyond these settlements the Science Vale area is mostly characterised by small villages within the wide, mostly flat valley of the River Thames. The Science Vale area is split between the VoWHDC and SODC districts.

3.2.2 South Oxfordshire is one of the five districts which make up the county of Oxfordshire. The area spans from south-east Oxford towards Reading. Its southern boundary is mostly marked by the River Thames. The VoWHDC directly borders South Oxfordshire to the west and extends to the border with Wiltshire. The eastern boundary of the district broadly follows the River Thames and outskirts of Didcot.

3.2.3 Didcot is located almost directly south of Oxford and is home to just over 25,000 people (as per the 2011 Census). The major road in the area is the A34 Trunk Road (managed by National Highways) which passes in a generally a north-south direction connecting the M40 and M4 via Oxford. The A34 has grade-separated, all movement junctions at Chilton, Milton (Didcot) and Marcham (Abingdon) and a limited movement junction at Lodge Hill (north of Abingdon)[35].

3.2.4 Didcot is a major railway hub for the GWML, providing access to London Paddington, Oxford, Bath, Bristol and South Wales. The railway station is located in the centre of the town. The main line route runs parallel to the alignment of the A4130/B4493/Station Road. Didcot Parkway is an interchange station as it sits at the

[35] Proposals for converting Lodge Hill into an all movements junction have recently received funding approval

junction between the GWML and the connecting line to Oxford. There are more minor stations at Culham, Radley and Appleford within the study area.

3.2.5 The area lies within the wider Thames Valley and the river provides a barrier within the Science Vale separating Culham Science Centre (CSC) from the rest of the Science Vale area. The bridges, which provide a link over the river at Culham and Clifton Hampden, are low standard, single lane crossings controlled by traffic signals with one-way shuttle. Both bridges are listed structures, over 200 years old.

3.3 Current Conditions

3.3.1 As part of the initial stage of option development, it is important to understand the current context and conditions in the study area, including the main issues and the proposals that have been put forward in recent years to address these.

3.3.2 The local context and, where appropriate, current and future trends for the following, are discussed in this section:

- Socio-economic context;
- Future growth;
- Existing highways and public transport infrastructure;
- Pedestrian and cycle infrastructure provision and use;
- Travel patterns and modal share;
- Journey times, traffic flows and congestion issues;
- Traffic collisions; and
- Environment.

Socio-economic Context

3.3.3 Selected socio-economic indicators are present in Table 3-1 (overleaf). South Oxfordshire has a population of around 142,100 and Vale of White Horse has a population of around 136,000, representing 21% and 20% of Oxfordshire's population respectively. Both districts have higher levels of employment compared to the averages across Oxford, Oxfordshire, the South East and England. In both districts the Professional, Scientific and Technical Activities is the largest employment sector, indicating the importance of Science Vale to local employment opportunities. Therefore, improvements to the transport network are required to ensure accessibility to and connectivity across Science Vale and provide agglomeration benefits.

3.3.4 While the proportion of the population in both districts with qualifications at NVQ4 and above is slightly lower than the average in Oxford, it is higher than the averages in the county, the South East region and England. Weekly pay in South Oxfordshire is approximately 20% higher than the England average. In Vale of White Horse, it is 17% higher. However, house prices for South Oxfordshire are approximately 57% higher than the England average, and in Vale of White Horse house prices are 36% higher.

Table 3-1 Socio-economic Metrics

Metrics		South Oxfordshire	Vale of White Horse	Oxford	Oxfordshire	South East	England
Population (2019)	All people	142,100	136,000	152,500	691,700	9,180,100	56,287,000
	Population aged 16 – 64	59.7%	60.5%	69.6%	62.5%	61.2%	62.4%
	Qualifications at NVQ4 and above	48.2%	49.2%	57.9%	50.9%	43.4%	40.0%
Employment (Jul 2019 – June 2020)	Economically active – in employment	88.5%	85.7%	79.5%	82.5%	79.3%	76.2%
	Economically active – unemployed	2.1%	2.5%	3.3%	2.5%	3.4%	4%
	Economic inactivity*	11.5%	11.2%	16.5%	15.2%	17.8%	20.5%
	Part time proportion	35%	27.3%	33.1%	32.3%	33.2%	32%
Job Density (2018)	Ratio jobs: population aged 16-64	0.85	0.89	1.33	0.67	0.88	0.87
Employee Jobs (2019)	The 2 largest employment sectors	18.3%	19.7%	28.9%	15.7%	16.4%	15.4%
		Professional, Scientific and Technical Activities	Professional, Scientific and Technical Activities	Education		Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	
		16.7%	12.1%	17.4%	14.6%	12.8%	12.8%
		Wholesale and Retail Trade; Repair of Motor Vehicles And Motorcycles	Wholesale and Retail Trade; Repair of Motor Vehicles And Motorcycles	Human Health and Social Work Activities	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	Human Health and Social Work Activities	
Gross Weekly Pay (by residence, 2020)	Full-Time Workers	£708.40	£690.80	£666.60	£662.00	£631.80	£589.80
	Ratio compared to England	1.20	1.17	1.13	1.12	1.07	1.00
House Prices (Jan. 2020)**	Average House Price	£327,494	£283,219	£378,629	£291,146	£259,098	£208,910
	Ratio compared to England	1.57	1.36	1.81	1.40	1.24	1.00

Source: NOMIS, unless stated otherwise

**Student, Looking after family/home, Temporary sick, Long-term sick, Discouraged, Retired, Other*

***UK House Price Index: Average price for first-time buyers*

3.3.5 Figure 3-1 shows the Indices of Multiple Deprivation (IMD) at a Lower Layer Super Output Area (LSOA) around Didcot. Overall, the Science Vale area has fairly low levels of deprivation. There are, however, pockets of higher levels of deprivation across the area, such as in the west and south-east of Didcot. Conversely, north and south Didcot have some of the lowest levels of deprivation. Improvements to the transport network in Didcot and Science Vale are therefore crucial to levelling out the disparity in IMD in Didcot, through improved transport provision. In addition, South Abingdon and Berinsfield also have some of the highest levels of deprivation across the region.

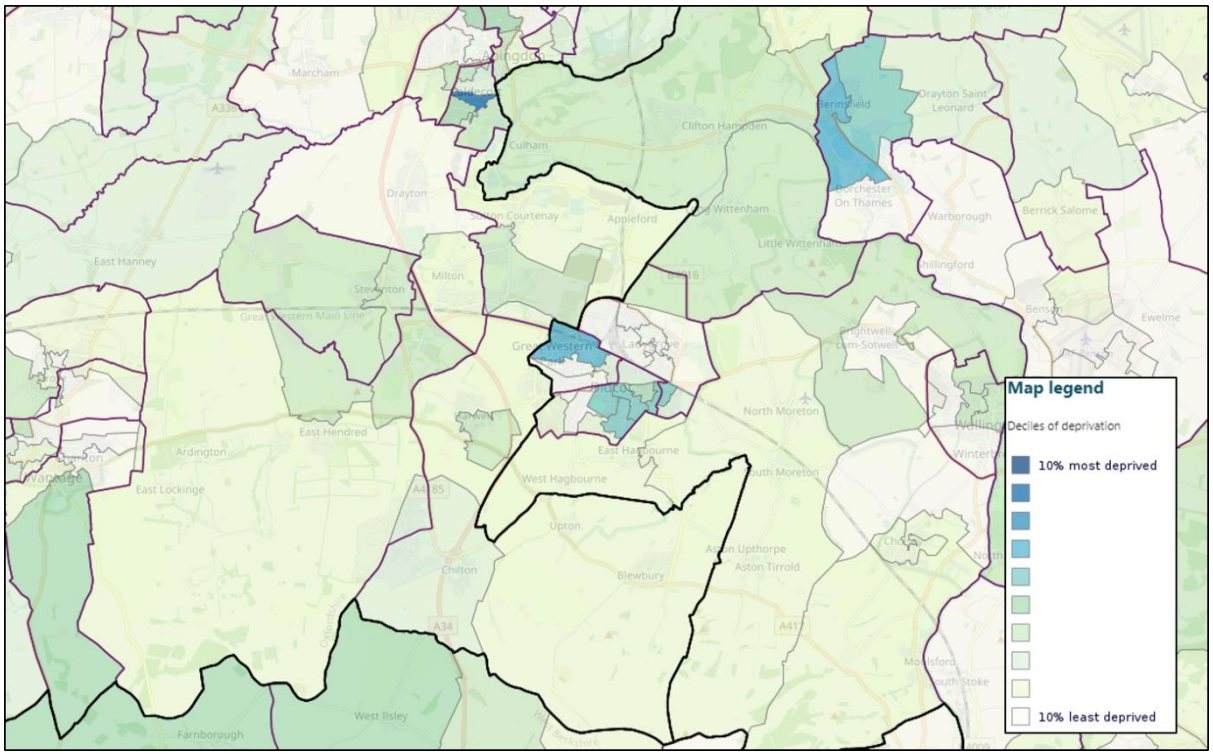

Figure 3-1 Indices of Multiple Deprivation

Source: Ministry of Housing, Communities & Local Government (2019)

Future Growth

3.3.6 The population of both SODC and VoWHDC is expected to grow in the future. South Oxfordshire's Local Plan commits to delivering 18,600 homes between 2011 and 2035 and an additional 4,950 homes as part of Oxford's unmet housing need. Similarly, in the Vale of White Horse 20,560 homes are planned between 2011 and 2031, plus an additional 2,200 homes from Oxford's unmet housing need. Overall, the two districts have a need of 46,310 homes over the two Local Plan periods.

3.3.7 As mentioned above, some of this housing is to be delivered in and around Didcot as part of strategic site allocations. Major strategic allocations include Valley Park to the south-west of Didcot, North East Didcot, land adjacent to Culham Science Centre and Grove Airfield. Based on the existing situation, the substantial future growth would worsen the current traffic congestion and access problems in Didcot, due to the limited capacity of the A4130 and the listed river crossings.

3.3.8 In the county as a whole, 88,000 new jobs and 100,000 new homes will be delivered between 2011-2031 as set out in Oxfordshire's Strategic Housing Market

Assessment[36]. In 2012, the Government awarded Enterprise Zone status to Science Vale, covering Harwell and Milton Park sites, providing at least 8,400 new jobs. In December 2015 the Government announced that Didcot would become a Garden Town, delivering 15,050 homes and 20,000 high-tech jobs being created in the Greater Didcot area[37].

Existing Highways and Public Transport Infrastructure

3.3.9 The major road in the area is the A34 Trunk Road which passes in a generally north/south direction connecting the M40 and M4 via Oxford. The other main roads form a loose grid across the area: A338 (Oxford-Wantage-M4); A4074 (Oxford-Reading); A415 (Witney-Abingdon-A4074) and; A417/A4130 (Wantage- Didcot-Wallingford). To the north of Didcot, the road network is relatively sparse and constrained by the River Thames. The B4016 connects to the village of Appleford (via a narrow bridge over the Didcot-Oxford railway, adjacent to Appleford station) and beyond to Culham and the A415 via Abingdon Road-Tollgate Road. An alternative route is provided to the east via the village of Long Wittenham which connects to the A415 at Clifton Hampden, close to the Culham Science Centre. To the west of Didcot, Sutton Courtney Road/Lane-Harwell Road-High Street-Church Street connects with Sutton Courtney as well as Abingdon Road-Tollgate Road and onwards to the A415. The road network is shown in Figure 3-2.

3.3.10 There are two main River Thames crossings in the form of bridges in the study area, at Culham and Clifton Hampden. These are low standard grade II, single lane crossings controlled by traffic signals with one-way shuttle running.

3.3.11 There are four main crossings over the GWML, however some of these have existing constraints. The Basil Hill Road bridge is of restricted width and the Cow Lane crossing is a single lane tunnel, limited to one direction for traffic. The underpass on Broadway B4016 near Marsh Lane is the only two-way railway crossing in central Didcot without potential physical capacity problems. There is also a pedestrian-only underpass at Backhill Tunnel.

[36] The Oxfordshire Strategic Housing Market Assessment (https://www.oxford.gov.uk/downloads/download/495/strategic_housing_market_assessment, 2014)
[37] https://www.gov.uk/government/publications/locally-led-garden-villages-towns-and-cities

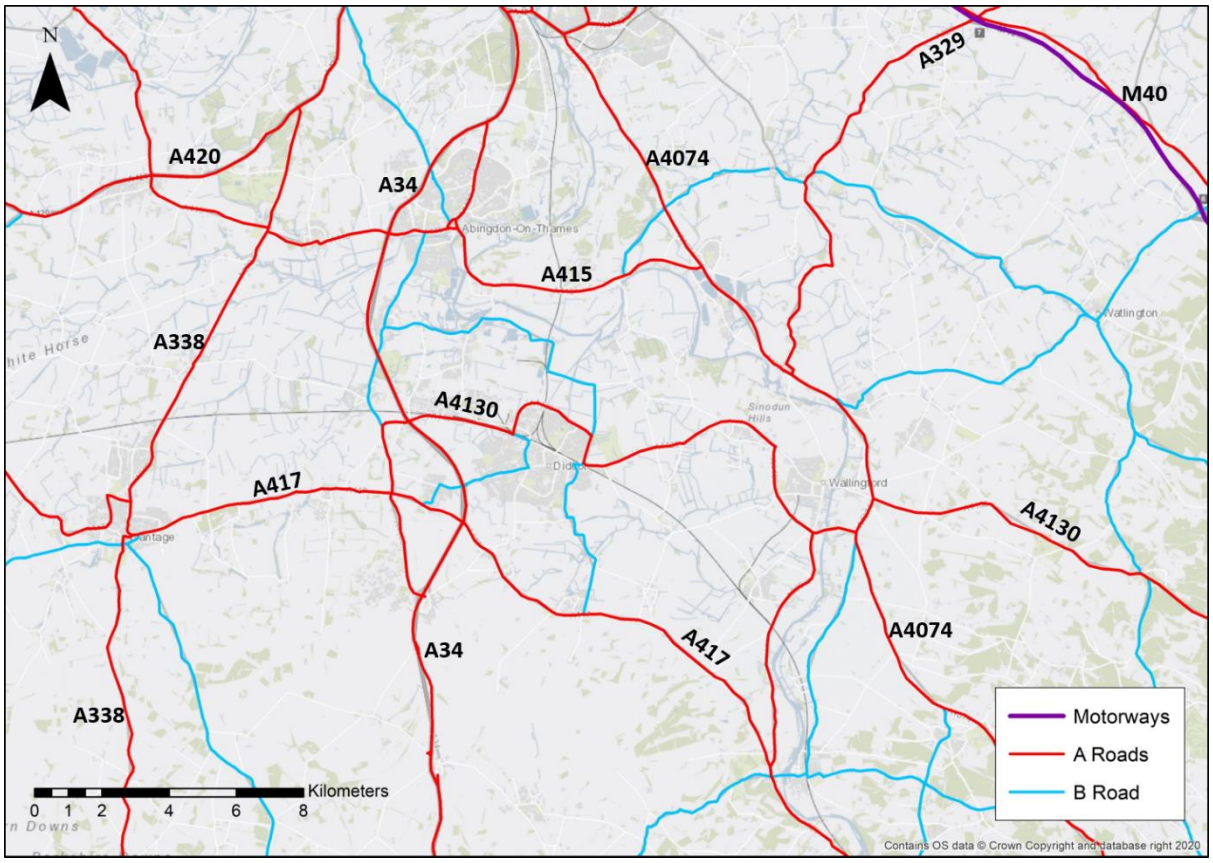

Figure 3-2 Road Network

Source: AECOM © Crown copyright and database right 2020

3.3.12 The area is served by the GWML (London to South Wales and South-west England) which runs along the southern edge of the area and the Didcot- Oxford railway which cuts north from Didcot Parkway. There is an interchange station at Didcot Parkway with more minor stations at Culham, Radley and Appleford. The regional rail network is shown in Figure 3-3.

3.3.13 From Didcot Parkway, Great Western Railways (GWR) offers both fast and local stopping services to London Paddington. The fast service stops only at Reading prior to arrival at London Paddington and takes as little as 38 minutes[38]. This has a frequency of 3 trains per hour (tph) off-peak and 4-5 tph in the AM and PM peaks. The local stopping service originates at Didcot and terminates at London Paddington, stopping at Cholsey, Goring & Streatley, Pangbourne amongst other local stops. This service takes around 1 hour 20 minutes to reach London, and has a frequency of 2 tph off-peak, 3 tph in the AM and PM peaks. In the peaks, some services originate and terminate at Reading rather than being through services to London Paddington.

3.3.14 Rail services from Didcot to Oxford are also operated by GWR and can be either fast or local stopping services. The fast services are direct from Didcot to Oxford, and has a frequency of 2 tph, rising to 3 tph in the AM and PM peaks. A direct service takes approximately 12 minutes. The local stopping services do not always stop at every station, and Radley has the highest frequency with a train approximately once an hour. Appleford and Culham are only mainly served in the AM and PM peaks, with a

[38] This is true at the time of writing, but may not take into account potential impacts from Covid-19 and changes in working habits as a result of the pandemic

few services outside the peak hours. These journeys are short with a service from Didcot to Oxford stopping at each station taking 19 minutes.

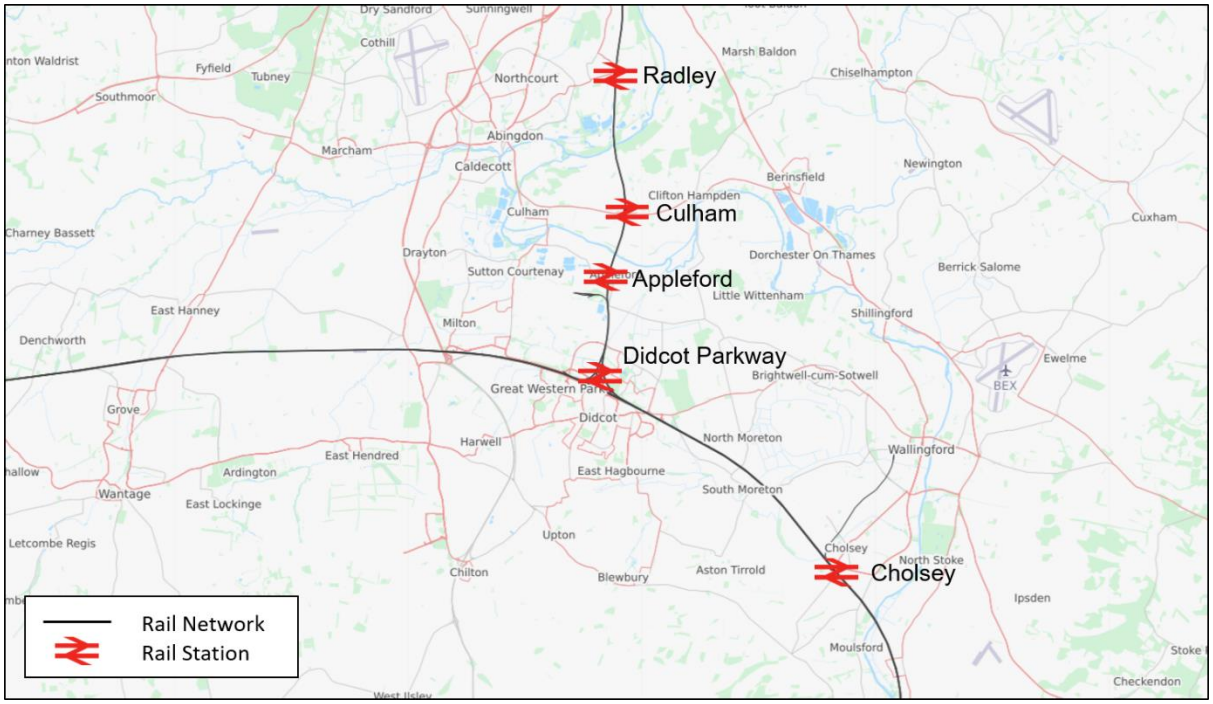

Figure 3-3 Rail Network near Didcot and Science Vale

Source: OpenStreetMap (2020)

3.3.15 Table 3-2shows statistics for the number of people entering and exiting stations across Science Vale for the past 5 years. It is important to note that the latest year of data available covers April 2019 to March 2020, and therefore does not capture the impact of COVID-19 on rail usage. The data shows that Appleford is by far the least used station, with little change in usage over the past 5 years. This is likely due to the station's rural location and the low frequency of services which serve the station.

3.3.16 Didcot Parkway is the most used station with over 3.3 million entries in 2019-2020 and only minor fluctuations in usage over the five year period. Culham has nearly doubled the number of entries and exits from 2015-2016 to 2019-2020, indicating that the use of the station has dramatically increased, potentially due to the expansion of Culham Science Centre. Radley and Cholsey are also moderately used stations, the former being the closest station to Abingdon and the latter being the closest station to Wallingford.

Table 3-2 Entries and exits across Science Vale over the past 5 years

Station Name	No. of passenger entries and exits per station				
	2015-16	2016-17	2017-18	2018-19	2019-20
Cholsey	275,100	281,438	271,850	290,196	284,448
Didcot Parkway	3,456,680	3,554,204	3,185,924	3,258,388	3,339,804
Appleford	7,752	6,426	6,562	7,504	7,232
Culham	59,958	69,216	83,908	92,784	107,072
Radley	145,904	145,348	141,786	129,982	135,780

Source: https://dataportal.orr.gov.uk/statistics/usage/estimates-of-station-usage

3.3.17 Appleford, Culham and Radley stations have limited station facilities and do not provide step-free access. Very limited car parking facilities are available at Culham and Radley stations, no car parking is provided at Appleford, and cycle parking is available at Culham station.

3.3.18 The local bus network across Science Vale is shown in Figure 3-4, as at March 2017, and associated levels of service are shown in Table 3-3. Although the network is relatively extensive given the dispersed nature of development in the local area, the frequency of services varies and is only more than four buses per hour on only a few sections of roads, even during the weekday peak periods.

3.3.19 Figure 3-5 shows a more recent map of the bus network within Didcot, as of January 2021. Overall, Didcot has a good level of bus service, with a clear link between Didcot Parkway Railway station and Milton Park. These services (X2, X32, X36, 33 and 99A/99C) are very frequent (one service every 5-10 minutes at peak times) and the journey time is between 12 and 17 minutes. Bus service ST1, the Science Transit Shuttle, connects Oxford to Harwell with a service every 30 minutes Monday – Friday. This service takes between 28 and 50 minutes from Oxford City Centre to the Harwell Campus, dependent on the time of the service. Since 2019, bus service 45 has provided a 15-minute bus route between Abingdon and Culham Science Centre throughout the day, with a frequency of once an hour in the peak periods.

3.3.20 Due to the severance created by the River Thames and the historic road network, there are poor opportunities for bus routes to offer good journey time reliability north / south in this area. Prior to January 2021, the only service operating over Clifton Hampden Bridge was a less-than-daily service providing access to Didcot from local villages. In January 2021, a new service (95) was introduced to provide a bus route between Didcot Parkway station and Culham Science Centre once an hour in the AM and PM peaks, taking just over 30 minutes.

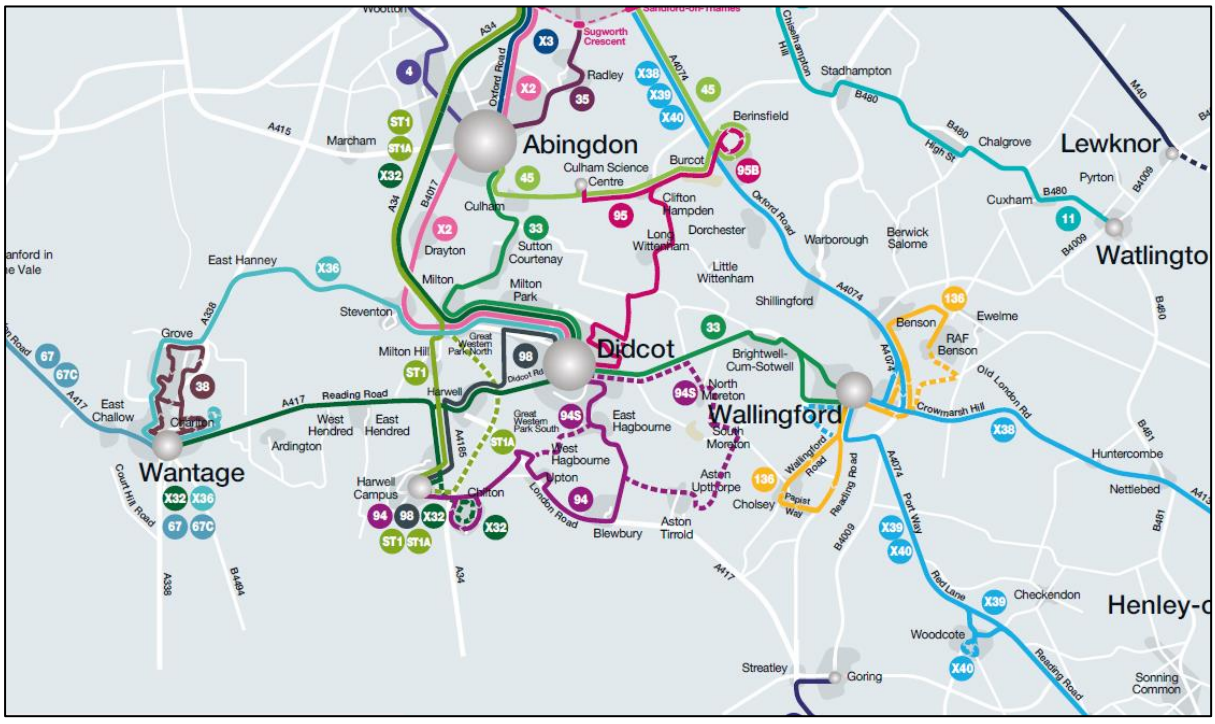

Figure 3-4 Bus Network in Science Vale

Source: https://www.oxfordkey.co.uk/site/uploads/images/originals/1538.pdf

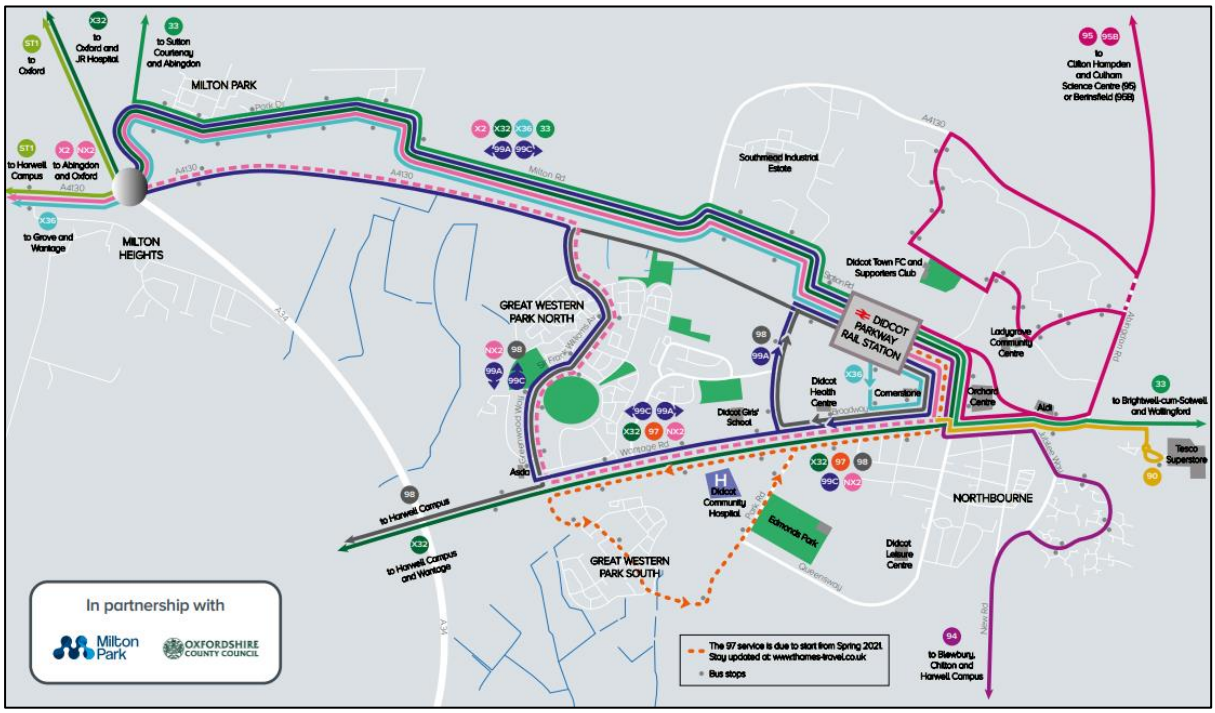

Figure 3-5 Didcot Bus Network

Source: https://assets.goaheadbus.com/media/cms_page_media/963/Didcot-map-January2021-19.pdf

Table 3-3 Bus Routes in Science Vale (as of April 2021)

Service	Route	Frequency[39]
ST1/ST1A	Oxford - Harwell	2 per hour (Mon-Fri)
X2	Oxford - Abingdon - Milton Park -Didcot	2 per hour (Mon-Fri)
X32	JR Hospital - Oxford- Milton Park -Didcot- Harwell- Wantage	2 per hour (Mon-Sat) Hourly (Sun) (Wantage-Didcot-Harwell only)
X36	Didcot – Steventon - Wantage	2 per hour (Mon-Sat)
33	Abingdon - Didcot - Wallingford	2 per hour (Mon-Sat) (Didcot-Wallingford only) 1 per hour (Mon-Sat) (Abingdon-Didcot) 1 per hour (Sun) (Abingdon-Didcot-Wallingford)
38	Wantage - Grove	1 per hour (Mon-Fri)
45	Oxford - Berinsfield - Culham Science Centre - Abingdon	1 every 2 hours (Mon-Fri) 2 per hour in the peaks (Mon-Fri) (Abingdon-Culham only)
94	Didcot - East Hagbourne - Blewbury - Harwell Campus	1 every 2 hours (Mon-Sat)
95	Didcot - Berinsfield - Culham Science Centre	1 every 2 hours (Mon-Fri) 1 per hour in the peaks (Mon-Fri)
98	Didcot – Harwell Campus	2 per hour (Mon-Sun) 3 per hour in the peaks (Mon-Fri)

3.3.21 Table 3-4 (overleaf) shows a comparison of travel times between Didcot and key destinations across Science Vale by mode. This analysis has been undertaken using the Google Maps journey planning tool for a journey at 8am (or as near as possible for scheduled public transport services) on a weekday. For the majority of destinations there is only a small difference in time between driving and cycling (around 5-10 minutes). This suggests many journeys within Science Vale could be undertaken by cycle. On journeys where the use of rail is possible, this is the quickest mode of transport. The low use of rail (as shown in Table 3-10 below) for journeys within Science Vale could therefore be due to the lack of frequent services or cost of the journey.

[39] Typical daytime frequency unless stated otherwise

Table 3-4 Travel time between Didcot and key destinations in Science Vale[40]

Route	Duration (minutes)			
	Private Car	Rail	Bus	Cycle
Didcot – Culham Science Centre	24	19	42	30
Didcot – Harwell Campus	16	N/A	37	25
Didcot – Milton Park	12	N/A	15	15
Didcot – Abingdon	30	29[41]	50	35
Didcot – Oxford	40	19	47	68

Pedestrian and Cycle Infrastructure Provision and Use

3.3.22 Active travel infrastructure is present across Science Vale and Didcot. However, this provision is fragmented and discontinuous in places, with a lack of infrastructure in several key areas across the region.

3.3.23 There is a concentration of cycling infrastructure in and around Didcot, notably with cycle infrastructure provided from Didcot to Milton Park, a key employment area. A cycle lane is provided alongside the A4130 and along Milton Road, however this provision is narrow and shared with pedestrians, with no buffer provided between the road and carriageway. Whilst this path was improved with lighting recently, it still does not attract significant numbers to cycle. There are some cycle paths within Harwell, however there is limited provision to access the area by bike. To access Culham, there is an off-road cycle path alongside part of the Abingdon Road (A415) from Clifton Hampden. The path is narrow and would not comfortably fit two cyclists passing one another and requires significant maintenance. No clear cycle paths are provided from Didcot to Harwell or Culham, while there is a distinct lack of cycle facilities in and around Wantage and Grove.

3.3.24 There are two National Cycling Network (NCN) routes across the Didcot area, as shown in Figure 3-6 overleaf.

[40] Where a range of journey times was provided, the longer journey time was taken.
[41] A combination of rail and bus (rail to Culham, bus to Abingdon)

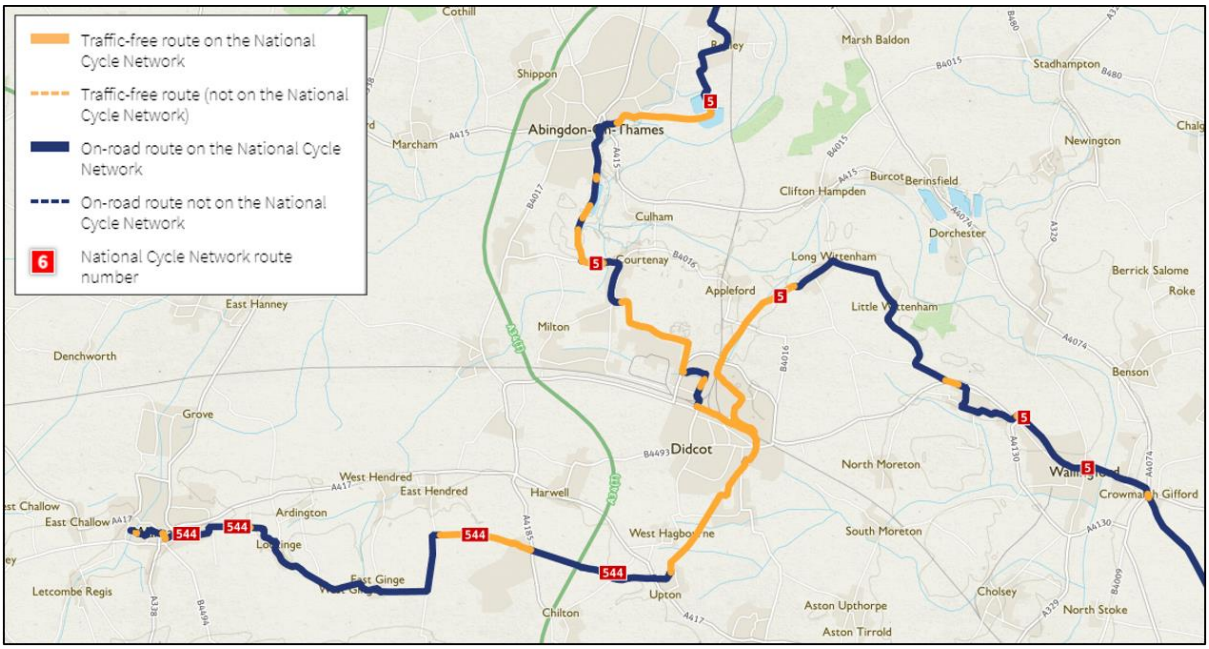

Figure 3-6 National Cycling Network

Source: https://www.sustrans.org.uk/national-cycle-network

3.3.25 The National Cycle Network Route 5 connects the area with the Didcot Parkway Station. NCN Route 5 is a long-distance route connecting Reading and Holyhead via Oxford, Stratford-upon-Avon, Bromsgrove, Birmingham, Stoke-on-Trent, Chester, Colwyn Bay and Bangor. National Cycle Network Route 544 connects Didcot and Wantage. It is a 12-mile route on quiet roads, byways and purpose-built paths.

3.3.26 As part of the Science Vale Cycle Network (SVCN) project[42], a network of new cycleways and footways have been designed and, in some cases, implemented. The project aims to provide easier and greater connectivity between the three main employment centres at Harwell Campus, Milton Park and Culham Science Centre and key urban centres: Didcot, Abingdon and Wantage. Six routes have been taken forward as part of the SVCN scheme, which are shown in Figure 3-7 and outlined below:

- Route 1: Wantage to Harwell Campus – The “Icknield Greenway”;”;
- Route 3: Abingdon to Milton Park;
- Route 5: Didcot to Harwell Campus;
- Route 6: Didcot to Milton Park;
- Route 7A: Abingdon to Culham Science Centre; and
- Route 8: Didcot to Culham Science Centre.

3.3.27 Some of these routes have already been constructed, and some (as of January 2021) are still under construction. It should be noted that the SVCN will not provide continuous off-road facilities and some elements of on-road cycling will be required.

[42] https://www.oxfordshire.gov.uk/residents/roads-and-transport/roadworks/major-current-roadworks/science-vale-cycle-network

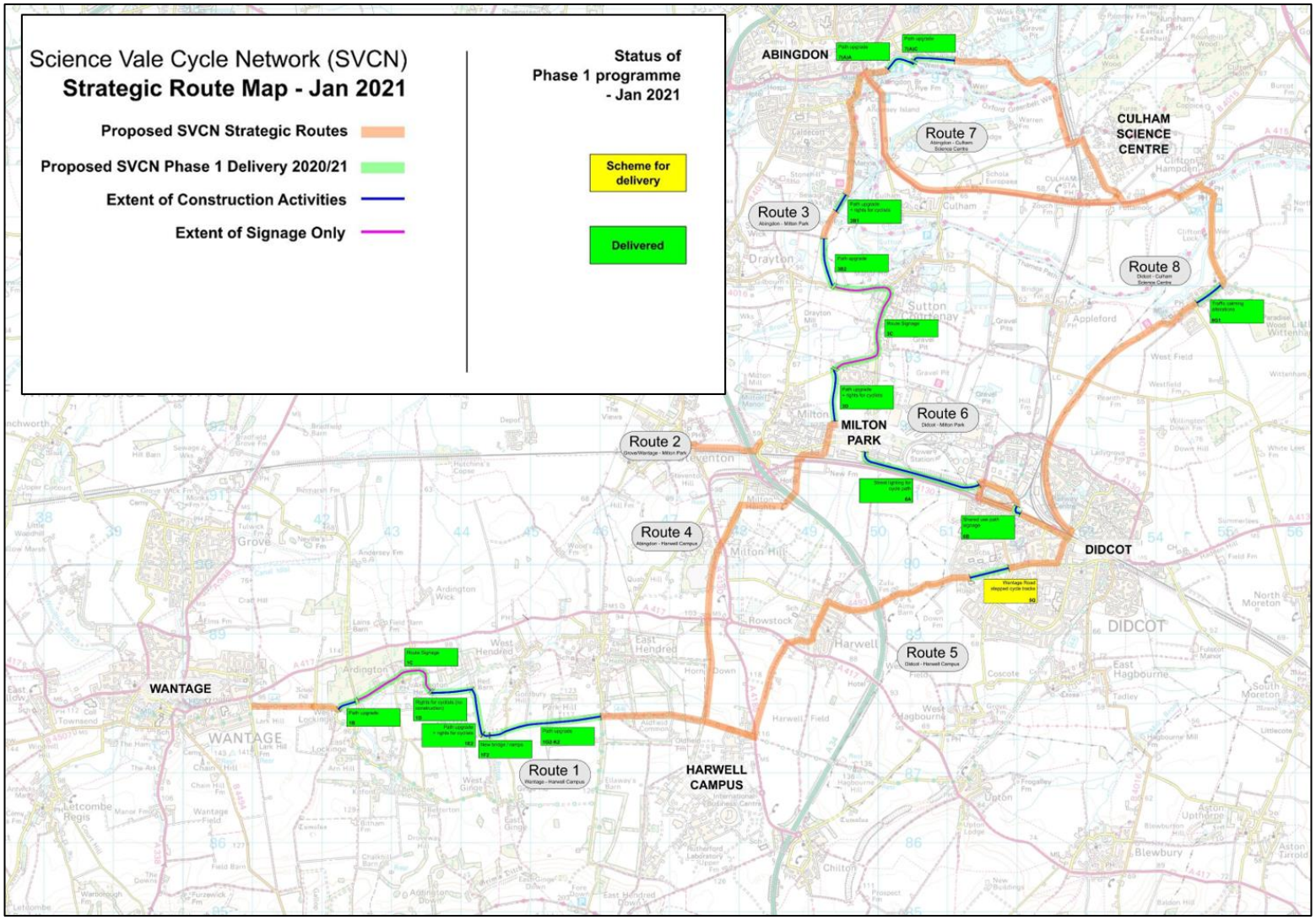

Figure 3-7 Science Vale Cycle Network

Source: https://www.oxfordshire.gov.uk/residents/roads-and-transport/roadworks/major-current-roadworks/science-vale-cycle-network

3.3.28 As part of OCC's LTP4 and the Science Vale Area Strategy, a Science Vale Cycling Strategy[43] was produced (2016). This outlines the importance of encouraging cycling within Science Vale and the settlements within the area, and the benefits this will have on the local residents and road network. This work sets the precedent for the SVCN as discussed above and gives a strategic overview of the potential for implementing routes and key cycling corridors across the area. As part of this, the strategy presents some information about existing patterns of cycling within the Science Vale area.

3.3.29 The 2011 Census shows there are already above average levels of cycling in Science Vale for journeys to work with 4.1% of journeys to work across Science Vale made by bike compared to 2.8% across England and Wales, and 3.16% in Oxfordshire. Table 3-5 shows that the majority of commuting cycling trips are intra-urban trips within Didcot, while there is also a significant proportion of trips from Didcot to Harwell and Milton.

Table 3-5 Percentage of Cycle to Work Trips originating from Didcot

Work Destination	Percentage of Trips
Didcot	62.83%
Harwell	20.49%
Milton	13.55%
Abingdon	1.44%
Wallingford	1.23%

Source:https://mycouncil.oxfordshire.gov.uk/documents/s33712/Background%20CA_JUN2816R13%20Connecting%20Oxfordshire%20vol%208%20part%20ii%20-%20Area%20Strategies.pdf

3.3.30 The Science Vale Area Strategy also identified that relatively high percentages of employees at the key employment centres across Science Vale cycle to work compared to the national average (2.8% in Census 2011), as shown in Table 3-6. Culham Science Centre appears to have the highest percentage of cycling commuting trips across Science Vale, and whilst not as high, Milton Park and Harwell Campus also have fair levels of cycling to work. The SVCN scheme will further encourage cycling across Science Vale and increase the percentage of commuters cycling further.

Table 3-6 Cycling to Science Vale

Destination	Percentage of commuters cycling
Harwell Campus	3.49%
Milton Park	4.52%
Culham Science Centre	6.40%

Source:https://mycouncil.oxfordshire.gov.uk/documents/s33712/Background%20CA_JUN2816R13%20Connecting%20Oxfordshire%20vol%208%20part%20ii%20-%20Area%20Strategies.pdf

[43]https://mycouncil.oxfordshire.gov.uk/documents/s33712/Background%20CA_JUN2816R13%20Connecting%20Oxfordshire%20vol%208%20part%20ii%20-%20Area%20Strategies.pdf

3.3.31 The Propensity to Cycle Tool (PCT) has been used to understand the patterns and scale of cycling commuting demand in the area. It should be noted that this tool is based on 2011 Census data. This shows that, whilst cycling levels are low in more rural areas, in towns there are high levels of cycle commuting as per Census 2011. For example, in the south of Abingdon, between 15-19% of commuting trips were made by bike. In Didcot, as shown in Figure 3-8, there are LSOAs where 10-14% of commuting trips occur by bicycle, but in other LSOAs where this is as low as 0-1%. Linking this back to the availability of cycling paths, it is obvious that there is a direct relation between the number of cycling trips to the areas that could provide access to appropriate cycling infrastructure.

3.3.32 Therefore, there is a big variation in the percentage of commuters who cycle between, but also within, towns. The majority of cycling is over shorter distances within settlements, however there are some cyclists between Didcot and Abingdon, as well as from the towns to Harwell Campus and Culham Science Centre.

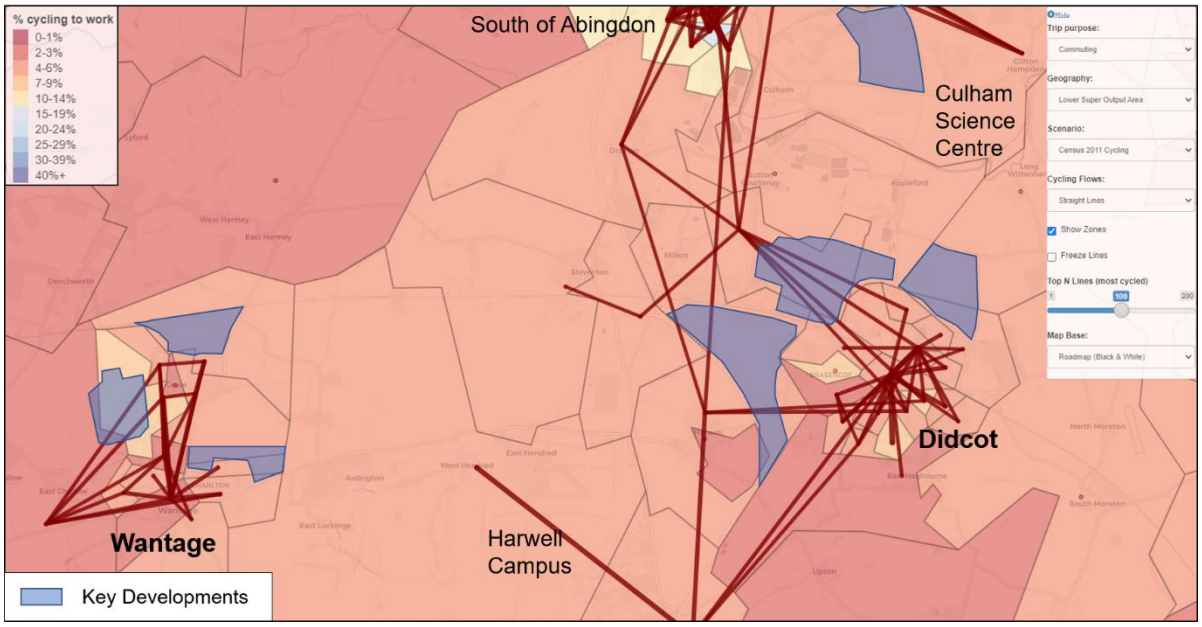

Figure 3-8 Census 2011 Cycle to Work Demand (LSOA Level)

Source: Propensity to Cycle Tool

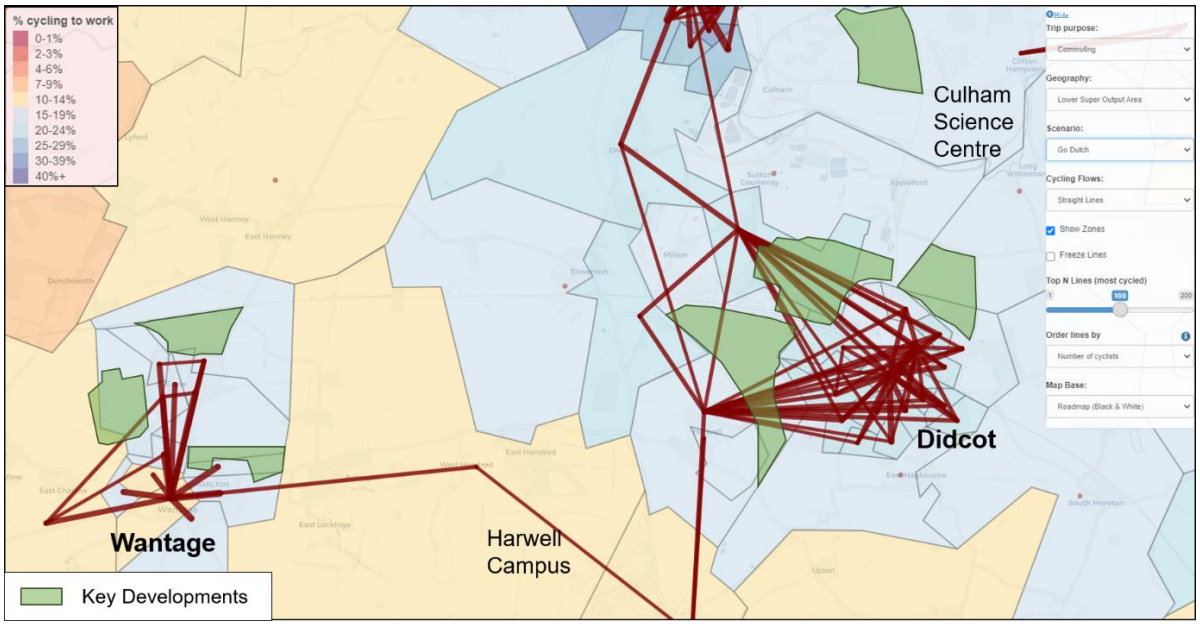

Figure 3-9 Potential Cycle to Work Demand: Go Dutch Scenario (LSOA Level)

Source: Propensity to Cycle Tool

3.3.33 The PCT has been used to demonstrate the high cycle demand under different scenarios, but this is still based on 2011 Census data and will not therefore capture more recent trends nationally in favour of increased cycling which may be reflected in the Science Vale. Figure 3-9 demonstrates the potential cycle demand in the area around Science Vale and Didcot in the "Go Dutch" scenario; the propensity to cycle if the area had the same infrastructure and cycling culture as the Netherlands (but retained its hilliness and commute distance patterns)[44]. In this scenario, cycle commuting demand significantly increases across Science Vale, with cycle commuting in the area reaching 15-29% in the Go Dutch Scenario, compared to the current level of 4.1%. The O-D desire lines between Abingdon, Didcot and Harwell Campus remain, and although not shown in the figure, there are significant O-D desire lines between Didcot, Abingdon and Culham Science Centre.

3.3.34 Figure 3-10 shows the existing network of footpaths, byways and bridleways across Science Vale. In comparison to the cycle infrastructure there is a more extensive, interconnected network of public rights of ways. For example, there are footpaths connecting Didcot to Culham via Sutton Courtenay, and there are paths linking Harwell and Wantage. However, it should be noted many of these footpaths are more likely to be leisure routes and as such are unlikely to be used for significant purposes.

[44] Lovelace, R., Goodman, A., Aldred, R., Berkoff, N., Abbas, A. and Woodcock, J. (2016). The Propensity to Cycle Tool: An Open Source Online System for Sustainable Transport Planning. Journal of Transport and Land Use, 10(1). Center for Transportation Studies. Available at: https://arxiv.org/abs/1509.04425

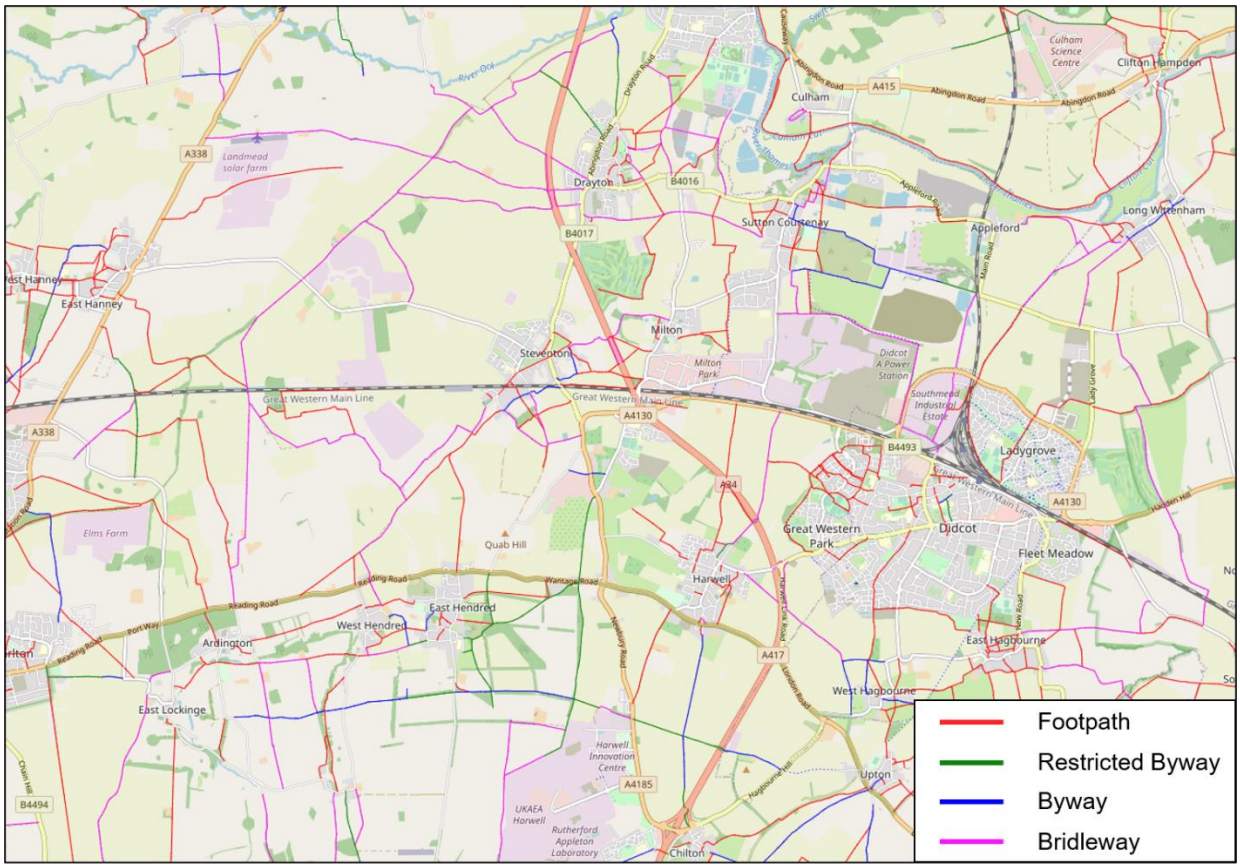

Figure 3-10 Footpaths across Science Vale and Didcot

Source: https://footpathmap.co.uk/

Travel Patterns and Modal Share

3.3.35 As part of the Access to Science Vale OAR Part 1 (March 2018), analysis was undertaken on Didcot Journey to Work data from Census 2011. This remains the most recent and comprehensive information available for travel patterns and mode share, although it is acknowledged it is quite old and travel behaviour may have changed since 2011.

Table 3-7 Origins for commuting trips (by all modes of travel) ending in Didcot

Origin	Number of Trips	% of trips
Didcot	2,948	46.1%
Science Vale[45]	449	7.0%
Abingdon	371	5.8%
Oxford	253	4.0%
Wantage & Grove	252	3.9%
Wallingford	168	2.6%
Reading	11	0.2%
Other origins	1,800	28.1%
Total	6,400	100%

Source: Access to Science Vale OAR Part 1 (March 2018)

[45] In this analysis "Science Vale" excludes Didcot and Wantage & Grove, but includes Harwell Campus, Didcot Power Station, Milton Park and Culham Science Centre

3.3.36 Table 3-7 shows the origins for commuting trips ending in Didcot. This shows that almost half of the journeys to work which end in Didcot also start in the town. Other areas accounting for commuting trips to Didcot include Wallingford, the rest of Science Vale (excluding Wantage & Grove) and Abingdon suggesting that currently there is limited longer distance commuting into Didcot. It is important to note that 28% of trips are from "other origins", indicating a wide range of locations for in-commuting. The exclusion of Milton Park from the definition of Didcot in this context may be distorting the picture slightly. Milton Park is also a major employer of local staff from the rest of the Didcot area, but it also is a major attractor of workers from a wide area, increasingly so as it has become a centre for more specialised, higher-end employment activities.

3.3.37 Table 3-8 highlights that trips to the rest of the Science Vale make up the largest number (about 20%), but this includes trips to Milton Park, Harwell and Culham. The next largest destination is Oxford with other significant destinations being Abingdon, Wallingford and Reading.

3.3.38 The exclusion of Milton Park and the power station (which was operational at the time of the Census) from the definition of Didcot in this analysis does give a slightly misleading picture of the balance of in-commuters to out-commuters. However, even if allowance for this is made then it is likely that there still are about 100% more trips to work out of Didcot than inbound trips.

Table 3-8 Destinations for commuting trips starting in Didcot

Destination	Number of Trips	% of trips
Didcot	2,948	24.4%
Science Vale[45]	2,570	21.2%
Oxford	1,434	11.9%
Abingdon	779	6.4%
Wallingford	517	4.3%
Reading	411	3.4%
Newbury	138	1.1%
Central London	110	0.9%
Wantage & Grove	107	0.9%
Other destinations	3,000	24.8%
Total	12,100	100%

Source: Access to Science Vale OAR Part 1 (March 2018)

3.3.39 The Access to Science Vale OAR Part 1 (March 2018) includes analysis on the mode of travel for both in-commuters and out-commuters to Didcot from Census 2011. Table 3-9 below outlines the modal split of journeys to work in Didcot, which highlights that, irrespective of the origin, the overwhelming mode of travel to work in Didcot is car. Overall, around 80% of external journeys to work in Didcot are made by car, either as a driver or passenger.

3.3.40 Figure 3-11 (overleaf) shows the modal split of commuting trips from Science Vale to Didcot. This shows that bus journeys make up 5-10% of external commuters from all locations, except Reading (which is directly linked by train). Cycle trips make up a similar proportion (5% and 4% respectively) of trips from Science Vale and Abingdon.

Use of train to commute only makes up any significant impact in journeys from Oxford and Reading where it is used by 7% and 22% respectively.

3.3.41 Intra-urban journeys within Didcot, shown in Table 3-9 and Figure 3-12, show that a similar proportion of journeys are made by car as on foot, with 39% of trips made on foot compared 48% are made by car (both driver and passenger). Around 11% of commuters cycle to work within Didcot, and a much smaller percentage use the bus, train or a motorcycle. Analysis of PCT demonstrates that the majority of trips within Didcot travel from residential areas to Didcot town centre and industrial estates.

Table 3-9 Modal split of journeys to work in Didcot

	Science Vale	Abingdon	Oxford	Wantage & Grove	Wallingford	Reading	Didcot*
Car	85%	85%	80%	88%	83%	77%	48%
Motorcycle	2%	2%	0%	2%	2%	0%	1%
Bus	5%	7%	6%	6%	10%	0%	1%
Train	1%	0%	7%	0%	0%	22%	1%
Foot	2%	1%	4%	3%	3%	1%	39%
Cycle	5%	4%	2%	0%	1%	1%	11%
Others	0%	0%	1%	0%	1%	0%	0%

**Commuting journeys which start and end within Didcot*
Source: AECOM analysis and Access to Science Vale OAR Part 1 (March 2018)

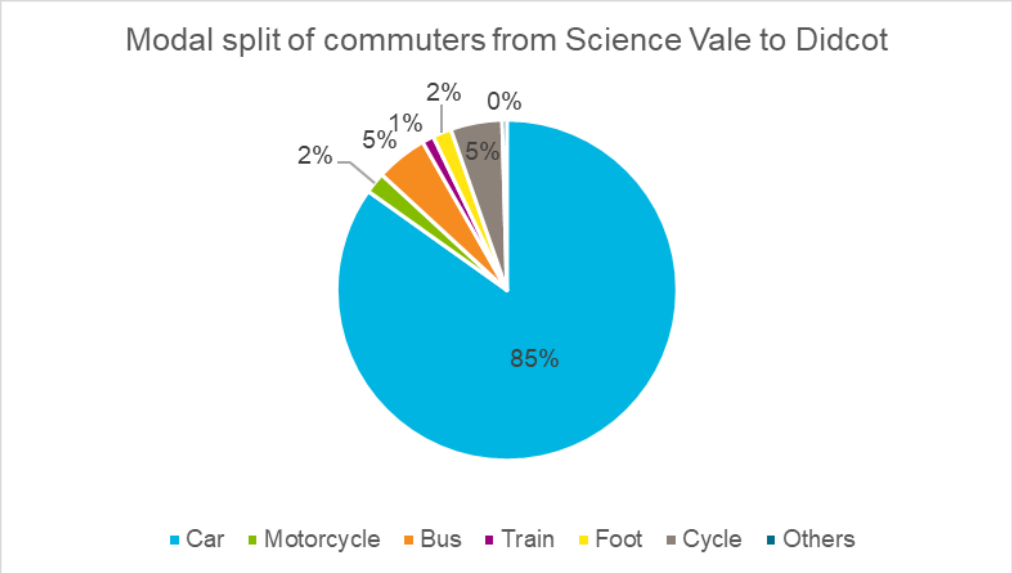

Figure 3-11 Modal split of journeys to work from Science Vale to Didcot

Source: AECOM analysis

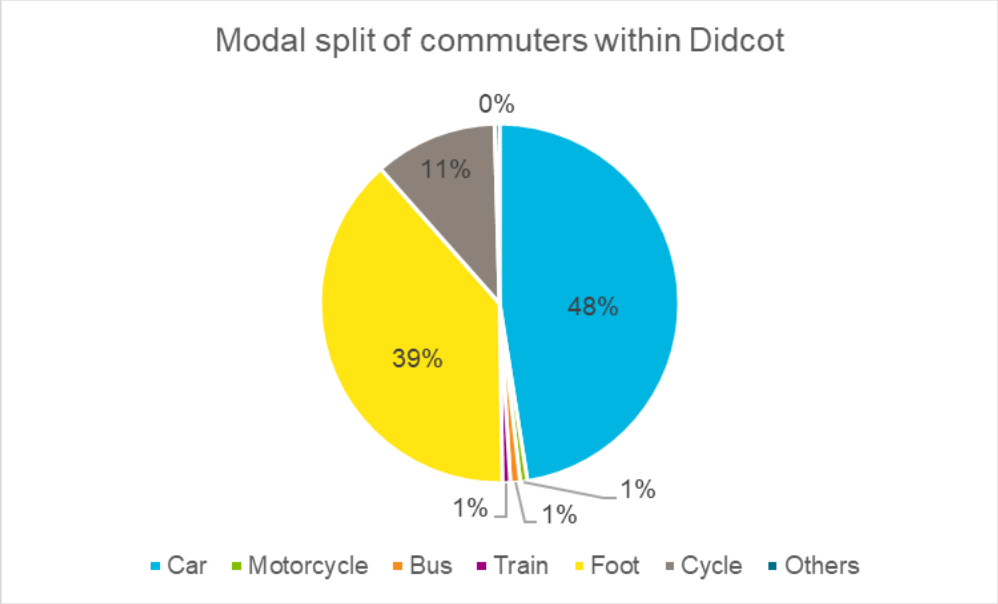

Figure 3-12 Modal split of journeys to work within Didcot

Source: AECOM analysis

3.3.42 Table 3-10 shows the modal split of journeys to work from Didcot. Again, car is the dominant mode of travel for commuting for residents of Didcot, irrespective of the location of their workplace. Reading has the lowest proportion of car trips; however, this is still over 50% of the total trips. As an example, Figure 3-13 shows the modal split of journeys to work from Didcot to Science Vale.

3.3.43 Bus trips for commuting are only significant for trips to elsewhere within Science Vale (which includes Milton Park). Out-commuting by train was significant to destinations in Reading and Oxford, reflecting the frequent services provided and the limits of the rail network. Journeys on foot and by cycle were only a significant proportion of trips within Science Vale, likely indicating movements from the town to Milton Park.

Table 3-10 Modal split of journeys to work from Didcot

	Science Vale	Oxford	Abingdon	Wallingford	Reading	Newbury
Car	77%	74%	89%	86%	52%	94%
Motorcycle	1%	1%	1%	0%	1%	1%
Bus	12%	3%	6%	6%	1%	0%
Train	0%	20%	1%	1%	43%	0%
Foot	2%	1%	2%	4%	1%	4%
Cycle	7%	1%	2%	2%	1%	1%
Others	0%	0%	0%	0%	0%	0%

Source: AECOM analysis and Access to Science Vale OAR Part 1 (March 2018)

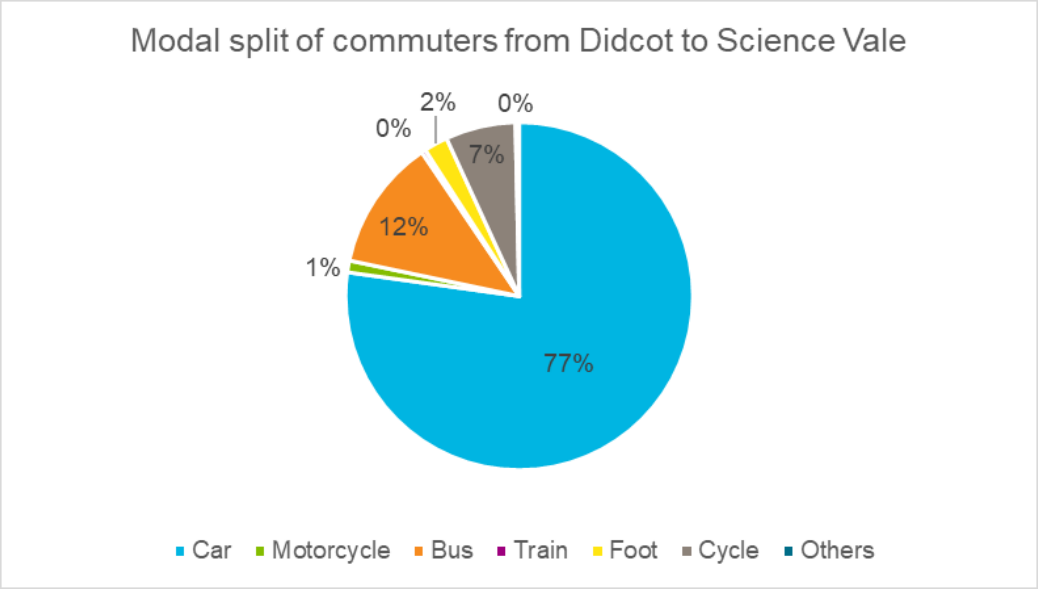

Figure 3-13 Modal split of journeys to work from Didcot to Science Vale

Source: AECOM analysis

Journey Times, Traffic Flows and Congestion Issues

3.3.44 Figure 3-14 (overleaf) shows peak hour congestion for the A and B class roads in Didcot for 2014-2015. This has been extracted from OCC congestion monitoring which is based upon the time taken to travel and mile in the peak hours compared to that out of peak (which is assumed to be free flow), based on short time surveys using Automatic Number Plate Recognition (ANPR). Figure 3-14 shows that the greatest delays are seen to be on Foxhall Road, Station Road and the section of Broadway between Jubilee Way and Marsh Bridge, which could be the result of traffic queueing from Sir Frank Williams Drive. This shows that even in 2014 there were congestion issues within Didcot, which will have only exacerbated further in the period to 2021. Furthermore, additional growth across Didcot and Science Vale will increase the number of vehicles using the road and further worsen congestion and delay.

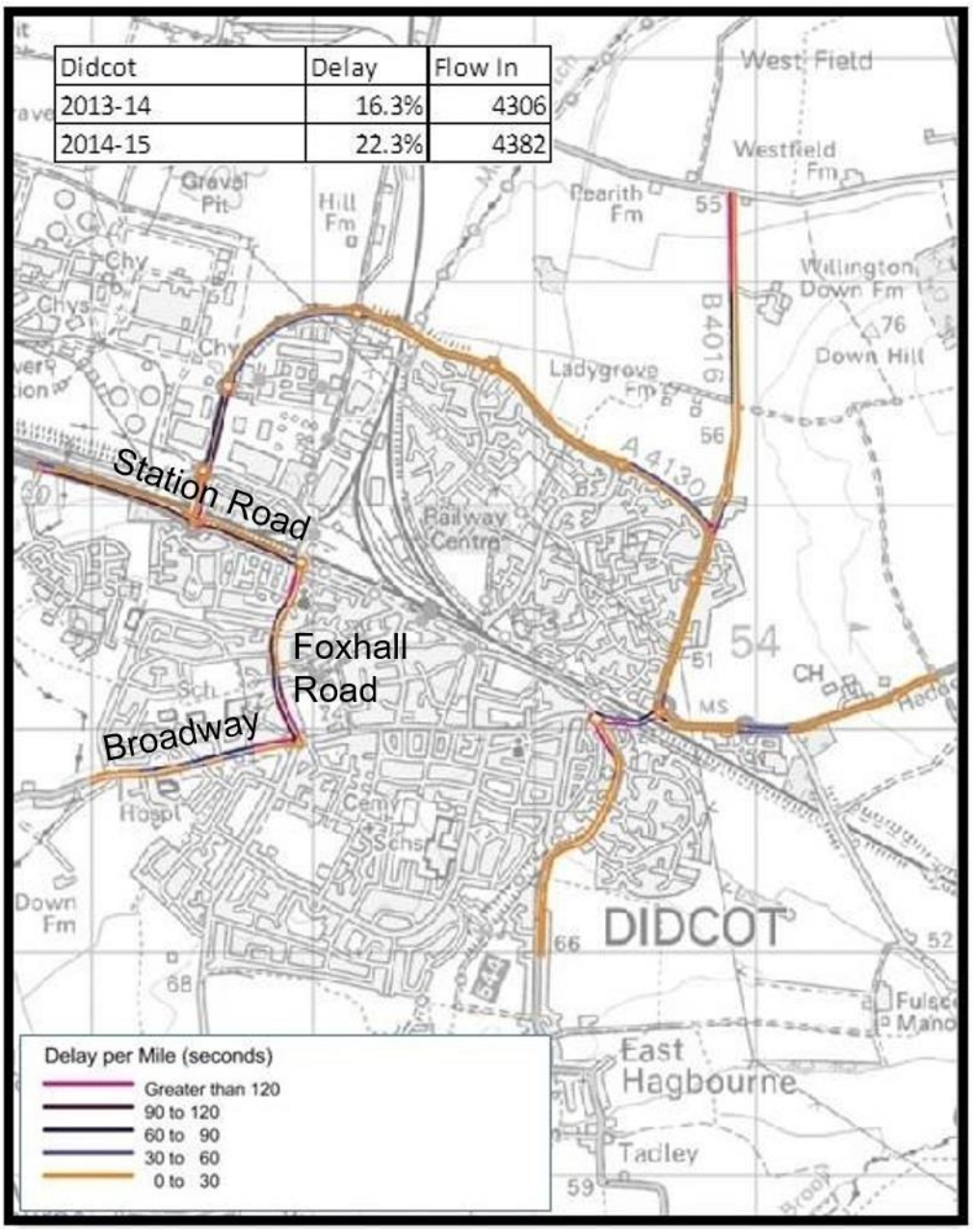

Figure 3-14 Peak Hour congestion in Didcot

Source: Access to Science Vale OAR Part 1 (March 2018)

Traffic Collisions

3.3.45 CrashMap, an online tool for mapping collisions over the past five years (2015 – 2019), has been used to identify any collision hotspots or potential areas of concern. It should be noted that CrashMap only considers personal injury collisions and not damage-only collisions. Figure 3-15 below shows the locations of crashes, and the severity of the crash for all vehicle types. Due to the large number of slight collisions, these were removed from the figure for ease of reading.

3.3.46 There are several more noticeable concentrations of collisions across the Science Vale. Within Didcot, collisions are concentrated along the A4130 and B4493/Broadway, with the majority of collisions being recorded as slight in nature. Serious collisions are found along both roads, generally concentrated near to

junctions as would normally be expected. There was one fatal accident along Jubilee Way in 2016.

3.3.47 At the Milton Interchange there is a concentration of collisions on the A4130 (Didcot) arm, including one serious and one fatal collision.

3.3.48 Near Culham, there are no clear concentrations of collisions, but it should be noted that there are several collisions located near to, or on Tollgate Road, across the river crossing.

3.3.49 Most of the collisions near to Harwell Campus are on the A34, the nearby strategic road. There were several collisions on Newbury Road, close to the Harwell Campus, one of them serious in nature. There were two fatal accidents on the A417 near to East Hendred and Ardington.

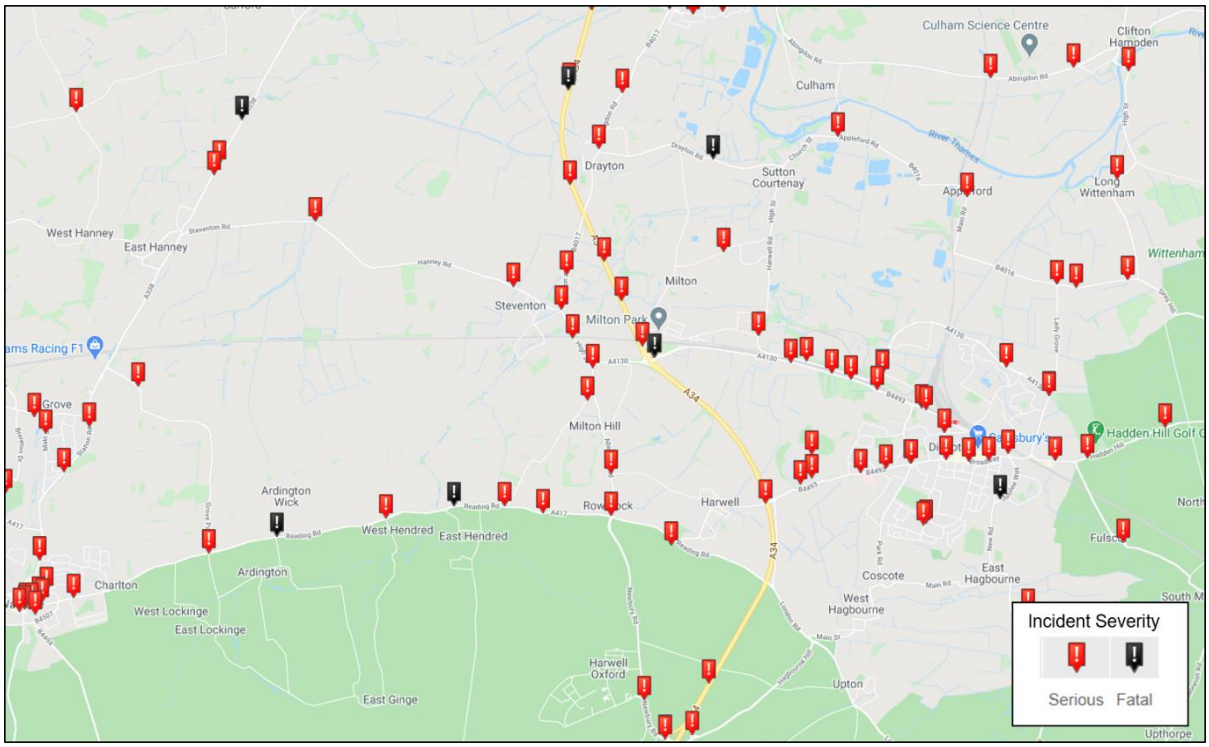

Figure 3-15 Location of Collisions across Science Vale, Serious and Fatal, 2015-2019

Source: Export from https://www.crashmap.co.uk/Search

3.3.50 Figure 3-16 shows collisions across Science Vale where at least one cyclist was involved over the five years from 2015 – 2019. Most of these collisions occur in Didcot along the B4493/Broadway, or along the A4130, and several of these collisions were serious in nature. There are a few collisions close to Culham Science Centre and Harwell Campus, all slight in severity. There was one fatal collision in South Abingdon in 2018.

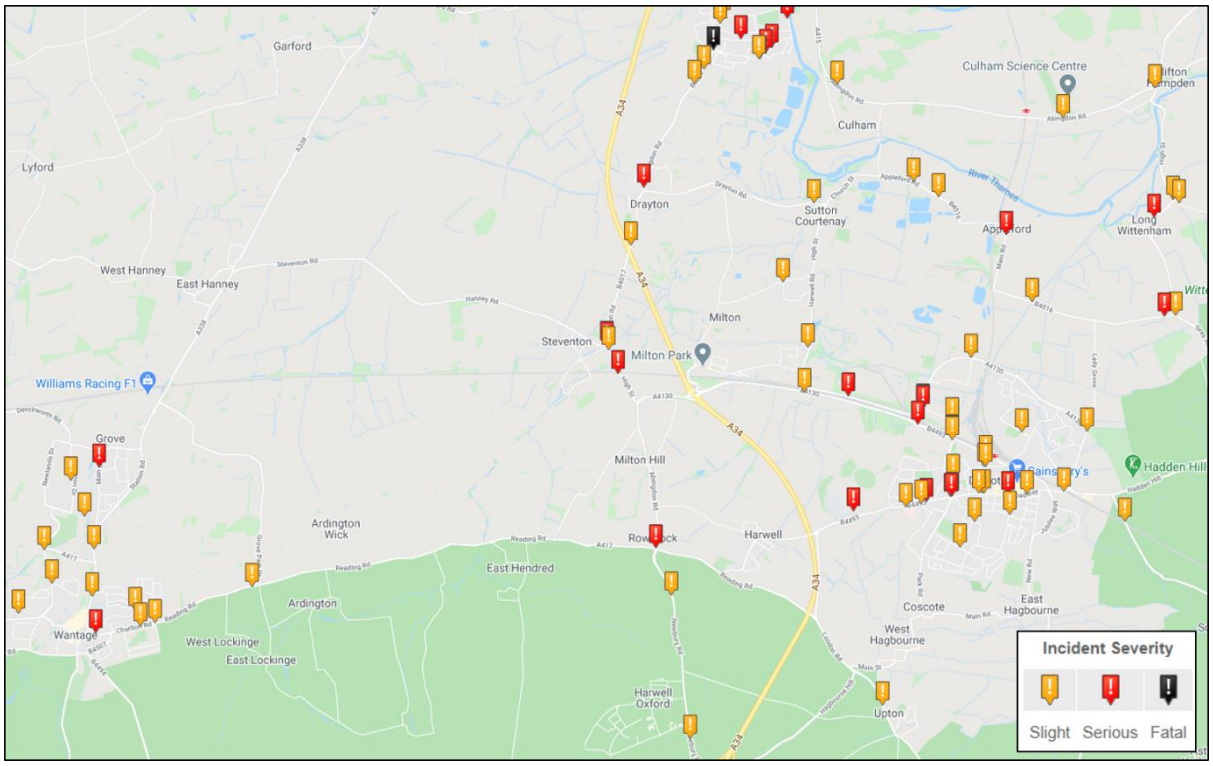

Figure 3-16 Location of Cyclist Collisions across Science Vale, 2015-2019

Source: Export from https://www.crashmap.co.uk/Search

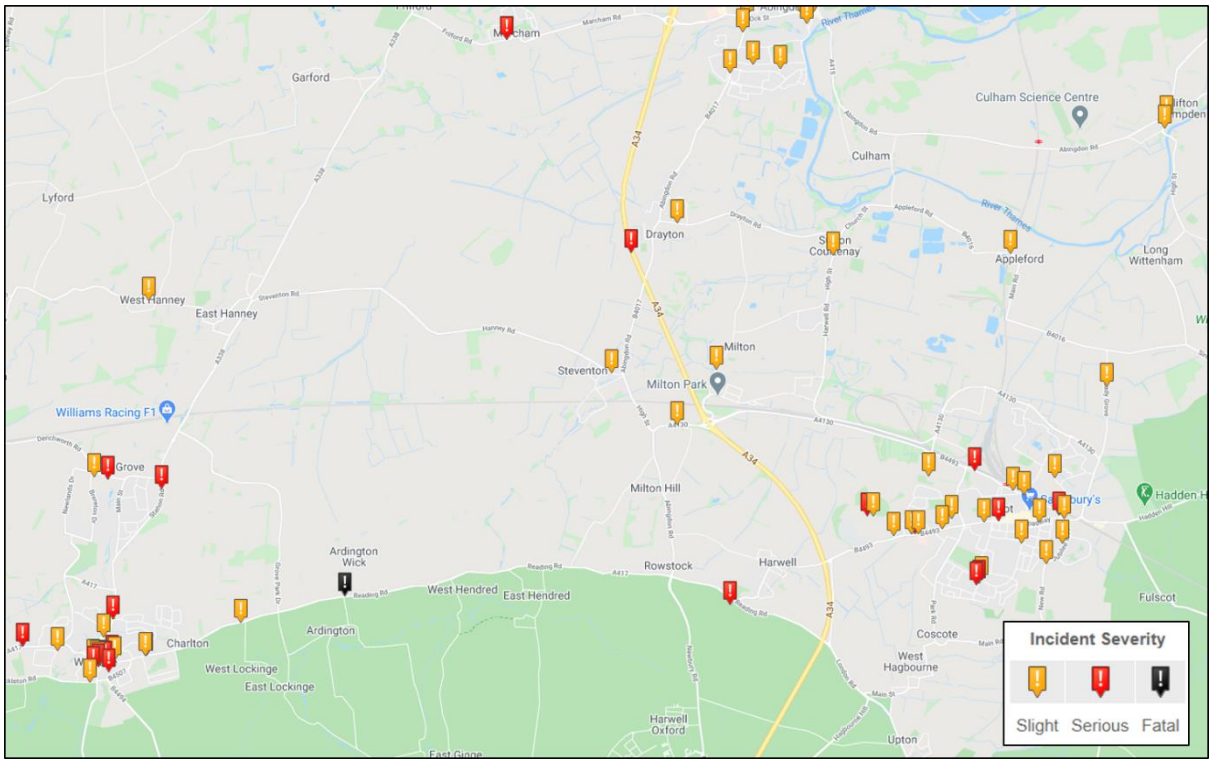

Figure 3-17 Location of Collisions involving a pedestrian across Science Vale, 2015-2019

Source: Export from https://www.crashmap.co.uk/Search

3.3.51 Figure 3-17 shows the location of collisions where there was at least one pedestrian casualty involved over the years 2015-2019.The majority of these collisions occur within the centre of Wantage and the centre of Didcot, with a concentration of

collisions along the B4493/Broadway, with one being serious in nature. There are no collisions involving pedestrians near to Culham Science Centre or Harwell Campus. There was one fatal collision involving a pedestrian along the A417 near Ardington Wick.

Environment

3.3.52 Science Vale and Didcot are located in close proximity to and within a number of environmental designations. The most sensitive designations are the nationally and internationally ecological sites, including the Little Wittenham Special Area of Conservation (SAC) and the nationally designated North Wessex Downs Area of Outstanding Natural Beauty (AONB). Figure 3-18 outlines the ecological designations across Science Vale and the wider area.

3.3.53 The Little Wittenham SAC, which is located north-east of Didcot, and approximately 3.1 km south east Clifton Hampden, is designated due to the presence of Great Crested Newts (GCN) and is one of the best-studied GCN sites in the UK. In order to get permission to carry out works near a SAC (and Sites of Special Scientific Interest), a Habitat Regulations Assessment (HRA) mut be developed and submitted to Natural England. This can be completed prior to submission or during the determination of a planning application and is usually produced by the relevant local authority in consultation with the developer of a scheme. The HRA must demonstrate that a project will not have likely significant effects on the qualifying features of the SAC and a site's integrity. There are no pathways, either directly or indirectly, that would impact upon the integrity or functioning of Little Wittenham SAC as a result of proposed transport improvements.

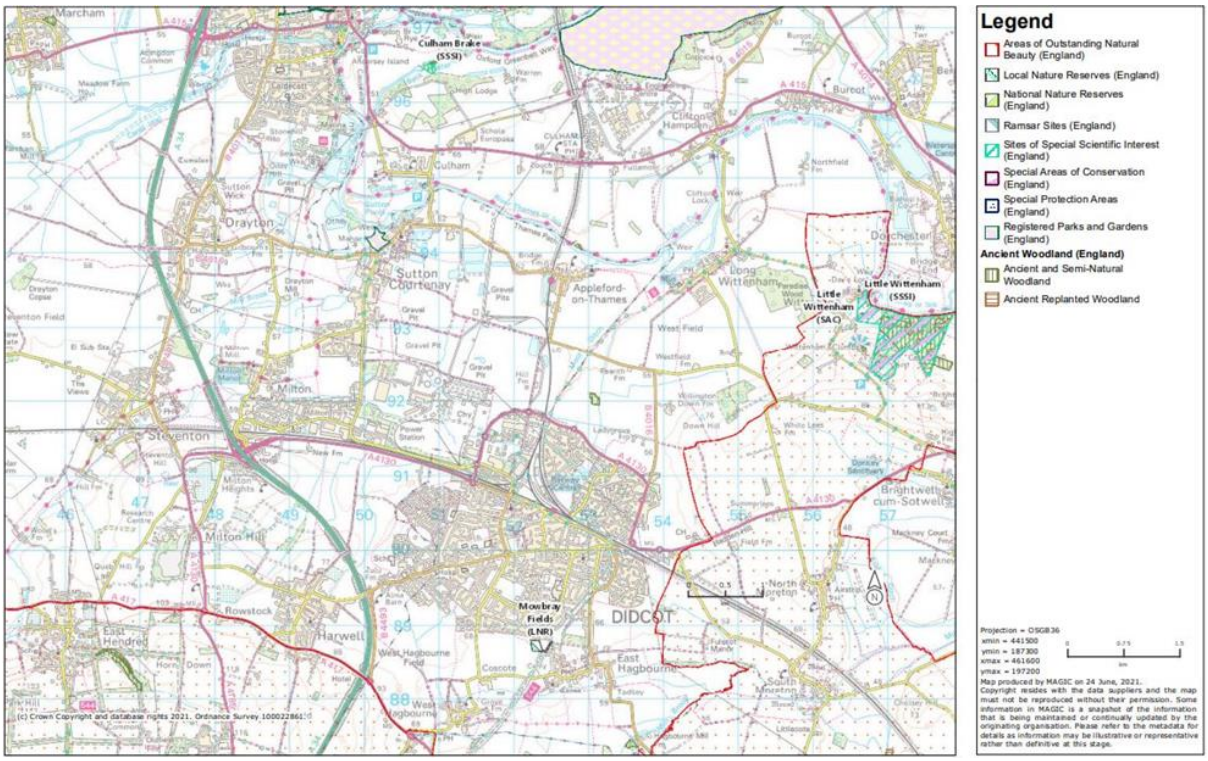

Figure 3-18 Environmental Designations across Science Vale

Source: MAGIC Maps; DEFRA (2021)

3.3.54 There are no Air Quality Management Areas (AQMA) within the Science Vale area, including Didcot. AQMAs areas are identified in central Abingdon-on-Thames and Marcham, however these are not currently anticipated to be negatively impacted. by the scheme.

3.3.55 Noise Important Areas (NIA) are noise hotspots where the 1% of the population that are affected by the highest noise levels from major roads are located. Figure 3-19 shows the prevalence of NIAs across Science Vale, distinguishing between those which are caused by roads and those which are caused by railways. There is a NIA on the A34, just south of the Milton Interchange, as well as a NIA in Rowstock. Additionally, there are several NIAs caused by rail including south of Steventon, in the east of Didcot and near to Appleford. The Defra Noise Action Plan: Roads (2019) sets out that the relevant highway authorities are responsible for examining NIAs and forming a view about the possible measures to be taken in order to assist with the implementation of the Government's policy on noise. This will be considered in the noise modelling and, if necessary, the requirement for further noise mitigation (e.g. acoustic barriers) will be considered.

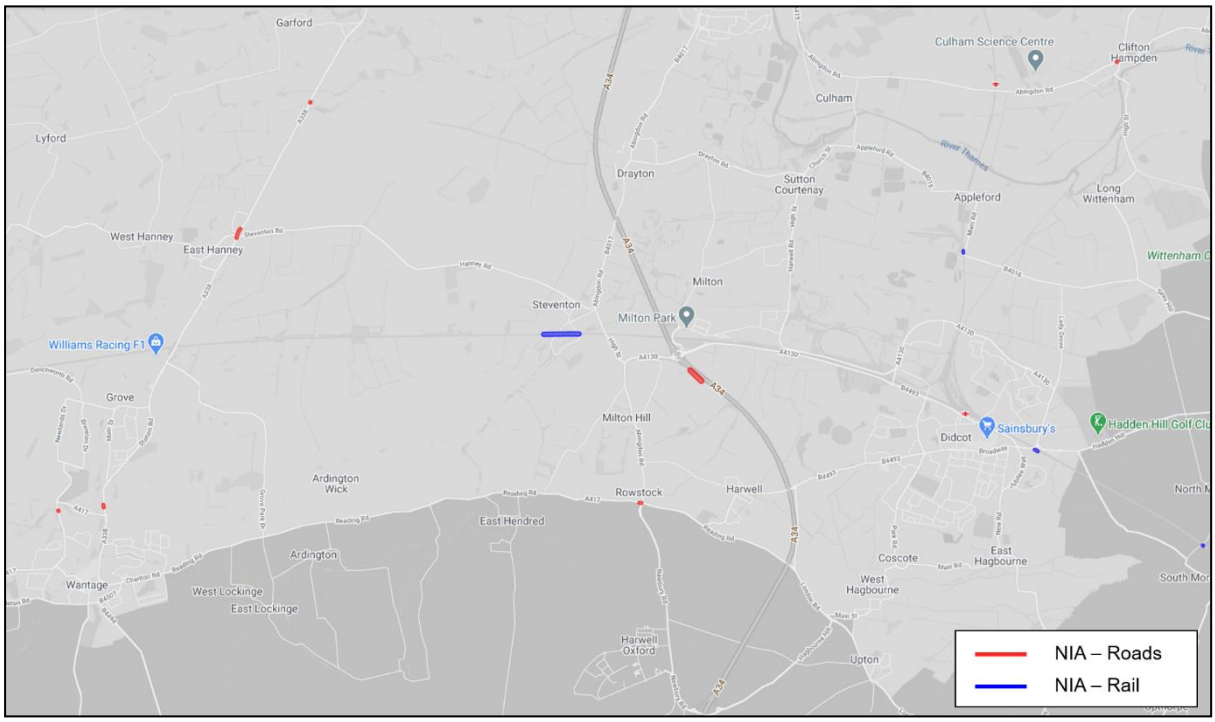

Figure 3-19 Noise Important Areas across Science Vale

Source: www.extrium.co.uk

3.3.56 Science Vale also has significant areas which are, or may be, subject to flooding, centred on the functional flood plain of the River Thames and its tributaries. The area shown in light blue in Figure 3-20 is that identified by the Environment Agency as being in Flood Risk Zone 2 and dark blue is Flood Risk Zone 3. Flood Risk Zones 2 and 3 are defined as follows:

- Zone 2, Medium Probability: Land having between 1 in 100 and 1 in 1,000 annual probability of river flooding; and
- Zone 3, High Probability: Land having a 1 in 100 or greater annual probability of river flooding.

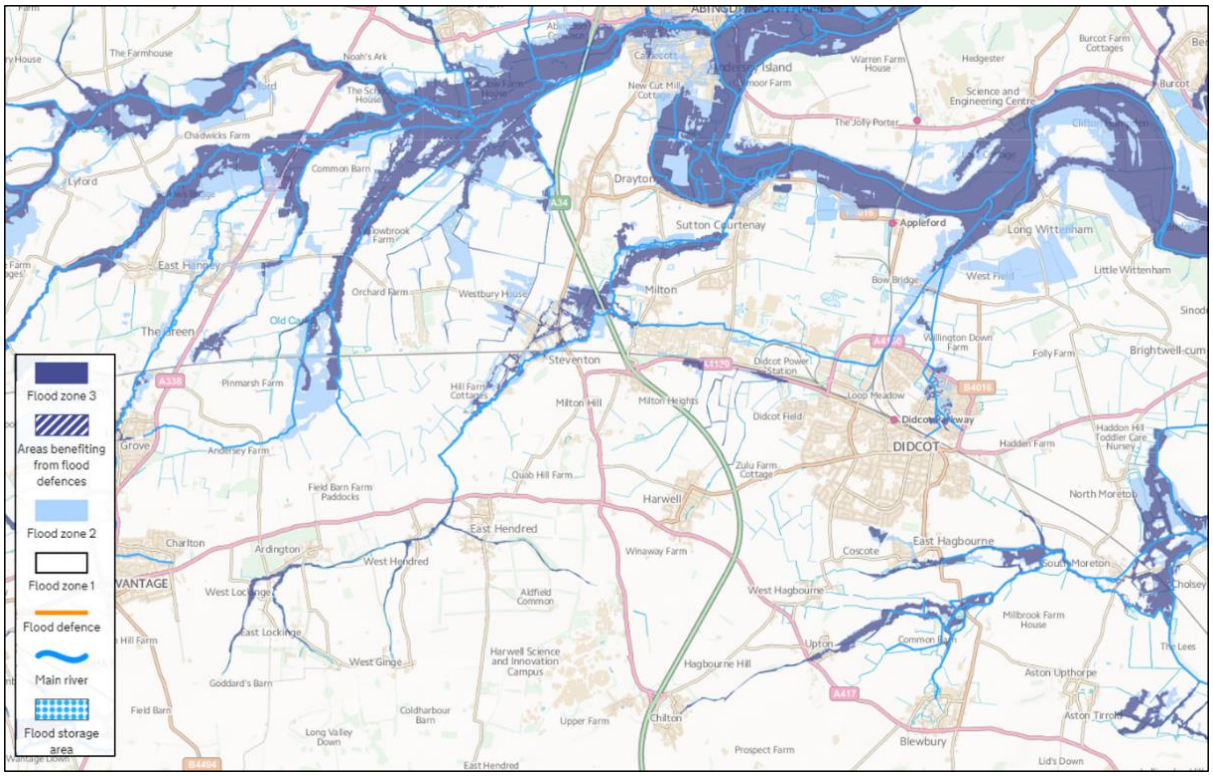

Figure 3-20 Area liable to flooding

Source: https://flood-map-for-planning.service.gov.uk/

3.3.57 There are a number of heritage designations within the Science Vale area, including scheduled monuments, registered parks and gardens and listed buildings. These include, the Grade I listed Nuneham Courtenay and the Grade II listed Sutton Courtenay registered park and gardens, multiple listed buildings ranging from Grade I to Grade II listed which are centred in the villages of Appleford, Sutton Courtenay, Clifton Hampden, Abingdon-on-Thames, Milton, Culham and Drayton. In addition, there are a number of scheduled monuments. These features are illustrated in Figure 3-21 and Figure 3-22 overleaf.

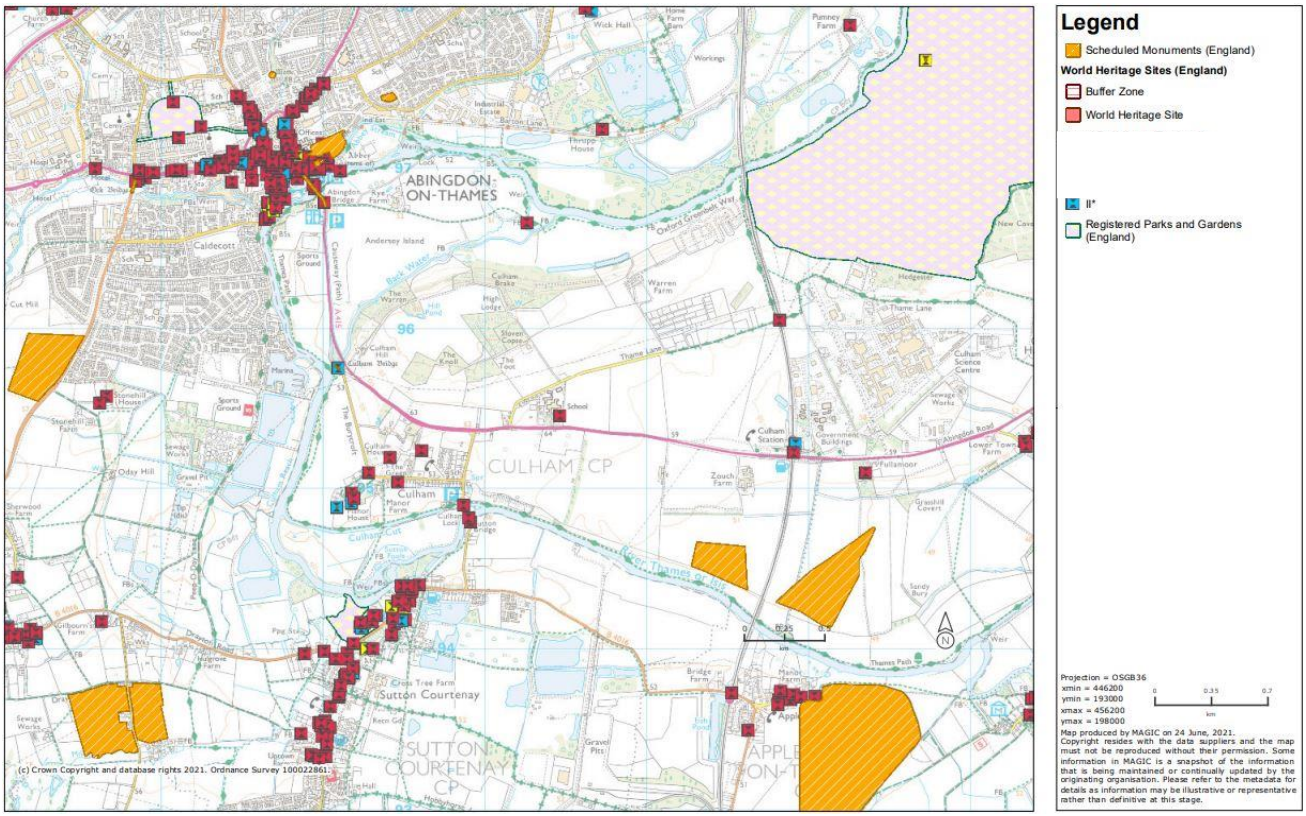

Figure 3-21 Heritage designations within the Science Vale

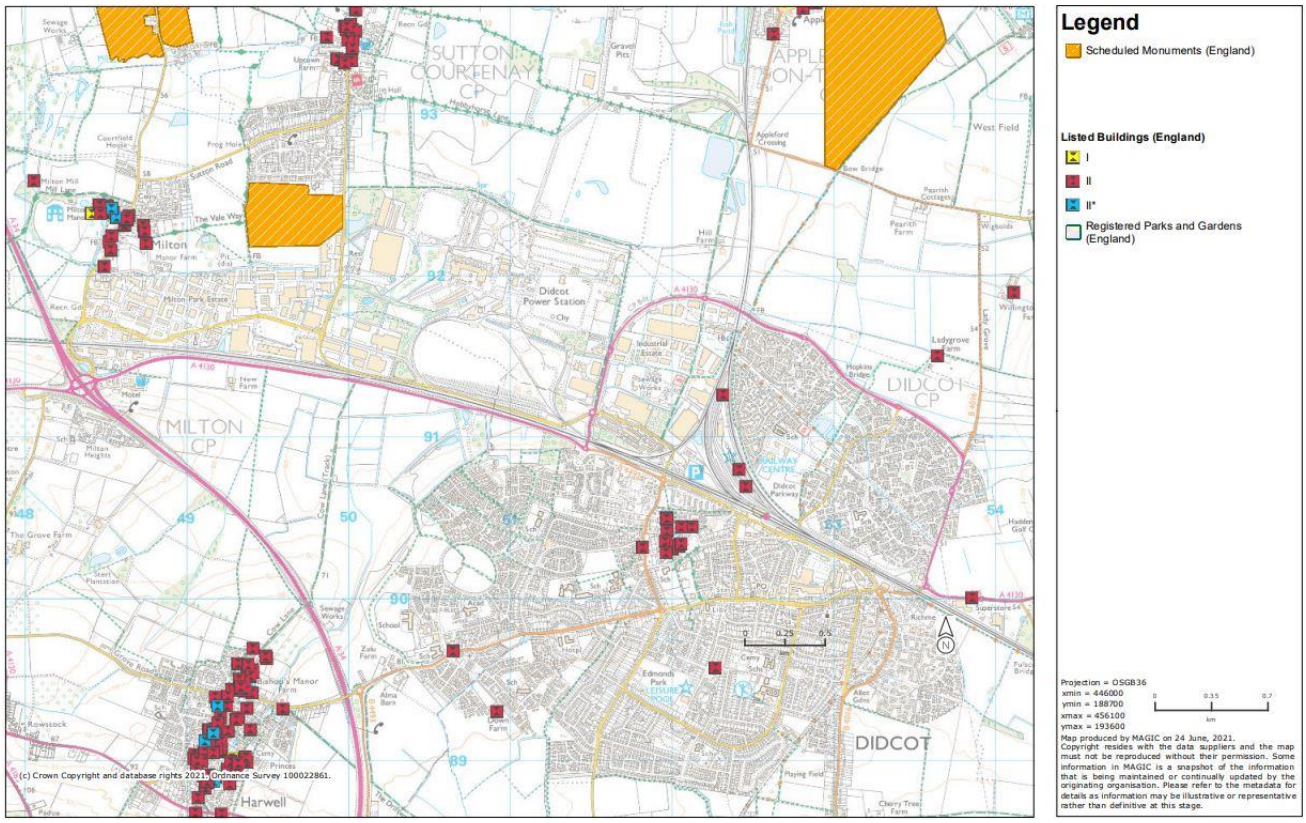

Figure 3-22 Heritage designations within the Science Vale

Source: MAGIC Maps; DEFRA (2021)

3.3.58 Furthermore, it is important to consider the location of Oxford's Green Belt, which was formally approved in 1975. The original designation of the Oxford Green Belt was to prevent the city from extending further into the countryside. The role of the Green Belt within the surrounding districts is to preserve the rural setting of the city. Figure 3-23 shows the extent of the Green Belt across Science Vale, which is located in the north-east of the area. Culham Science Centre is within the Green Belt, as is Culham village, however the majority of Science Vale is not within the Green Belt.

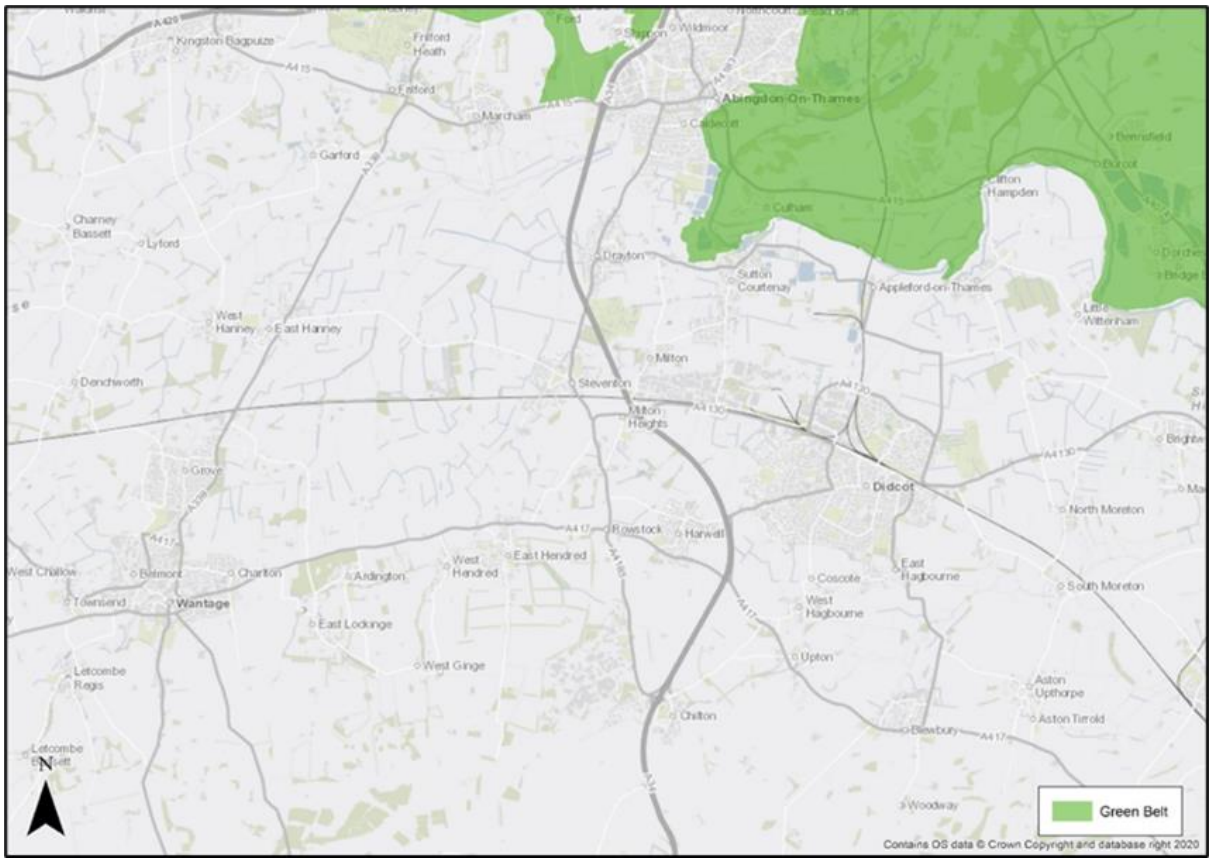

Figure 3-23 Green Belt Map

Source: AECOM analysis using https://data.gov.uk/dataset/ccb505e0-67a8-4ace-b294-19a3cbff4861/english-local-authority-green-belt-dataset

3.4 Understanding the Future Situation

3.4.1 In order to effectively appraise any potential transport scheme in Didcot and Science Vale, it is imperative to understand the future context and situation in which the schemes will sit. As part of this, this section provides an overview of development proposals, future changes to the transport network and forecasted transport conditions.

Development

3.4.2 In this context, development means both housing and employment development, and both will be considered in the following sections. The discussion is structured around specific development locations as housing and employment development across Science Vale tend to be in tandem.

Science Vale

3.4.3 As the overarching area, Science Vale guides future growth and development across the region. The potential for job creation and growth in the area is large, not just for the immediate area, but for the benefit of the wider Oxford city region and the national economy as a whole. In 2012, the Government awarded Enterprise Zone[46] status to Science Vale with the designation covering 92 hectares in the Harwell and Milton Park sites. The plans for the Enterprise Zone sites envisage the development of up to 200,000m^2, providing at least 8,400 new direct jobs and yielding £10.5m per annum in additional business rates. A new Enterprise Zone, the Didcot Growth Accelerator[47], was declared in 2016 and now covers an area of approximately 113 hectares.

Didcot Garden Town

3.4.4 In April 2014, the Department for Communities and Local Government (DCLG, now the Ministry of Housing, Communities and Local Government) published a prospectus on Garden Cities and identified these as critical to addressing the nation's housing shortage.

3.4.5 In response to this prospectus, SODC, VoWHDC, OCC and OxLEP joined together to develop an Expression of Interest for a Greater Didcot Garden Town. As set out in Paragraph 3.3.8 in December 2015, the Government announced that Didcot was successful in its bid, and that it will become a Garden Town delivering 15,050 new homes and 20,000 high-tech jobs in the greater Didcot area.

3.4.6 Historically, Garden Cities and Towns have been synonymous with new settlements: they typically comprise development of Greenfield land to create entirely new communities. Whilst new development in and around Didcot presents an opportunity to incorporate the Garden Town principles from the offset, it will also be important to retrofit the existing town to ensure that Didcot has a unified sense of place grounded in being a Garden Town. Some of the existing issues that Didcot faces which the Garden Town proposals need to address are:

- *A lack of identity and character;*
- *Underutilised gateway;*
- *Sprawl; and*
- *A town centre lacking vibrancy and diversity.*

3.4.7 Since the success of the bid, the Didcot Garden Town proposal has been developed including a vision and masterplan, as well as supporting a delivery strategy to ensure the plans are realised. Seven high level Garden Town Priorities have been identified[48] which refer to:

- A permeable, connected movement network that supports and future proofs transport;
- Smart principles to introduce new technology;

[46] https://enterprisezones.communities.gov.uk/enterprise-zone-finder/science-vale-uk-enterprise-zone/
[47] https://enterprisezones.communities.gov.uk/enterprise-zone-finder/didcot-growth-accelerator/
[48] As per the Didcot Garden Town Delivery Plan (October 2017)

- Design to facilitate, encourage and support communities through design;
- A network of open spaces forming the backbone of the Garden Town;
- An extended and enhanced town centre in the heart of the Garden Town;
- Range of uses and designs of housing with appropriate density; and
- Sustainability embedded in every aspect of decision making.

3.4.8 The masterplan for the Didcot Garden town can be seen in Figure 3-24 . The masterplan recognises the importance of the villages surrounding Didcot and therefore the proposals include the establishment of green buffers to each of the villages within the Didcot Garden Town Area of Influence. These serve to protect the setting of the villages rather than provide a green belt to Didcot, while their rural agricultural use will include suitable environmental features to promote opportunities for wildlife, assist carbon capture and help prevent flooding.

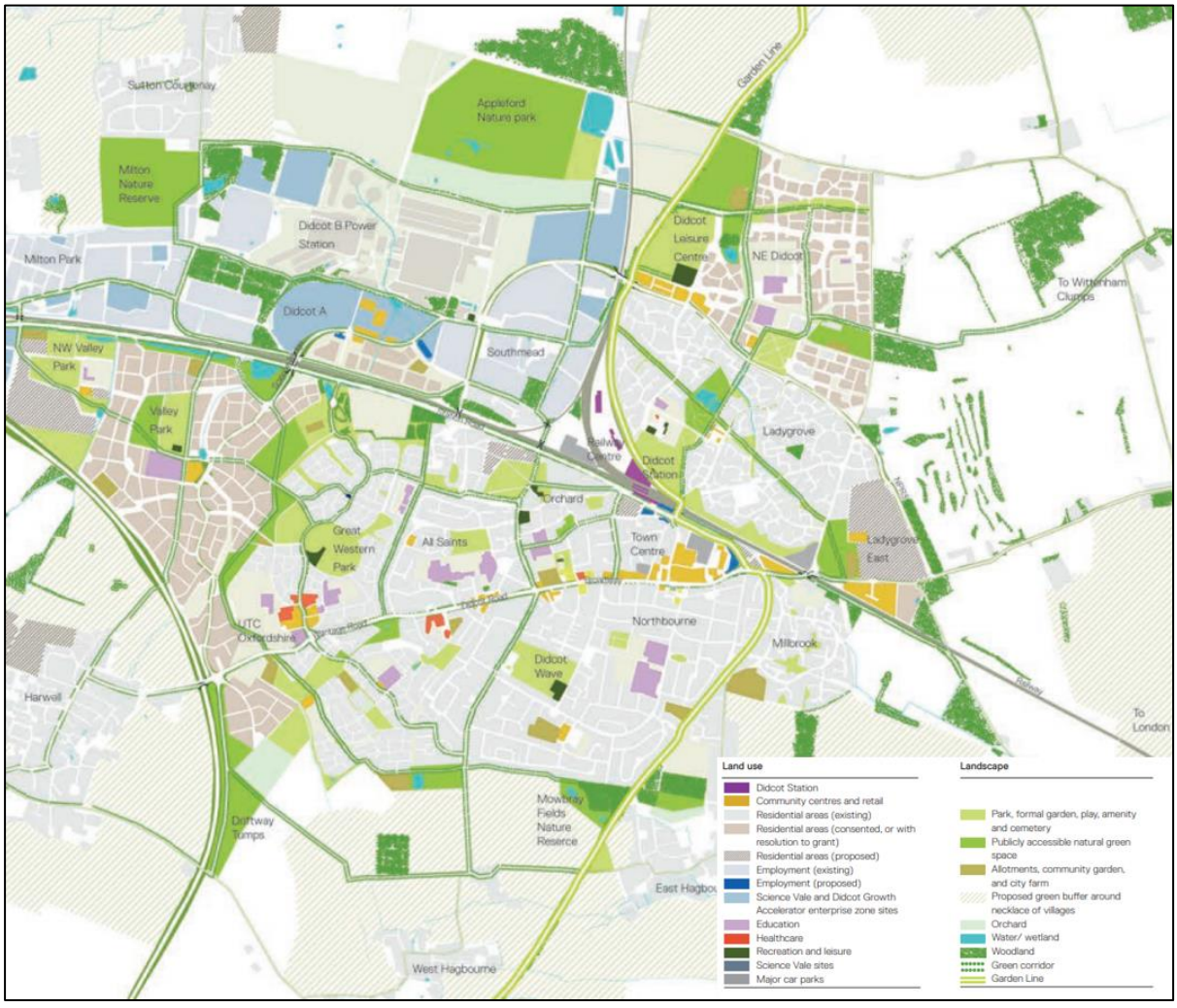

Figure 3-24 Didcot Garden Town Masterplan

Source: https://www.whitehorsedc.gov.uk/wp-content/uploads/sites/3/2020/10/Delivery-Plan-Section-9-10th-October-2017-web-q-5.pdf

3.4.9 The masterplan and the movement strategies for the Garden Town are aimed at encouraging a shift away from reliance on the private car and towards other modes of

transport. Investment in new infrastructure to accommodate town-wide movement, therefore, needs to enable alternative modes of transport to become the preference for as many journeys as possible.

3.4.10 As part of the Garden Town proposals, the population of Didcot is expected to more than double in the next 15 years. The 15,050 homes are to come forward across a number identified sites, including several strategic housing allocations, as follows:

- North East Didcot;
- Valley Park;
- Ladygrove East; and
- Didcot Gateway.

3.4.11 The delivery of these sites is critical to the success of the Garden Town, not least to realise the Garden Town's role in providing much needed new homes, but also because they present a ready opportunity to embed the Garden Town principles – including intensification of land use – in Didcot through new development. Overall, this will support sustainable growth across Didcot and help achieve the objectives of the Garden Town.

Didcot Power Station

3.4.12 Didcot A Power Station, a feature on the area's landscape for over forty years, closed in March 2013 and offers a significant opportunity for further development when it is fully decommissioned. The Local Plan includes the redevelopment of the Didcot A site to provide a high-quality mixed-use development. The site will continue to be reserved for a range of uses, particularly employment (B1, B2 and B8). Other acceptable uses for the site include, but are not limited to, residential (C1, C2 and C3), ancillary retail, an element of bulky goods retail, leisure (D2) and community uses.

D-Tech

3.4.13 There is an emerging application for a Local Development Order to be known as D-Tech, located in the Didcot Growth Accelerator Enterprise Zone. It is located north of the A4130 as shown in blue in the Didcot Garden Town Masterplan (Figure 3-24, above). The site is flanked by the Cherwell Valley Railway Line to the east, and the FCC Landfill site to the north west. The proposal is to develop the land into an employment site catering for multiple use classes.

3.4.14 D-Tech is a 23 hectare site which is capable of providing over 950,000 square feet of high-tech offices, laboratories and manufacturing facilities. It is expected the site will provide 2,000 new jobs and bring a £350 million investment to the town of Didcot.

Culham

3.4.15 The site is at the outer edge of the Oxford Green Belt. SODC Local Plan proposes to inset Culham Science Centre and land adjacent to it from the Green Belt. The exceptional circumstances justifying a review of the Green Belt in this area are:

- The Science Centre, and Culham No.1 site, were previously identified as “major development sites in the Green Belt” and there is significant development on the two sites and the land surrounding them is suburban in nature;
- The additional land provides an opportunity to deliver housing adjacent to one of the major employers in southern Oxfordshire;
- Development here would make the most of a sustainable transport opportunity at the railway station;
- Development in this location is at the heart of Science Vale and supports the delivery of significant strategic infrastructure; and
- The definable boundaries avoid coalescence with other settlements.

3.4.16 Land within the developable area identified adjacent to Culham Science Centre is proposed to be developed to deliver approximately 3,500 new homes, a net increase of 2 hectares of employment land, 12 pitches for Gypsies and Travellers and supporting services and facilities.

Harwell and Milton Park

3.4.17 There is an ambitious programme of job creation and growth for the Science Vale area, including the two Enterprise Zone sites at Harwell Campus and Milton Park designated in 2011. The Harwell Campus and Milton Park sites are both identified as strategic employment sites, providing a combined total of 156 hectares of available employment land.

3.4.18 It is considered important that this growth is delivered alongside new housing and the provision of appropriate infrastructure to help make the area more self-contained and to achieve a sustainable pattern of development. Job growth in the south–east of the Science Vale is intended to be focused at these sites, which is likely to positively impact the local and wider economy.

Berinsfield

3.4.19 The village of Berinsfield, located to the east of Clifton Hampden, is currently ‘washed over’ by the Green Belt. This village faces considerable challenges related to high levels of deprivation compared to the rest of South Oxfordshire district and the future viability of local facilities considered essential by the local community. The Adopted Local Plan proposes to inset the built-up area of the village and an area of greenfield land to the east of the village from the Oxford Green Belt. This will allow up to 1,700 new homes to be delivered with the aim of re-balancing the community, securing and enhancing valuable local community facilities. The Local Plan also includes 5 hectares of additional employment land around the village.

HIF Bid

3.4.20 As part of the successful HIF bid, twelve housing sites were identified. These are as follows:

- Land at Berinsfield (1,650 units);
- Land adjacent to Culham Science Centre (3,500 units);

- Gateway Site, Station Road, Didcot (252 units);
- Ladygrove East (572 units);
- Land at former Didcot A Power Station (259 units);
- Land to South of the A4130 (41 units);
- Orchard Centre Phase 2 (300 units);
- Vauxhall Barracks (300 units);
- Valley Park (44,254 units);
- North West Valley Park (560 units);
- Land to East of Sutton Courtenay (200 units); and
- Land North of Appleford (93 units).

3.4.21 The HIF bid outlines that the total size of supported development is 846.8ha, 831.9ha of which is housing area. The aim is for 36% of the new homes to be classed as affordable, regardless of whether they will be made available for sale or for rent.

3.4.22 The developments listed above will generate the need for new school places in all sectors. As such, several new schools have been planned and these are as follows:

- A secondary school on Site 2 (Culham);
- 2 primary schools at Site 26 (Valley Park); and
- Primary schools on sites larger than c.800 homes.

3.4.23 Additionally, the HIF bid also outlines the requirements for utility infrastructure, health and care services, and sustainability to ensure the proposed developments are in line with Local Plans.

Transport Modelling

3.4.24 In order to understand the impact of proposed developments across Didcot and Science Vale on the transport network, different iterations of transport modelling have been previously undertaken. This includes strategic modelling, microsimulation modelling, and local junction modelling[49].

3.4.25 The modelling described below reflects the Do Minimum scenarios.

Strategic Modelling

3.4.26 In order to assess the impacts of proposed housing growth across Science Vale and to support the evidence base for local plans, both SODC and VoWHDC have produced Evaluation of Transport Impacts reports (ETI). An ETI is used to model the impact of the Local Plan and understand the transport requirements to mitigate any negative impacts. The ETIs provide an idea of the level of housing growth expected across Science Vale and Didcot and describe the future transport network based on several indicators (such as junction delay and level of congestion).

3.4.27 Both the SODC and VoWHDC ETI have been based on the Oxfordshire Strategic Model (OSM). The OSM has a base year of 2013 and is composed of a Highway

[49] Further information on modelling, including other growth scenarios tested in relation to scheme options, can be found in Appendix F

Assignment Model, a Public Transport Assignment Model and a five-stage multi-modal Demand Model. The model covers the whole of Great Britain with different degrees of detail and has a detailed modelled area and a fully modelled area, as shown in Figure 3-25. In the OSM the Area of Detailed Modelling is bounded by Bicester to the north, Wallingford to the east, Burford and Witney to the west and Wantage and Didcot to the south.

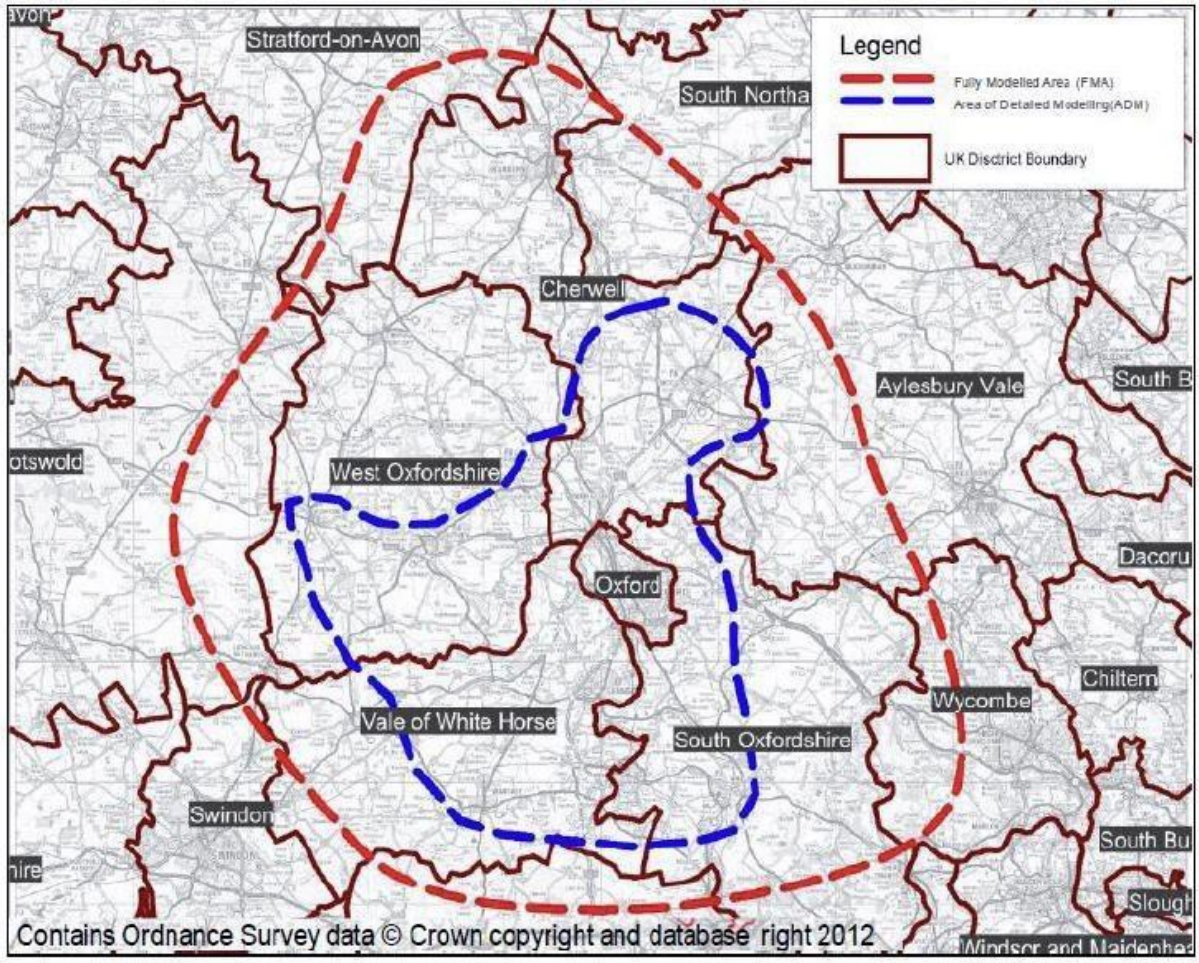

Figure 3-25 Area of Detailed Modelling and Fully Modelled Area of OSM

Source: Access to Science Vale OAR Part 1 (March 2018)

3.4.28 The VoWHDC ETI Part 1[50] (2014) outlines Stage 1 of the ETI which was undertaken in February 2013 as part of the Draft Local Plan Consultation. This involved transport modelling which produced a baseline for the Science Vale area, with limited transport interventions but with key development locations. This Local Plan included a housing target for 13,294 new homes and the ETI was used to test the proposed growth to help the council understand the impact of the emerging plan on the highway network. This enabled appropriate mitigation to be identified and included within the plan.

3.4.29 The ETI included the following transport interventions in the ETI Stage 1 modelling:

- Wantage Eastern Link Road;
- Featherbed Lane;

[50] Evaluation of Transport Impacts Study to inform the Vale of White Horse District Council Local Plan 2031 : Part 1 Strategic Sites and Policies, Atkins (November 2014)

- Steventon Lights;
- Milton Interchange;
- Chilton North Facing Slips;
- Hagbourne Hill Improvements;
- Harwell Link Road (B4493 to A417);
- Science Bridge;
- Harwell Oxford Entrance; and
- Rowstock Roundabout.

3.4.30 The Science Bridge scheme, included in the optioneering described below, was originally identified as part of OCC's Local Transport Plan 3 (LTP3) in 2011. The scheme was included in order to help mitigate the growth associated with planned development at the time, prior to subsequent Local Plans which proposed additional growth across Science Vale. As such, relief to the existing Manor Bridge was required even when lower levels of growth were proposed in Science Vale. Therefore, modelling which includes Science Bridge in this way can be used as a suitable baseline from which to understand problems across Science Vale prior to the allocation of additional growth for the area by Local Plans.

3.4.31 The highway network performance for this transport modelling is outlined in Table 3-11.

Table 3-11 ETI Stage 1 Network performance on the Vale of White Horse road network

	AM peak hour	PM peak hour
Delay (pcu/h)	4,554	4,118
Total time (pcu/h)	12,276	11,917
Total distance (pcu/km)	540,180	549,537
Average speed (km/h)	44	46

Source: Evaluation of Transport Impacts Study to inform the Vale of White Horse District Council Local Plan 2031 : Part 1 Strategic Sites and Policies, Atkins (November 2014)

3.4.32 The VoWHDC ETI (2014) summarises the results of the modelling as follows [bold added for emphasis]: "From the work carried out to test the highway impact of the levels and distribution of growth across the Vale as part of the February 2013 consultation stage, it has been shown that **the package of strategic highway measures[51] provide appropriate levels of mitigation**, that is considered both affordable and deliverable with the plan time period. However, **even with these planned measures, it is recognised that some parts of the network still have issues to be addressed, both through further consideration of sustainable transport improvements, and focused highway improvements**. As such, results from this stage are considered to provide a suitable base for comparison with higher levels of development as set out in subsequent stages, but that this **further work will need to consider the potential for further significant interventions to deal with higher levels of growth.**"

[51] Package as outlined in 3.4.29

3.4.33 Furthermore, a variety of growth packages have been assessed as part of the ETI process. This has included assessment of various schemes, including packages of measures, to help mitigate the impact of this and further growth. As the ETIs are complex documents, a full overview of the results has not been given here, but further detail on the results and the ETIs overall can be found in the supporting documentation for the SODC Local Plan[52] and the Vale of White Horse Local Plan[53].

Junction Capacity Modelling

3.4.34 Junction capacity modelling has been undertaken by AECOM for OCC, of which full details can be found in the Transport Assessment[54]. These capacity assessments have been undertaken for the do-minimum scenarios in 2020 base year, and 2024 and 2034 future years using Junctions 9 for priority junctions and roundabouts and LinSig v3.2 for signalised junctions. For signalised junctions, information was obtained from OCC regarding existing signal timings. Geometric parameters for junctions have been obtained from OS data[55].

3.4.35 The performance of the priority junctions and roundabouts has been assessed by considering the ratio to flow capacity (RFC) for each of the approach arms. An RFC value of 0.85 or below indicates that the arm is operating within design capacity. An RFC value of 0.85 to 1.00 indicates that the approach is operating above design capacity but within theoretical capacity, while an RFC value of 1.00 or more indicates that the arm is operating above theoretical capacity and significant queuing and delays may occur.

3.4.36 The performance of the signalised junctions has been assessed by considering the Degree of Saturation (DoS) for each of the approach arms. A DoS value of 90% or below indicates that the arm is operating within design capacity. A DoS value of 90% to 100% indicates that the approach is operating above design capacity but within theoretical capacity, while a DoS value of 100% or more indicates that the arm is operating above theoretical capacity where significant queuing and delays may occur. The results for the LinSig models also present the Mean Max Queue (MMQ) in PCUs. The Practical Reserve Capacity (PRC) of the signalised junctions is also presented in the modelling results tables along with the cycle time for the AM and PM peak hours. Table 3-12 below shows the summary results.

[52] https://data.southoxon.gov.uk/ccm/support/Main.jsp?MODULE=FolderView&ID=1421403146&CODE=3187906E1C19C2DBD31A7EACD8810ADF&NAME=Local%20Plan%202035%20Documents%20and%20Evidence%20Base&REF=SLP_EXAMLIB&REFERER_URL_IN=&SOVA_IN=SOUTH#exactline

[53] Part 1: https://data.whitehorsedc.gov.uk/java/support/Main.jsp?MODULE=FolderView&ID=910605701&CODE=7CAF110B631BCF98EDAD994696E9106B&NAME=Local%20Plan%202031%20Part%201%20Examination%20Library&REF=VALE_2031&REFERER_URL_IN=&SOVA_IN=VALE#exactline

Part 2: https://data.whitehorsedc.gov.uk/java/support/Main.jsp?MODULE=FolderView&ID=1019020186&CODE=AADB659EF81E63B1128E105FAFFAF419&NAME=The%20Local%20Plan%202031%20Part%202:%20Detailed%20Policies%20and%20Additional%20Sites%20-%20Examination%20Library&REF=VALE_2031_3&REFERER_URL_IN=&SOVA_IN=VALE#exactline

[54] Didcot Garden Town Transport Assessment, AECOM (2021)

[55] Traffic data for this modelling has used the outputs of modelling described in Appendix F

Table 3-12 Summary of Junction Capacity Results

Junction	Junction Type	2020 Baseline				2024				2034			
		AM		PM		AM		PM		AM		PM	
		RFC/ PRC	Queue (PCU)	RFC/ PRC	Queue (PCU)	RFC/ PRC	Queue (PCU)	RFC/ PRC	Queue (PCU)	RFC/ PRC	Queue (PCU)	RFC/ PRC	Queue (PCU)
A4130 / Service Area	Priority Junction	0.69	2	0.55	1	0.61	2	0.59	1	1.07	18	0.77	3
A4130 / Milton Gate	Signalised Junction	+7%	15	-2%	18	-5%	22	-2%	20	-52%	220	-25%	93
A4130 / B4493 / Mendip Heights	Roundabout	0.62	2	0.73	3	1.02	31	1.02	33	1.47	459	1.42	229
A4130 / Basil Hill Rd / Milton Rd (Power Station)	Roundabout	0.79	4	1.16	77	0.73	2	0.83	5	1.10	122	1.11	57
A415 / High Street/ B4015 Oxford Rd	Signalised Junction	-241%	173	-273%	194	-270%	192	-122%	160	-606%	539	-348%	455
Harwell Road / Milton Road / High Street	Mini Roundabout	0.39	1	0.54	1	0.47	1	0.63	2	0.97	15	1.00	25
High St / High St	Priority Junction	0.44	1	0.89	7	1.00	18	1.10	44	1.88	494	1.76	447
High St /Church St	Priority Junction	0.58	1	1.19	47	1.35	87	1.47	135	2.69	654	2.43	557
High St / Brook St	Priority Junction	0.23	1	0.16	0	0.26	1	0.18	0	0.31	1	0.24	0
B4016 / Abingdon Road	Priority Junction	-22%	51	-14%	37	-26%	58	20%	15	-47%	109	-11%	30
A415 / Tollgate Road	Signalised Junction												
A4130 / Lady Grove	Priority junction / Roundabout *	0.68	2	0.97	19	0.53	1	0.50	1	0.58	1	0.62	2
Lady Grove / Sires Hill	Priority Junction	0.95	10	0.48	1	0.79	3	0.43	1	1.37	49	1.07	13
Sires Hill / Didcot Road	Priority Junction	0.26	1	0.29	0	0.35	1	0.38	1	0.96	25	1.54	45

** Priority junction in 2020 baseline scenario; roundabout in 2024 and 2034 scenario*

3.4.37 The results show that in 2020 many of the junctions at or over capacity in one or both peaks. This is particularly evident at the staggered signalised junction in Clifton Hampden (PRC -241% AM and -273% PM) and the existing river crossing at Culham / Sutton Courtenay (PRC -22.3% AM and -14.1%). 116This shows that even prior to additional growth across Science Vale, several junctions are already operating over capacity.

3.4.38 In 2024, the results indicate that several of the junctions assessed are forecast to operate above capacity. The A4130 / Milton Gate junction is forecast to operate PRC -5% AM and -2% PM. The A4130 / B4493 / Mendip Heights Roundabout is forecast to operate above capacity in both the AM and PM peak hours. The Clifton Hampden junctions are forecast to operate over capacity at PRC -270% AM and -122% PM., causing significant queuing and delays. The High Street / Church Street / Brook Street junction is forecast to operate over capacity in 2024 in both the AM and PM peak hours. In addition, the Tollgate Road / Abingdon Road junction are forecast to operate over capacity in the AM peak hour.

3.4.39 In 2034, the junction capacity results further deteriorate, with all of the assessed junctions forecast at or over capacity in one or both of the peak hours, except the A4130 / Ladygrove junction.

3.4.40 There are forecast to be significant queues many of the junctions assessed, including:

- A4130 / Milton Gate;
- A4130 / B4493 / Mendip Heights;
- A4130 / Basil Hill Rd / Milton Rd (Power Station);
- A415 / High Street/ B4015 Oxford Rd;
- High St / High St / Church St / Brook St; and
- B4016 / Abingdon Road and A415 / Tollgate Road.

Future changes to the transport network

3.4.41 To mitigate the impact of the proposed development across Science Vale, a number of highways improvements are included as part of the SODC and VoWHDC Local Plans. If the currently proposed housing and employment developments come forward without any improvement to the capacity of the transport network, modelling has shown there will be unacceptable levels of local congestion. The committed schemes are shown in Figure 3-26 and are as follows:

- Hagbourne Hill Improvement (completed 2016);
- Harwell Relief Road (Phase 1) (completed);
- Harwell Relief Road (Phase 2);
- Didcot Northern Perimeter Road Phase 3;
- Wantage Northern Perimeter Road[56]; and
- Featherbed Lane Improvement and Steventon lights.

[56] This is also known as the Wantage Eastern Link Road.

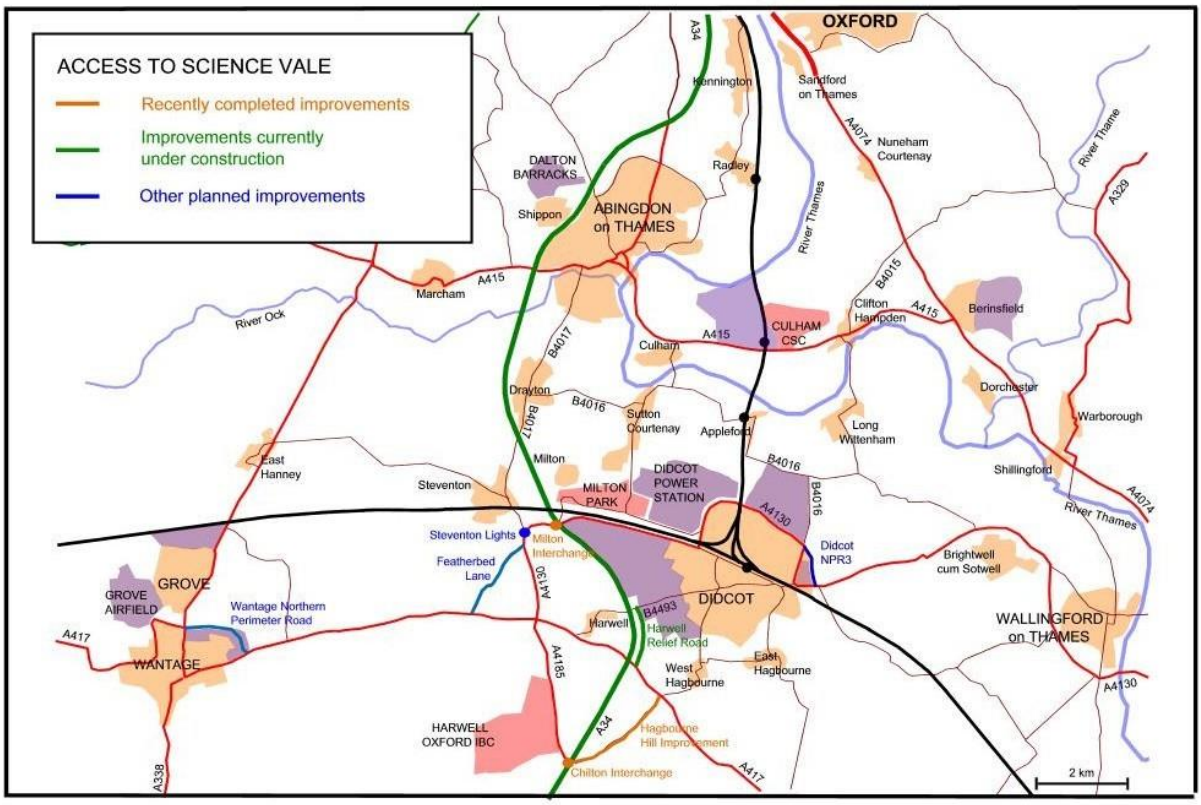

Figure 3-26 Planned Highway Improvements

Source: Access to Science Vale OAR Part 1 (March 2018)

3.4.42 In addition, there are a number of other proposals, which are either in OCC's forward aspirations, National Highway's future programme or Network Rail's possible future improvement list, for which it is currently uncertain as to how, when or where they are going to be delivered. These include the following:

- A34 Improvement (M4-M40);
- East West Rail;
- Cowley branch line;
- Didcot to Oxford railway four-tracking;
- Didcot Parkway Station; and
- Grove Station.

3.4.43 If any of these enhancements are delivered in the period to 2031, then they could have significant impacts on the level, modal split and pattern of traffic within the Didcot area.

3.4.44 As mentioned earlier in this report, the Science Vale Cycle Network (SVCN) has been taken forward. This includes an interlinked network of cycle routes and improved cycling facilities to encourage cycling across Science Vale.

3.5 Identifying the Need for Intervention

3.5.1 The analysis to date has demonstrated that there are significant challenges facing Didcot and Science Vale, including both existing issues and future concerns. These can be broadly categorised into Highways (including all vehicular traffic), Public

Transport and Active Travel. The need for intervention in each category is considered.

Highways

3.5.2 Didcot has seen considerable growth, both in housing and employment over the past 30 years, which has led to a mismatch between the employment available and the highest level of qualification and work experience of the local population. This growth has also led to significant traffic growth, both within the town and related to commuting. Currently, congestion is found within Didcot town centre, on the A4130/B4493 to the A34 and on the River Thames crossings to the north of the town. In addition, whilst the GWML brings many benefits to the town, the crossings over/under the railway bring about problems related to limited visibility, restricted width lanes and unidirectional tunnels.

3.5.3 Crucially, both housing and employment growth is set to continue throughout Didcot and the wider Science Vale area. If growth continues as planned, with no additional transport mitigation, current congestion issues will be further exacerbated as demonstrated in previous paragraphs. This problem will be especially acute within Didcot. In addition, increased levels of congestion will very likely lead to worsening air quality throughout Didcot and Science Vale as a whole.

3.5.4 Movement in Didcot and Science Vale is characterised by high levels of private car travel and dependence upon the car. The existing high levels of car use across Didcot and Science Vale will continue unabated without suitable transport interventions. There are underlying issues which cause the high use of car including the rural nature of Science Vale and the lack of attractive sustainable alternatives. Whilst distances travelled may be short, the private car appears to be a popular mode of travel within Didcot. In part, this is self-reinforcing as high levels of vehicular traffic makes active travel less attractive.

Public Transport

3.5.5 Bus services in Science Vale have a very low frequency with only a few sections of road having a peak frequency of more than 4 buses per hour. In most cases, this is not frequent enough to make buses an attractive alternative to the car. There are dedicated bus services from Abingdon – Culham Science Centre, Didcot – Culham Science Centre and Oxford – Harwell, but this network of buses to major employment sites within Science Vale could be improved by expanding routes to provide a more cohesive north-south and east-west connectivity. Bus frequencies are linked to the ability of operators to serve a large rural network with a dispersed population as well as working around congestion hotspots which cause journey time reliability issues for all vehicles including buses.

3.5.6 Rail provision across Science Vale provides a good alternative to the car for travel between Didcot, Oxford, Reading and beyond. However, the low frequency of local stopping services at the more rural stations within the Science Vale limits the number of users of rail service as it is geared to those travelling in the AM and PM peaks.

3.5.7 Air quality is below the national standard along the line of the railway west of Didcot Parkway station. At present, this is not considered an issue due to the distance to the

nearest residences. However, as Didcot develops further[57], the number of homes which would be exposed to this level of air pollution could potentially increase.

Active Travel

3.5.8 There is an overall lack of active travel provision across Science Vale. In Didcot and the wider Science Vale the active travel network is fragmented, discontinuous and not conducive to encouraging active travel. There are already relatively high levels of commuters who cycle across Science Vale, and this could be encouraged further through improved infrastructure provision such as dedicated routes and safe, attractive crossings. Provision for pedestrians is of low quality in some places and not suitable for all pedestrians. This will discourage use of walking throughout Science Vale.

Summary

3.5.9 The lack of river crossing options and constrained capacity on existing routes, railway crossing capacity and connections to the A34 have the potential to become serious enough that they may make proposed developments less attractive, exacerbate existing traffic-related issues and lead to more traffic congestion. This may then disrupt local aspirations to use this growth as the catalyst to transform Didcot into a more coherent and cohesive Garden Town community. In addition, it is imperative to encourage use of sustainable travel throughout Science Vale to reduce health impacts and improve air quality.

3.5.10 Thus, intervention is required to:

- **Reduce congestion** on the arterial routes within Didcot;
- **Enable modal shift** across Science Vale;
- **Improve accessibility** across the River Thames and the GWML in Didcot;
- **Improve resilience** of the transport network, including safety enhancements;
- Enable **sustainable growth** within Science Vale; and
- Ensure Science Vale remains a world-leading research location.

3.5.11 As such, the analysis of challenges to date has demonstrated the need for interventions to address the issues and ensure the area has transport provisions suitable for the intended increase in housing.

3.5.12 The next section sets out scheme objectives that have been developed on the basis of the identified challenges and existing policies, both local and national.

3.5.13 A longlist of options has subsequently been generated to address the identified challenges by meeting the proposed objectives. For this assessment, an unbiased approach is taken, irrespective of previously identified or ‘preferred’ options.

[57] This includes a range of housing and employment developments, such as the Didcot Gateway redevelopment

4. Development of Scheme Objectives

4.1 Introduction

4.1.1 This section sets out the agreed scheme objectives based on the assessment of contextual factors, challenges and the underlying policy context set out in the previous two sections of this report.

4.1.2 As such, the objectives have been informed by previous work, but also to maintain consistency with the local policy aspirations, and other committed schemes in the area, and to ensure that the identified schemes will contribute to delivering wider national and regional policies and plans.

4.1.3 The scheme objectives were defined as part of previous work, detailed in Access to Science Vale OAR Part 1 (issued in March 2018), OAR Part 2 (prepared in August 2019 but not yet issued) and the successful HIF bid, and this process is outlined below. The objectives have then been mapped to OCC's LTP4 objectives, as well as SODC[25] and VoWHDC[26] Local Plan objectives.

4.1.4 All potential scheme options will be assessed against these objectives.

4.2 Previously Identified Objectives

4.2.1 As part of the OAR Part 1 (March 2018), the following objectives were agreed by a county/district working group as the basis for developing strategic level transport improvements in Science Vale and Didcot:

- Reduce congestion;
- Provide capacity for development;
- Improve connections to major destinations;
- Reduce emissions associated with travel;
- Encourage modal change;
- Provide a flexible transport network that can cope with future uncertainties and opportunities; and
- Improve safety of travel.

4.2.2 In addition, each objective has been assigned outcomes which would be expected from any improvement, taking into account the current and future conditions in and around Didcot. This is shown in Table 4-1.

Table 4-1 Outcomes for Each Objective

Objective	Outcomes
Reduce congestion	Strategy should reduce congestion on roads within the town (particularly in crossing the railway) or on its approaches either by providing additional capacity or reducing traffic demand.
Provide capacity for development	Future conditions should be no worse than the current situation, and preferably should be an improvement, even allowing for the increased number of homes and jobs.
Improve connections to major destinations	Travel times and journey reliability should be improved in terms of access to Oxford, Reading, the rest of Science Vale and other important destinations.
Reduce emissions associated with travel	The strategy should encourage lower pollutant and greenhouse gas emission travel modes.
Encourage modal change	The strategy should provide for more local and medium distance trips to be made on foot or by cycle, and public transport for medium to long distance trips.
Provide a flexible transport network that can cope with future uncertainties and opportunities	The strategy should complement future developments, such as East-West Rail and Oxford-Cambridge Expressway, and allow for innovations, such as autonomous vehicles and connected travel.
Improve safety of travel	Future conditions should be no worse than the current situation, and preferably should be an improvement, even allowing for any increased traffic.

4.2.3 Following this, the OAR Part 2 (August 2019) refined the overarching objectives to ensure they directly address the problems and opportunities and align with established regional and local policies and plans. These objectives consider:

- Unlocking the delivery of homes in the Didcot Garden Town area;
- Supporting the delivery of affordable homes in the Didcot Garden Town area;
- Ensuring impact of additional housing on the transport network is acceptable;
- Provisioning of flexible transport network to cope with future uncertainties and opportunities; and
- Unlocking commercial space at key employment sites within the Didcot area.

4.2.4 The successful HIF bid further refined the scheme objectives and ensured they were SMART (specific, measurable, achievable, relevant and time constrained). These objectives consider:

- Unlocking the delivery of 11,711[58] additional homes in the Didcot Garden Town area;
- Supporting the delivery of 4,847 affordable homes in the Didcot Garden Town area in support of the Housing Growth Deal;
- Ensuring the impact of additional housing on the transport network is acceptable and associated impacts on the transport network are adequately mitigated;
- Delivering high value for money to the public sector; and

[58] Initially this was defined as 13,411 homes in the HIF bid, however this has since been revised to 11,711 homes

- Unlocking commercial space at key employment sites (D-Tech and Culham Science Centre).

4.3 LTP4, SODC and VoWHDC Local Plan Objectives

4.3.1 The OCC 'Connecting Oxfordshire' Local Transport Plan 4 developed three overarching transport goals around the economy (1), the environment (2) and society (3), and ten objectives to support these goals. These are set out in Table 4-2.

Table 4-2 LTP4 Goals and Objectives

LTP4 Goals	LTP4 Objectives	
LTP4#1 – Support jobs and housing growth and economic vitality	1.1	Maintain and improve transport connections to support economic growth and vitality across the county.
	1.2	Make most effective use of all available transport capacity through innovative management of the network
	1.3	Increase journey time reliability and minimise end-to-end public transport journey times on main routes.
	1.4	Develop a high-quality, innovative and resilient integrated transport system that is attractive to customers and generates inward investment.
LTP4#2 – Reduce emissions, enhance air quality and support the transition to a low carbon economy	2.1	Minimise the need to travel.
	2.2	Reduce the proportion of journeys made by private car by making the use of public transport, walking and cycling more attractive.
	2.3	Influence the location and layout of development to maximise the use and value of existing and planned sustainable transport investment.
	2.4	Reduce per capita carbon emissions from transport in Oxfordshire in line with UK Government targets.
LTP4#3 – Support social inclusion and equal opportunities; protect and enhance the environment and improve quality of life (including public health, safety and individual wellbeing)	3.1	Mitigate and, wherever possible, enhance the impacts of transport on the local built, historic and natural environment.
	3.2	Improve public health and wellbeing by increasing levels of walking and cycling, reducing transport emissions, reducing casualties and enabling inclusive access to jobs, education, training and services.

Source: Connecting Oxfordshire: Local Transport Plan 2015-2031, Oxfordshire County Council

4.3.2 The specific transport related objectives identified in the SODC Local Plan are identified in Table 4-3 (overleaf). These have been mapped to the most pertinent OCC LTP4 objectives to demonstrate the synergy and consistency between them. The SODC objectives include a combination of economic, environmental and social elements, which therefore may link to more than one of the LTP4's three overarching goals (Table 4-2).

Table 4-3 SODC Local Plan 2036: Transport-related Objectives

Objectives	Objective Number	Description	Link to LTP4 Objectives
Settlements	OBJ 1.1	Support the settlement hierarchy, the growth and development of Didcot Garden Town, the delivery of new development in the district, the growth of our market towns and the vitality of our villages.	1.1, 2.3
	OBJ 1.4	Focus growth in Science Vale through delivering homes and jobs, retail and leisure facilities and enhanced transport infrastructure.	1.1, 1.4, 2.3
Economy	OBJ 3.2	Aim to reduce commuting distances by supporting business growth in locations close to existing business areas, transport connections and broadband provision.	1.2, 2.1, 2.3, 2.4
	OBJ 3.3	Ensure economic and housing growth are balanced, to support sustainable journeys to work, recognising that we cannot determine where people work – some of whom will choose to travel to employment locations beyond our district, such as London, Oxford and Reading.	1.1, 1.2, 1.3, 1.4, 2.3, 3.2
	OBJ 3.5	Create the conditions whereby world-renowned and cutting-edge industries choose to locate and grow their businesses here, contributing to a strong and successful economy, in line with the Strategic Economic Plan for Oxfordshire.	1.1, 1.4, 2.3
Infrastructure	OBJ 4.1	Ensure that essential infrastructure is delivered to support our existing residents and services as well as growth.	1.1, 1.4, 2.3, 3.2
	OBJ 4.2	Make sustainable transport, walking and cycling an attractive and viable choice for people, whilst recognising that car travel and parking provision will continue to be important in this predominantly rural District.	1.3, 2.2, 2.4, 3.1, 3.2
Community	OBJ 6.2	Provide access to high quality leisure, recreation, cultural, community and health facilities.	3.2
Climate Change	OBJ 8.1	Minimise carbon emissions and other pollution such as water, air, noise and light, and increase our resilience to the likely impact of climate change, especially flooding. Lower energy use and support an increase in renewable energy use. Support growth in locations that help reduce the need to travel.	2.2, 2.3, 2.4, 3.1, 3.2

4.3.3 As Science Vale spans both SODC and VoWHDC, it is imperative to also consider the relevance of the VoWHDC Local Plan objectives. These objectives are outlined in Table 4-4 (overleaf) and have also been mapped to both the most pertinent OCC LTP4 objectives and the SODC Local Plan objectives to understand the synergy and consistency between them.

Table 4-4 VoWHDC Local Plan 2031: Transport-related Objectives

Strategic Objectives	Objective Number	Description	Link to LTP4 Objectives	Link to SODC Objectives
Building healthy and sustainable communities	SO1	Provide for a range of homes across the district to deliver choice and competition in the housing market and to meet the identified need, including for affordable housing.	1.1, 1.4, 2.3	OBJ 1.1, OBJ 1.4
	SO3	Direct growth to the most sustainable locations in the district, ensuring development is integrated with and respects the built, natural and historic heritage and creates attractive places in which people will want to live, as well as being supported by a sufficient range of services and facilities.	1.1, 1.4, 2.1, 2.3, 3.1	OBJ 1.1, OBJ 3.2
Supporting economic prosperity	SO6	Support the continued development of Science Vale as an internationally significant centre for innovation and science-based research and business.	1.4	OBJ 1.4, OBJ 3.5, OBJ 4.1
Sustainable transport and accessibility	SO8	Reduce the need to travel and promote sustainable modes of transport.	1.2, 2.1, 2.2, 2.3, 3.2	OBJ 3.2, OBJ 3.3, OBJ 4.2
	SO9	Seek to ensure new development is accompanied by appropriate and timely infrastructure delivery to secure effective sustainable transport choices for new residents and businesses.	1.1, 2.2, 2.3, 3.2	OBJ 1.1, OBJ 3.2, OBJ 3.3, OBJ 4.1,
Protecting the environment and responding to climate change	SO11	Ensure all new development achieves high quality design standards and conserves and enhances the natural, historic, cultural and landscape assets of the Vale.	2.3, 3.1	OBJ 6.2, OBJ 8.1
	SO12	Minimise greenhouse gas emissions and other pollution (such as water, air, noise and light) across the district and increase our resilience to likely impacts of climate change, especially flooding.	2.1, 2.2, 2.4, 3.1, 3.2	OBJ 8.1

4.3.4 This assessment of the objectives across SODC and VoWHDC Local Plans, and OCC's LTP4, has been used to understand the correlation between these documents. This has shown that the identified objectives are interlinking and cover many of the same issues, such as mitigating climate change impacts, promoting sustainable transport choices, enabling growth and minimising the need to travel. Furthermore, there is clear support in SODC and VoWHDC Local Plans for the continuous development of Science Vale, thus the objectives for improvements to the

transport network in Didcot and Science Vale would need to be aligned with enabling housing and economic growth, encouraging use of sustainable transport and improving the natural environment. This is discussed next.

4.4 Scheme Objectives

4.4.1 In order to ensure that the final objectives fit within the local policy context, the objectives from the successful HIF bid have been mapped to the SODC and VoWHDC Local Plan objectives, as well as to the OCC LTP4 objectives. Table 4-5 provides the link between these objectives together with a more holistic view on the overall regional objectives that the scheme objectives would have to fulfil.

Table 4-5 HIF bid objectives mapped to the local policy context

HIF Bid Objectives	Link to LTP4 Objectives	Link to SODC Objectives	Link to VoWHDC Objectives
Unlock the delivery of 11,711 additional homes in the Didcot Garden Town area	1.1, 1.4, 2.3	OBJ 1.1, OBJ 1.4, OBJ 3.3, OBJ 4.1	SO1, SO3, SO9
Support the delivery of 4,847 affordable homes in the Didcot Garden Town area in support of the Housing Growth Deal	1.1, 1.4, 2.3	OBJ 1.1, OBJ 1.4, OBJ 3.3, OBJ 4.1	SO1, SO3, SO9
Ensure the impact of additional housing on the transport network is acceptable and associated impacts on the transport network are adequately mitigated.	1.2, 1.3, 2.2, 3.1	OBJ 3.2, OBJ 3.3, OBJ 4.1	SO3, SO9, SO11
Deliver high value for money to the public sector.	1.4	OBJ 1.4, OBJ 3.5	SO6
Unlock commercial space at key employment sites (D-Tech and Culham Science Centre).	1.1, 1.4, 2.3	OBJ 1.4, OBJ 3.5, OBJ 4.1	SO6, SO9
Gap – policies not addressed *by the* **HIF Bid** *Objectives*	2.1, 2.4, 3.2	OBJ 4.2, OBJ 6.2, OBJ 8.1	SO8, SO12

4.4.2 This assessment shows that the HIF bid objectives align to the Local Plans and LTP4 objectives with regard to unlocking development and mitigating the impact of development, there are some areas in which the objectives could be more robust.

Nonetheless, and regardless of specific objectives, the HIF bid objectives align well with the SODC and VoWHDC Local Plans due to the focus on Science Vale and Didcot. The policies not strongly linked to the existing HIF bid objectives but could be partially met are as follows:

- LTP4 Objectives:
  - Policy 2.1: Minimise the need to travel;
  - Policy 2.4: Reduce per capita carbon emissions from transport in Oxfordshire in line with UK Government targets; and
  - Policy 3.2: Improve public health and wellbeing by increasing levels of walking and cycling, reducing transport emissions, reducing casualties and enabling inclusive access to jobs, education, training and services.
- SODC Objectives:
  - OBJ 4.2: Make sustainable transport, walking and cycling an attractive and viable choice for people, whilst recognising that car travel and parking provision will continue to be important in this predominantly rural District;
  - OBJ 6.2: Provide access to high quality leisure, recreation, cultural, community and health facilities; and
  - OBJ 8.1: Minimise carbon emissions and other pollution such as water, air, noise and light, and increase our resilience to the likely impact of climate change, especially flooding. Lower energy use and support an increase in renewable energy use. Support growth in locations that help reduce the need to travel.
- VoWHDC Objectives:
  - SO8: Reduce the need to travel and promote sustainable modes of transport; and
  - SO12: Minimise greenhouse gas emissions and other pollution (such as water, air, noise and light) across the district and increase our resilience to likely impacts of climate change, especially flooding.

4.4.3 Overall, the HIF bid objectives focus on the economic elements of the scheme, such as delivering housing and providing high value for money. This is to be expected as the objectives were formed in support of the successful HIF bid. The result of focussing on mostly economic objectives is that there is limited consideration of the environmental aspects, and potential benefits, of the schemes. Revising the objectives will help counter this imbalance and enable full assessment of the schemes.

4.4.4 Mitigating the environmental impact of growth is a clear objective within the LTP4, SODC and VoWHDC Local Plans, which is reflected by the individual objectives that refer to reducing the need to travel and ensuring sustainable development and transport options. As shown above, this is currently absent from the HIF bid objectives.

4.4.5 Therefore, it is proposed that a combination of the HIF bid objectives, the objectives defined in the Access to Science Vale OAR Part 2 (August 2019) and three new objectives become the objectives for this optioneering process. The Access to Science Vale OAR Part 2 objectives are very similar to those defined in the HIF bid, however one of the HIF objectives, referring to delivering high value for money to the

public sector, has not been included as it was deemed unsuitable for an optioneering process. This was to enable the assessment and comparison of options (as discussed below) to be as fair as possible, as some schemes may not have quantified costs and benefits to calculate value for money with.

4.4.6 Three new objectives have been included to address the gaps identified by the Local Plan and LTP4 review, while some small wording changes have also been incorporated to ensure relevance to the Science Vale scheme overall.

4.4.7 Table 4-6 outlines the objectives which will be used for optioneering in this report.

Table 4-6 Defined Objectives

Objectives	Theme	Objective Description	Relevance against the scheme	Source
Objective 1	Support housing development	Unlock the delivery of 11,711 additional homes in the Didcot Garden Town area, and more across Science Vale	Improve accessibility across Science Vale between new developments and key employment sites, whilst addressing existing congestion issues	HIF Bid
Objective 2		Support the delivery of 4,847 affordable homes in the Didcot Garden Town area in support of the Housing Growth Deal, and more across Science Vale		HIF Bid
Objective 3		Ensure the impact of additional housing on the transport network is acceptable and associated impacts on the transport network are adequately mitigated.	Increased transport capacity will help mitigate the impact of proposed development across Science Vale	HIF Bid
Objective 4	Support economic growth	Ensure the impact of employment growth on the transport network is acceptable and associated impacts on the transport network are adequately mitigated.	Increased transport capacity will help mitigate the impact of proposed employment growth across Science Vale	*New objective*
Objective 5		Unlock Commercial space at key employment sites across Science Vale, including D-Tech and Culham Science Centre	Additional capacity (both private and public transport) to employment sites and improved accessibility, in particular to Science Vale and key employment sites	HIF Bid
Objective 6	Future-proofing	Provision of a flexible transport network to cope with future uncertainties and opportunities	Improved resilience to changes in travel patterns)	Access to Science Vale OAR Part 2 (August 2019)
Objective 7	Sustainable Travel	Minimise the need to travel and where travel is necessary promote sustainable modes of transport	Improved public transport capacity and sustainable developments would improve air quality Improved active travel facilities across Science Vale	*New objective*
Objective 8		Minimise carbon emissions and other pollution such as water, air, noise and light, and increase resilience to the likely impact of climate change, especially flooding.		*New objective*

5. Option Development and Sifting

5.1 Introduction

5.1.1 This section discusses the option development method and assessment framework developed to sift the options. The assessment framework has been developed in accordance with the DfT's Transport Appraisal Process (2018, part of Transport Analysis Guidance (TAG)), Early Assessment Sifting Tool (EAST) Guidance (2017) and the HM Treasury Green Book (2020). This OAR has made reference to DfT TAG as published at the time of writing (January-April 2021).

5.1.2 The options have been derived based on the assessment of current[59] and future travel patterns, development, growth, challenges and professional judgement based on experience elsewhere and within Oxfordshire. This also includes previous and current proposals from local authorities and stakeholders.

5.1.3 In addition to the previously defined interventions, new intervention options will be considered based on the analysis presented in this report.

5.1.4 It is recognised that individual intervention options could be packaged together in order to provide an optimum solution to the identified problems and achieve the scheme objectives. There may be stronger synergies and potential dependencies between some intervention options more than others. Given the complexity of the Science Vale area and issues identified earlier in this report, it is unlikely a single option solution is appropriate, therefore indicating that a package approach comprising multiple intervention options, is more appropriate. Funding, financing and affordability as well as deliverability will need to be taken into account for not just single options but also potential packages. Delivery may be dependent on different agencies, developers and funding sources, and completion and sign-off of other emerging strategies.

5.1.5 Options that are sifted out may still perform well either as part of an overall package, by addressing other specific issues such as those related to development sites or following implementation of other options.

5.2 Method

5.2.1 The objectives aim to enable growth within Science Vale, mitigate impacts on the road network and encourage sustainable growth. The identified solution(s) will need to meet most, if not all, of the objectives, although each to varying degrees. This process includes consideration of multi-modal options.

5.2.2 A robust optioneering and appraisal process was adopted to select better performing junctions/ access points improvement options, in accordance to the DfT TAG guidance. A four-phase appraisal process has been undertaken (shown in Figure 5-1).

[59] In this context current refers to pre-Covid-19, as the evidence base was compiled prior to this. Therefore, travel patterns and modal share do not account for the shift to working from home

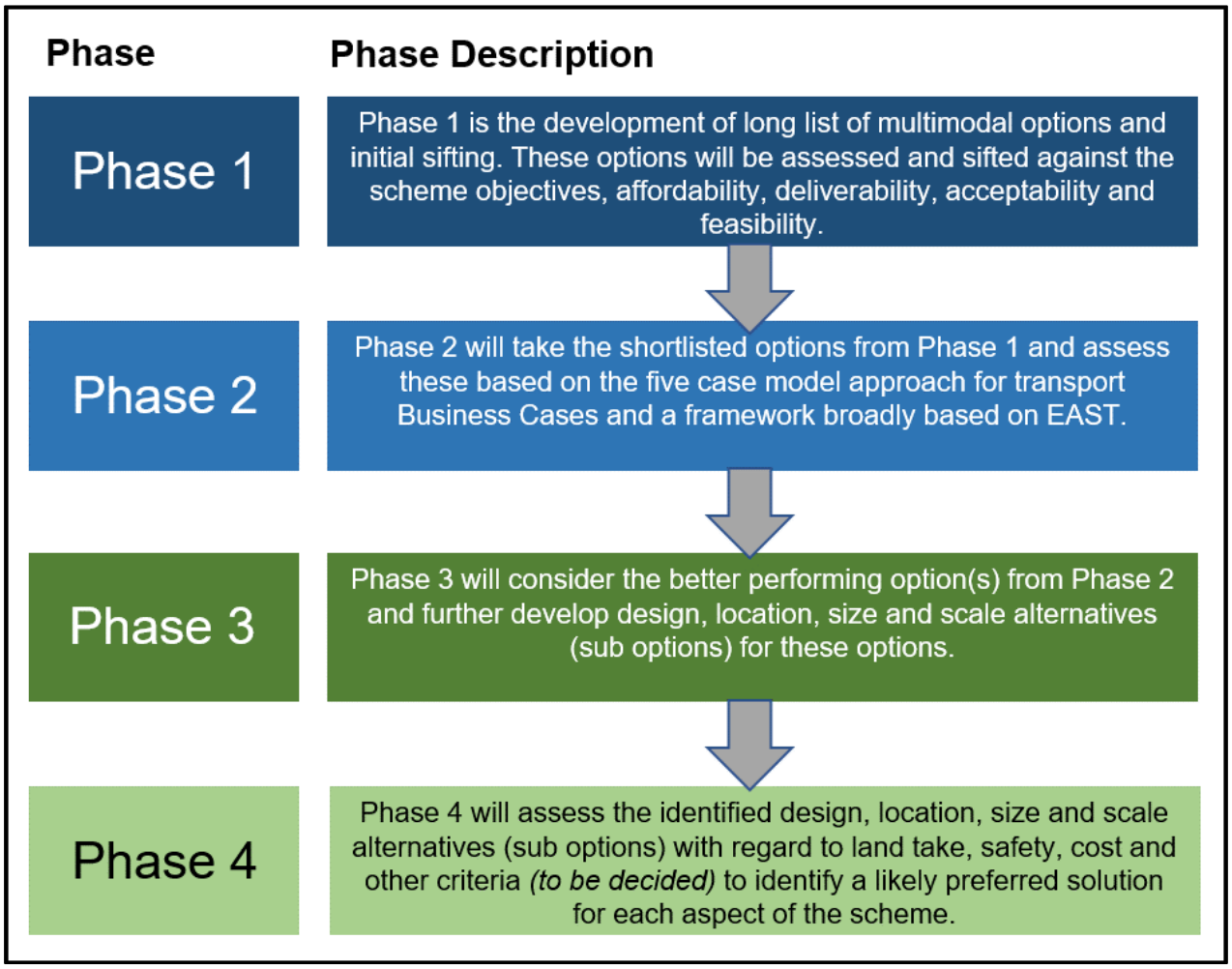

Figure 5-1 Options Identification and Appraisal Process

5.2.3 At each phase, the evidence available to base the assessment on is different. As the phases were completed chronologically, evidence gathered during an earlier phase were fed into a later phase, enriching the assessment with more specific appraisal of options. Hence, the later phases draw not only on the new evidence included as part of that phase, but also on the evidence compiled in the previous phases. Table 5-1 overleaf shows the evidence available at each phase.

5.2.4 It is to be noted that this is an iterative process, therefore further corrections to the scoring can take place in line with feedback from relevant stakeholders, OCC and new/revised evidence.

5.2.5 Furthermore, it is important to highlight that each of the options have been assessed in isolation. This has involved consideration the impact of the intervention alone, and the extent to which this would achieve the aims of the scheme including facilitating the growth required across Science Vale. As a result, it is likely that some options dismissed as part of this sifting process still have considerable merit, as a broader package of interventions which has different aims.

Table 5-1 Evidence Base for Appraisal

Phase	Evidence
Phase 1&2	• CAD sketches (for limited options) • Professional judgement • Mapping of land use and environmental constraints • Previous OAR work undertaken
Phase 3&4	• CAD drawings (for some options) • Professional judgement • Mapping of land use and environmental constraints • Extents of highway boundary; land take • General location of utilities; constructability • Previous OAR work undertaken

5.2.6 The long list of options to be assessed has been developed based on the review of current[60] and future conditions, as well as previously defined options. The long list of interventions can be found in Appendix B, including the source and status of the intervention.

5.2.7 Previously defined options are interventions which have already been through an appraisal process, such as in the Access to Science Vale OAR Part 1 (March 2018) of the successful HIF bid (2019). Newly identified interventions have been developed based on the assessment of current and future travel patterns, development, challenges and professional judgement based on experience elsewhere and within Oxfordshire. These options have not previously been appraised as part of an OAR, and this is undertaken in the following sections.

5.2.8 Table 5-2 provides an overview of all options considered as part of this appraisal process, including the mode and source document. The schemes identified in the HIF bid have been defined as multi-modal due to segregated walking and cycling facilities featuring in each scheme. The options are shown in Figure 5-2.

[60] In this context current refers to pre-Covid-19, as the evidence base was compiled prior to this. Therefore, travel patterns and modal share do not account for the shift to working from home

Table 5-2 Options assessed as part of this OAR

Ref	Intervention	Mode	Source
0	Do Minimum	No additional Interventions	N/A
1	A4130 Widening	Multi-modal	Previously defined option (HIF)
2	Didcot Science Bridge	Multi-modal	Previously defined option (HIF)
3	Didcot to Culham River Crossing	Multi-modal	Previously defined option (HIF)
4	Clifton Hampden Bypass	Multi-modal	Previously defined option (HIF)
5	Enhanced bus network including bus lanes and bus priority signals	Public Transport	Previously defined option (OAR Part 1)
6	Park & Ride in vicinity of A34	Public Transport	Previously defined option (OAR Part 1)
7	Improved rail services from Didcot to Oxford and Reading	Public Transport	Previously defined option (OAR Part 1)
8	Improved stations at Didcot & Culham plus new station at Grove	Public Transport	Previously defined option (OAR Part 1)
9	Junction realignments and signalisation	Highways	Previously defined option (OAR Part 1)
10	Upgraded and co-ordinated traffic signal control	Highways	Previously defined option (OAR Part 1)
11	Comprehensive cycle and walking networks across Science Vale	Active Travel	Previously defined option (OAR Part 1; SVCN); New option
12	Science Vale Bus Rapid Transit	Public Transport	New option
13	Science Vale Light Rail Link	Public Transport	New option
14	Demand Responsive Transport	Public Transport	New option
15	Small scale bus improvements across Science Vale	Public Transport	New option
16	A34 Widening	Highways	Previously defined option (Didcot to Culham New Road and Thames Crossing: Optioneering and Proof of Concept (2016))

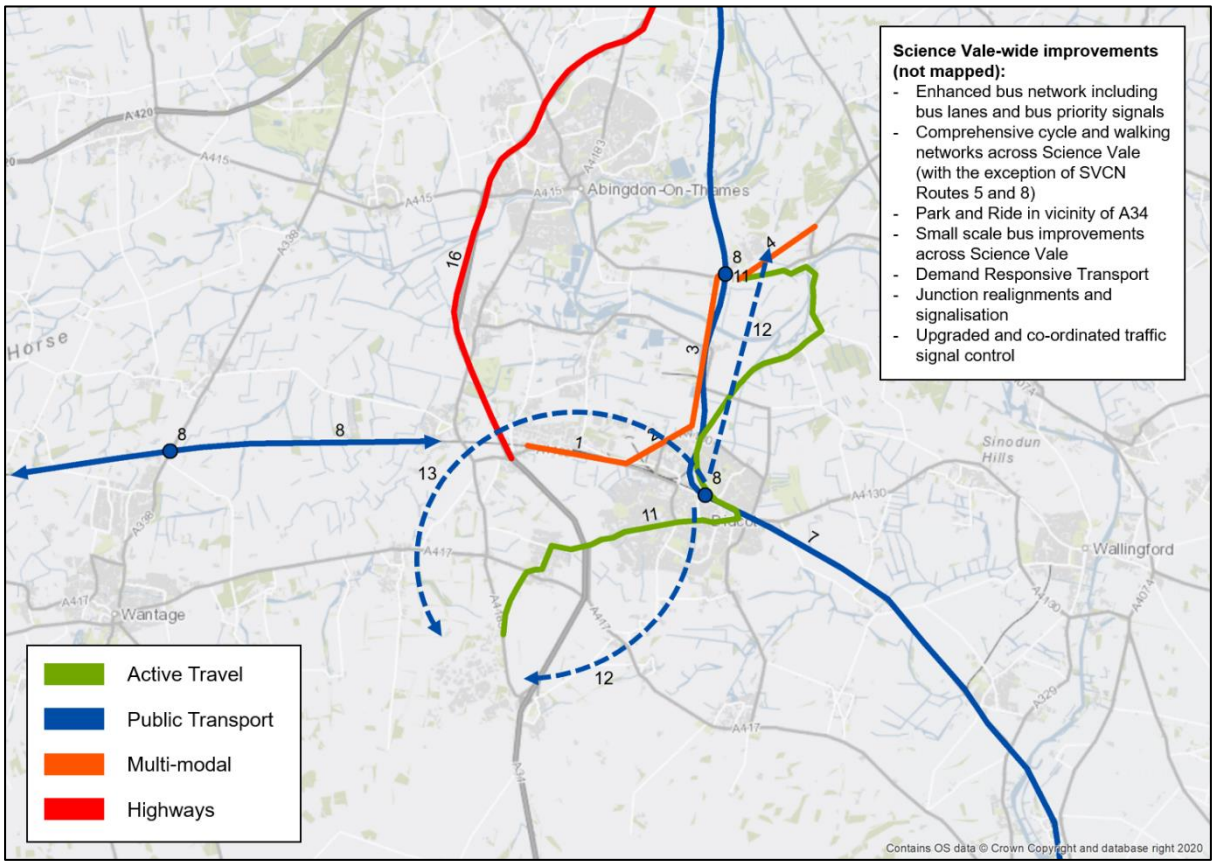

Figure 5-2 Options assessed as part of this OAR

Note: the dashed lines for Options 12 and 13 indicate that the specific alignment of this option has not yet been defined

6. Phase 1: Initial Sift

6.1.1 For the initial sift (Phase 1), each option in Table 5-2 was appraised by assessing its alignment with the scheme objectives (Table 4-6) and additional criteria (affordability[61], deliverability, acceptability and feasibility). The scoring system used for the Phase 1 Sift is shown in Table 6-1 below.

Table 6-1 Scoring methodology

Score	Description
2	Very good fit
1	Good fit
0	Neutral or negligible impact
-1	Low fit
-2	Poor fit
-3	Showstopper, which would make the scheme untenable, or could pose considerable feasibility constraints

[61]Affordability in this context refers to the availability of funding for the option, and whether this funding has been identified and/or secured

6.1.2 In the following paragraphs, the results of Phase 1: Initial Sift are presented. The decision whether each intervention was taken forward for further assessment is explained, based on the score achieved by the intervention.

6.1.3 It should be noted that the scores outlined below have been reviewed, adapted, and confirmed by OCC. The full results of the Phase 1 Sift can be found in Appendix C.

6.1.4 It is also important to note that a low or negative score for a particular mode option does not necessarily indicate that this option would perform poorly in all contexts, however in the context of the specific challenges, opportunities and objectives set out in this OAR, these options are considered to be of a poorer fit.

Option 0: Do Minimum

6.1.5 Option 0 refers to the Do Minimum option, for which only interventions that have already been committed, and are currently being undertaken on the network across Science Vale, are considered. This option does not consider any additional physical intervention and includes all committed Local Plan developments.

6.1.6 Table 6-2 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-2 Option 0: Do Minimum

Score against objectives and additional criteria	**-17**
Comment	• The Do Minimum option will not address any of the issues identified across Science Vale. • This option will not assist in anyway with unlocking the delivery of homes across Didcot Garden Town and Science Vale, as no additional capacity will be provided making development unviable. • This option identifies five showstoppers regarding Objectives 1 – 5, which relate to unlocking housing and economic development. • This option scores poorly for the remaining objectives, as it will not contribute to the achievement of these. • Although this option would be affordable, deliverable and feasible, as no additional interventions are required, it does not negate the showstoppers identified and may be perceived negatively if it fails to manage the impacts of future traffic growth.
Status	This option has **not been taken forward** for assessment due to the very poor score achieved.

Option 1: A4130 Widening

6.1.7 Option 1 comprises a dual carriageway from a point approximately 250m east of Milton Interchange at the junction with Milton Gate, eastwards for approximately 1.6km to the proposed eastern roundabouts connecting into the future development at Valley Park and the Didcot Science Bridge scheme. Dualling of the A4130 will consist of modifications to the existing single carriageway, establishment of a central reserve and provision of two additional lanes to the south of it (to form the new westbound carriageway).

6.1.8 A four-arm roundabout at the western end of the scheme will serve commercial development and the 'North West of Valley Park' strategic allocation site. A new

signalised junction is proposed, approximately 630m east of this roundabout, which will provide access to the 'Valley Park' strategic housing allocation site. A new three-arm roundabout is proposed 620m east of the signalised junction, which will connect to the new Didcot Science Bridge three-arm roundabout. The Didcot Science Bridge roundabout will provide access to the new Didcot Science Bridge to the north, and Valley Park housing development to the south. The road corridor will also include a 3m bi-directional segregated cycleway and a 2m footway on the southern side of the dual carriageway, as well as several formal crossing points. Option 1 was part of the HIF bid in 2019.

6.1.9 Table 6-3 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-3 Option 1: A4130 Widening

Score against objectives and additional criteria	**20**
Comment	• This option will help deliver many of the scheme objectives, especially those focussed on housing and employment growth. • This option is likely to have a slight positive impact on carbon emissions due to reduced congestion and queuing compared to the DM. In the DM significant queues form due to the increase in employment and housing but without any supporting infrastructure. • There are also slight improvements in air quality in Milton as a result of the scheme, with reductions in NO_2. • The clearing of land required to widen the road is likely to have adverse environmental impacts and lead to some ecological loss. However, the scheme will provide 10% biodiversity net gain to mitigate, and improve upon, this impact. • The presence of a segregated shared-use path for pedestrians and cyclists alongside the A4130, would provide a viable alternative to driving, especially for short trips from Didcot to Milton Park. • This option will be partially within Flood Zone 2, which poses a key environmental concern with regards to its construction. • This option is expected to have high public support and is feasible, although some third-party land take may be required. • This option scores well for flexibility in the future, as the second lane of the dual carriageway could be used as a bus lane to facilitate more sustainable modes. • The additional capacity provided will improve the resilience of the network within Didcot and enable better traffic demand management. • This option is affordable as HIF funding has been secured. • This option scores positively for deliverability, as designs have been produced and, whilst it is dependent on the other HIF schemes and stakeholders, it is not as complex as other options.
Status	This option has been **taken forward** for further assessment in Phase 2.

Option 2: Didcot Science Bridge

6.1.10 Option 2 is a new north-south bridge from the proposed Didcot Science Bridge roundabout, over the existing A4130A4130, the GWML and Milton Road, into the former Didcot A Power Station site. The proposed Didcot Science Bridge Link Road will connect the bridge with the A4130 Northern Perimeter Road north of the Purchas Road roundabout, close to the existing Southmead Industrial Estate. There will be various embankments associated with the road bridge, which will vary in width. The road bridge will be approximately 15m in width, including a single carriageway, with 2m footways and 3m bi-directional cycleways on both sides of the road for the majority of its length, but not on the bridge itself. Option 2 was part of the HIF bid in 2019.

6.1.11 Table 6-4 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-4 Option 2: Didcot Science Bridge

Score against objectives and additional criteria	15
Comment	• This option will help deliver many of the scheme objectives, especially hose focussed on housing and employment growth • This option will be partially within Flood Zone 2, which poses a key environmental concern with regards to its construction. • The clearing of land required to build the bridge is likely to have adverse environmental impacts and lead to some ecological loss. However, the scheme will provide 10% biodiversity net gain to mitigate, and improve upon, this impact. • Provision of the bridge reduces some journey lengths and reduces queueing and congestion, and along with pedestrian and cyclist facilities, will lead to a slight improvement in carbon emissions compared to the DM. In the DM significant queues form due to the increase in employment and housing but without any supporting infrastructure. • There is a very slight worsening of air quality in Didcot as a result of the Didcot Science Bridge. • This option is future-proofed in terms of usability, as the provision of additional capacity from the new bridge would enable changes to the use, for example to bus-only, but the location of the physical infrastructure could not be changed. • This option scores neutral for feasibility, as being constrained by development sites on either side of the bridge, could have an impact. • The practicalities of engaging with Network Rail, and seeking necessary approvals, may affect its programme and deliverability. • This option is affordable as HIF funding has been secured. • This option scores neutral for deliverability as, whilst designs have been produced, this is a complex scheme which is dependent on the other HIF schemes and stakeholders. For example, this bridge crosses the GWML and will require engagement with Network Rail and other stakeholders. Further work is required to determine deliverability.
Status	This option has been **taken forward** for further assessment in Phase 2.

Option 3: Didcot to Culham River Crossing

6.1.12 Option 3 is a new link road between the A4130 at the existing Collett roundabout junction (Didcot) and A415 at Culham. It includes two new bridges: one over the River Thames and one over the Hanson private railway sidings near Appleford level crossing. The proposed route for this part of the scheme lies to the west of the Didcot to Oxford rail line (Cherwell Valley railway line) and Appleford. The route will pass over historic landfill, areas of historic mineral extraction and some undeveloped agricultural land.

6.1.13 In addition to the two bridges, the proposal includes rebuilding a larger junction at the existing A4130 / Collett roundabout on the outskirts of Didcot; a new access to the FCC / Hanson site; a new priority junction with the B4016 west of Appleford; a new three-arm roundabout connecting the new link road with Appleford Road towards Sutton Courtney; and a new four-arm roundabout serving the new link road, A415 Abingdon Road and new northern stub for future development access, west of the railway line. This roundabout incorporates a change in the alignment of a section of the A415 Abingdon Road.

6.1.14 The new road will be approximately 3.6km in length and will comprise a single carriageway incorporating a 1m hard strip on each side. In addition to this, on the eastern side of the road, a grass verge, 3m bi-directional segregated cycleway and 2m footway are proposed. Option 3 was part of the HIF bid in 2019.

6.1.15 Table 6-5 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-5 Option 3: Didcot to Culham River Crossing

Score against objectives and additional criteria	16
Comment	• This option will help deliver many of the scheme objectives, especially those focussed on housing and employment growth. • This option will be partially within Flood Zone 2, which poses a key environmental concern with regards to its construction. • The clearing of land required to build the scheme is likely to have adverse environmental impacts and lead to some ecological loss. However, the scheme will provide 10% biodiversity net gain to mitigate, and improve upon, this impact. • Provision of the bridge reduces some journey lengths and reduces queueing and congestion which leads to a slight improvement in carbon emissions compared to the DM. In the DM significant queues form due to the increase in employment and housing but without any supporting infrastructure. • There is also provision for pedestrian/cyclist facilities across the bridge and this option allows for existing river crossing bridges to be altered for sustainable modes in the future. • This option will reduce queuing within the villages close to the scheme and will contribute towards improving air quality and reducing noise in these historic villages. The scheme leads to improved air quality (NO_2) in Long Wittenham, however there is expected to be a slight worsening in Air Quality in Appleford and Sutton Courtenay. • This option is future-proofed and could be used for sustainable modes in the future. However, the location of the crossing is not flexible, which reduces the score for Objective 6. • The additional river crossing will provide improved resilience compared to the Do Minimum option, where the current river crossings are sometimes closed due to flooding concerns. • The additional capacity provided will enable demand management of traffic across Science Vale, especially for the two existing river crossings. • This option is expected to be feasible, although crossing the river is likely to pose engineering and environmental challenges. • This option is affordable as HIF funding has been secured. • This option scores neutral for deliverability because, whilst designs have been produced, this is a complex scheme which is dependent on the other HIF schemes and stakeholders. For example, this option crosses the River Thames and will therefore require stakeholder input from the EA, Canal and River Trust amongst other environmental stakeholders. Further work is required to determine deliverability.
Status	This option has been **taken forward** for further assessment in Phase 2.

Option 4: Clifton Hampden Bypass

6.1.16 Option 4 will provide a new single carriageway link between the B4015 Oxford Road, to the north of Clifton Hampden, and the A415 Abingdon Road to the west of the village. The link road will provide a 2.2km long western bypass to Clifton Hampden village. The new road will provide a single carriageway with adjacent hard strips, grass verges, a wide combined bi-directional pedestrian/cycle facility separated from the carriageway, a large four-arm roundabout at the western end of the scheme, providing access to the Culham Science Centre, and a new junction with the existing B4015 Oxford Road at the eastern extent of the scheme. Option 4 was part of the HIF bid in 2019.

6.1.17 Table 6-6 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-6 Option 4: Clifton Hampden Bypass

Score against objectives and additional criteria	**18**
Comment	• This option will help deliver many of the scheme objectives, especially those focussed on housing and employment growth. • This option will be partially within Flood Zone 2, which poses a key environmental concern with regards to its construction. • The clearing of land required to create the bypass is likely to have adverse environmental impacts and lead to some ecological loss. However, the scheme will provide 10% biodiversity net gain to mitigate, and improve upon, this impact. • Provision of the bypass reduces some journey lengths, reduces queueing and congestion which leads to a slight improvement in carbon emissions compared to the DM. In the DM significant queues form due to the increase in employment and housing but without any supporting infrastructure. • This option will reduce queuing within the villages close to the scheme (such as Clifton Hampden and Burcot) and will contribute towards improving air quality and reducing noise in these historic villages. • The additional road link will provide improved resilience compared to the Do Minimum option. • This option is very feasible and is likely to have significant public support. • This option scores positively for provision of a flexible transport network as there is the opportunity to implement more sustainable modes along the bypass in the future. • This option is affordable as HIF funding has been secured. • This option scores positively for deliverability, as designs have been produced, and, whilst this is dependent on the other HIF schemes and stakeholders, it is not as complex as other options.
Status	This option has been **taken forward** for further assessment in Phase 2.

Option 5: Enhanced bus network including bus lanes and bus priority signals

6.1.18 Option 5 includes a comprehensive bus network across the entirety of Science Vale, including bus lanes, bus priority and a frequent and reliable service. This would be in co-operation with other services which operate across the area.

6.1.19 Table 6-7 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-7 Option 5: Enhanced bus network including bus lanes and bus priority signals

Score against objectives and additional criteria	**-3**
Comment	• This option is unlikely to lead to the scale of change required for the development planned across Didcot and Science Vale. • This option would require road capacity in order to ensure reliable journey times, while coordinated marketing and promotional strategies would need to be put in place to increase the currently low passenger demand to the level required to support development across Science Vale. • This option will be flexible and would minimise carbon emissions, however it is partially within Flood Zone 2 which poses a key environmental concern with regards to its construction. • This option is not likely to be affordable, as the cost of a comprehensive bus network across Science Vale, that includes both the physical infrastructure and provision of increased services, will be significant. • This option will be very complex to deliver, and it has many interdependencies with other schemes, which impacts upon its viability. • This option is likely not feasible, as it requires significant land take and a Compulsory Purchase Order (CPO). • This option is considered to have neutral acceptability. On the one hand, previous discussions with bus operators have identified that operators are not aiming for priority in the network but limiting the number of junctions along bus routes. On the other hand, acceptability by the public would likely be high, but there could be objections regarding the scale of works required to implement such a comprehensive network, which will reduce road space available to traffic, and possibly to pedestrians and cyclists. In addition, previous experience with public consultation on bus gates elsewhere in the county (Oxford), has shown that such interventions are not always well received.
Status	This option has **not been taken forward** for assessment due to the poor score achieved.

Option 6: Park and Ride in vicinity of A34

6.1.20 Option 6 is a new Park and Ride in the vicinity of the A34 which would serve both journeys into Science Vale and as a remote park and ride for journeys to Oxford.

6.1.21 Table 6-8 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-8 Option 6: Park and Ride in vicinity of A34

Score against objectives and additional criteria	**-10**
Comment	• This option is unlikely to lead to the scale of change required for the development planned across Didcot and Science Vale and will not provide suitable capacity to enable this dependent development. Therefore, it scores a low fit against these objectives. • This option could be dependent upon additional road capacity in order to ensure reliable journey times, therefore improvements to services alone may be unviable. • This option will not be very flexible in unlocking commercial space at key sites, as it involves infrastructure at one specific location. • This option may worsen the existing situation as it would increase the amount of traffic using the A4130 (to access the Park and Ride location), exacerbating existing congestion issues. • This option scores neutral for minimising the need to travel and promoting sustainable modes, as it requires travel to the park and ride location, which induces additional traffic in the local area. • This option is expected to be a lower cost option, however there will be significant capital costs involved with developing the park and ride, including purchasing land. • This option is likely to have very low acceptability as landowners may not support this proposal, and the public is likely to prefer other, more flexible interventions. • This option has low feasibility and deliverability as it will require significant land take on greenfield land, which has been earmarked for future development.
Status	This option has **not been taken forward** for assessment due to the poor score achieved.

Option 7: Improved rail services from Didcot to Oxford and Reading

6.1.22 The implementation of Option 7 aims to double existing service frequency, including at smaller rural stations at Appleford, Culham and Radley. As the Didcot to Oxford line is already at capacity, this would require four-tracking this line.

6.1.23 Table 6-9 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-9 Option 7: Improved rail services from Didcot to Oxford and Reading

Score against objectives and additional criteria	-7
Comment	• This option will provide improved accessibility to Culham Science Centre via the rail line. It will, therefore, partially unlock both housing and employment development at Culham Science Centre and ensure the impact of the development is partially mitigated. • This option scores neutral for Objectives 1 to 5, as it will enable development at one specific location (Culham Science Centre), and therefore would not contribute to the achievement of the proposed development across Science Vale. • This option will help in providing a flexible network to cope with future uncertainties and opportunities, as the timetable can be revised if necessary. • This option would minimise carbon emissions and other pollution through promoting and increasing use of public transport, but it is partially within Flood Zone 2 which poses a key environmental concern with regards to its construction. • This option will require four-tracking the line between Didcot and Oxford, which will have significant environmental impacts. • This option would also minimise the need to travel, and promote the use of the rail line, a sustainable mode of travel. • This is expected to be a very expensive option. • This option would have to be developed in line with the Governance for Railway Investment Projects framework used by Network Rail to develop rail projects. • This option has identified three key showstoppers in relation to affordability, deliverability and feasibility, due to the requirement for four-tracking along the Didcot to Oxford route as this will require significant land take and upgrades/extension to multiple railway bridges. • This option is outside of local control to deliver and could have wider implications on rail service operations along the GWML and routes through Oxford. The impact of service frequency enhancements at rural stations could be limited if access to these stations is quite restricted.
Status	This option has **not been taken forward** for assessment due to the poor score achieved.

Option 8: Improved stations at Didcot and Culham, plus a new station at Grove

6.1.24 Option 8 is to improve rail stations at Didcot & Culham and provide a new station at Grove, including improved links to Culham Station. This will include upgrading the path between Culham Rail Station and Culham Science Centre. Aim to provide a segregated path set back from the road for the use of pedestrians accessing Culham

Science Centre from the train station. This would be future proofed for the Culham development coming forward.

6.1.25 Table 6-10 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-10 Option 8: Improved stations at Didcot and Culham, plus a new station at Grove

Score against objectives and additional criteria	**3**
Comment	• This option scores neutral for Objectives 1-5 as upgrades to existing stations are unlikely to lead to the scale of change required to support growth across Science Vale. In addition, this option scores neutral for Objective 6, as whilst it may be able to cope with future uncertainties it is not a flexible option. • The new station at Grove will help provide a flexible transport network to cope with future demand, however it is unlikely that many intercity services will stop at Grove due to its proximity to Didcot Parkway. • This option would help to minimise the need to travel and promote sustainable modes of travel through the new and improved stations as well as improved connections. • This option may lead to increased public transport patronage and lead to reduced carbon emissions, air quality improvements and other environmental benefits, as the new Grove station would be promoting a sustainable mode as an alternative to the car. • Improvements to Culham and Didcot stations are likely to be affordable, however a new station at Grove would be very expensive. Therefore, this option has scored neutral for affordability. • This option may not lead to the scale of change required and is outside of local control to deliver. • The impact of introducing a new station on the GWML could have much wider implications on rail service operations beyond the local area, e.g. with fewer trains able to stop at Didcot to serve Grove. • This option is likely to be acceptable by the general public through improved rail provision. • This option scores neutral for deliverability and feasibility, as whilst a new station at Grove is potentially deliverable and feasible, the capacity issues would remain along the Didcot to Oxford line. • The remaining, undealt challenges along the Didcot-Oxford line lower the score of this option. The new station at Grove may have merit beyond the scope of this study if part of another programme.
Status	This option has been **taken forward** for further assessment as it scores positively and requires further assessment to understand in greater detail the benefits and challenges associated with this option.

Option 9: Junction realignments and signalisation

6.1.26 Option 9 consists of junction realignments and signalisation of key junction pinch points and hotspots across the local area.

6.1.27 Table 6-10 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-11 Option 9: Junction realignments and signalisation

Score against objectives and additional criteria	**-22**
Comment	• This option is unlikely to lead to the scale of change required to support development across Science Vale, and therefore scores as 'poor fit' for Objectives 1 to 5. • Upgrades to junctions and signalisation has already been undertaken in several locations across Didcot. • This option will have negative impacts several environmental indicators, although optimised signals at junctions could have a small positive effect on reducing queues and potentially reducing carbon emissions. • Affordability is identified as a showstopper due to the sheer number of junctions to upgrade and the cost associated with this. • This option has poor feasibility and deliverability due to the lack of space required to upgrade these junctions to achieve significant congestion and journey times reduction, and constraints from properties close to junctions. • This option scores low on acceptability as it is unlikely the public will accept this option as a standalone solution.
Status	This option has **not been taken forward** for assessment due to the poor score achieved.

Option 10: Upgraded and co-ordinated traffic signal control

6.1.28 Option 10 is to upgrade, optimise and co-ordinate traffic signal control at existing signal-controlled junctions across Science Vale.

6.1.29 Table 6-12 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-12 Option 10: Upgraded and co-ordinated traffic signal control

Score against objectives and additional criteria	**-14**
Comment	• Upgrades to the traffic signal control are very unlikely to lead to the scale of change required to support development across Science Vale, and therefore this option has 'poor fit' for Objectives 1 to 5. • This option will have negative impacts on several environmental indicators, although co-ordinated traffic signals would reduce the need for frequent acceleration and deceleration which reduces carbon emissions. • Affordability is considered neutral because, although across the Vale as a whole there are numerous signal-controlled junctions, they may not all need significant upgrade works and opportunities for linking signals together (e.g. through a UTC SCOOT-based network) are quite limited. • This option has neutral feasibility and deliverability as there may be some complexities of delivering an interconnected traffic signal control across Didcot and the wider Science Vale area, but the technology exists. • This option has low acceptability as it is unlikely the public will accept this option in isolation as the effects may not be obvious or equitable for all users.
Status	This option has **not been taken forward** for assessment due to the poor score achieved.

Option 11: Comprehensive cycle and walking networks within Didcot

6.1.30 Option 11 would provide a comprehensive cycle and walking networks within Didcot and Science Vale, including cycle links to other parts of Science Vale, cycle priority in Didcot town centre, and completion of the SVCN Routes 5 and 8. SVCN Route 5 is a new cycle/pedestrian route from Didcot to Harwell Campus. This will follow the proposed SVCN Route 5, which mainly follows the B4493 out of Didcot through Harwell and down Winaway to Harwell Campus. SVCN Route 8 is a new cycle/pedestrian route from Didcot to Culham Science Centre, including a new shared-use bridge over the river. Furthermore, this option will include improved walking and cycling links to Culham train station.

6.1.31 Table 6-13 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-13 Option 11: Comprehensive cycle and walking networks within Didcot

Score against objectives and additional criteria	**-2**
Comment	• This option, concerning cycling and walking alone, is unlikely to be enough to fully support the development across Science Vale, and therefore scores low on Objectives 1 to 5. Improved walking and cycling should, however, be a key feature of preferred scheme options. • This option is a sustainable option and will help to reduce carbon emissions and other pollution. However, it will be partially within Flood Zone 2, which is a key environmental concern. This option is low cost and will be acceptable to the public. However, it may also be controversial if it involves reallocation of road space away from private vehicles. This option still requires land. It also requires agreement from Environment Agency to cross the Thames. • This option will connect employment sites across Science Vale. • This option has neutral feasibility and deliverability scores, as SVCN Routes 5 and 8 have already undergone design and planning, with some small sections already built.
Status	This option has **not been taken forward** for assessment due to the poor score achieved. **Improved walking and cycling should, however, be a key feature of preferred scheme options.**

Option 12: Science Vale Bus Rapid Transit

6.1.32 Option 12 focusses on connecting Science Vale through a network of Bus Rapid Transit (BRT) routes, in order to improve existing bus routes and frequencies. Key routes would be Didcot-Culham Science Centre-Oxford, Didcot-Harwell Campus. Didcot would be an interchange station at the centre of the routes. BRT would take the form of segregated bus-only lanes, with bus priority at busy junctions. This option would include a new bus-only bridge over the River Thames near Culham Science Centre, with a shared use path alongside to encourage active travel.

6.1.33 Table 6-14 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-14 Option 12: Science Vale Bus Rapid Transit

Score against objectives and additional criteria	**-3**
Comment	• This option could lead to the scale of change required for the development planned across Didcot and Science Vale. • This option would require road capacity in order to ensure reliable journey times, which would involve taking highway capacity away from private vehicles. • Coordinated marketing and promotional strategies would need to be put in place. • This option will promote sustainable modes of transport and provide a flexible transport network, as buses can be re-routed to meet demand over time. • This option would minimise carbon emissions and other pollutants, as it will form an interconnected set of bus services, which could lead to increased patronage. However, it is partially within Flood Zone 2, which poses a key environmental concern with regards to its construction. • This option has low affordability, as the cost of implementing BRT systems is significant, considering both the physical infrastructure and provision of services. • This option will be very complex to deliver, and its viability is interdependent on many other schemes. In addition, it could likely have implications on the viability of existing bus services. • This option has very low feasibility, due to the significant land take and CPO required for its implementation, where dedicated infrastructure such as bus-only lanes, roads, signal-control, laybys (stops) will be built. • As a fast, frequent and reliable public transport service, this option is expected to be acceptable to the public, however it may be controversial as it involves the reallocation of road to public transport away from private car.
Status	This option has **not been taken forward** for assessment due to the poor score achieved.

Option 13: Science Vale Light Rail Link

6.1.34 Option 13 focusses on connecting Milton Park, Didcot and Harwell Campus via a light rail link. Didcot Parkway would be the terminus with the route feeding into direct train services from Didcot to Oxford. A high frequency service would be provided, with the highest frequency reflecting prevalent working patterns. This option can also be timed to connect with services stopping at Culham if possible. There is the opportunity to use emerging technology as part of the light rail network. This option could also be operated by a tram.

6.1.35 Table 6-15 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-15 Option 13: Science Vale Light Rail Link

Score against objectives and additional criteria	**-7**
Comment	• This option is unlikely to lead to the scale of change required for some of the development planned across Didcot and Science Vale, and therefore scores neutral/low fit for Objectives 1-5.This option would provide a sustainable mode of transport and minimise carbon emissions and other pollutants. • This option may have negative visual impacts across open land. • This option scores neutral for providing for a flexible transport network as, whilst it is not very flexible due to the physical infrastructure required for light rail, it will help cope with future uncertainties and opportunities. • It is a very expensive option due to the infrastructure required and cost of running services. • This option will be very complex to deliver, with many interdependencies with other aspects of the transport network, which can impact upon the success of the scheme. • This option has very low feasibility due to the significant land take requirements, CPO and complexity of implementing a light rail system. • The land take required for this option, and visual impacts of the scheme are likely to lead to low public acceptability.
Status	This option has **not been taken forward** for assessment due to the poor score achieved.

Option 14: Demand Responsive Transport

6.1.36 Option 14 is to provide demand responsive service within Didcot and Science Vale, for example similar to or expanding on the offer available elsewhere (such as demand responsive taxi-buses). This could replace some existing fixed route bus services, and provide more flexible services across the area. One way this service would work is by passengers inputting their journey into an app and the service then matching up the journey with that of others close by going in the same direction.

6.1.37 Table 6-16 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-16 Option 14: Demand Responsive Transport (DRT)

Score against objectives and additional criteria	**-4**
Comment	• This option will provide increased capacity across Science Vale however it is unlikely to lead to the scale of change required to support the proposed development and sufficiently mitigate the impact of this development on the local road network. • This option is very flexible and will cope with future uncertainties and opportunities through the provision of DRT. • This is a sustainable option reducing carbon emissions and other pollutants. However, this option is still a motorised option, and may have negative environmental impacts if powered by fossil fuels. • This option is not as costly as other options, but previous unsuccessful DRT trials within Oxford suggest that additional investment might be necessary to turn this option to a commercial success. This suggests a DRT within Science Vale may need to be subsidised by local authorities. • Although the Oxford trial achieved substantial ridership, it did not meet the critical mass for the service, which may suggest that DRT is not a popular solution for the public and could impact this option's acceptability. • This option may impact upon the viability of existing fixed bus route services, which may also affect public acceptability. • This option scores neutral on feasibility, as it requires physical infrastructure, even if this would be limited. • As this option does not include a new bridge over the River Thames, the bus services would have to use the existing bridges. This would pose poor journey time reliability, particularly in the future years when the queueing at these bridges would increase due to housing and employment growth.
Status	This option has **not been taken forward** for assessment due to the low score achieved.

Option 15: Small scale bus improvements across Science Vale

6.1.38 Option 15 includes small scale improvements to bus routes and facilities across Science Vale. This could include improved waiting facilities such as bus shelters and real time information boards. There may also be improved marketing of bus services, and small tweaks to routes to ensure key origins and destinations are served potentially with increased frequencies at busy times. This can be undertaken in consultation with bus companies to understand what they require of the network.

6.1.39 Table 6-17 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-17 Option 15: Small scale bus improvements across Science Vale

Score against objectives and additional criteria	**-9**
Comment	• This option is very unlikely to increase to the level required to support development across Science Vale, and therefore four showstoppers are identified for Objectives 1-4. • This option will be flexible and promote sustainable modes. • This option may help to minimise carbon emissions and adverse environmental impacts through encouraging the use of public transport. Its impact on emissions is, however, likely to be very limited and has, therefore, been scored neutral. • This option has a good affordability score as it is not expensive to implement. • This option is likely to be feasible and deliverable as it supplements the existing bus network and infrastructure. • This option could receive a mixed response from the public, as some will be supportive of a public transport intervention, while others would prefer a car-based solution. • As this option does not include a new bridge over the River Thames, the bus services would have to use the existing bridges. This would pose poor journey time reliability, particularly in the future years when the queueing at these bridges would increase due to housing and employment growth.
Status	This option has **not been taken forward** for assessment due to the low score achieved.

Option 16: A34 Widening

6.1.40 Option 16 is to widen the A34 in both directions for 13.5km from Milton Interchange to Hinksey Hill Interchange. As the existing A34 is dual carriageway, this would include providing a third lane in each direction. This option was identified as part of the Didcot to Culham New Road and Thames Crossing: Optioneering and Proof of Concept (2016) as an alternative to Option 3.

6.1.41 Table 6-18 outlines the option's score against the scheme objectives and additional criteria, its status and the reasoning behind the decision.

Table 6-18 Option 16: A34 widening

Score against objectives and additional criteria	-12
Comment	• This option, whilst providing additional capacity, will not provide significant capacity within Science Vale to enable the delivery of required development (residential and employment) in the area • This option is not flexible, although it does provide additional capacity for future uncertainties and increased traffic flows. • This option does not promote sustainable travel, nor does it minimise carbon emissions. Also, the clearing of land required to widen the existing dual carriageway is likely to have adverse environmental impacts and lead to some ecological loss. • Furthermore, the option is unaffordable due the high cost of the scheme, primarily arising from extensive land take required. • There are deliverability and feasibility issues due to the complex nature of a scheme of this scale and magnitude. • In addition, as this road is managed by National Highways (NH) the scheme would need to be promoted by NH rather than OCC • This option is likely to have negative public acceptability as some endorse the additional capacity improvements while other members of the public oppose the proposal by recognising that priority should be given to other network needs and due to negative environmental impacts.
Status	This option has **not been taken forward** for assessment due to the low score achieved.

6.2 Summary

6.2.1 The Phase 1: Initial Sift identified five options that would contribute to achieving the level of growth aspired in Science Vale. Due to the positive score achieved the following options will be taken forward to Phase 2 for a more detailed appraisal:

- Option 1: A4130 Widening;
- Option 2: Didcot Science Bridge;
- Option 3: Didcot to Culham River Crossing;
- Option 4: Clifton Hampden Bypass; and
- Option 8: Improved stations at Didcot and Culham, plus a new station at Grove.

6.2.2 In Phase 2, these five options have been assessed in more detail against the five-case business case approach in an adapted EAST assessment. The five schemes taken forward are those which are mostly aligned with the set objectives, as well as

with feasibility, affordability, acceptability and deliverability criteria. Nevertheless, it is important to note that the remaining interventions dismissed at this stage may still have value as part of a wider package, to further support the transport network. For example, whilst bus improvement schemes will not enable development within Science Vale alone, they will provide alternative means of travel. Furthermore, some of the options identified above may also have merit individually in supporting other schemes across Science Vale.

6.2.3 As such, the following section outlines the methodology and outcome of the EAST assessment undertaken as part of Phase 2.

7. Phase 2: EAST Appraisal and Scoring

7.1 Introduction

7.1.1 In order to further appraise the five shortlisted options, Phase 2 assesses these based on the five-case business case approach and a framework based on EAST. The criteria used to assess each option is set out in Appendix D.

7.1.2 Table 7-1 summarises the results of the Phase 2 sift, which are discussed in the following paragraphs. The full assessment is outlined in Appendix E. This assessment is aimed at drawing out the weaknesses and strengths of each of the options, rather than quantitatively comparing them on the score achieved, to understand the nuance of each of the options. The scores nevertheless provide a broad guide as to how the options compare to one another.

Table 7-1 Phase 2 score results

Option	Business Case Element				
	Strategic *(max score 60)*	**Economic** *(max score 25)*	**Management** *(max score 25)*	**Financial** *(max score 20)*	**Commercial** *(max score 15)*
A4130 Widening	50	19	22	17	13
Didcot Science Bridge	49	18	18	15	12
Didcot to Culham River Crossing	49	19	18	14	12
Clifton Hampden Bypass	50	19	20	16	12
Improved stations at Didcot and Culham, plus a new station at Grove	35	18	16	12	7

7.2 Option 1: A4130 Widening

7.2.1 In the Phase 2 EAST assessment was shown to provide many benefits to the local area. In the **Strategic Case**, the option meets all but two of the scheme objectives. This was also outlined above as part of the Phase 1 sift. In addition, the option meets most of the National, Regional and Local Policies, especially those focussed on growth and improvements to the transport network. This option does not meet National, Regional and Local policies on improvements to the public transport network, as it is focussed on road and active travel improvements. This option contributes to addressing the Climate Emergency through the provision of active travel and the reduction of queueing traffic. There is some stakeholder consensus for this option, as local councils have been engaged in discussions on the acceptability of the scheme.

7.2.2 In the **Economic Case**, this option will have a positive impact on economic growth based on positive impacts on a variety of indicators. For example, there will be improved journey times and reliability in Didcot and Science Vale due to the widening of the A4130, as demonstrated by the Paramics modelling (see Appendix F). Furthermore, the option will improve the resilience of the transport network through provision of increased highway capacity and new active travel infrastructure. This

option leads to a slight improvement in carbons emissions as there is a reduction congestion and queuing compared to the DM.

7.2.3 This option will have positive socio-distributional impacts and delivering an agglomeration benefits. This option leads to both a reduction in carbon emissions compared to the DM scenario and slight improvements in air quality (NO_2) at Milton. Noise levels are anticipated to moderately increase at Premier Inn (A4130 near Milton Interchange), however significant decreases in traffic noise are expected along and near local roads where traffic has moved to main roads. This option provides generally positive impacts on well-being and health through the provision of segregated bi-directional pedestrian and cyclist path and improvements to accessibility to key destinations. However, it may increase the number of accidents due to higher traffic volumes, although severity of these accidents may decrease due to the lower speed of the road.

7.2.4 For the **Management Case,** this option scores very well due to the high levels of public support it will receive, as widening the A4130 has been a long-held ambition for Didcot. In addition, the option is deliverable and feasible as designs have been produced and limited land take is required. The key risks associated with this option are land acquisition and construction within Flood Zone 2 and 3.

7.2.5 In the **Financial Case,** this option also scores well, as its implementation is considered affordable. There will be some capital costs to maintain the scheme, which are expected to be around 10% of the scheme cost.

7.2.6 Finally, in the **Commercial Case,** the option scores well, as it has secured funding from HIF. The option provides some flexibility regarding its future use, which can be altered based on future traffic circumstances. The scheme will also generate some income through indirect tax benefits due to the increased road demand.

7.3 Option 2: Didcot Science Bridge

7.3.1 Overall, this option scores well across all five cases. In the **Strategic Case,** the Didcot Science Bridge meets all but two of the scheme objectives, as it will unlock development and provide the capacity to accommodate additional demand from these developments. This option contributes to addressing the Climate Emergency through the provision of active travel and the reduction of queueing traffic. This option meets most of the National, Regional and Local Policies, especially those focussed on growth and improvements to the transport network.

7.3.2 This option does not wholly meet National, Regional and Local policies on improving public transport, including bus services, and sustainability, although active travel improvements go some way to addressing this. Whilst this option does not provide bus priority measures in and of itself, through the provision of increased capacity it would improve the journey time reliability of buses. There is some stakeholder consensus for this option as local councils have been engaged in discussions on the acceptability of the scheme.

7.3.3 In the **Economic Case,** this option scores well, however there are some areas which do not score as positively. Modelling for the Didcot Science Bridge (see Appendix F) has demonstrated that (in combination with the other HIF schemes) the scheme will significantly mitigate congestion and delays. The scheme will enhance the resilience

of the network and will have a very positive impact on development across Science Vale. Through dependent development, the scheme will help deliver affordable housing and provide agglomeration benefits.

7.3.4 This option leads to a reduction in carbon emissions compared to the DM scenario. However, there is a very slight worsening in air quality (NO_2) in Didcot. Noise levels are anticipated to moderately increase for one property in Great Western Park, however significant decreases in traffic noise are expected along and near local roads where traffic has moved to main roads. Significant adverse visual effects are predicted from the perimeter of Great Western Park (Didcot) however mitigation means it is likely by operation year 15 this will no longer be significant.

7.3.5 There will be positive impacts on health, it would improve accessibility to key destinations and drastically reduce the severance caused by the GWML across Didcot. However, this may lead to an increase in accidents due to increased highway capacity and increased demand, although severity of these accidents may decrease due to the lower speed of the road.

7.3.6 For the **Management Case,** this option performs fairly well, as this option will be deliverable, acceptable, and feasible. However, it is important to highlight the deliverability issues surrounding constructing a bridge to cross the GWML and the feasibility issues of the number of stakeholders involved, including engagement with Network Rail. The key risks for this option are the land take required, the high flood risk and necessary approvals from Network Rail.

7.3.7 In the **Financial Case**, the score given to this option reflects both the fact that the option is affordable, but that the infrastructure cost is fairly high . In addition, this option may have increased running costs, due to the future maintenance that would be required for the bridge structure.

7.3.8 In the **Commercial Case**, this option performs well as the bridge provides future flexibility, such as potential future use as a bus-only link, and funding has been secured for this option from HIF.

7.4 Option 3: Didcot to Culham River Crossing

7.4.1 In the **Strategic Case**, and as highlighted in the Phase 1 Initial Sift, the Didcot to Culham River Crossing meets many of the scheme objectives. This option will help unlock development across Science Vale, provide capacity for this development and help future-proof the transport network. This option meets most of the National, Regional and Local policies through provision of a transport intervention which supports the network and proposed local growth. The option is partially aligned with policies concerning the improvement of the public transport network and increasing use of public transport systems. This option contributes to addressing the Climate Emergency through the provision of active travel and the reduction of queueing traffic. There is some stakeholder consensus for this option as local councils have been engaged in discussions on the acceptability of the scheme.

7.4.2 For the **Economic Case**, the option performs favourably, with modelling identifying that the implementation of the Didcot to Culham River Crossing would reduce delay at the existing river crossings at Culham and Clifton Hampden (see Appendix F for further information). The option would improve resilience of the network through

provision of an alternative river crossing, which would be useful in times of disruption. The option will support delivery of affordable housing and provide agglomeration benefits. Furthermore, this option will reduce the existing north/south severance caused by the River Thames. The new river crossing will provide for more direct, and therefore shorter, active travel journeys between areas that currently are severed, as it enables connectivity through walking and cycling.

7.4.3 From an environmental perspective, this option leads to both a reduction in carbon emissions compared to the DM scenario and significant improvements in air quality (NO_2) at Long Wittenham. There is expected to be a very slight worsening in air quality at Appleford and Sutton Courtenay, but air quality remains well within acceptable levels. Noise levels are anticipated to moderately increase at Culham Science Centre Nursery, as well as moderate to major increases in locations close to the scheme such as the southern edge of Appleford. However significant decreases at educational facilities in Culham and Long Wittenham as well as for residential properties in local villages (such as Culham and Long Wittenham).

7.4.4 There are expected to be significant adverse landscape effects for the location of the improvements at the Thames Floodplain, due to the predominantly rural characteristics of the baseline landscape. By operational year 15, these impacts will be mitigated by landscape planting and the perception of the scheme will reduce. Significant adverse visual effects are predicted from south Appleford (PROW users and residents near Appleford Level Crossing) and the Thames Path National Trail. Mitigation means that by operational year 15 this impact will no longer be significant for Appleford residents. The new bridge over the River Thames will impact the tranquillity of the local area as well as the area's historical character through impacts on scheduled monuments and Grade II listed buildings. The option will improve accessibility and health benefits but may lead to increased accidents due to the increased highway capacity provided.

7.4.5 In the **Management Case,** this option scores fair, reflecting that, even though it is deliverable and feasible, the river crossing is likely to pose engineering and environmental challenges (these challenges will be better understood as the scheme is developed in more detail). Stakeholder agreement with EAEA, amongst other environmental stakeholders, will be required. The scheme will also have high public acceptability, but the provision of an "iconic" structure and increased noise in nearby villages may affect this. Key risks identified for this option include land acquisition, a high flood risk zone and engagement with EA. Furthermore, the costs of the scheme need to take into account uncertainty of building a scheme over historic landfill.

7.4.6 In the **Financial Case,** this option does not perform as well, in part due to the large infrastructure costs associated with its implementation. This leads to an increase in the maintenance costs required for the option but a potential reduction on existing routes. It should be noted, though, that the option is affordable, as funding has been secured from HIF.

7.4.7 Finally, in the **Commercial Case** the option scores well due to the already-secured funding. The scheme will also generate some income through indirect tax benefits, due to the increased road demand.

7.5 Option 4: Clifton Hampden Bypass

7.5.1 In the **Strategic Case,** this option meets many of the strategic objectives of the scheme, as discussed in the Phase 1 Initial Sift. The scheme will help unlock development across Science Vale, supporting and improving the resilience of the transport network. This option contributes to addressing the Climate Emergency through the provision of active travel and the reduction of queueing traffic.

7.5.2 As with the other options, this option meets most of the National, Regional and Local policies through provision of a transport intervention, which supports the network and proposed local growth. The option does not fully address policies concerned with improving the public transport network and increasing use of public transport systems, however the bypass does enable new bus routes and provides new bus stops. There is some stakeholder consensus for this option as local councils have been engaged in discussions on the acceptability of the scheme.

7.5.3 In the **Economic Case,** the option scores well, with modelling showing the significant impact the Clifton Hampden Bypass will have on traffic and delays in the local areas (see Appendix F for further information). Modelling suggests that, without this intervention and all Local Plan development, significant queues and delays would be experienced at Clifton Hampden, with around 2km queues from the A415/High Street/Oxford Road staggered junction towards Culham Science Centre. Conversely, in the modelling scenario, where the Clifton Hampden Bypass (and other HIF schemes) are operational, there are very low levels of queueing along the A415 in the AM and PM peaks.

7.5.4 The scheme will improve the resilience of the transport network in responding to negative externalities, such as climate change. This option leads to both reductions in carbon emissions compared to the DM scenario and significant air quality (NO_2) improvements in Clifton Hampden and Burcot. There are expected to be moderate to major increases in locations close to the scheme such as the northern edge of Clifton Hampden. However, there are several locations in which a moderate to major decrease in traffic noise is expected including the school, a medical building, and places of worship in Clifton Hampden. There will also be a significant reduction in traffic noise for residential properties in local villages, including Clifton Hampden and Sutton Courtenay.

7.5.5 There are expected to be significant adverse landscape effects for the location of the improvements at Clifton Hampden Farmland, due to the predominantly rural characteristics of the baseline landscape. By operational year 15, these impacts will be mitigated by landscape planting and the perception of the scheme will reduce. Significant adverse visual effects are predicted from the entrance to Culham Science Centre, residents at Fullamoor and around Clifton Hampden (residents at the northern edge of the village and PROW users).

7.5.6 This option may lead to an increase in the rate of accidents due to new highway capacity being provided, although the scheme would be designed to modern standards and undergo Road Safety Audits (RSA). By having provision of pedestrian and cycling infrastructure, this will provide health benefits and reduce severance for these modes.

7.5.7 In the **Management Case,** the option performs well, as it is considered to be deliverable, feasible and acceptable. However, this option is within the Green Belt, which may impact its feasibility. In addition, the public may express preference to alternative solutions, as the nature of a bypass means that is inflexible in its location and requires building across existing open land. The key risks for this option are the land acquisition required and construction within Flood Zone 2.

7.5.8 In the **Financial Case**, this option scores well as it has a lower infrastructure cost, which makes it affordable. This option is likely to have lower maintenance costs.

7.5.9 In the **Commercial Case**, this option is considered flexible in future use, as it could accommodate more sustainable modes, depending on future traffic conditions or enable changes in existing routes. Funding has been secured for this option through HIF and could also generate some income through indirect tax benefits, due to the increased road demand.

7.6 Option 8: Improved stations at Didcot and Culham, plus a new station at Grove

7.6.1 In the **Strategic Case**, this option only meets several of the strategic objectives of the scheme, as discussed in the Phase 1 Initial Sift. Due to the localised nature of the intervention in Didcot and Culham, and the remaining focus in Grove, it is very unlikely that this option will support the scale of delivery of homes across Science Vale that are required. However, it is likely that this option will minimise the need to travel and promote sustainable modes, reducing carbon emissions and providing air quality improvements, contributing to addressing the Climate Emergency.

7.6.2 This option does not meet all of the National, Regional and Local Policies, as it will not support the scale of housing and employment growth required. As a large proportion of the intervention is located in Grove, not Didcot, this is unlikely to support the development of Didcot Garden Town. However, the option does meet policies surrounding improving public transport and increasing the use of public transport systems. It is likely there may be some stakeholder disagreement on widening of the railway to four track beyond Didcot, as this may be a controversial scheme.

7.6.3 In the **Economic Case**, this option scores well, as it is likely to improve journey times and journey resilience. Although, as this option involves improvements to the rail network in specific locations, it is likely to mostly benefit residents of Grove with journey time benefits. However, the impact of introducing a new station on the GWML could have much wider implications on rail services beyond the wider area, as fewer trains may stop at Didcot if they stop at Grove. The scheme is likely to promote modal shift to sustainable modes which would lead to reduced carbon emissions and improvements to air quality. Improvements to the train stations will improve the streetscape and urban environment in these areas. However, the scheme is likely to increase noise in the vicinity of the GWML in Grove.

7.6.4 This option will have health benefits as modal shift leads to improved air quality and reduced risk of accidents on the road. There will also be a reduction of severance at Culham Rail Station through provision of a segregated footpath to access CSC.

7.6.5 In the **Management Case**, the option scores satisfactory, with some issues surrounding the potential deliverability and feasibility of the scheme. The scheme would need to fit within the rail investment programme, and the timetable of delivery would be 5-10 years, which may pose an issue in aligning with the programme planned development in Didcot and Science Vale. Furthermore, this option is mostly beyond local control to deliver. There are also existing capacity issues along the Didcot to Oxford line which may complicate delivery. Furthermore, with no additional services able to run, improvements to Didcot Parkway and Culham stations will have marginal impact. The scheme is expected to have fair public acceptability as it is a sustainable mode of travel and does not require significant behaviour change. However, it may be that a road-based scheme is preferred to achieve the levels of development required in Didcot.

7.6.6 For the **Financial Case**, this option performs fairly. Whilst improvements to Didcot Parkway and Culham stations will be affordable, a new train station at Grove would be very expensive. This could potentially impact the viability of the option as a whole.

7.6.7 In the **Commercial Case**, this option is considered to be partially flexible as the separate elements of the scheme can be pursued independently. Funding for this scheme would have to be secured through the rail industry or from central government, especially for a new station at Grove.

7.7 Summary

7.7.1 The Phase 2 appraisal has shown how the five options perform against the five-case business case criteria laid out in the EAST tool. The benefits of the five options have been clearly defined, whilst also the areas in which each option do not perform have been highlighted. This assessment was not aimed at identifying one single preferred option, but instead to draw out the strengths and weaknesses of each option.

7.7.2 This assessment has identified that across all five-case business case criteria Option 8 (Improved stations at Didcot and Culham, plus a new station at Grove) performs the worst. There are some key concerns for this option including the significant cost of the scheme, deliverability, and potential to support planned development across Didcot and Science Vale. There are also concerns surrounding the programme of delivery of this option and how this would align with planned development. Overall, it has been demonstrated that this scheme would not be a suitable fit to support development across Didcot and Science Vale, and therefore this scheme has been discounted and not taken forward to the next stage of assessment. It should be noted that whilst Option 8 does not fit strategically with the aims of this project, the scheme may still have merit as part of a separate study, such as one focussed on improvements to Grove.

7.7.3 Therefore, the remaining four assessed options will go forward to further be assessed as part of Phase 3 and 4. These are as follows:

- Option 1: A4130 Widening;
- Option 2: Didcot Science Bridge;
- Option 3: Didcot to Culham River Crossing; and
- Option 4: Clifton Hampden Bypass.

8. Phase 3 and 4: Sub-Options

8.1 Introduction and identification of options

8.1.1 This section considers design, location, size, and scale alternatives to the four preferred options as identified above. These alternatives are based on optioneering studies undertaken by OCC. These sub-options will help further refine and develop the option design to ensure the benefits are maximised and the negatives minimised, and ensure the preferred option taken forward is the best fit for the scheme objectives. As part of Phase 3, a summary of all sub-options considered can be found in Table 8-2.

8.1.2 To complete the Phase 4 assessment there has been a consideration of the benefits and challenges associated with each sub-option. For each option it is identified which sub-option should be taken forward as the preferred design. It should also be noted that the as this optioneering work is taking place later on in the design process, the level of information available for the assessment varies between the different sub-options. As a result, some sub-options have been through extensive appraisal and have feasibility drawings produced whereas others have little previous work completed. The level of information available for each of the sub-options is identified in Table 8-3in line with the definitions outlined in Table 8-1.

Table 8-1 Level of Evidence

Evidence Level	Description
Limited Evidence	Limited or no supporting evidence in the form of drawings/sketches and feasibility and impact assessments, therefore greater uncertainty around identifying benefits and challenges
Moderate Evidence	Some supporting evidence in the form of drawings/sketches and feasibility and impact assessments which provides a general indication of potential benefits and challenges with a moderate level of certainty
Substantial Evidence	Substantial supporting evidence in the form of drawings/sketches and feasibility and impact assessments which provides a clear indication of potential benefits and challenges with a higher level of certainty

8.1.3 It is not possible to completely separate Phases 3 and 4 without repeating much of the same material, so what is presented below is a combination of both. This includes a description of the sub-option as well as identification of the benefits and challenges associated with that sub-option. A more detailed assessment of sub-options has not been undertaken as part of this phase as these options have already been assessed by a high-level sift and through EAST, and therefore further interrogation of these options is not required. In addition, imbalance of information between the sub-options complicates the assessment further.

Table 8-2 Phase 3 Sub-Options

Ref	Option	Sub-Option	Source
Option 1: A4130 Widening			
1.1	A4130 Widening	Introducing higher capacity/quality pedestrian/cycle lanes	Optioneering Prior to 2018 (OCC)
1.2	A4130 Widening	Roundabout at Great Western Park	Optioneering Prior to 2018 (OCC)
1.3	A4130 Widening	Introducing bus only lanes	Optioneering Prior to 2018 (OCC)
1.4	A4130 Widening	Dualling	Optioneering Prior to 2018 (OCC)
1.5	A4130 Widening	Dualling – retain existing drainage ditch and associated vegetation	Post 2018 Consultation (OCC)
Option 2: Didcot Science Bridge			
2.1	Didcot Science Bridge	Alignment A (next to Manor Bridge)	Optioneering Prior to 2018 (OCC)
2.2	Didcot Science Bridge	Roundabout at Great Western Park[62]	Optioneering Prior to 2018 (OCC)
2.3	Didcot Science Bridge	Alignment B	Optioneering Prior to 2018 (OCC)
2.4	Didcot Science Bridge	Alignment C	Optioneering Prior to 2018 (OCC)
Option 3: Didcot to Culham River Crossing			
3.1	Didcot to Culham River Crossing	Option 1	2016 Optioneering (OCC)
3.2	Didcot to Culham River Crossing	Option 2	2016 Optioneering (OCC)
3.3	Didcot to Culham River Crossing	Option 3	2016 Optioneering (OCC)
3.4	Didcot to Culham River Crossing	Option 4	2016 Optioneering (OCC)
3.5	Didcot to Culham River Crossing	Option 5	2016 Optioneering (OCC)
3.6	Didcot to Culham River Crossing	New Western Alignment	Post 2018 Consultation (OCC)
Option 4: Clifton Hampden Bypass			
4.1	Clifton Hampden Bypass	Change signal timings	Optioneering Prior to 2018 (OCC)
4.2	Clifton Hampden Bypass	Localised widening at the staggered junction	Optioneering Prior to 2018 (OCC)
4.3	Clifton Hampden Bypass	Southern Bypass	Optioneering Prior to 2018 (OCC)
4.4	Clifton Hampden Bypass	Northern Bypass – alignment closer to Clifton Hampden village	Post 2018 Consultation (OCC)
4.5	Clifton Hampden Bypass	Northern Bypass – roundabout at eastern end	Post 2018 Consultation (OCC)
4.6	Clifton Hampden Bypass	Northern Bypass – T-junction at eastern end of bypass	Post 2018 Consultation (OCC)

8.1.4 Table 8-3 outlines the level of evidence available to assess each of the sub-options, as well as the assessment status of the sub-option. It was decided that not all

[62] Please note – Options 1.2 and 2.2 are the same

identified sub-options would be assessed as part of Phase 4 due to the following reasons:

- The sub-option had already been assessed as part of the Phase 1 sift as part of a wider option; and/or
- Consultation as part of the 2018 OCC Public Consultation showed the option to be unviable.

8.1.5 It should be noted that the alternatives put forward by Appleford Parish Council for the Didcot to Culham River Crossing have not been assessed as part of the OAR. This is because the Phase 4 appraisal does not include new sub-options put forward by external groups after the July 2020 OCC Cabinet approval of the preferred alignment for the Didcot to Culham Crossing. At the time of writing five alignments have been submitted after the July 2020 approval, which include multiple iterations of similar options. These options have all been found to be unfeasible due to construction constraints. For further information on the response to Appleford Parish Council's proposed options please refer to the Statement of Community Involvement and the Environmental Impact Assessment, in Chapter 3 of the Environmental Statement.

8.1.6 It should also be noted that for several sub-options an assessment has been undertaken with only limited evidence available, such as a lack of technical drawings. All possible sources have been explored to assess these sub-options, but for several options this missing information has limited the assessment. The current assessment is as complete as possible given the information available.

8.1.7 Furthermore, it is important to note that this assessment only considers distinct sub-options, rather than evaluating small changes made to designs they may occur as schemes are developed through feasibility and preliminary design stages including as part of value engineering. For example, distinct changes to the alignment or junction type which are likely to have notable effects are included as sub-options but minor changes to the road layout (such as moving bus stops), or modest alignment alterations are not (these could be regarded as sub-sub options and so on). Further information on the value engineering process can be found in the appropriate technical reports.

Table 8-3: Sub-Option Assessment Status

Ref	Sub-Option	Level of Information	To be assessed?
Option 1: A4130 Widening			
1.1	Introducing higher capacity/quality pedestrian/cycle lanes	Limited Evidence	Not assessed - assessed as part of the Phase 1 sift (Option 12)
1.2	Roundabout at Great Western Park	Limited Evidence	Not assessed – consultation in 2018 has shown that this is not feasible
1.3	Introducing bus only lanes	Limited Evidence	Not assessed - assessed as part of the Phase 1 sift (Option 5)
1.4	Dualling	Substantial Evidence	To be assessed (see section 8.2)
1.5	Dualling – retain existing drainage ditch and associated vegetation	Substantial Evidence	To be assessed (see section 8.2)
Option 2: Didcot Science Bridge			
2.1	Alignment A (next to Manor Bridge)	Moderate Evidence	To be assessed (see section 8.3)
2.2	Roundabout at Great Western Park	Limited Evidence	Not assessed – consultation in 2018 has shown that this is not feasible
2.3	Alignment B	Moderate Evidence	To be assessed (see section 8.3)
2.4	Alignment C	Substantial Evidence	To be assessed (see section 8.3)
Option 3: Didcot to Culham River Crossing			
3.1	Option 1	Substantial Evidence	To be assessed (see section 8.4)
3.2	Option 2	Substantial Evidence	To be assessed (see section 8.4)
3.3	Option 3	Substantial Evidence	To be assessed (see section 8.4)
3.4	Option 4	Substantial Evidence	To be assessed (see section 8.4)
3.5	Option 5	Substantial Evidence	To be assessed (see section 8.4)
3.6	New Western Alignment	Substantial Evidence	To be assessed (see section 8.4)
Option 4: Clifton Hampden Bypass			
4.1	Change signal timings	Limited Evidence	Not assessed - assessed as part of the Phase 1 sift (Option 11)
4.2	Localised widening at the staggered junction	Limited Evidence	Not assessed - assessed as part of the Phase 1 sift (Option 10)
4.3	Southern Bypass	Moderate Evidence	To be assessed (see section 8.5)
4.4	Northern Bypass – alignment closer to Clifton Hampden village	Substantial Evidence	To be assessed (see section 8.5)
4.5	Northern Bypass – roundabout at eastern end	Substantial Evidence	To be assessed (see section 8.5)
4.6	Northern Bypass – T-junction at eastern end of bypass	Substantial Evidence	To be assessed (see section 8.5)

8.2 Sub-options for A4130 Widening

8.2.1 For the A4130 Widening, two sub-options were assessed. Figure 8-1 below shows the indicative alignments of the two sub-options assessed.

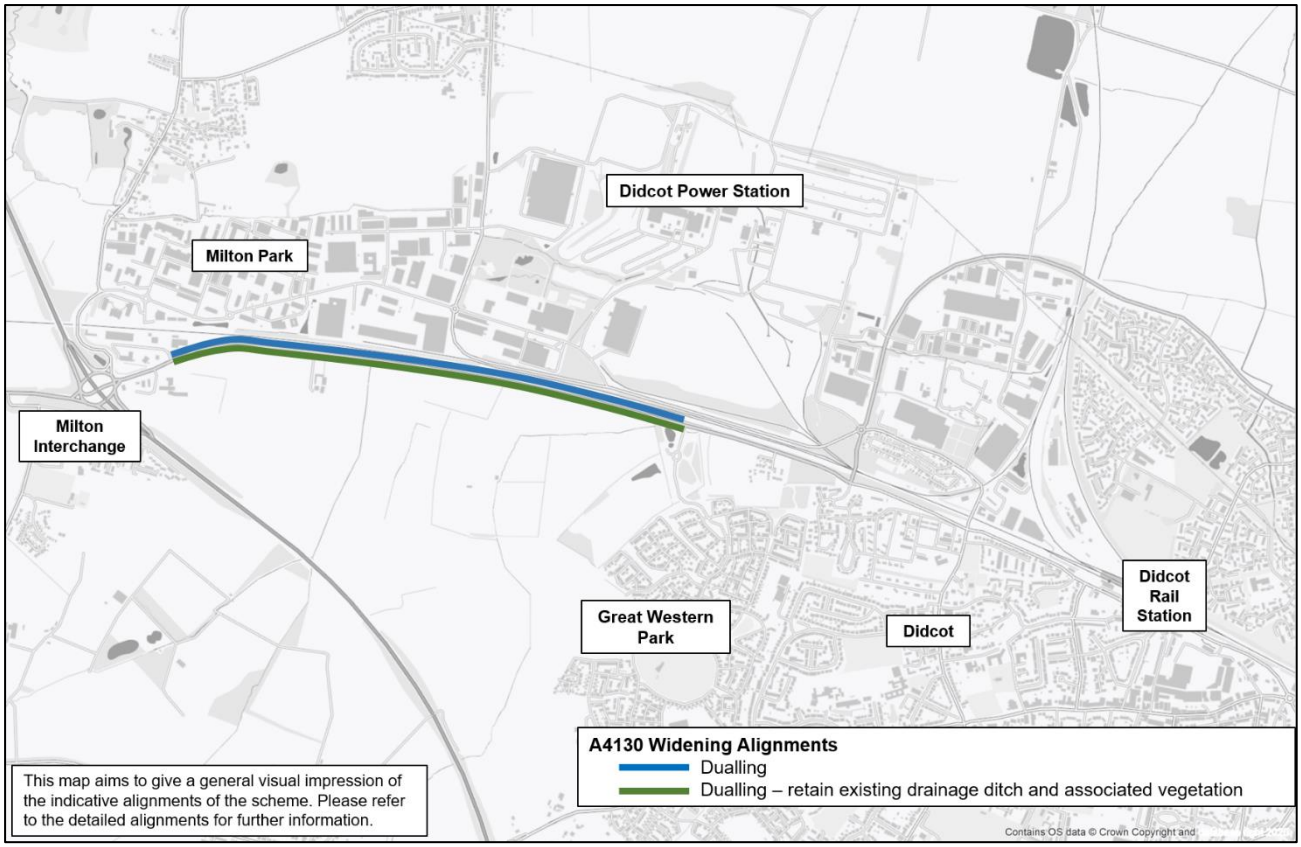

Figure 8-1 A4130 Widening Sub-options

Sub-option 1.4: Dualling

8.2.2 This sub-option involves widening the existing A4130 to two lanes in each direction between Milton Gate and the proposed Didcot Science Bridge scheme. This is the initial alignment of the dualling which includes removing the existing drainage ditch and associated vegetation to keep the alignment alongside the current A4130.

8.2.3 The benefits and challenges associated with this sub-option are shown in Table 8-4.

Table 8-4 Sub-option 1.4: Benefits and Challenges

Benefits	Challenges
• Significant widening • Opportunity for improved pedestrian and cycle infrastructure • Links housing directly to employment • Increased journey time reliability for bus passengers due to increased capacity • Although vegetation is removed this is not of high ecological value	• Requires additional land • Removes existing vegetation • Drainage ditch will need to be removed along the entire route • May not be acceptable to the public as this removes existing vegetation

Sub-option 1.5: Dualling – retain existing draining ditch and associated vegetation

8.2.4 This sub-option involves the westbound lanes shifting south to retain the existing drainage ditch and associated vegetation (where possible) to the south of the existing A4130. This option provides single carriageway between the two roundabouts in the Valley Park development at the eastern end of the scheme.

8.2.5 The benefits and challenges associated with this sub-option are shown in Table 8-5.

Table 8-5 Sub-option 1.5: Benefits and Challenges

Benefits	Challenges
• Significant widening • Opportunity for improved pedestrian and cycle infrastructure • Links housing directly to employment • Increased journey time reliability for bus passengers due to increased capacity • No ecological impact as majority of vegetation is retained • Limited visual impact compared to existing situation as majority of vegetation is retained • Retention of approximately 50% of existing drainage ditch • Higher public acceptability as retains existing vegetation and does not contribute to the further urbanisation of Didcot • Links into the Valley Park development	• Requires additional land • Drainage ditch will need to be removed at both signalised junctions and roundabouts (including the western roundabout) to create the access junctions to Valley Park

Summary – A4130 Widening

8.2.6 After consideration of the benefits, issues and deliverability constraints for each of the A4130 Widening sub-options it has been determined that **sub-option 1.5** (Dualling – retain existing draining ditch and associated vegetation) is the preferred option. This sub-option will then go through further refinements to the design to ensure it meets the scheme objectives as best as possible. Some Paramics modelling has been undertaken for this sub-option, identifying the impact on the local road network with and without the scheme. This is described further in Appendix F.

8.3 Sub-options for Didcot Science Bridge

8.3.1 For Didcot Science Bridge, three sub-options were assessed. These alignments were first identified in the Didcot Science Bridge Scoping Report produced by Atkins in 2014 and have since been refined further. The Scoping Report also included discussion of the engineering specifications of the bridge, including design and materials, but this has not been included below as it is beyond the scope of this OAR. Figure 8-2 below shows the indicative locations of the three sub-options assessed.

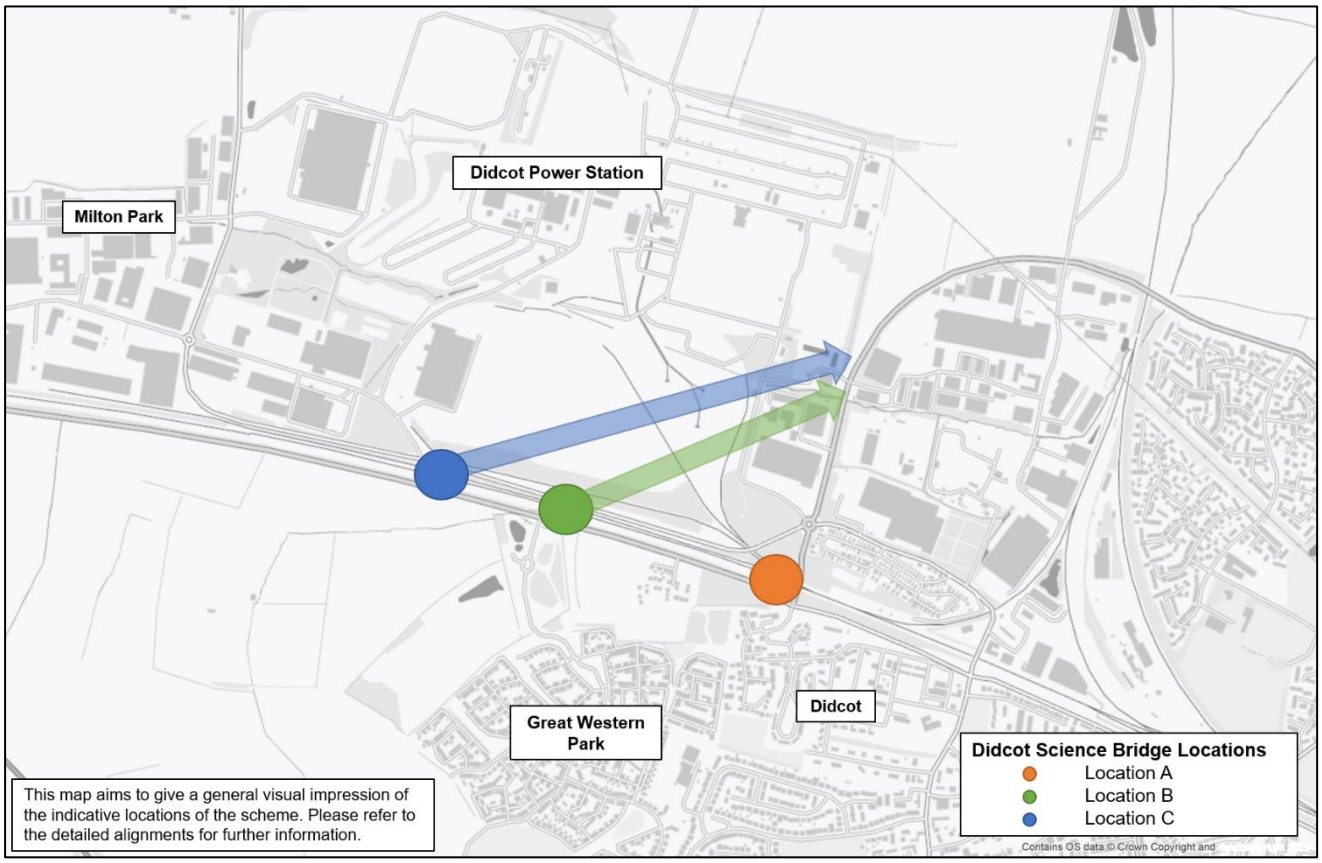

Figure 8-2 Didcot Science Bridge Sub-options

Source: Based on Didcot Science Bridge Scoping Report, Atkins (2014)

Sub-option 2.1: Alignment A (next to Manor Bridge)

8.3.2 This sub-option provides another bridge parallel to the existing Manor Bridge over the GWML. This would facilitate a dual carriageway with the south-bound carriageway located on the existing bridge and the north bound carriageway on the new bridge. This alignment will require modification to the existing roundabout junctions both north and south of the bridge to accommodate the dual carriageway The following benefits and challenges were identified as part of the 2018 Public Consultation on the Access to Science Vale schemes.

8.3.3 The benefits and challenges associated with this sub-option are shown in Table 8-6.

Table 8-6 Sub-option 2.1: Benefits and Challenges

Benefits	Challenges
• Introduces improved pedestrian and cycle access across at this location • Provides additional road capacity	• Expensive due to additional dualling and rail crossing • Does not help reduce congestion at GWP • Would require the demolition of properties • Difficult to deliver in engineering terms • Additional dualling would be required - causing further delay when constructing

Sub-option 2.3: Alignment B

8.3.4 Alignment B is located half-way between the existing A4130 Manor Bridge and the western end of the decommissioned Didcot A power station, at the Great Western Park entrance. The bridge would need to span the GWML, A4130, Milton Road and the railway lines within the power station boundary. The following benefits and challenges were identified as part of the 2018 Public Consultation on the Access to Science Vale schemes.

8.3.5 The benefits and challenges associated with this sub-option are shown in Table 8-7.

Table 8-7 Sub-option 2.3: Benefits and Challenges

Benefits	Challenges
• Introduces improved pedestrian and cycle access across the bridge	• Expensive due to rail and road crossing required • Southern end of bridge ties into Great Western Park Junction, but there is not enough space to achieve this alignment. • Would reduce the developable space of Didcot A development – potentially making it unviable

Sub-option 2.4: Alignment C

8.3.6 This sub-option involves an alignment located at the western extent of the decommissioned Didcot A power station. In this alignment the road travels south before curving north for the bridge over the railway. The alignment then curves eastwards to join the Northern Perimeter Road just north of the Purchas Road Roundabout. The following benefits and challenges were identified as part of the 2018 Public Consultation on the Access to Science Vale schemes.

8.3.7 The benefits and challenges associated with this sub-option are shown in Table 8-8.

Table 8-8 Sub-option 2.4: Benefits and Challenges

Benefits	Challenges
• Significant road widening on the bridge • Reduction in congestion within the town centre and Station Road • Opportunity for improved pedestrian and cycle infrastructure • Links housing directly to employment • Can predominantly be built off-line (away from the current road network) – reducing impact on current road network	• Expensive due to rail and road crossing required

Summary – Didcot Science Bridge

8.3.8 After considerations of the benefits and issues for each of the Didcot Science Bridge sub-options it has been determined that **sub-option 2.4** (Alignment C) is the best performing as it can be built off-line and links housing directly to employment. Therefore, this is taken forward as the preferred option. This sub-option will then go through further refinements to the design to ensure it meets the scheme objectives as

best as possible. Transport modelling has been undertaken for this sub-option, identifying the impact on the local road network with and without the scheme. This is described further in Appendix F.

8.4 Sub-options for Didcot to Culham River Crossing

8.4.1 For the Didcot to Culham River Crossing, six sub-options were assessed. These are all alternative alignments for the scheme. It should be noted that the Didcot to Culham River Crossing scheme has been subject to substantially more optioneering than the other options brought forward as the site is less spatially constrained and many different alignments are able to be investigated at the early design stage. However, there are also a number of environmental and engineering constraints which are unique to the Didcot to Culham River Crossing, and these need to be taken into consideration as part of design.

8.4.2 It should be noted that sub-options 1 – 5 were initially identified in the Didcot to Culham New Road and Thames Crossing: Optioneering and Proof of Concept (2016). Since then, the design of the options was developed further in Extended Feasibility Appraisal Work undertaken by Glanville in June and July 2018, which was then peer-reviewed by Waterman in December 2018[63]. As this work, and subsequent review, focussed mainly on the engineering specifications of the options, it has not been included below as this is beyond the scope of this OAR.

8.4.3 Figure 8-3 below shows the indicative alignments of the six sub-options assessed.

[63] Waterman (December 2018) also reviewed a Structures Feasibility Report produced by GHD (April 2018), a Flood Study Report produced by Brookbanks (May 2018), an Ecological Desktop Study produced by Baker (June 2018), Extended Feasibility Appraisal Report for Built Heritage produced by Montagu Evans (May 2018), an Extended Feasibility Landscape and Visual Appraisal Report produced by Define (June 2018) and an Archaeological Desk-based Assessments produced by Orion (April 2018).

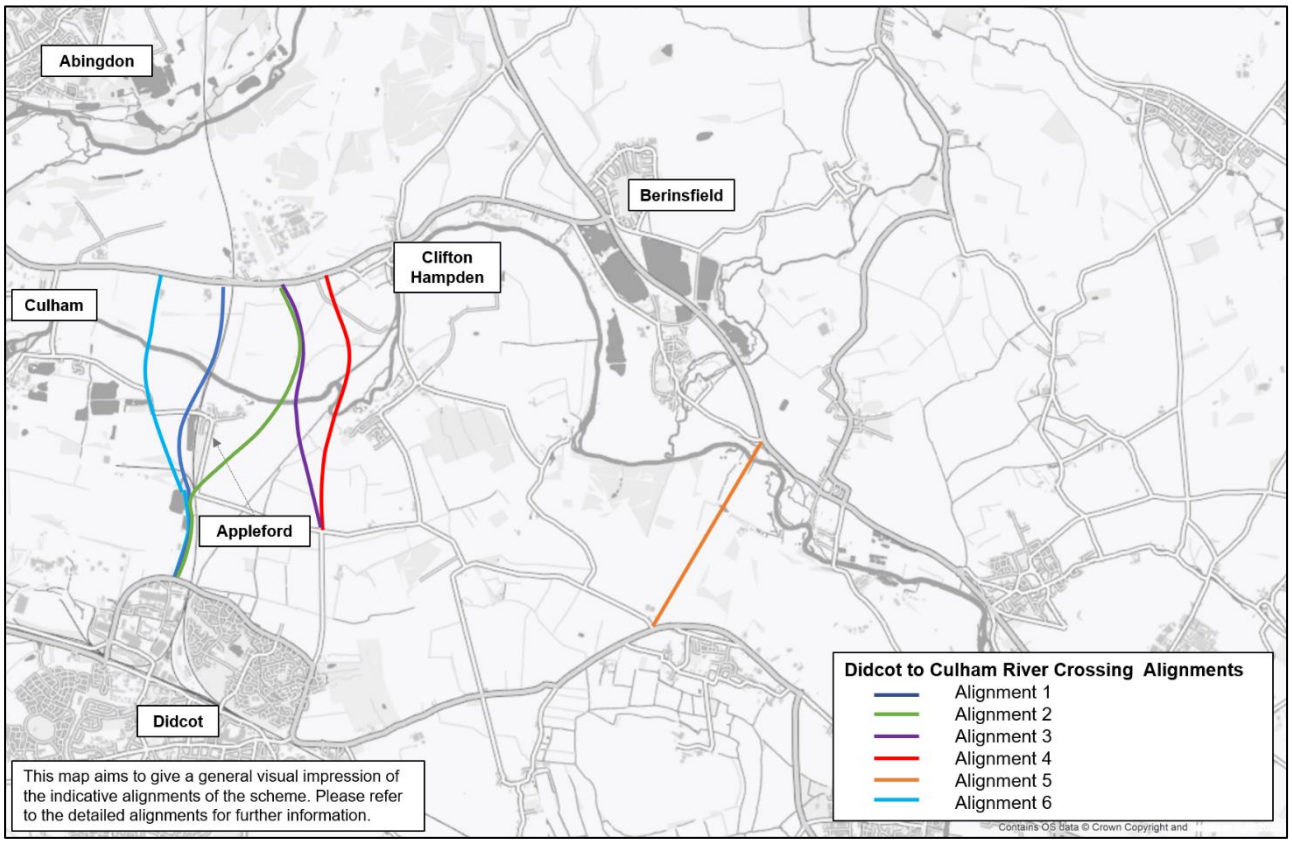

Figure 8-3 Didcot to Culham River Crossing Sub-options

Sub-option 3.1: Option 1

8.4.4 This sub-option is the most westerly option and is the only option west of the railway. It utilises a small stretch of the existing A415 to connect to the Clifton Hampden Bypass scheme before heading south from the A415 via a proposed roundabout. The sub-option crosses the flood plain and the River Thames on a new bridge before meeting the B4016 to the west of Appleford via another proposed roundabout. The alignment continues south passing over the Appleford Sidings rail tracks on a new bridge before negotiating its way between existing ponds and the railway to ultimately join the A4130 via an existing roundabout. This route is adjacent to the railway line, and travels through historic mineral extraction and landfill sites for a large section.

8.4.5 The benefits and challenges associated with this sub-option are shown in Table 8-9. This sub-option is shown in Figure 8-3 (identified as Alignment 1).

Table 8-9 Sub-option 3.1: Benefits and Challenges

Benefits	Challenges
• Provides additional road capacity to alleviate existing congestion issues and provides the required strategic connections needed. • Directly links employment sites at Culham and Enterprise Zones in Didcot. • Likely to attract vehicles away from Culham, Long Wittenham, Sutton Courtenay and Clifton Hampden, re-routing existing trips to Didcot, Abingdon, and the Eastern-Arc. • Limited noise impact due to proximity to railway line, and positive impact on noise reduction in Long Wittenham as traffic is diverted away from driving through the village. • Limited visual impact as this follows the line of the existing railway. • The shortest of the Didcot alignments. • Could directly serve future housing site to the north of the A415.	• Possible impact on the setting of a Scheduled Ancient Monument to north of the River Thames as it passes in close proximity of a Scheduled Ancient Monument. This is likely to lead to strong objection from the local community and English Heritage. • Partly in Green Belt. • Land take required. • Passes close to the village of Appleford. • The site of the historic landfill to the west of Appleford has an access track which surrounds the perimeter which the proposed option severs. It will need to be determined if the track needs to be reconnected once the scheme has been constructed. • Impacts upon several existing public rights of way. • Ponds within 500m of the alignment, and crosses suitable terrestrial habitat for Great Crested Newts. • Potential planning constraints with respect to mineral extraction and landfill restoration. Appleford Sidings is safeguarded as a permanent aggregate depot which could pose planning issues. • Noise impact on some Appleford properties.

Sub-option 3.2: Option 2

8.4.6 From the north this sub-option ties directly into the proposed roundabout of Clifton Hampden Bypass and Culham Science Centre. The alignment heads south from the A415 crossing the flood plain and River Thames on a new bridge. After the river crossing the alignment passes directly through a Scheduled Ancient Monument as it passes the eastern extent of Appleford. The alignment continues to head south-west before crossing the B4016 and railway on a new bridge where it then heads south to the west of the railway and ties into the A4130 via an existing roundabout.

8.4.7 The benefits and challenges associated with this sub-option are shown in Table 8-10. This sub-option is shown i in Figure 8-3 above (identified as Alignment 2).

Table 8-10 Sub-option 3.2: Benefits and Challenges

Benefits	Challenges
• Provides additional road capacity to alleviate existing congestion issues and provides the required strategic connections needed. • Provides the most direct link between Didcot and Culham Science Centre/Eastern Arc. • Provides better route continuity than other options, facilitating strategic movements to/from the Didcot and Culham Science Centre. • Positive impact on noise reduction in local villages as through traffic is diverted away.	• Directly passes through a Scheduled Ancient Monument to the south of the River Thames. This is likely to lead to strong objection from the local community and English Heritage. • Passes close to the village of Appleford. • Potential tie-in issues at the northern end with Culham Science Centre and Clifton Hampden bypass (may require significant land). • This option impacts on several agricultural plots and their associated access tracks. Further consideration will have to be given as how to best provide alternative arrangements. • Impacts upon existing public rights of way (one footpath and two bridleways). • Ponds within 500m of the alignment, and crosses suitable terrestrial habitat for Great Crested Newts. • Noise impact on some Appleford properties.

Sub-option 3.3: Option 3

8.4.8 From the north this sub-option ties directly into the proposed roundabout of Clifton Hampden Bypass at Culham Science Centre. The alignment heads south from the A415 crossing the flood plain and River Thames on a structure. After the river crossing the alignment passes but does not directly affect a Scheduled Ancient Monument. The alignment continues to head south-east before meeting the B4016 where a proposed roundabout will be provided. The alignment continues south on the line of the existing B4016 and joins the proposed roundabout of Didcot Northern Perimeter Road.

8.4.9 The benefits and challenges associated with this sub-option are shown in Table 8-11. This sub-option is shown in Figure 8-3 above (identified as Alignment 3).

Table 8-11 Sub-option 3.3: Benefits and Challenges

Benefits	Challenges
• Passes but does not directly affect any Scheduled Ancient Monuments. • More likely to be accepted as equidistant between Appleford and Long Wittenham. • Limited noise impact, and positive impact on noise reduction in local villages as through traffic is diverted away. • Limited impact on surrounding ecology. • Provides additional road capacity to alleviate existing congestion issues and provides the required strategic connections needed.	• Potential tie-in issues at the northern end with Culham Science Centre and Clifton Hampden bypass (may require significant land). • Partly in Green Belt. • Requires widening of the B4016, Lady Grove. • This option impacts on several agricultural plots and their associated access tracks. Further consideration will have to be given as how to best provide alternative arrangements. • Impacts upon existing public rights of way (two footpaths and two bridle paths). • Alignment is near to Little Wittenham Wood SSSI/SAC which is designated for its Great Crested Newt population.

Sub-option 3.4: Option 4

8.4.10 From the north sub-option 3.4 it heads south from the A415 crossing the flood plain and the River Thames twice (via two new bridges) before passing the western fringe of Long Wittenham before meeting the B4016 via a proposed roundabout. The alignment continues south on the line of the existing B4016 where it ultimately interfaces with the proposed Didcot Northern Perimeter Road.

8.4.11 The benefits and challenges associated with this sub-option are shown in Table 8-12. This sub-option is shown in Figure 8-3 above (identified as Alignment 4).

Table 8-12 Sub-option 3.4: Benefits and Challenges

Benefits	Challenges
• Limited impact on surrounding ecology. • Provides additional road capacity to alleviate existing congestion issues and provides the required strategic connections needed. • Positive impact on noise reduction in local villages as through traffic is diverted away.	• Direct impact on Long Wittenham Conservation Area. • Partly in Green Belt. • Requires widening of the B4016, Lady Grove. • This option impacts upon several agricultural plots and their associated access tracks north and south of the river Thames. Further consideration will have to be given as how to best provide alternative arrangements. • Impacts upon existing public rights of way (four footpaths and two bridle paths). • Less likely than some of the other options to reduce traffic at Clifton Hampden.

Sub-option 3.5: Option 5

8.4.12 Sub-option 3.5 is the most easterly of all the sub-options and links the A4130 and the A4074. From the A4074 the option heads south and crosses the flood plain and the River Thames on a new bridge. After crossing the river, the option continues south until meeting the existing A4130. This option is dependent on significant lengths of the existing A4130 and A4074 to connect the desired origin/destination.

8.4.13 The benefits and challenges associated with this sub-option are shown in Table 8-13. This sub-option is shown in Figure 8-3 above (identified as Alignment 5).

Table 8-13 Sub-option 3.5: Benefits and Challenges

Benefits	Challenges
• Lowest costs as shortest length of new road. • Fewer construction impacts as this is the shortest of all options. • Smallest risk profile of all options. • Provides additional road capacity to alleviate existing congestion issues and provides the required strategic connections needed.	• Doesn't provide enough additional road capacity to support proposed growth. • Not an attractive alternative – too far for vehicles to divert. • Partly in Green Belt. • Does not provide any access to Culham Science Centre or Milton Park. • Visual intrusion of the Thames Valley for residential properties in Brightwell-cum-Sotwell and Shillingford. • Within an Area of Outstanding Natural beauty and has a significant impact on the Thames Valley Landscape. • This sub-option has both Highlands Farm and North Farm within close proximity of the proposed alignment. Any proposal in the area will need to consider how the land which is not purchased as part of the scheme will be farmed and accessed. • Impacts upon existing public rights of way (one footpath and one bridle path). • Potential impact on a Principal Aquifer. • Does not provide opportunity for convenient and direct walking and cycling routes between housing and major employment areas.

Sub-option 3.6: New Western Alignment

8.4.14 This sub-option is based on the alignment of sub-option 3.1, which was the initial preferred option from the earlier optioneering[64]. This design was amended following stakeholder engagement, traffic modelling and archaeological assessments. During the November 2018 public consultation, OCC received comments from Appleford residents that the alignment was too close to the village and should be moved westwards.

8.4.15 Updated traffic modelling showed that increased separation between the proposed Abingdon roundabout and proposed Clifton Hampden roundabout, operated better in future years. Historic England preferred a more western alignment as it was further from the 'Settlement site N of Thames' Scheduled Ancient Monument.

8.4.16 Additionally, the positioning of the proposed Sutton Courtenay roundabout has been moved offline from the B4016, so that the current road surface could be utilised for the proposed pedestrian and cycle facilities. Additionally, building a roundabout offline would reduce the need for traffic management on the road creating a lower impact on local drivers. It should be noted that originally, when moving the alignment further west it was first attempted to omit a roundabout in the centre of the scheme, as shown in Figure 8-4. However, traffic modelling showed that a roundabout is required

[64] Didcot to Culham New Road and Thames Crossing: Optioneering and Proof of Concept (2016)

on the Sutton Courtenay junction. In addition, the turning into Appleford becomes a ghost right junction rather than a roundabout.

8.4.17 It should be noted only the northern section of the alignment has been altered, as shown in Figure 8-4. The overall alignment is shown in Figure 8-3 above (identified as Alignment 6).

8.4.18 The benefits and challenges associated with this sub-option are shown in Table 8-14.

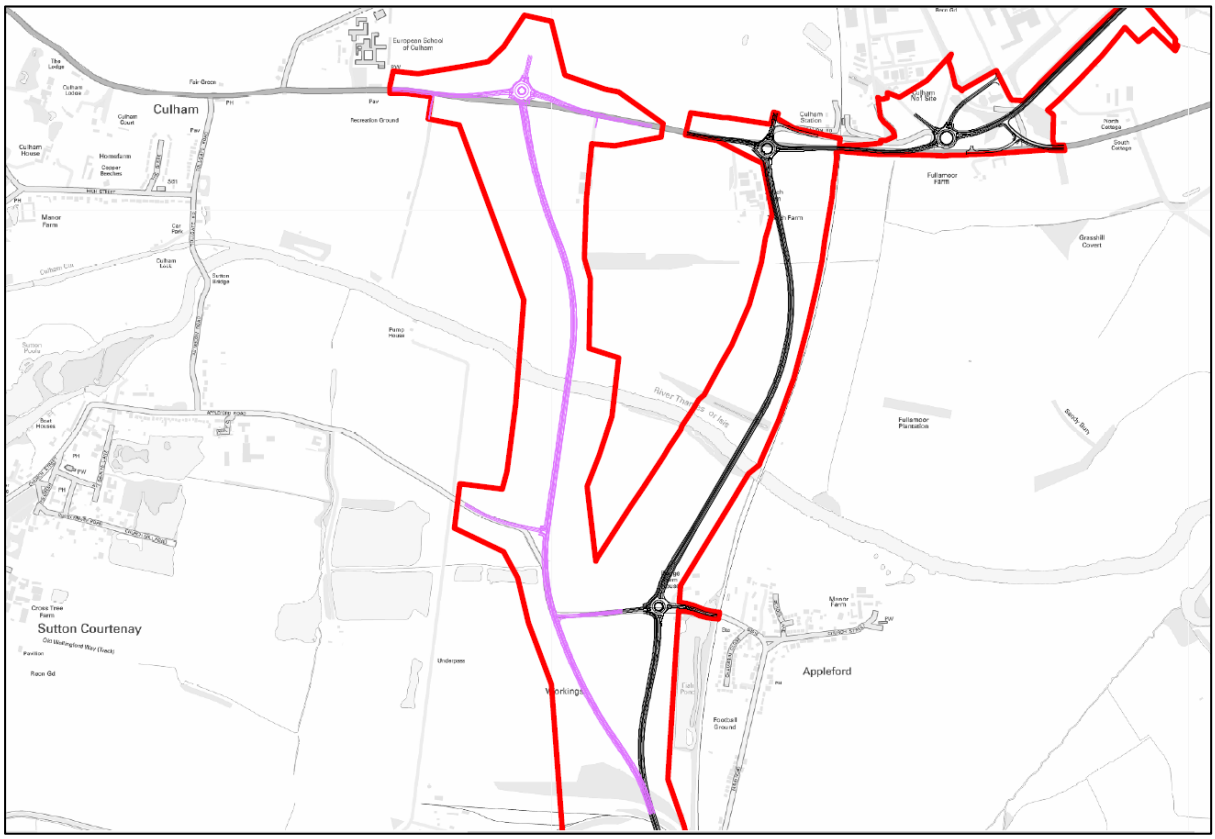

Figure 8-4 The once preferred option (black) and the new western alignment (pink)

Table 8-14 Sub-option 3.6: Benefits and Challenges

Benefits	Challenges
• Compared to sub-option 3.1, the alignment moved further away from the residential properties located in Appleford and at Zouch Farm (located between the River Thames and the A415), potential reducing noise and air quality impacts. • Reduces the potential for unknown archaeological impacts of the Scheme, as quarrying and landfill activities will have sterilised the land in terms of archaeological finds. • Avoiding potential for impacts on known archaeological monuments located close to the once preferred alignment, some of which are demonstrably equivalent in significance to a 'Scheduled Monument' and in-line with the NPPF, they would require equivalent protection. • Reduced construction waste material due to moving of Sutton Courtenay roundabout. • Operates better in traffic modelling due to greater distance between northern roundabout and Clifton Hampden Bypass roundabout. • Moving the central roundabout offline reduces the traffic management required and therefore reduces disruption on local drivers during construction.	• Slight increase agricultural land take. • This option will be partially within Flood Zone 2, which poses a key environmental concern with regards to its construction. • Requires building over Hanson restoration area. • Noise impact on some Appleford properties, although adjacent to existing transport corridor (rail line).

Summary – Didcot to Culham River Crossing

8.4.19 After consideration of the benefits and issues for each of the Didcot to Culham River Crossing sub-options it has been determined that **sub-option 3.6** (New Western Alignment) is the best performing as this minimises the environmental impacts of the scheme, avoids areas of archaeological importance and is more likely to be cost-effective. Therefore, this is taken forward as the preferred option. This sub-option will then go through further refinements to the design to ensure it meets the scheme objectives as best as possible. Transport modelling has been undertaken for this sub-option, identifying the impact on the local road network with and without the scheme. This is described further in Appendix F.

8.5 Sub-options for Clifton Hampden Bypass

8.5.1 For the Didcot to Culham River Crossing, four sub-options were assessed. Figure 8-5 below shows the indicative alignments of the four sub-options assessed.

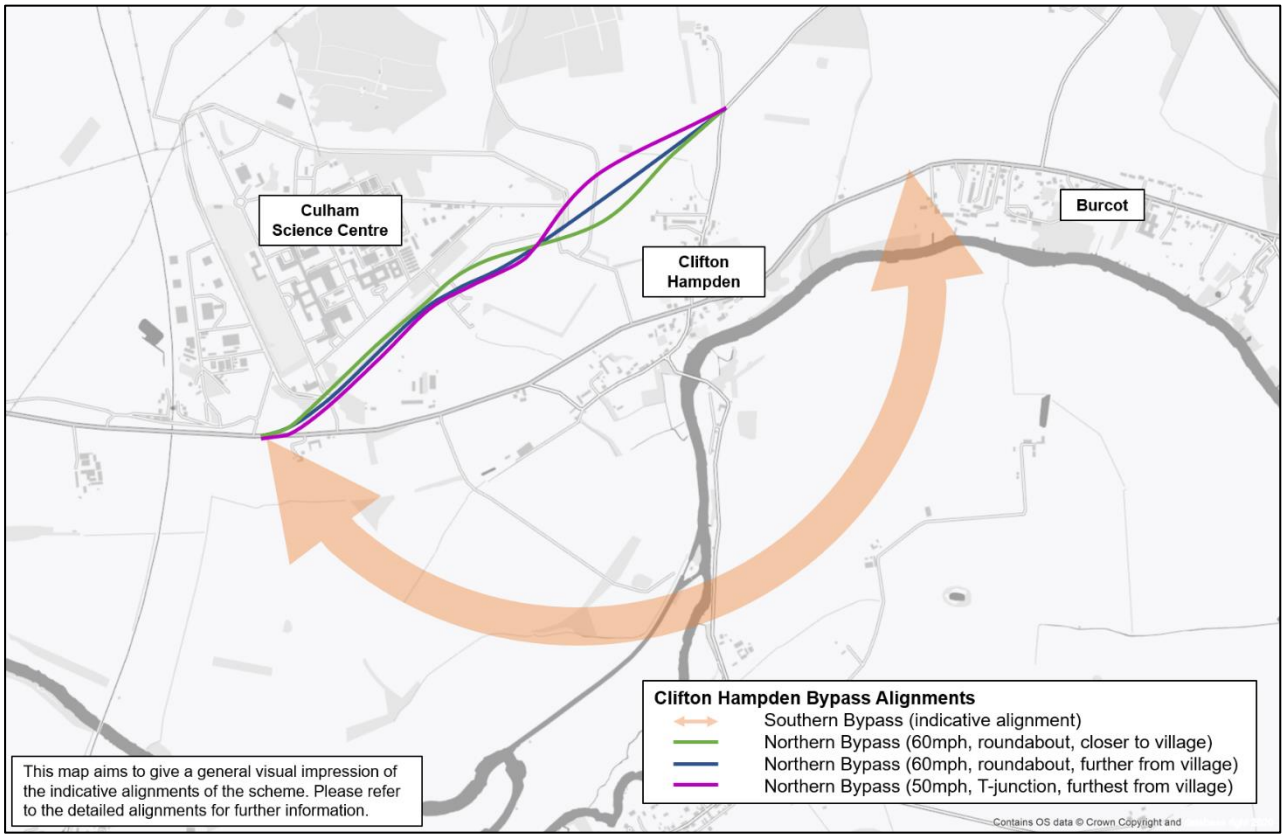

Figure 8-5 Clifton Hampden Bypass Sub-options

Sub-option 4.3: Southern Bypass

8.5.2 This sub-option provides a bypass to the south of Clifton Hampden. As this proposal has not been extensively investigated, the exact alignment has not been determined.

8.5.3 The benefits and challenges associated with this sub-option are shown in Table 8-15.

Table 8-15 Sub-option 4.3: Benefits and Challenges

Benefits	Challenges
• Reduction in some traffic through Clifton. Hampden village (but not east-west A-road traffic). • Opportunity for improved pedestrian and cycle infrastructure in the village.	• Expensive due to river crossing requirement. • Not optimal Widening due to south flow not being the main flow. • Increases traffic through Long Wittenham • Potentially within Green Belt. • Additional noise for residents near the bypass route. • Increased length of highway required compared to northern bypass options leads to a worse environmental impact. • Presence of the Clifton Hampden Meadows Local Wildlife Site and Clifton Hampden Wood LWS. • Proximity to the Clifton Hampden Conservation Area – scheme may possibly extend through southern tip. • Closer proximity to the boundary of the North Wessex Downs Area of Outstanding Natural Beauty. • Complicated construction due to the requirement for several bridges over the River Thames. • Numerous listed buildings in the proximity. • Proximity to Scheduled Monuments – 'Settlement site at Northfield Farm' and 'Round barrow cemetery at Fullamoor Plantation'. • Extensive areas of Flood Zone 2 and 3. • Additional river crossings, which would be required to demonstrate no effect on upstream and downstream flood risk potential. • Likely additional land take would be required given the available routes – therefore, potential for additional Best and Most Versatile land to be sterilised. • Would have implications on the optimum alignment for Option 3, Didcot to Culham River Crossing.

Sub-option 4.4: Northern Bypass – alignment closer to Clifton Hampden village

8.5.4 This sub-option provides northern bypass of Clifton Hampden from Culham Science Centre on the A415 to the B4015 (Oxford Road). This alignment follows the edge of Culham Science Centre, but the alignment is closer to Clifton Hampden village. This road has a 60mph speed limit. This was the initial alignment of the northern bypass.

8.5.5 The benefits and challenges associated with this sub-option are shown in Table 8-16.

Table 8-16 Sub-option 4.4: Benefits and Challenges

Benefits	Challenges
• Reduction in traffic through Clifton Hampden village including both east-west and north-south traffic, including slow moving queues of idling vehicles. Provides noise and air quality benefits through the village. • Links to proposed Didcot to Culham River Crossing scheme to allow direct access to housing and employment. • Helps facilitate planned growth in the area • Opportunity for improved pedestrian and cycle infrastructure.	• Increased noise for Clifton Hampden residents due to higher speed limit (60mph). • Impacts upon a Category A Oak Tree. • Increased visual impacts from the scheme in Clifton Hampden due to proximity to village • Built within Green Belt. • Requires short PROW diversion as bypass severs existing route. • Does not meet DMRB requirements for a 60mph road.

Sub-option 4.5: Northern Bypass – roundabout at eastern end

8.5.6 This sub-option provides northern bypass of Clifton Hampden from Culham Science Centre on the A415 to the B4015 (Oxford Road). This alignment follows the edge of Culham Science Centre. For this option, a roundabout is provided at the eastern extent of the scheme where the bypass will meet the B4015.

8.5.7 The benefits and challenges associated with this sub-option are shown in Table 8-17.

Table 8-17 Sub-option 4.5: Benefits and Challenges

Benefits	Challenges
• Reduction in traffic through Clifton Hampden village including both east-west and north-south traffic, including slow moving queues of idling vehicles. Provides noise and air quality benefits through the village. • Links to proposed Didcot to Culham River Crossing scheme to allow direct access to housing and employment. • Helps facilitate planned growth in the area. • Opportunity for improved pedestrian and cycle infrastructure. • Alignment shifted to avoid large and significant tree near B4015 (Category A mature oak tree). • Alignment shifted north by lowering speed limit to 50mph allows increased distance between scheme and residences, reducing any visual and noise impacts.	• Substantial land required. • Some cost due to land take. • Built within Green Belt. • Potential for noise impact on some residences if un-mitigated, however there would be noise reductions for many residences through centre of Clifton Hampden. • Roundabout does not discourage the use of the route through the village. • Requires short PROW diversion as bypass severs existing route.

Sub-option 4.6: Northern Bypass – T-junction at eastern end

8.5.8 This sub-option provides northern bypass of Clifton Hampden from Culham Science Centre on the A415 to the B4015 (Oxford Road). This alignment follows the edge of Culham Science Centre. For this option, a T-junction is provided at the eastern extent of the scheme where the bypass meets the B4015, and the B4015 is the minority arm. In addition, this alignment has been shifted westwards to avoid a Category A Oak Tree

8.5.9 The benefits and challenges associated with this sub-option are shown in Table 8-18.

Table 8-18 Sub-option 4.6: Benefits and Challenges

Benefits	Challenges
• Reduction in traffic through Clifton Hampden village including both east-west and north-south traffic, including slow moving queues of idling vehicles. Provides noise and air quality benefits through the village. • Links to proposed Didcot to Culham River Crossing scheme to allow direct access to housing and employment. • Helps facilitate planned growth in the area. • Opportunity for improved pedestrian and cycle infrastructure. • Alignment shifted to avoid large and significant tree near B4015 (Category A mature oak tree).). • Alignment shifted north by lowering speed limit to 50mph allows increased distance between scheme and residences, reducing any visual and noise impacts. • Reduces land take compared to sub-option 4.4 due to T-junction. • Discourages use of the village as a through route as the road into the village will be the minor arm of the T-junction. • Reduced cost compared to sub-option 4.4 as less land take required for T-junction as well as less lighting needed. • Improved air quality in Clifton Hampden village. • Maintains a distinct feature on the approach to and exit from Clifton Hampden, retaining significant landscape and amenity value to the surrounding area. • No encroachment on the tree's Root Protection Area.	• Built within Green Belt. • Additional noise for residents near the bypass route. • Requires short PROW diversion as bypass severs existing route.

Summary – Clifton Hampden Bypass

8.5.10 After consideration of the benefits and issues for each of the Clifton Hampden Bypass sub-options it has been determined that **sub-option 4.6** (Northern Bypass – T-junction at eastern end) is the best performing as it reduces land take and cost, protects a Category A Oak Tree and discourages the use of the village as a through-route. Therefore, this is taken forward as the preferred option. This sub-option will then go through further refinements to the design to ensure it meets the scheme objectives as best as possible. Transport modelling has been undertaken for this sub-option, identifying the impact on the local road network with and without the scheme. This is described further in Appendix F.

9. Summary

9.1.1 This OAR has given an overview of the optioneering and appraisal process undertaken to identify transport interventions to support future growth in Didcot and Science Vale. This has included a review of the policy context, an overview of the current and future context and the development of scheme objectives.

9.1.2 The optioneering process, broken down into four phases, has been detailed and included a high level sift (Phase 1), a DfT EAST-based assessment aligned with HM Treasury guidance on business case criteria (Phase 2), and identified and assessment of design, size, scale and location alternatives (sub-options) to the preferred options (Phases 3 and 4).

9.1.3 This OAR has been informed heavily by assessment work undertaken previously by OCC, including two previous OARs, traffic modelling and assessment of environmental constraints. No newly commissioned surveys or transport data has been compiled.

9.1.4 Information available for options is variable, and therefore reliance has been placed upon qualitative evidence, professional judgement and local knowledge informed by OCC officers engaged during the assessment of options. The assessment has been undertaken based on information and guidance available at the time of writing (January to April 2021).

9.1.5 Phase 1 took a significant step back to consider a wide range of different modal and spatial options. Many of the options scored relatively poorly against objectives (which had been informed by evidence gathering and aligned with local policies). The best performing options were as follows:

- Option 1: A4130 Widening;
- Option 2: Didcot Science Bridge;
- Option 3: Didcot to Culham River Crossing; and
- Option 4: Clifton Hampden Bypass.
- Option 8: Improved stations at Didcot and Culham, plus a new station at Grove

9.1.6 Other schemes performing less well, including walking, cycling and public transport schemes, were not taken forward past Phase 1. However, it is important to recognise that whilst this assessment dismissed them, they are likely to have merit in other contexts and should be considered in conjunction with the preferred options.

9.1.7 Phase 2 assessed the five best performing options in more detail using the DfT EAST framework, against the Strategic, Economic, Managerial, Commercial and Financial business cases. This assessment identified that Option 8 was not a suitable fit to support the development planned in Didcot and Science Vale but noted that this option may still have value as part of a separate scheme. Therefore, the four remaining schemes were identified to be broadly well-matched in performance against the diverse criteria and therefore it was determined that there was clear justification that these four should be developed further.

9.1.8 Phases 3 and 4 considered the variants within each scheme and assessed these in terms of the overall benefits and challenges they are likely to generate. Again, it is important to highlight here that the list of sub-options has drawn heavily from the previous OARs and from more recent optioneering. The level of evidence available for each sub-option, in the form of technical drawings and environmental assessments, varies considerably and therefore a different level of confidence can be attached to the assessment of each option. However, the options that have less evidence made available to AECOM have generally performed more poorly and there appears to be clear rationale for certain options having been developed in more detail.

9.1.9 Overall, the OAR has identified a preferred option for improvements to the transport network to support development in Didcot and Science Vale. These are as follows:

- **A4130 Widening**: Sub-option 1.5 – Dualling – retain existing drainage ditch and associated vegetation;
- **Didcot Science Bridge**: Sub-option 2.4 – Alignment C;
- **Didcot to Culham River Crossing**: Sub-option 3.6 – New Western Alignment; and
- **Clifton Hampden Bypass**: Sub-option 4.6 – Northern Bypass – T-junction at eastern end.

Appendix A List of Referred Documents

List of Referred Documents

Document name	Last updated	Project	Author
Access to Science Vale Option Assessment Report Part 1	2018	Didcot Garden Town HIF1	OCC
Housing Infrastructure Fund 1: Outline Business Case - TAG Preliminary Environmental Impact Appraisal Report	2018	Didcot Garden Town HIF1	OCC
Didcot Microsimulation Model: Didcot HIF Option Appraisal	2019	Didcot Garden Town HIF1	Systra
Business Case - HIF/FF/000015/BC/01 - Access to Didcot Garden Town	2019	Didcot Garden Town HIF1	OCC
Access to Science Vale, Options Assessment Report (Part 2)	2019	Didcot Garden Town HIF1	OCC
Didcot Garden Town Delivery Plan	2017	Didcot Garden Town	South Oxfordshire District Council
Oxfordshire Housing and Growth Deal	2017	Oxfordshire Housing and Growth Deal	Oxfordshire Growth Board
Oxfordshire Infrastructure Strategy (OXIS)	2017	Oxfordshire Infrastructure Strategy (OXIS)	Oxfordshire Growth Board
Oxfordshire Investment Plan	2020	Oxfordshire Investment Plan	OxLEP
Connecting Oxfordshire Local Transport Plan 4 (LTP4)	2016	Connecting Oxfordshire Local Transport Plan 4 (LTP4)	OCC
South Oxfordshire Local Plan	2020	South Oxfordshire Local Plan (2019 – 2035)	South Oxfordshire District Council
Vale of White Horse Local Plan	2016	Vale of White Horse Local Plan (2016 – 2031)	Vale of White Horse District Council
Oxford Local Plan 2036	2019	Oxford Local Plan 2036	Oxford City Council
National Planning Policy Framework	2019	National Planning Policy Framework	Ministry of Housing, Communities and Local Government
Highways England Delivery Plan	2015	Delivery Plan	National Highways
Industrial Strategy White Paper	2017	Building a Britain fit for the future	HM Government
Housing White Paper	2017	Fixing our broken housing market	Ministry of Housing, Communities and Local Government
Transport Investment Strategy	2017	Transport Investment Strategy	Department for Transport
Strategic Economic Plan Oxfordshire	2016	Strategic Economic Plan	OxLEP
Bus and Rapid Transit Strategy	2016	Bus and Rapid Transit Strategy	OCC

Document name	Last updated	Project	Author
Science Vale Transport Strategy	2016	Science Vale Transport Strategy	OCC
Active and Healthy Travel Strategy	2016	Active and Healthy Travel Strategy	OCC
Land at Valley Park Transport Assessment	2016	Valley Park Development	Brookbanks
Land at North East Didcot Transport Assessment	2015	North East Didcot Development	RPS
Gear Change: a bold vision for cycling and walking	2020	Cycling and walking plan for England	Department for Transport
National Infrastructure Strategy	2020	National Infrastructure Strategy	HM Treasury
A Better Deal for Bus Users	2020	A Better Deal for Bus Users	Department for Transport
Green Book Review	2020	Green Book Review	HM Treasury
Climate Change Guidance	2019	Climate Change Guidance	Ministry of Housing, Communities & Local Government
Western Route Study	2016	Western Route Study	National Rail
Clifton Hampden Neighbourhood Plan	WIP	Clifton Hampden Neighbourhood Plan	Clifton Hampden Parish Council
East Hagbourne Neighbourhood Plan	2019	East Hagbourne Neighbourhood Plan	East Hagbourne Parish Council
Sutton Courtenay Neighbourhood Plan	WIP	Sutton Courtenay Neighbourhood Plan	Sutton Courtenay Parish Council
Oxfordshire Strategic Housing Market Assessment	2014	Oxfordshire Strategic Housing Market Assessment	OCC
Didcot to Culham New Road and Thames Crossing: Optioneering and Proof of Concept	2016	Didcot Garden Town HIF1	Atkins
Housing Infrastructure Fund 1 Outline Business Case: Environmental Assessment Report	2018	Didcot Garden Town HIF1	Atkins
Housing Infrastructure Fund 1 Outline Business Case: WebTAG Preliminary Environmental Impact Appraisal Report	2018	Didcot Garden Town HIF1	Atkins
Early Assessment and Sifting Tool (EAST) Guidance	2017	Early Assessment and Sifting Tool	DfT
Transport Appraisal Process	2018	Transport Analysis Guidance	DfT
Evaluation of Transport Impacts Study to inform the Vale of White Horse District Council Local Plan 2031 : Part 1 Strategic Sites and Policies	2014	VoWHDC Local Plan	Atkins

Document name	Last updated	Project	Author
Vale of White Horse District Council Local Plan Part 2: Evaluation of Transport Impacts - Stage 1	2017	VoWHDC Local Plan	Atkins
South Oxfordshire District Council Local Plan Evaluation of Transport Impacts: Stage 1 - Development Scenarios	2017	SODC Local Plan	Atkins
Ten Point Plan for a Green Industrial Revolution	2020	HM Government	HM Government
Decarbonising Transport: Setting the Challenge	2020	DfT	DfT
Didcot Science Bridge Scoping Report	2014	Didcot Science Bridge	Atkins
Didcot to Culham Link Road, Thames Crossing and Clifton Hampden Bypass: Review of Extended Feasibility Appraisal Work	2018	Didcot to Culham River Crossing	Waterman
Alignment Drawings for Alignments 1 and 3	2018	Didcot to Culham River Crossing	Glanville
Structures Feasibility Report	2018	Didcot to Culham River Crossing	GHD
Flood Study Report	2018	Didcot to Culham River Crossing	Brookbanks
Ecological Desktop Study	2018	Didcot to Culham River Crossing	Baker
Extended Feasibility Appraisal report for Built Heritage	2018	Didcot to Culham River Crossing	Montagu Evans
Extended Feasibility Landscape and Visual Appraisal report	2018	Didcot to Culham River Crossing	Define
Archaeological Desk-based Assessments	2018	Didcot to Culham River Crossing	Orion

Appendix B Initial Long List of Options

Ref	Intervention	Description	Source
0	Do Minimum	This includes no additional physical interventions, aside from those that are already committed, being undertaken on the network across Science Vale. This includes all committed Local Plan developments	Access to Science Vale OAR Part 1; HIF Bid
1	A4130 Widening	A dual carriageway from a point approximately 250m east of A34 Milton Interchange at the junction with Milton Gate, eastwards for approximately 1.6km to the proposed eastern roundabouts connecting into the future development at Valley Park and the Didcot Science Bridge scheme. The road corridor will also include a 3m bi-directional segregated cycleway and a 2m footway on the southern side of the dual carriageway, as well as several formal crossing points.	Access to Science Vale OAR Part 1; HIF Bid
2	Didcot Science Bridge	A new north-south bridge from the proposed Didcot Science Bridge roundabout, over the GWML, the existing A4130 and Milton Road, into the former Didcot A Power Station site. The road bridge will be approximately 15m in width, including a single carriageway, a one-way cycleway, a 3m bi-directional segregated cycleway and a 2m footway. The link road will be a single carriageway, with 2m footways and 3m bi-directional cycleways on both sides of the road for the majority of its length.	Access to Science Vale OAR Part 1; HIF Bid
3	Didcot to Culham River Crossing	A new link road between the A4130 at the existing Collett roundabout junction (Didcot) and A415 at Culham. It includes two new bridges: one over the River Thames and one over the Hanson private railway sidings near Appleford level crossing. On the eastern side of the road, a grass verge, 4m bi-directional segregated cycleway and 2m footway are proposed.	Access to Science Vale OAR Part 1; HIF Bid
4	Clifton Hampden Bypass	A new single carriageway link between the B4015 Oxford Road, to the north of Clifton Hampden, and the A415 Abingdon Road to the west of the village. The new road will provide a single carriageway with adjacent hard strips, grass verges, a wide combined bi-directional pedestrian/cycle facility separated from the carriageway.	Access to Science Vale OAR Part 1
5	Enhanced bus network including bus lanes and bus priority signals	A comprehensive bus network across the entirety of Science Vale, including bus lanes, bus priority and a frequent and reliable service. This would be in co-operation with other services which operate across the area.	Access to Science Vale OAR Part 1
6	Park & Ride in vicinity of A34	Would serve both journeys into Science Vale and as a remote P&R for journeys to Oxford	Access to Science Vale OAR Part 1
7	Improved rail services from Didcot to Oxford and Reading	Double existing service frequency, including at smaller rural stations at Appleford, Culham and Radley. As the Didcot to Oxford line is already at capacity, this would require four-tracking this line	Access to Science Vale OAR Part 1

8	Improved stations at Didcot & Culham plus new station at Grove	Improved stations at Didcot & Culham plus new station at Grove, including improved links to Culham Station. This will include upgrading the path between Culham Rail Station and Culham Science Centre. Aim to provide a segregated path set back from the road for the use of pedestrians accessing Culham Science Centre from the train station. This would be future proofed for the Culham development coming forward.	Access to Science Vale OAR Part 1
9	Junction realignments and signalisation	Junction realignments and signalisation of key junction pinch points and hotspots across the local area.	Access to Science Vale OAR Part 1
10	Upgraded and co-ordinated traffic signal control	Upgraded, optimised and co-ordinated traffic signal control at existing signal-controlled junctions across Science Vale	Access to Science Vale OAR Part 1
11	Comprehensive cycle and walking networks across Science Vale	Comprehensive cycle and walking networks within Didcot and Science Vale, including cycle links to other parts of Science Vale, cycle priority in Didcot town centre, and completion of the SVCN Routes 5 and 8. SVCN Route 5 is a new cycle/pedestrian route from Didcot to Harwell Campus. This will follow the proposed SVCN Route 5 which mainly follows the B4493 out of Didcot through Harwell and down Winaway to Harwell Campus. SVCN Route 8 is a new cycle/pedestrian route from Didcot to Culham Science Centre, including a new shared-use bridge over the river. Furthermore, this option will include improved walking and cycling links to Culham train station.	Access to Science Vale OAR Part 1; SVCN Cycle Routes; New intervention
12	Science Vale Bus Rapid Transit including bus-only river crossing	Connecting Science Vale through a network of Bus Rapid Transit (BRT) routes, in order to improve existing bus routes and frequencies. Key corridors would be Didcot-Culham Science Centre-Oxford, Didcot-Harwell Campus. Didcot would be an interchange station at the centre of the routes. BRT would take the form of segregated bus-only lanes, with priority at junctions. This would include a new bus-only bridge over the River Thames near Culham Science Centre, with a shared use path alongside to encourage active travel.	New intervention
13	Science Vale Light Rail Link	Connecting Milton Park, Didcot, and Harwell Campus via a light rail link. Didcot Parkway would be the terminus with the route feeding in to direct train services from Didcot to Oxford (passengers will need to interchange). High frequency service to be provided, with the highest frequency reflecting working patterns. Also, can be timed to connect with services stopping at Culham if possible. Opportunity to use emerging technology as part of the network. This could also be operated by a tram.	New intervention

14	Demand Responsive Transport	This option would provide demand responsive service within Didcot and Science Vale, for example similar to or expanding on the offer available elsewhere (such as demand responsive taxi-buses). This could replace some existing fixed route bus services, and instead provide more flexible services across the area. The service would work by for example passengers inputting their journey into an app, the service would then match up the journey with others close by going in the same direction.	New intervention
15	Small scale bus improvements across Science Vale	Provision of small scale improvements to bus routes and facilities across Science Vale. This could include improved waiting facilities such as bus shelters and real time information boards. Improved marketing of bus services, and small tweaks to routes to ensure key origins and destinations are served potentially with increased frequencies at busy times. This can be undertaken in consultation with bus companies to understand what they require of the network.	New intervention
16	A34 Widening	This option requires the widening of the A34 in both directions for 13.5km from Milton Interchange to Hinksey Hill Interchange. As the existing A34 is dual carriageway, this would lead to providing a third lane in each direction. This option is suggested as an alternative to Option 3.	Didcot to Culham New Road and Thames Crossing: Optioneering and Proof of Concept (2016)

Appendix C Phase 1 Sift Results

#	Long List Options	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5	Objective 6	Objective 7	Objective 8	Affordability	Deliverability	Acceptability	Feasibility	Total Score	Comment
0	**Do Minimum**	-3	-3	-3	-3	-3	-2	-2	-2	2	2	-2	2	**-17**	The Do Minimum option does not address any of the issues identified across Science Vale. Furthermore, the option will not assist in anyway with unlocking the delivery of homes across Didcot Garden Town and Science Vale as no additional capacity will be provided making development unviable. Therefore, this option has identified five showstoppers with regard to the scheme objectives, for Objectives 1 - 5 which relate to unlocking housing and economic development. In addition, this option scores poorly for the remaining objectives as it has a poor fit and will not enable these objectives to be achieved. The option would be affordable, deliverable, and feasible as no additional interventions are required; however, this does not negate the showstoppers identified and may be perceived negatively if there are impacts from traffic growth which are not being managed.
1	**A4130 Widening**	2	2	2	2	2	2	1	0	2	1	2	2	**20**	This option will help deliver many of the scheme objectives such as those focussed on housing and employment growth. It has a slight positive impact on carbon emissions due to reduced congestions and queueing. There are also slight improvements in Air Quality in Milton as a result of the scheme, with reductions in NO_2. The presence of a segregated shared use path for pedestrians and cyclists alongside the A4130 provides a viable alternative to driving, especially for short trips from Didcot to Milton Park. This option is partially within Flood Zone 2, which can lead to negative environmental impacts. This option is expected to have high public support and is feasible. Third party land take is required to deliver the scheme. This option scores well for flexibility in the future to use the second lane from the dual carriageway as a bus lane, to facilitate more sustainable modes. Furthermore, the additional capacity provided will improve the resilience of the network within Didcot and enable better demand management of traffic. This option is affordable as HIF funding has been secured. This option scores positively for deliverability as designs have been produced and whilst this is dependent on the other HIF schemes and stakeholders, it is not as complex as other options.

2	**Didcot Science Bridge**	2	2	2	2	2	1	1	0	2	0	1	0	**15**	This option will help deliver many of the scheme objectives such as those focussed on housing and employment growth. As this option is partially within Flood Zone 2 it scores negatively. There is a very slight worsening of Air Quality in Didcot as a result of the Science Bridge. However, it is also recognised that provision of the bridge will reduce some journey lengths, congestion and queuing and therefore may produce fewer carbon emissions for certain movements. In addition, there is provision of pedestrian/cyclist facilities across the bridge. This option provides an additional carriageway link over the Great Western Mainline which partially future-proofs the local road network, however the location of the physical infrastructure is not flexible. This option is feasible, however the practicalities of engaging with Network Rail, and seeking necessary approvals, may pose some issues in relation to programme and deliverability. Furthermore, this option is constrained by development sites either side of the Bridge, and this leads to the option scoring neutral for feasibility. This option is affordable as HIF funding has been secured. This option scores neutral for deliverability as whilst designs have been produced, this is a complex scheme which is dependent on the other HIF schemes and stakeholders. For example, this bridge crosses the Great Western Mainline and will require engagement with Network Rail and other stakeholders. Given the above Further work is required to determine deliverability.
3	**Didcot to Culham River Crossing**	2	2	2	2	2	1	-1	0	2	0	1	1	**16**	This option will help deliver many of the scheme objectives such as those focussed on housing and employment growth. This option is partially within Flood Zone 2. However, it is also recognised that provision of the crossing will reduce some journey lengths and associated delays which will lead to fewer carbon emissions. In addition, this option will reduce queuing within the villages close to the scheme (such as Culham and Sutton Courtenay) and will contribute to reducing noise in these historic villages. The scheme leads to improved Air Quality (NO_2) in Long Wittenham, however there is expected to be a slight worsening in Air Quality in Appleford and Sutton Courtenay. There is also provision for pedestrian/cyclist facilities across the bridge and this option allows for existing river crossing bridges to be altered for sustainable modes in the future. Furthermore, the additional river crossing will provide improved resilience compared to the Do Minimum, where the current river crossings are sometimes closed due to flooding concerns. However, the location of the crossing is not flexible, which reduces the score of Objective 6 to 'Good fit'. Furthermore, the additional capacity provided will enable demand management of traffic across Science Vale, especially for the two existing river crossings. This option is expected to be feasible, although crossing the river is likely to pose engineering and environmental challenges. This option is affordable as HIF funding has been secured. This option scores neutral for deliverability because whilst designs have been produced, this is a complex scheme which is dependent on the other HIF schemes and stakeholders. For example, this option crosses the River Thames and will therefore require stakeholder agreement from the EA, Canal and River Trust amongst other environmental stakeholders. Further work is therefore required to determine deliverability.

4	**Clifton Hampden Bypass**	2	2	2	2	2	1	0	1	2	1	1	2	**18**	This option will help deliver many of the scheme objectives such as those focussed on housing and employment growth. This option will be partially within Flood Zone 2, which poses a key environmental concern with regards to its construction. This option significantly reduces current and future vehicle queues and associated delays through historic villages including past Schools, leading to a reduction in carbon emissions. In addition, this option will reduce queuing within the villages close to the scheme (such as Clifton Hampden and Burcot) and will contribute to significantly improving Air Quality and reducing noise in these historic villages. Furthermore, the additional road link will provide improved resilience compared to the Do Minimum. This option is very feasible and is likely to have significant public support. This option scores positively for provision of a flexible transport network as there is the opportunity to implement more sustainable modes along the bypass at a later point. This option is affordable as HIF funding has been secured. This option scores positively for deliverability as designs have been produced and whilst this is dependent on the other HIF schemes and stakeholders, it is not as complex as other options.
5	**Enhanced bus network including bus lanes and bus priority signals**	0	0	0	0	0	1	1	1	-2	-2	0	-2	**-3**	This option is unlikely to lead to the scale of change required for the development planned across Didcot and Science Vale. This option would require road capacity in order to ensure reliable journey times and coordinated marketing and promotional strategies would need to be put in place to increase the currently low passenger demand to the level required to support development across Science Vale. This option will be flexible and minimise pollution, however it is partially within Flood Zone 2 which is a key environmental concern. This option has very low affordability as the cost of a comprehensive bus network across Science Vale will be significant including both the physical infrastructure and provision of services. This option will be very complex to deliver and involves interdependencies with many other schemes to be viable. This option has very low feasibility due to the likely involving significant land take requirement and CPO. It is considered to have neutral acceptability as, on the one hand, previous discussions with bus operators have identified that the operators are not aiming for priority in the network but limiting the number of junctions along bus routes. However, on the other hand, the provision of an extensive bus network is likely to be accepted by the public, but there will likely be objections to the scale of works required to enable this comprehensive network include reduction in road space available to general traffic or possibly the reduction in space for pedestrians and cyclists. In addition, bus gates were consulted upon elsewhere in the county (Oxford City) and these were not well received.
6	**Park & Ride in vicinity of A34**	-1	-1	-1	-1	-1	-2	0	0	1	-1	-2	-1	**-10**	This option is unlikely to lead to the scale of change required for the development planned across Didcot and Science Vale and will not provide suitable capacity to enable this dependent development. Therefore, it scores a low fit against these objectives. It could be dependent upon additional road capacity in order to ensure reliable journey times, therefore alone improvements to services may be unviable. This option will not be very flexible in unlocking commercial space at key sites, as it involves infrastructure at one specific location. Furthermore, this option may worsen the existing situation as it would increase the amount of traffic using the A4130 (to access the Park and Ride), exacerbating existing congestion issues. This option scores neutral for minimising the need to travel and promoting sustainable modes, as it requires travel to the park and ride, which induces additional traffic in the local area. This option is expected to be a lower cost option however there will be significant capital costs involved with developing the park and ride including purchasing land. This option will have very low acceptability as landowners may not support this proposal, and the public are likely to prefer other interventions which are more flexible. This option has low feasibility and deliverability as it will require significant land take on greenfield land, and the land it would occupy has been earmarked for future development.

7	**Improved rail services from Didcot to Oxford and Reading**	0	0	0	0	0	0	1	0	-3	-3	1	-3	**-7**	This option will provide improved accessibility to Culham Science Centre via the rail line and will therefore partially unlock both housing and employment development at Culham Science Centre. This option scores neutral for Objectives 1-5 as it only able to address these objectives at one specific development location (Culham Science Centre) and therefore does not provide for all of the proposed development across Science Vale. This will help in providing a flexible network to cope with future uncertainties and opportunities, as the timetable can be revised if necessary. This option would minimise carbon emissions and other pollution through promoting and increasing use of public transport, but it is partially within Flood Zone 2 which is a key environmental concern. Furthermore, this option will require four-tracking the line between Didcot and Oxford which will have significant environmental impacts. This option would also minimise the need to travel, and promote the use of the rail line, a sustainable mode of travel. However, this is expected to be a very expensive option. Scoring for this option has identified three key showstoppers in relation to affordability, deliverability, and feasibility, due to the requirement for four-tracking along the Didcot to Oxford route as this will require significant land take and upgrades/extension to multiple railway bridges. Furthermore, this is outside of local control to deliver and could have wider implications on rail service operations along the GWML and routes through Oxford. The impact of service frequency enhancements at rural stations could be limited if access to these stations is quite restricted.
8	**Improved stations at Didcot & Culham plus new station at Grove**	0	0	0	0	0	0	1	1	0	0	1	0	**3**	This option scores neutral for Objectives 1-5 as upgrades to existing stations are unlikely to lead to the scale of change required to support growth across Science Vale. In addition, this option scores neutral for Objective 6, as whilst it may be able to cope with future uncertainties it is not a flexible option. This option would help to minimise the need to travel and promote sustainable modes of travel through the new and improved stations as well as improved connections. This option may lead to increased public transport patronage and lead to carbon emission and air quality improvements, as well as to environmental benefits as the new Grove station would be promoting a sustainable mode as an alternative to the car. Improvements to Culham and Didcot stations are likely to be affordable, however a new station at Grove would be very expensive. Therefore, this option has scored neutral for affordability. This option will not lead to the scale of change required and is also outside of local control to deliver. The impact of introducing a new station on the GWML could have much wider implications on rail service operations beyond the local area This option is likely to be acceptable by the general public through improved rail provision.
9	**Junction realignments and signalisation**	-2	-2	-2	-2	-2	0	-2	-1	-3	-2	-2	-2	**-22**	This option is unlikely to lead to the scale of change required to support development across Science Vale, and therefore scores as 'poor fit' for Objectives 1-5. Furthermore, upgrades to junctions and signalisation has already been undertaken in several locations across Didcot. This option will have negative impacts on carbon emissions and other pollution, although optimised signals at junctions could have a small positive effect on reducing queues and potentially therefore effecting emissions. Affordability is identified as a showstopper due to the sheer number of junctions to upgrade and the cost associated with this. This option has poor feasibility and deliverability due to the lack of space to upgrade these junctions to the extent that a significant improvement in terms of reduce congestion and journey times can be achieved, including constraints from properties close to junctions. This option has low acceptability as it is unlikely the public will accept this option as a standalone solution.

10	**Upgraded and co-ordinated traffic signal control**	-2	-2	-2	-2	-2	0	-2	-1	0	0	-1	0	**-14**	Upgrades to the traffic signal control are very unlikely to lead to the scale of change required to support development across Science Vale, and therefore scores as 'poor fit' for Objectives 1-5. This option will have negative impacts on carbon emissions and other pollution although co-ordinated traffic signals would reduce the need for frequent acceleration and deceleration which reduces emissions. Affordability is considered neutral because, although across the Vale as a whole there are numerous signal-controlled junctions, they may not all need significant upgrade works and opportunities for linking signals together (e.g. through a UTC SCOOT-based network) are quite limited. This option has neutral feasibility and deliverability as there may be some complexities of delivering an interconnected traffic signal control across Didcot and the wider Science Vale area, but the technology exists. This option has low acceptability as it is unlikely the public will accept this option in isolation as the effects may not be very obvious or equitable for all users.
11	**Comprehensive cycle and walking networks across Science Vale**	-1	-1	-1	-1	-1	0	1	1	1	0	0	0	**-2**	This option is a sustainable option and will help to reduce carbon emissions and other pollution however it will be partially within Flood Zone 2 which is a key environmental concern. It is also low cost and will be acceptable to the public. However, it may also be controversial if it involves reallocating road space away from private vehicles. It will link into employment sites across Science Vale. This option has neutral feasibility and deliverability scores, as SVCN Routes 5 and 8 have already undergone design and planning, with some small sections already built. Furthermore, an intervention around cycling is very unlikely to be enough to fully support the development across Science Vale and is therefore unsuitable on its own. Improved walking and cycling should however be a key feature of preferred scheme options.
12	**Science Vale Bus Rapid Transit including bus-only river crossing**	1	1	-1	-1	-1	1	1	1	-1	-2	0	-2	**-3**	This option could lead to the scale of change required for the development planned across Didcot and Science Vale. This option would require road capacity in order to ensure reliable journey times, which would involve taking highway capacity away from private vehicles. Coordinated marketing and promotional strategies would need to be put in place. This option will promote sustainable modes of transport and provide a flexible transport network as buses can be re-routed to meet demand over time. It will also provide a sustainable mode of transport and minimise carbon emissions and other pollution however it is partially within Flood Zone 2 which is a key environmental concern. However, overall, this is expected to lead to reductions in carbon emissions and other pollutants as it will be an interconnected set of bus services which will lead to increased patronage. This option has low affordability as the cost of implementing BRT will be significant including both the physical infrastructure and provision of services. This option will be very complex to deliver and involves interdepends with many other schemes to be viable. It would also likely have implications on the viability of existing bus services. This option has very low feasibility due to the likely involving significant land take requirement and CPO where dedicated infrastructure such as bus-only lanes, roads, signal-control, laybys (stops) are required. As a fast, frequent, and reliable public transport service, this option is expected to be acceptable to the public however it may be controversial as it involves the reallocation of road to public transport away from private car.
13	**Science Vale Light Rail Link**	0	0	-1	-1	0	0	1	1	-2	-2	-1	-2	**-7**	This option is unlikely to lead to the scale of change required for some of the development planned across Didcot and Science Vale, and therefore scores neutral/low fit for Objectives 1-5. This option would provide a sustainable mode of transport and minimise carbon emissions and other pollution. However, this option may have negative visual impacts across open land. This option scores neutral for providing for a flexible transport network as whilst it is not very flexible due to the physical infrastructure required for light rail, it will help cope with future uncertainties and opportunities. It is a very expensive option due to the infrastructure required and cost of running services. This option will be very complex to deliver, with many interdependencies with other aspects of the transport network which can impact upon the success of the scheme. This option has very low feasibility due to the likely involving significant land take requirements, CPO, and the complexity of implementing a light

														rail system. The land take required, and visual impacts of the scheme are likely to lead to low acceptability of the option.
14	**Demand Responsive Transport**	-1	-1	-1	-1	0	2	1	0	-1	-1	-1	0	**-4**	This option will provide some increased capacity across Science Vale however it is unlikely to lead to the scale of change required to support the proposed development and sufficiently mitigate the impact of this development on the local road network. This option is very flexible and will cope with future uncertainties and opportunities through the provision of DRT, and this is a sustainable option reducing carbon emissions and other pollutants. However, this option is still a motorised option, and may have negative environmental impacts. Therefore, it scores neutral for Objective 8. This option is not as costly as other options, but previous unsuccessful DRT trials within Oxford suggest that additional investment might be necessary to turn this option to a commercial success. This suggests a DRT within Science Vale may need to be subsidised by local authorities. Furthermore, the Oxford trial, whilst it achieved substantial ridership, it did not meet the critical mass for the service. This may suggest that DRT is not a popular solution for the public, which impacts upon acceptability. In addition, this option may impact upon the viability of existing fixed bus route services, which may reduce acceptability. This option scores neutral on feasibility, as it requires physical infrastructure, even if this would be limited.
15	**Small scale bus improvements across Science Vale**	-3	-3	-3	-3	-2	1	1	0	1	1	0	1	**-9**	This option is very unlikely to increase to the level required to support development across Science Vale, and therefore four showstoppers are identified for Objectives 1-4. This option will be flexible and promote sustainable modes. This option may help to minimise carbon emissions and adverse environmental impacts through encouraging use of public transport, although this is likely to be very limited and has therefore been scored neutral. This option has a good affordability score as it is not an expensive option. This option is likely to feasible and deliverable as it supplements the existing bus network and infrastructure. This option will have a mixed response from the public, as some will be supportive of a public transport intervention however others will prefer a road-based solution.
16	**A34 Widening**	0	0	0	0	-1	-1	-2	-2	-1	-2	-1	-2	**-12**	This option, whilst providing additional capacity, will not provide significant capacity within Science Vale to enable the delivery of required development (residential and employment) in the area. This option is not flexible, although it does provide additional capacity for future uncertainties and increased traffic flows. This option does not promote sustainable travel nor does it minimise carbon emissions. Also, the clearing of land required to widen the existing dual carriageway is likely to have extensive adverse environmental impacts and lead to significant ecological loss. Furthermore, the option is unaffordable due the high cost of the scheme, primarily arising from extensive land take required. As this is a long section of road (13.5km) to widen, it would lead to significant deliverability and feasibility issues due to the complex nature and size of the scheme. This option is likely to have negative public acceptability as some endorse the additional capacity improvements while other members of the public oppose the proposal by recognising that priority should be given to other network needs and due to negative environmental impacts.

Appendix D Phase 2 Sifting Criteria

Business Case - Elements	Category	Criteria		Sub-criteria
Strategic Case	S1. Scheme Objectives	S1.1	Scheme Objectives	Unlock the delivery of 13,411 additional homes in the Didcot Garden Town area, and more across Science Vale
				Support the delivery of 4,847 affordable homes in the Didcot Garden Town area in support of the Housing Growth Deal, and more across Science Vale.
				Ensure the impact of additional housing on the transport network is acceptable and associated impacts on the transport network are adequately mitigated.
				Ensure the impact of employment growth on the transport network is acceptable and associated impacts on the transport network are adequately mitigated.
				Unlock Commercial space at key employment sites across Science Vale, including D-Tech and Culham Science Centre
				Provision of a flexible transport network to cope with future uncertainties and opportunities
				Minimise the need to travel and where travel is necessary promote sustainable modes of transport
				Minimise carbon emissions and other pollution such as water, air, noise, and light, and increase resilience to the likely impact of climate change, especially flooding.
	S2. Wider transport and government objectives	S2.1	National Policies	NPFF, Industrial Strategy, Housing White Paper, NIS, DfT's Transport Investment Strategy, Gear Change: A bold vision for cycling and walking, A Better Deal for Bus Users, Green Book, Climate Change
				Housing White Paper
		S2.2	Regional Policies	OxLEP's Strategic Economic Plan, LIS, Oxfordshire Investment Plan, Oxfordshire's Housing and Growth Deal, OXIS, Connecting Oxfordshire Local Transport Plan 4, Active and Healthy Travel Strategy, Western Route Strategy
		S2.3	Local Policies	Bus and Rapid Transit Strategy, Science Vale Transport Strategy, SODC Local Plan 2035, VoWHDC, Didcot Garden Town Delivery Plan, Clifton Hampden Neighbourhood Plan , East Hagbourne Neighbourhood Plan , Sutton Courtenay Neighbourhood Plan

Business Case - Elements	Category	Criteria		Sub-criteria
	S3. Stakeholder Consensus	S3.1	Level of consultation with relevant stakeholders	
	S4. Key Uncertainties	S4.1		
Economic Case	E1. Impact on the Economy	E1.1	Connectivity	Impact on travel times, delays, and cost of travel
		E1.2	Reliability	Impact on the day to day variability in journey times
		E1.3	Wider economic impacts	Future Economic Impact
		E1.4	Resilience	Impact on Network Vulnerability
		E1.5	Delivery of Housing	Impact on development
	E2. Carbon Emissions	E2.1	Carbon Emissions	Impact on the environment and climate change challenge / Change in CO2 emissions
	E3. Socio-distributional Impacts	E3.1	Social and distributional	Impact on users
		E3.2	Regeneration	Impact on wider area realm
		E3.3	Regional imbalance	As defined in the Green Book, Regeneration is the holistic process of reversing economic, social, and physical decay in areas where it has reached a stage when market forces alone will not suffice.
	E4. Local Environment	E4.1	Air Quality	Estimated change in NOx/PM emitted
		E4.2	Noise	Construction and Operation Period Environmental Impacts

Business Case - Elements	Category	Criteria		Sub-criteria
		E4.3	Natural environment, heritage, and landscape	
		E4.4	Streetscape and urban environment	
	E5. Wellbeing	E5.1	Physical activity	Health benefits
		E5.2	Injury or death	Impact on number of accidents
		E5.5	Access to Services	Access to a range of goods, services, people, and places, including education
		E5.6	Severance	Severance
		E5.7	Expected VfM	Benefits for £1 of costs
Management Case	M1. Deliverability	M1.1		Timescales for implementing the option, from inception to delivery
	M2. Public Acceptability	M2.1	Public acceptability / interest	Public view on scheme components. Earlier consultation responses may help inform this. Views are relevant when related to the actual scheme impacts e.g. traffic flows, congestion, noise, air quality etc, rather than whether the scheme enables more development.
	M3. Practical Feasibility	M3.1	Scheme Feasibility	Design and Construction - Include programme etc. design standards
	M4. Supporting Evidence	M4.1	Modelling Outputs/Previous Experience	
	M5. Key Risks	M5.1	Implementation Risks	Identified risks and Management.

Business Case - Elements	Category	Criteria		Sub-criteria
Financial Case	F1. Affordability	F1.1	Available Funds	Available Funds
	F2. Capital Costs (£m)	F2.1	Infrastructure capital costs, operating and maintenance costs	Infrastructure capital costs, operating and maintenance costs
	F3. Revenue Costs	F3.1	Revenue Costs	All running costs to keep the scheme in operation
	F4. Cost Profile and Risks	F4.1	Cost Profile and Risks	Costs to local businesses
Commercial Case	C1. Flexibility	C1.1	Option Flexibility	Purpose, alignment, capacity
	C2. Funding (£m)	C2.1	Funding source	Qualitative assessment of the way the option will be financed
	C2. Income (£m)	C2.3	Income source	Income Generation

Appendix E Phase 2 Sifting Results (based on DfT EAST)

Business Case - Elements	Category	Criteria		Sub-criteria/ details	Do Minimum	1. A4130 Widening	Comment	2. Science Bridge	Comment	3. Didcot to Culham River Crossing	Comment	4. Clifton Hampden Bypass	Comment	5. Improved stations at Didcot & Culham plus new station at Grove	Comment
Strategic Case	S1. Scheme Objectives	S1.1	Didcot Garden Town HIF 1 Objectives	Unlock the delivery of 13,411 additional homes in the Didcot Garden Town area, and more across Science Vale	1	5	The scheme will help unlock the delivery of additional homes at strategic sites in the Didcot Garden Town area, and across Science Vale, as these are allocated in the SODC and VoWHDC Local Plans.	5	The scheme will help unlock the delivery of additional homes at strategic sites in the Didcot Garden Town area, and across Science Vale, as these are allocated in the SODC and VoWHDC Local Plans.	5	The scheme will help unlock the delivery of additional homes at strategic sites in the Didcot Garden Town area, and across Science Vale, as these are allocated in the SODC and VoWHDC Local Plans.	5	The scheme will help unlock the delivery of additional homes at strategic sites in the Didcot Garden Town area, and across Science Vale, as these are allocated in the SODC and VoWHDC Local Plans.	4	The scheme will help unlock the delivery of additional homes, however upgrades to existing stations are unlikely to lead to the scale of change required to support growth across Science Vale.
				Support the delivery of 4,847 affordable homes in the Didcot Garden Town area in support of the Housing Growth Deal, and more across Science Vale.	1	5	The scheme will support the delivery of affordable homes in support of the Housing Growth Deal, and across Science Vale.	5	The scheme will support the delivery of affordable homes in support of the Housing Growth Deal, and across Science Vale.	5	The scheme will support the delivery of affordable homes in support of the Housing Growth Deal, and across Science Vale.	5	The scheme will support the delivery of affordable homes in support of the Housing Growth Deal, and across Science Vale.	3	The scheme proposes a localised intervention which will very unlikely support the delivery of affordable homes in support of the Housing Growth Deal, and across Science Vale.

				Ensure the impact of additional housing on the transport network is acceptable and associated impacts on the transport network are adequately mitigated.	1	5	The scheme will ensure that the demand created from additional housing will be acceptable as modelling will take into account the growth forecast in regional and local plans. It will also ensure that congestion and delay challenges will be mitigated.	5	The scheme will ensure that the demand created from additional housing will be acceptable as modelling will take into account the growth forecast in regional and local plans. It will also ensure that congestion and delay challenges will be mitigated.	5	The scheme will ensure that the demand created from additional housing will be acceptable as modelling will take into account the growth forecast in regional and local plans. It will also ensure that congestion and delay challenges will be mitigated.	5	The scheme will ensure that the demand created from additional housing will be acceptable as modelling will take into account the growth forecast in regional and local plans. It will also ensure that congestion and delay challenges will be mitigated.	3	Although modelling will ensure that the demand arriving and leaving the new station at Grove from additional housing will be acceptable and that congestion and delay challenges will be mitigated, it is unlikely that improvements to existing stations will have the same impact.
				Ensure the impact of employment growth on the transport network is acceptable and associated impacts on the transport network are adequately mitigated.	1	5	The scheme will ensure that the demand created from additional employment will be acceptable as modelling will take into account the growth forecast in regional and local plans. It will also ensure that congestion and delay challenges will be mitigated.	5	The scheme will ensure that the demand created from additional employment will be acceptable as modelling will take into account the growth forecast in regional and local plans. It will also ensure that congestion and delay challenges will be mitigated.	5	The scheme will ensure that the demand created from additional employment will be acceptable as modelling will take into account the growth forecast in regional and local plans. It will also ensure that congestion and delay challenges will be mitigated.	5	The scheme will ensure that the demand created from additional employment will be acceptable as modelling will take into account the growth forecast in regional and local plans. It will also ensure that congestion and delay challenges will be mitigated.	3	Although modelling will ensure that the demand arriving and leaving the new station at Grove from additional employment will be acceptable and that congestion and delay challenges will be mitigated, it is unlikely that improvements to existing stations will have the same impact.
				Unlock Commercial space at key employment sites across Science Vale, including D-Tech and Culham Science Centre	1	5	The scheme would provide improved connections to the Strategic Road Network and an alternative route to Abingdon and Oxford	5	The scheme would provide new and improved connections to the Strategic Road Network and an alternative route to Abingdon and Oxford	5	The scheme would directly link new housing sites with Culham Science Centre and would provide new and improved connections to the Strategic Road Network and an alternative route to Abingdon and Oxford	5	The scheme would provide new and improved connections to the Strategic Road Network and an alternative route to Abingdon and Oxford	3	The scheme will neither provide new or improved connections to the Strategic Road Network nor alternative routes to the wider Science Vale area.

				Provision of a flexible transport network to cope with future uncertainties and opportunities	1	5	This scheme is flexible as, in the future, the second lane from the dual carriageway could be used as a bus lane to facilitate more sustainable modes. The additional capacity provided will improve the resilience of the network within Didcot and enable better demand management of traffic.	4	This option is partially future-proofed through provision of additional capacity meaning the use of the bridge can change, but the location of the physical infrastructure is not flexible.	4	This scheme is future-proofed and could be used for sustainable modes in the future. The additional river crossing will provide improved resilience compared to the Do Minimum, where the current river crossings are sometimes closed due to flooding concerns. The additional capacity provided will enable future demand management of traffic across Science Vale, especially for the two existing river crossings, however, the location of the crossing is not flexible.	4	The additional road link will provide improved resilience and the opportunity to implement more sustainable modes along the bypass at a later point compared to the Do Minimum.	3	The new station at Grove will help provide a flexible transport network to cope with future changes on the network, however it is unlikely that many intercity services will stop at Grove due to the proximity to Didcot Parkway.
				Minimise the need to travel and where travel is necessary promote sustainable modes of transport	1	2	It has a slight positive impact on carbon emissions due to reduced congestions and queueing.	2	There is a potential that the scheme could encourage more road travel, which would consequently increase emissions and reduce air quality.	2	There is a potential that the scheme could encourage more road travel, which would consequently increase emissions and reduce air quality.	2	There is a potential that the scheme could encourage more road travel, which would consequently increase emissions and reduce air quality.	4	This scheme would help to minimise the need to travel and promote sustainable modes of travel through the new and improved stations as well as improved connections.

				Minimise carbon emissions and other pollution such as water, air, noise and light, and increase resilience to the likely impact of climate change, especially flooding.	1	3	It has a slight positive impact on carbon emissions due to reduced congestions and queueing. There are also slight improvements in Air Quality in Milton as a result of the scheme, with reductions in NO2. The presence of a segregated shared use path for pedestrians and cyclists alongside the A4130 provides a viable alternative to driving, especially for short trips from Didcot to Milton Park. This option is partially within Flood Zone 2, which can lead to negative environmental impacts.	3	As this option is partially within Flood Zone 2 it scores negatively. There is a very slight worsening of Air Quality in Didcot as a result of the Didcot Science Bridge. However, it is also recognised that provision of the bridge will reduce some journey lengths, congestion and queuing and therefore may produce fewer carbon emissions for certain movements. In addition, there is provision of pedestrian/cyclist facilities across the bridge.	3	This option is partially within Flood Zone 2. However, it is also recognised that provision of the crossing will reduce some journey lengths and associated delays which will lead to fewer carbon emissions. In addition, this option will reduce queuing within the villages close to the scheme (such as Culham and Sutton Courtenay) and will contribute to reducing noise in these historic villages. The scheme leads to improved Air Quality (NO2) in Long Wittenham, however there is expected to be a slight worsening in Air Quality in Appleford and Sutton Courtenay.	4	This option will be partially within Flood Zone 2, which poses a key environmental concern with regards to its construction. This option significantly reduces current and future vehicle queues and associated delays through historic villages including past Schools, leading to a reduction in carbon emissions. In addition, this option will reduce queuing within the villages close to the scheme (such as Clifton Hampden and Burcot) and will contribute to significant improvements Air Quality and reducing noise in these historic villages.	4	This option may lead to increased public transport patronage, thus to carbon emission and air quality improvements. Environmental benefits may be seen as the new Grove station would be promoting a sustainable mode as an alternative to the car.

	S2. Wider transport and government objectives	S2.1	National Policies	NPFF, Industrial Strategy, Housing White Paper, NIS, DfT's Transport Investment Strategy, Gear Change: A bold vision for cycling and walking, A Better Deal for Bus Users, Green Book, Climate Change	1	4	**Meets:** 1. Delivering a sufficient supply of homes and supporting development. Considering the presence of Air Quality management areas and clean area zones (NPPF). 2. Transforming the economy and providing high-quality infrastructure (Industrial Strategy) 3. Planning for the right homes in the right places; Building homes faster; Diversifying the market; and Helping people now. (Housing White Paper) 4. Fairer, faster, greener' and the importance of "levelling up" investment across all regions in the UK (NIS) 5. 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 the global competitiveness by making Britain a more attractive place to	4	**Meets:** 1. Delivering a sufficient supply of homes and supporting development. Considering the presence of Air Quality management areas and clean area zones (NPPF). 2. Transforming the economy and providing high-quality infrastructure (Industrial Strategy) 3. Planning for the right homes in the right places; Building homes faster; Diversifying the market; and Helping people now. (Housing White Paper) 4. Fairer, faster, greener' and the importance of "levelling up" investment across all regions in the UK (NIS) 5. 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 the global competitiveness by making Britain a more attractive place to	4	**Meets:** 1. Delivering a sufficient supply of homes and supporting development. Considering the presence of Air Quality management areas and clean area zones (NPPF). 2. Transforming the economy and providing high-quality infrastructure (Industrial Strategy) 3. Planning for the right homes in the right places; Building homes faster; Diversifying the market; and Helping people now. (Housing White Paper) 4. Fairer, faster, greener' and the importance of "levelling up" investment across all regions in the UK (NIS) 5. 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	4	**Meets:** 1. Delivering a sufficient supply of homes and supporting development. Considering the presence of Air Quality management areas and clean area zones (NPPF). 2. Transforming the economy and providing high-quality infrastructure (Industrial Strategy) 3. Planning for the right homes in the right places; Building homes faster; Diversifying the market; and Helping people now. (Housing White Paper) 4. Fairer, faster, greener' and the importance of "levelling up" investment across all regions in the UK (NIS) 5. 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 the global competitiveness by making Britain a more attractive place to	2	1. Delivering a sufficient supply of homes and supporting development. Considering the presence of Air Quality management areas and clean area zones (NPPF). 2. Transforming the economy and providing high-quality infrastructure (Industrial Strategy) 3. Planning for the right homes in the right places; Building homes faster; Diversifying the market; and Helping people now. (Housing White Paper) 4. Fairer, faster, greener' and the importance of "levelling up" investment across all regions in the UK (NIS) 5. 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 the global competitiveness by making Britain a more attractive place to trade and invest; and

							trade and invest; and Support the creation of new housing (the Housing White Paper recognises transport infrastructure as one of the keys to unlocking development and delivering places where people want to live). (DfT's TIS) 6. Increasing cycling and walking to help tackle some of the most challenging issues faced by society: improving air quality, combatting climate change, improving health and wellbeing, addressing inequalities and tackling congestion. (Gear Change) **Does not fully meet:** 7. All new road investments in England, which receive central government funding, will now be required to either support bus priority measures or explain why bus priority is not necessary (A Better Deal for Bus Users) 8. Identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. (Climate Change)		trade and invest; and Support the creation of new housing (the Housing White Paper recognises transport infrastructure as one of the keys to unlocking development and delivering places where people want to live). (DfT's TIS) 6. Increasing cycling and walking to help tackle some of the most challenging issues faced by society: improving air quality, combatting climate change, improving health and wellbeing, addressing inequalities and tackling congestion. (Gear Change) **Does not fully meet:** 7. All new road investments in England, which receive central government funding, will now be required to either support bus priority measures or explain why bus priority is not necessary (A Better Deal for Bus Users) 8. Identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. (Climate Change)		responding to local growth priorities; Enhance the global competitiveness by making Britain a more attractive place to trade and invest; and Support the creation of new housing (the Housing White Paper recognises transport infrastructure as one of the keys to unlocking development and delivering places where people want to live). (DfT's TIS) 6. Increasing cycling and walking to help tackle some of the most challenging issues faced by society: improving air quality, combatting climate change, improving health and wellbeing, addressing inequalities and tackling congestion. (Gear Change) **Does not fully meet:** 7. All new road investments in England, which receive central government funding, will now be required to either support bus priority measures or explain		trade and invest; and Support the creation of new housing (the Housing White Paper recognises transport infrastructure as one of the keys to unlocking development and delivering places where people want to live). (DfT's TIS) 6. Increasing cycling and walking to help tackle some of the most challenging issues faced by society: improving air quality, combatting climate change, improving health and wellbeing, addressing inequalities and tackling congestion. (Gear Change) **Does not fully meet:** 7. All new road investments in England, which receive central government funding, will now be required to either support bus priority measures or explain why bus priority is not necessary (A Better Deal for Bus Users) 8. Identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. (Climate Change)		Support the creation of new housing (the Housing White Paper recognises transport infrastructure as one of the keys to unlocking development and delivering places where people want to live). (DfT's TIS) 6. Increasing cycling and walking to help tackle some of the most challenging issues faced by society: improving air quality, combatting climate change, improving health and wellbeing, addressing inequalities and tackling congestion. (Gear Change) 7. All new road investments in England, which receive central government funding, will now be required to either support bus priority measures or explain why bus priority is not necessary (A Better Deal for Bus Users) 8. Identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. (Climate Change)

												why bus priority is not necessary (A Better Deal for Bus Users) 8. Identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. (Climate Change)					

		S2.2	Regional Policies	OxLEP's Strategic Economic Plan, LIS, Oxfordshire Investment Plan, Oxfordshire's Housing and Growth Deal, OXIS, Connecting Oxfordshire Local Transport Plan 4, Active and Healthy Travel Strategy, Western Route Strategy	1	4	**Meets:** 1. To plan simultaneously for both jobs and housing growth, putting in place the infrastructure required for both, whilst also protecting and, where possible, enhancing environmental quality and social inclusion. To support for the implementation of the Oxfordshire Local Transport Plan 2015-2031 to address congestion and to identify ways to avoid exacerbating existing problems due to growth; To ensure, through the planning process, that connectivity improvements are linked to the scale and location of planned growth; and To implement the Oxfordshire Active and Healthy Travel Strategy. (OxLEP's) 3. Didcot Garden Town is as a key development location within the county, and the schemes identified in the HIF bid are considered critical to the success of the county. (OIP) 4. To plan and support the delivery of 100,000 new homes	4	**Meets:** 1. To plan simultaneously for both jobs and housing growth, putting in place the infrastructure required for both, whilst also protecting and, where possible, enhancing environmental quality and social inclusion. To support for the implementation of the Oxfordshire Local Transport Plan 2015-2031 to address congestion and to identify ways to avoid exacerbating existing problems due to growth; To ensure, through the planning process, that connectivity improvements are linked to the scale and location of planned growth; and To implement the Oxfordshire Active and Healthy Travel Strategy. (OxLEP's) 3. Didcot Garden Town is as a key development location within the county, and the schemes identified in the HIF bid are considered critical to the success of the county. (OIP) 4. To plan and support the delivery of 100,000 new homes	4	**Meets:** 1. To plan simultaneously for both jobs and housing growth, putting in place the infrastructure required for both, whilst also protecting and, where possible, enhancing environmental quality and social inclusion. To support for the implementation of the Oxfordshire Local Transport Plan 2015-2031 to address congestion and to identify ways to avoid exacerbating existing problems due to growth; To ensure, through the planning process, that connectivity improvements are linked to the scale and location of planned growth; and To implement the Oxfordshire Active and Healthy Travel Strategy. (OxLEP's) 3. Didcot Garden Town is as a key development location within the county, and the schemes identified in the HIF bid are considered critical	4	**Meets:** 1. To plan simultaneously for both jobs and housing growth, putting in place the infrastructure required for both, whilst also protecting and, where possible, enhancing environmental quality and social inclusion. To support for the implementation of the Oxfordshire Local Transport Plan 2015-2031 to address congestion and to identify ways to avoid exacerbating existing problems due to growth; To ensure, through the planning process, that connectivity improvements are linked to the scale and location of planned growth; and To implement the Oxfordshire Active and Healthy Travel Strategy. (OxLEP's) 3. Didcot Garden Town is as a key development location within the county, and the schemes identified in the HIF bid are considered critical to the success of the county. (OIP) 4. To plan and support the delivery of 100,000 new homes	2	1. To plan simultaneously for both jobs and housing growth, putting in place the infrastructure required for both, whilst also protecting and, where possible, enhancing environmental quality and social inclusion. To support for the implementation of the Oxfordshire Local Transport Plan 2015-2031 to address congestion and to identify ways to avoid exacerbating existing problems due to growth; To ensure, through the planning process, that connectivity improvements are linked to the scale and location of planned growth; and To implement the Oxfordshire Active and Healthy Travel Strategy. (OxLEP's) 2. To deliver clean and sustainable transformative growth across Oxfordshire, through focussing on innovation, people and improvements to the physical, digital, financial, knowledge and social infrastructure. (LIS) 3. Didcot Garden Town is as a key

							between 2011 and 2031. (Housing and Growth Deal) 5. It is recognised that the funded HIF schemes are local road interventions which have the potential to alleviate congestion at hot spots and accommodate traffic generated by proposed housing and employment. Additional active travel infrastructure will be required to support the proposed Didcot Garden Town. (OXIS) 6. LTP4 identifies that a number of new road links and capacity improvements are necessary to accommodate the large scale of employment and residential development in Didcot. **Does not fully meet:** 2. To deliver clean and sustainable transformative growth across Oxfordshire, through focussing on innovation, people and improvements to the physical, digital, financial, knowledge and social infrastructure. (LIS) 7. To contribute to reducing pressure on		between 2011 and 2031. (Housing and Growth Deal) 5. It is recognised that the funded HIF schemes are local road interventions which have the potential to alleviate congestion at hot spots and accommodate traffic generated by proposed housing and employment. Additional active travel infrastructure will be required to support the proposed Didcot Garden Town. (OXIS) 6. LTP4 identifies that a number of new road links and capacity improvements are necessary to accommodate the large scale of employment and residential development in Didcot. **Does not fully meet:** 2. To deliver clean and sustainable transformative growth across Oxfordshire, through focussing on innovation, people and improvements to the physical, digital, financial, knowledge and social infrastructure. (LIS) 7. To contribute to reducing pressure on		to the success of the county. (OIP) 4. To plan and support the delivery of 100,000 new homes between 2011 and 2031. (Housing and Growth Deal) 5. It is recognised that the funded HIF schemes are local road interventions which have the potential to alleviate congestion at hot spots and accommodate traffic generated by proposed housing and employment. Additional active travel infrastructure will be required to support the proposed Didcot Garden Town. (OXIS) 6. LTP4 identifies that a number of new road links and capacity improvements are necessary to accommodate the large scale of employment and residential development in Didcot. **Does not fully meet:** 2. To deliver clean and sustainable transformative growth across		between 2011 and 2031. (Housing and Growth Deal) 5. It is recognised that the funded HIF schemes are local road interventions which have the potential to alleviate congestion at hot spots and accommodate traffic generated by proposed housing and employment. Additional active travel infrastructure will be required to support the proposed Didcot Garden Town. (OXIS) 6. LTP4 identifies that a number of new road links and capacity improvements are necessary to accommodate the large scale of employment and residential development in Didcot. **Does not fully meet:** 2. To deliver clean and sustainable transformative growth across Oxfordshire, through focussing on innovation, people and improvements to the physical, digital, financial, knowledge and social infrastructure. (LIS) 7. To contribute to reducing pressure on		development location within the county, and the schemes identified in the HIF bid are considered critical to the success of the county. (OIP) 4. To plan and support the delivery of 100,000 new homes between 2011 and 2031. (Housing and Growth Deal) 5. It is recognised that the funded HIF schemes are local road interventions which have the potential to alleviate congestion at hot spots and accommodate traffic generated by proposed housing and employment. Additional active travel infrastructure will be required to support the proposed Didcot Garden Town. (OXIS) 6. LTP4 identifies that a number of new road links and capacity improvements are necessary to accommodate the large scale of employment and residential development in Didcot. 7. To contribute to reducing pressure on the road network, contribute to

							the road network, contribute to economic growth and the reduction of emissions, improve quality of life and health, and link active travel with bus and rail options by enabling sustainable door to door journeys combining cycling or walking with public transport. (Active and Healthy Travel Strategy)		the road network, contribute to economic growth and the reduction of emissions, improve quality of life and health, and link active travel with bus and rail options by enabling sustainable door to door journeys combining cycling or walking with public transport. (Active and Healthy Travel Strategy)		Oxfordshire, through focussing on innovation, people and improvements to the physical, digital, financial, knowledge and social infrastructure. (LIS) 7. To contribute to reducing pressure on the road network, contribute to economic growth and the reduction of emissions, improve quality of life and health, and link active travel with bus and rail options by enabling sustainable door to door journeys combining cycling or walking with public transport. (Active and Healthy Travel Strategy)		the road network, contribute to economic growth and the reduction of emissions, improve quality of life and health, and link active travel with bus and rail options by enabling sustainable door to door journeys combining cycling or walking with public transport. (Active and Healthy Travel Strategy)		economic growth and the reduction of emissions, improve quality of life and health, and link active travel with bus and rail options by enabling sustainable door to door journeys combining cycling or walking with public transport. (Active and Healthy Travel Strategic)

		S2.3	Local Policies	Bus and Rapid Transit Strategy, Science Vale Transport Strategy, SODC Local Plan 2035, VoWHDC, Didcot Garden Town Delivery Plan, Clifton Hampden Neighbourhood Plan , East Hagbourne Neighbourhood Plan , Sutton Courtenay Neighbourhood Plan	1	4	**Meets:** 2. Employment and housing growth is required within Science Vale as part of Local Plans and transport infrastructure is required to enable this growth and mitigate any negative impacts as a result of the scheme. (Science Vale Transport Strategy) 3. To deliver economic and housing growth with the need to protect the greenness of the district. As part of the Local Plan, Science Vale is identified as a focus for delivering housing and employment, noting that Didcot will be both the gateway and the heart of Science Vale. There is an opportunity for sustainable travel, but the rural nature of South Oxfordshire means that many residents will remain reliant on car travel for part or all of their journey. (SODC) 4. To deliver sustainable development, including identifying the number of houses required. To encourage sustainable modes of transport and a reduction in the	4	**Meets:** 2. Employment and housing growth is required within Science Vale as part of Local Plans and transport infrastructure is required to enable this growth and mitigate any negative impacts as a result of the scheme. (Science Vale Transport Strategy) 3. To deliver economic and housing growth with the need to protect the greenness of the district. As part of the Local Plan, Science Vale is identified as a focus for delivering housing and employment, noting that Didcot will be both the gateway and the heart of Science Vale. There is an opportunity for sustainable travel, but the rural nature of South Oxfordshire means that many residents will remain reliant on car travel for part or all of their journey. (SODC) 4. To deliver sustainable development, including identifying the number of houses required. To encourage sustainable modes of transport and a reduction in the	4	**Meets:** 2. Employment and housing growth is required within Science Vale as part of Local Plans and transport infrastructure is required to enable this growth and mitigate any negative impacts as a result of the scheme. (Science Vale Transport Strategy) 3. To deliver economic and housing growth with the need to protect the greenness of the district. As part of the Local Plan, Science Vale is identified as a focus for delivering housing and employment, noting that Didcot will be both the gateway and the heart of Science Vale. There is an opportunity for sustainable travel, but the rural nature of South Oxfordshire means that many residents will remain reliant on car travel for part or all of their journey. (SODC) 4. To deliver sustainable development, including identifying	4	**Meets:** 2. Employment and housing growth is required within Science Vale as part of Local Plans and transport infrastructure is required to enable this growth and mitigate any negative impacts as a result of the scheme. (Science Vale Transport Strategy) 3. To deliver economic and housing growth with the need to protect the greenness of the district. As part of the Local Plan, Science Vale is identified as a focus for delivering housing and employment, noting that Didcot will be both the gateway and the heart of Science Vale. There is an opportunity for sustainable travel, but the rural nature of South Oxfordshire means that many residents will remain reliant on car travel for part or all of their journey. (SODC) 4. To deliver sustainable development, including identifying the number of houses required. To encourage sustainable modes of transport and a reduction in the	2	1. Developing a new high quality premium urban and inter-urban service across Science Vale will help address the challenges presented in the area: limited bus connectivity between major settlements and employment areas; traffic congestion; weak car demand management policies and measures; limited public transport interchange and inadequate passenger facilities; lack of integrated ticketing (Bus Rapid Transit Strategy) 2. Employment and housing growth is required within Science Vale as part of Local Plans and transport infrastructure is required to enable this growth and mitigate any negative impacts as a result of the scheme. (Science Vale Transport Strategy) 3. To deliver economic and housing growth with the need to protect the greenness of the district. As part of the Local Plan, Science Vale is identified as a focus for delivering housing and employment, noting that Didcot will

							need to travel. (VoWHDC) 5. To diversify housing types and delivery methods, providing new choices, such as professionally managed private rented homes and a locally based factory-built home constructor; To accelerate the delivery of homes and the social and physical infrastructure required to support new residential development; To support economic growth generated by UK's leading cluster for commercialisation of science, building on the strengths of Harwell Campus, Culham Science Centre and Milton Park to deliver an additional £1bn of annual gross value added to the UK economy; To explore ways to capture value from new development, which can be channelled into the infrastructure, affordable housing and green spaces to ensure these developments benefit the wider community; and To establish strong local governance for the		need to travel. (VoWHDC) 5. To diversify housing types and delivery methods, providing new choices, such as professionally managed private rented homes and a locally based factory-built home constructor; To accelerate the delivery of homes and the social and physical infrastructure required to support new residential development; To support economic growth generated by UK's leading cluster for commercialisation of science, building on the strengths of Harwell Campus, Culham Science Centre and Milton Park to deliver an additional £1bn of annual gross value added to the UK economy; To explore ways to capture value from new development, which can be channelled into the infrastructure, affordable housing and green spaces to ensure these developments benefit the wider community; and To establish strong local governance for the		the number of houses required. To encourage sustainable modes of transport and a reduction in the need to travel. (VoWHDC) 5. To diversify housing types and delivery methods, providing new choices, such as professionally managed private rented homes and a locally based factory-built home constructor; To accelerate the delivery of homes and the social and physical infrastructure required to support new residential development; To support economic growth generated by UK's leading cluster for commercialisation of science, building on the strengths of Harwell Campus, Culham Science Centre and Milton Park to deliver an additional £1bn of annual gross value added to the UK economy; To explore ways to capture value from new development, which can be		need to travel. (VoWHDC) 5. To diversify housing types and delivery methods, providing new choices, such as professionally managed private rented homes and a locally based factory-built home constructor; To accelerate the delivery of homes and the social and physical infrastructure required to support new residential development; To support economic growth generated by UK's leading cluster for commercialisation of science, building on the strengths of Harwell Campus, Culham Science Centre and Milton Park to deliver an additional £1bn of annual gross value added to the UK economy; To explore ways to capture value from new development, which can be channelled into the infrastructure, affordable housing and green spaces to ensure these developments benefit the wider community; and To establish strong local governance for the		be both the gateway and the heart of Science Vale. There is an opportunity for sustainable travel, but the rural nature of South Oxfordshire means that many residents will remain reliant on car travel for part or all of their journey. (SODC) 4. To deliver sustainable development, including identifying the number of houses required. To encourage sustainable modes of transport and a reduction in the need to travel. (VoWHDC) 5. To diversify housing types and delivery methods, providing new choices, such as professionally managed private rented homes and a locally based factory-built home constructor; To accelerate the delivery of homes and the social and physical infrastructure required to support new residential development; To support economic growth generated by UK's leading cluster for commercialisation of science, building on the strengths of

							garden town. Representatives of the local community, local businesses and district, county and town councils to create a unified, democratically accountable delivery body. (Didcot Garden Town Delivery Plan) 6.Small-scale development within Clifton Hampden, sustainable future for East Hagbourne, and equity of transport infrastructure between road users, reducing traffic speeds, encouraging use of sustainable modes of transport and reducing reliance on private vehicles in Sutton Courtenay (Neighbourhood Plans of several Parish Councils in the area) **Does not fully meet:** 1. Developing a new high quality premium urban and inter-urban service across Science Vale will help address the challenges presented in the area: limited bus connectivity between major settlements and employment areas; traffic congestion; weak car demand management policies and measures; limited public transport		garden town. Representatives of the local community, local businesses and district, county and town councils to create a unified, democratically accountable delivery body. (Didcot Garden Town Delivery Plan) 6.Small-scale development within Clifton Hampden, sustainable future for East Hagbourne, and equity of transport infrastructure between road users, reducing traffic speeds, encouraging use of sustainable modes of transport and reducing reliance on private vehicles in Sutton Courtenay (Neighbourhood Plans of several Parish Councils in the area) **Does not fully meet:** 1. Developing a new high quality premium urban and inter-urban service across Science Vale will help address the challenges presented in the area: limited bus connectivity between major settlements and employment areas; traffic congestion; weak car demand management policies and measures; limited public transport		channelled into the infrastructure, affordable housing and green spaces to ensure these developments benefit the wider community; and To establish strong local governance for the garden town. Representatives of the local community, local businesses and district, county and town councils to create a unified, democratically accountable delivery body. (Didcot Garden Town Delivery Plan) 6.Small-scale development within Clifton Hampden, sustainable future for East Hagbourne, and equity of transport infrastructure between road users, reducing traffic speeds, encouraging use of sustainable modes of transport and reducing reliance on private vehicles in Sutton Courtenay (Neighbourhood Plans of several Parish Councils in the area) **Does not fully meet:**		garden town. Representatives of the local community, local businesses and district, county and town councils to create a unified, democratically accountable delivery body. (Didcot Garden Town Delivery Plan) 6.Small-scale development within Clifton Hampden, sustainable future for East Hagbourne, and equity of transport infrastructure between road users, reducing traffic speeds, encouraging use of sustainable modes of transport and reducing reliance on private vehicles in Sutton Courtenay (Neighbourhood Plans of several Parish Councils in the area) **Does not fully meet:** 1. Developing a new high quality premium urban and inter-urban service across Science Vale will help address the challenges presented in the area: limited bus connectivity between major settlements and employment areas; traffic congestion; weak car demand management policies and measures; limited public transport		Harwell Campus, Culham Science Centre and Milton Park to deliver an additional £1bn of annual gross value added to the UK economy; To explore ways to capture value from new development, which can be channelled into the infrastructure, affordable housing and green spaces to ensure these developments benefit the wider community; and To establish strong local governance for the garden town. Representatives of the local community, local businesses and district, county and town councils to create a unified, democratically accountable delivery body. (Didcot Garden Town Delivery Plan) 6.Small-scale development within Clifton Hampden, sustainable future for East Hagbourne, and equity of transport infrastructure between road users, reducing traffic speeds, encouraging use of sustainable modes of transport and reducing reliance on private vehicles in

							interchange and inadequate passenger facilities; lack of integrated ticketing (Bus Rapid Transit Strategy)		interchange and inadequate passenger facilities; lack of integrated ticketing (Bus Rapid Transit Strategy)		1. Developing a new high quality premium urban and inter-urban service across Science Vale will help address the challenges presented in the area: limited bus connectivity between major settlements and employment areas; traffic congestion; weak car demand management policies and measures; limited public transport interchange and inadequate passenger facilities; lack of integrated ticketing (Bus Rapid Transit Strategy)		interchange and inadequate passenger facilities; lack of integrated ticketing (Bus Rapid Transit Strategy)		Sutton Courtenay (Neighbourhood Plans of several Parish Councils in the area)

	S3. Stakeholder Consensus	S3.1	Level of consultation with relevant		1	3	The broad concept of the scheme has gone through stakeholder consultation (OCC), and local relevant councils have been engaged (SODC and VoWHDC) in discussions who expressed their acceptability on the proposed scheme.	3	The broad concept of the scheme has gone through stakeholder consultation (OCC), and local relevant councils have been engaged (SODC and VoWHDC) in discussions who expressed their acceptability on the proposed scheme.	3	The broad concept of the scheme has gone through stakeholder consultation (OCC), and local relevant councils have been engaged (SODC and VoWHDC) in discussions who expressed their acceptability on the proposed scheme.	3	The broad concept of the scheme has gone through stakeholder consultation (OCC), and local relevant councils have been engaged (SODC and VoWHDC) in discussions who expressed their acceptability on the proposed scheme.	2	Widening of rail lines may be controversial
	S4. Key Uncertainties	S4.1					Access across the railway would need to be negotiated and agreed with rail industry		Access across the railway would need to be negotiated and agreed with rail industry		Amount of induced traffic created by new river crossing; impact of additional traffic on A4074 to Oxford; form of river crossing.		Amount of induced traffic created by new river crossing; impact of additional traffic on A4074 to Oxford; form of river crossing.		As well as infrastructure improvements the improved services would depend on the rail operator’s willingness to operate additional services - this would impact on the case for the new and improved stations.
	Score - Strategic Case				**12**	**50**		**49**		**49**		**50**		**35**	

Economic Case	**E1. Economic Growth**	E1.1	Connectivity	Impact on travel times, delays and cost of travel	1	4	The Paramics Option Appraisal assessment demonstrates that without this scheme in the future year scenario (2033), the Transport Network would be gridlocked for the whole 3-hour peak period and beyond on all parts of the network. This scheme will significantly mitigate congestion and delays, especially at the A4130 and A415 roundabouts. Without it in place, road users will continue to experience delays at the junctions designed to accommodate SODC and VoWHDC growth.	4	The Paramics Option Appraisal assessment demonstrates that without this scheme in the future year scenario (2033), the Transport Network would be gridlocked for the whole 3-hour peak period and beyond on all parts of the network. This scheme will significantly mitigate congestion and delays, especially at the A4130 and A415 roundabouts. Without it in place, road users will continue to experience delays at the junctions designed to accommodate SODC and VoWHDC growth.	5	The Paramics Option Appraisal assessment demonstrates that without this scheme in the future year scenario (2033), the Transport Network would be gridlocked for the whole 3-hour peak period and beyond on all parts of the network. This scheme will significantly mitigate congestion and delays, especially at the A4130 and A415 roundabouts. Without it in place, road users will continue to experience delays at the junctions designed to accommodate SODC and VoWHDC growth.	5	The Paramics Option Appraisal assessment demonstrates that without this scheme in the future year scenario (2033), the Transport Network would be gridlocked for the whole 3-hour peak period and beyond on all parts of the network. This scheme will significantly mitigate congestion and delays, especially at the A4130 and A415 roundabouts. Without it in place, road users will continue to experience delays at the junctions designed to accommodate SODC and VoWHDC growth.	4	This scheme is expected to improve journey time

		E1.2	Reliability	Impact on the day to day variability in journey times			Paramics modelling for this option shows that: •In the scenario with all growth but no intervention congestion is experienced on the A4130 for the entire length from Milton Interchange to Didcot in both peak periods • In a scenario tested with the Didcot to Culham River Crossing and Clifton Hampden Bypass but not the A4130 Widening and Didcot Science Bridge, significant queueing is forecast on the A4130, which leads to increased queueing on the existing Culham crossing southbound Therefore, this scheme will significantly mitigate this congestion and delay on the A4130. This is shown in modelling whereby all four HIF schemes come forward and journey times along the A4130 reduce		Paramics modelling for this option shows that: • In the scenario with all growth but no intervention congestion is experienced on the A4130 for the entire length from Milton Interchange to Didcot in both peak periods • In a scenario tested with the Didcot to Culham River Crossing and Clifton Hampden Bypass but not the A4130 Widening and Didcot Science Bridge, significant queueing is forecast on the A4130, which leads to increased queueing on the existing Culham crossing southbound Therefore, Didcot Science Bridge will help mitigate this congestion and delay on the A4130. This is shown in modelling whereby all four HIF schemes come forward and journey times along the A4130 reduce		Modelling suggests the following in the AM Peak : • Due to the increase in capacity more traffic is drawn to Culham Crossing from competing river crossings; and • There is a reduction in delay southbound on Culham Crossing, but a slight increase in delay northbound. This equates to a more balanced level of delay, with a 40-50 second delay in both directions, which is likely to be a more representative reflection of conditions that are forecast in 2041. Modelling suggests the following in the AM Peak : • More traffic is drawn to Culham Crossing from competing river crossings; • There is a reduction in delay southbound on Culham Crossing, but a slight increase in delay northbound. This means there is nearly two minutes of delay on the		Paramics modelling for this option shows that: • In the AM peak, the most significant increase is on the High Street/Oxford Road southbound route through Clifton Hampden, which shows an increase in average journey time of approximately 300 seconds in a scenario with all growth. Increased congestion at Clifton Hampden causes increased journey times on the A415 near Culham. • In the PM peak there is an increase in congestion at Clifton Hampden both on the Oxford Road approach to the A415 and eastbound on the approach to the Abingdon Road/High Street junction. This demonstrates that without the HIF schemes and with only a small number of new homes, the model experiences severe congestion. Significant queues and delays are experienced at Clifton Hampden with circa 2 km queues from the Clifton Hampden staggered junction passed CSC. • In a scenario where		This scheme is expected to improve journey reliability

												northbound approach to the A415 in the PM peak. However, reflecting the nature of the local highway network, the Culham Crossing is likely to remain an attractive alternative. Therefore, some degree of delay can be expected, especially considering the network is facing further strain from additional demand assigned to the network in 2041. Inevitably, given the scale of growth and the current issues across the network, congestion to a certain degree cannot be removed entirely, but day-to-day journeys will be made more reliable		the Clifton Hampden Bypass and other HIF schemes are on the network, there are very low levels of queueing along the A415 in the AM Peak.		
		E1.3	Wider economic	Future Economic Impact			The scheme will promote economic growth		The scheme will promote economic growth		The scheme will promote economic growth		The scheme will promote economic growth		The scheme will promote economic growth

		E1.4	Resilience	Impact on Network Vulnerability	🟥	🟩	This scheme would contribute in reducing the effect of climate change, through reduced congestion and junction delays. In addition, the provision of sustainable infrastructure, i.e. pedestrian and cyclist paths, would add to the environmental improvement. However, it is very likely that the scheme would encourage more car travel and less modal shift, thus its impact on climate change will be negligible.	🟩	This scheme would contribute in reducing the effect of climate change, through reduced congestion and junction delays. In addition, the provision of sustainable infrastructure, i.e. pedestrian and cyclist paths, would add to the environmental improvement. However, it is very likely that the scheme would encourage more car travel and less modal shift, thus its impact on climate change will be negligible.	🟩	This scheme would contribute in reducing the effect of climate change, through reduced congestion and junction delays. In addition, the provision of sustainable infrastructure, i.e. pedestrian and cyclist paths, would add to the environmental improvement. However, it is very likely that the scheme would encourage more car travel and less modal shift, thus its impact on climate change will be negligible.	🟩	This scheme would contribute in reducing the effect of climate change, through reduced congestion and junction delays. In addition, the provision of sustainable infrastructure, i.e. pedestrian and cyclist paths, would add to the environmental improvement. However, it is very likely that the scheme would encourage more car travel and less modal shift, thus its impact on climate change will be negligible.	🟩	This scheme would contribute in reducing the effect of climate change, by encouraging less car travel and more shift to sustainable modes.
		E1.5	Delivery of Housing	Impact on development			Absence of this scheme will significantly affect the area's development with Didcot's housing and employment growth only partially delivered..		Absence of this scheme will significantly affect the area's development with Didcot's housing and employment growth only partially delivered..		Absence of this scheme will significantly affect the area's development with Didcot's housing and employment growth only partially delivered..		Absence of this scheme will significantly affect the area's development with Didcot's housing and employment growth only partially delivered..		This scheme is expected to be resilient

	E2. Carbon Emissions	E2.1	Carbon Emissions	Impact on the environment and climate change challenge / Change in CO2 emissions	1	4	Modelling of GHG emissions has shown that the scheme will lead to a reduction in Carbon Emissions as a result of the scheme compared to the Do Minimum Scenario (with an increase in employment and housing but no transport improvements)	4	Modelling of GHG emissions has shown that the scheme will lead to a reduction in Carbon Emissions as a result of the scheme compared to the Do Minimum Scenario (with an increase in employment and housing but no transport improvements)	4	Modelling of GHG emissions has shown that the scheme will lead to a reduction in Carbon Emissions as a result of the scheme compared to the Do Minimum Scenario (with an increase in employment and housing but no transport improvements)	4	Modelling of GHG emissions has shown that the scheme will lead to a reduction in Carbon Emissions as a result of the scheme compared to the Do Minimum Scenario (with an increase in employment and housing but no transport improvements)	4	This scheme will promote modal shift, through which fuel use will be reduced. However, it requires high level of construction which have a negative impact on C)2
	E3. Socio-distributional Impacts	E3.1	Social and distributional	Impact on users	2	4	The delivery of affordable housing will be a great social benefit for the area, due to the reduction in overcrowding in existing social housing and the reduction in homelessness.	4	The delivery of affordable housing will be a great social benefit for the area, due to the reduction in overcrowding in existing social housing and the reduction in homelessness.	4	The delivery of affordable housing will be a great social benefit for the area, due to the reduction in overcrowding in existing social housing and the reduction in homelessness.	4	The delivery of affordable housing will be a great social benefit for the area, due to the reduction in overcrowding in existing social housing and the reduction in homelessness.	3	This scheme will benefit the area from a socio-distributional point of view.
		E3.2	Regeneration	Impact on wider area realm.			This scheme would deliver agglomeration benefits through two avenues: • "Static" agglomeration or proximity effects – these result from improved connectivity between businesses which increases the "effective density" of (the measure of agglomeration) firms by bringing them - in effect - closer together. The net effect of these likely to be modest as the overall change in travel costs is limited		This scheme would deliver agglomeration benefits through two avenues: • "Static" agglomeration or proximity effects – these result from improved connectivity between businesses which increases the "effective density" of (the measure of agglomeration) firms by bringing them - in effect - closer together. The net effect of these likely to be modest as the overall change in travel costs is limited		This scheme would deliver agglomeration benefits through two avenues: • "Static" agglomeration or proximity effects – these result from improved connectivity between businesses which increases the "effective density" of (the measure of agglomeration) firms by bringing them - in effect - closer together. The net effect of these likely to be modest		This scheme would deliver agglomeration benefits through two avenues: • "Static" agglomeration or proximity effects – these result from improved connectivity between businesses which increases the "effective density" of (the measure of agglomeration) firms by bringing them - in effect - closer together. The net effect of these likely to be modest as the overall change in travel costs is limited		This scheme will positively impact the areas regeneration and will reduce severance between the north and south areas of the rail line

							(as the externality effects from additional housing largely outweigh the time savings from the infrastructure). • "Dynamic" agglomeration – reflected by the change in scale and / or location of economic activity. New housing developments will have a direct role in making the area a more viable and attractive location for businesses to locate, expand and invest, thereby increasing the overall number of jobs in the area than would be possible in the absence of the scheme. This will thereby support the expansion of jobs in already dynamic and highly productive cluster and yield productivity benefits at a local and national level.		(as the externality effects from additional housing largely outweigh the time savings from the infrastructure). • "Dynamic" agglomeration – reflected by the change in scale and / or location of economic activity. New housing developments will have a direct role in making the area a more viable and attractive location for businesses to locate, expand and invest, thereby increasing the overall number of jobs in the area than would be possible in the absence of the scheme. This will thereby support the expansion of jobs in already dynamic and highly productive cluster and yield productivity benefits at a local and national level.		as the overall change in travel costs is limited (as the externality effects from additional housing largely outweigh the time savings from the infrastructure). • "Dynamic" agglomeration – reflected by the change in scale and / or location of economic activity. New housing developments will have a direct role in making the area a more viable and attractive location for businesses to locate, expand and invest, thereby increasing the overall number of jobs in the area than would be possible in the absence of the scheme. This will thereby support the expansion of jobs in already dynamic and highly productive cluster and yield productivity benefits at a local and national level.		(as the externality effects from additional housing largely outweigh the time savings from the infrastructure). • "Dynamic" agglomeration – reflected by the change in scale and / or location of economic activity. New housing developments will have a direct role in making the area a more viable and attractive location for businesses to locate, expand and invest, thereby increasing the overall number of jobs in the area than would be possible in the absence of the scheme. This will thereby support the expansion of jobs in already dynamic and highly productive cluster and yield productivity benefits at a local and national level.		

		E3.3	Regional imbalance	As defined in the Green Book, Regeneration is the holistic process of reversing economic, social and physical decay in areas where it has reached a stage when market forces alone will not suffice.	🟧	🟩	This scheme will have a positive impact on the current north/south severance created by railway lines and the River Thames, and its implementation would reduce severance between ‘old’ and ‘new’ Didcot. It would also help to segregate local from strategic traffic by removing through traffic from the centre of Didcot, which will create a safer environment for pedestrians and cyclists.	🟩	This scheme will have a positive impact on the current north/south severance created by railway lines and the River Thames, and its implementation would reduce severance between ‘old’ and ‘new’ Didcot. It would also help to segregate local from strategic traffic by removing through traffic from the centre of Didcot, which will create a safer environment for pedestrians and cyclists.	🟩	This scheme will have a positive impact on the current north/south severance created by railway lines and the River Thames, and its implementation would reduce severance between ‘old’ and ‘new’ Didcot. It would also help to segregate local from strategic traffic by removing through traffic from the centre of Didcot, which will create a safer environment for pedestrians and cyclists.	🟩	This scheme will have a positive impact on the current north/south severance created by railway lines and the River Thames, and its implementation would reduce severance between ‘old’ and ‘new’ Didcot. It would also help to segregate local from strategic traffic by removing through traffic from the centre of Didcot, which will create a safer environment for pedestrians and cyclists.	🟨	This scheme will positively impact the areas regeneration and will reduce severance between the north and south areas of the rail line
	E4. Local Environment	E4.1	Air Quality	Estimated change in NOx/ PM emitted	2	3	There are also slight improvements in Air Quality in Milton as a result of the scheme, with reductions in NO2.	2	There is a very slight worsening of Air Quality in Didcot as a result of the Science Bridge.	2	In addition, this option will reduce queuing within the villages close to the scheme (such as Culham and Sutton Courtenay) and will contribute to reducing noise in these historic villages. The scheme leads to improved Air Quality (NO2) in Long Wittenham, however there is expected to be a slight worsening in Air Quality in Appleford and Sutton Courtenay.	2	This option significantly reduces current and future vehicle queues and associated delays through historic villages including past Schools, leading to a reduction in carbon emissions. In addition, this option will reduce queuing within the villages close to the scheme (such as Clifton Hampden and Burcot) and will contribute to significantly improving Air Quality and reducing noise in these historic villages.	3	The scheme will have a positive impact on air quality, especially if line is electrified

		E4.2	Noise	Operation Period Environmental Impacts			The Premier Inn on the A4130 near Milton Interchange is anticipated to experience a moderate increase in traffic noise levels at both day and night. However, there is expected to be a much larger number of receptors which experience a potentially significant decrease in traffic noise in the long term as traffic moves of small local roads to main roads.		One property in Great Western Park is anticipated to experience a moderate increase in traffic noise levels at both day and night. However, there is expected to be a much larger number of receptors which experience a potentially significant decrease in traffic noise in the long term as traffic moves of small local roads to main roads.		There is anticipated to be a moderate increase at Culham Science Centre Nursery in the long term. There are also expected to be moderate to major increases in locations close to the scheme such as the southern edge of Appleford. However, there are many locations in which a moderate to major decrease in traffic noise is expected including educational facilities in Culham and places of worship in Long Wittenham. There will also be a significant reduction in traffic noise for residential properties in local villages, including Culham and Long Wittenham.		There are expected to be moderate to major increases in locations close to the scheme such as the northern edge of Clifton Hampden. However, there are several locations in which a moderate to major decrease in traffic noise is expected including the school, a medical building and places of worship in Clifton Hampden. There will also be a significant reduction in traffic noise for residential properties in local villages, including Clifton Hampden and Sutton Courtenay.		The scheme will have a negative impact on noise

		E4.3	Natural environment, heritage and landscape				There are expected to be significant adverse landscape effects for the location of the improvements, the Thames Floodplain and Clifton Hampden Farmland, due to the predominantly rural characteristics of the baseline landscape. By operational year 15, these impacts will be mitigated by landscape planting and the perception of the scheme will reduce. Significant adverse visual effects are predicted from south of the A4130 (residents of New Farm), Didcot (Great Western Park perimeter), however mitigation means it is likely by operation year 15 this will no longer be significant.		There are expected to be significant adverse landscape effects for the location of the improvements, the Thames Floodplain and Clifton Hampden Farmland, due to the predominantly rural characteristics of the baseline landscape. By operational year 15, these impacts will be mitigated by landscape planting and the perception of the scheme will reduce. Significant adverse visual effects are predicted from Didcot (Great Western Park perimeter), however mitigation means it is likely by operation year 15 this will no longer be significant.		There are expected to be significant adverse landscape effects for the location of the improvements, the Thames Floodplain and Clifton Hampden Farmland, due to the predominantly rural characteristics of the baseline landscape. By operational year 15, these impacts will be mitigated by landscape planting and the perception of the scheme will reduce. Significant adverse visual effects are predicted from south Appleford (PROW users and residents near Appleford Level Crossing) and the Thames Path National Trail. Mitigation means that in year 15 this impact will no longer be significant for Appleford residents.		There are expected to be significant adverse landscape effects for the location of the improvements, the Thames Floodplain and Clifton Hampden Farmland, due to the predominantly rural characteristics of the baseline landscape. By operational year 15, these impacts will be mitigated by landscape planting and the perception of the scheme will reduce. Significant adverse visual effects are predicted from the entrance to Culham Science Centre, residents at Fullamoor and around Clifton Hampden (residents at the northern edge of the village and PROW users).		This scheme will have a negative impact of amenity loss from development of greenfield land, due to the change of land use.

		E4.4	Streetscape and urban environment			Improvements to urban environment and streetscape through provision of segregated shared use path. This option is located within an urban context and as an existing road corridor would result in vegetation removal and road widening that would increase its prominence from some receptors. However, if future development to the south takes place the road corridor would become visually enclosed.		Improvements to urban environment and streetscape through provision of segregated shared use path. This option is located within an urban context but appears to be away from views associated with sensitive visual receptors. This option provides opportunities for local improvements in the townscape character.		Some of the historic villages located in Science Vale (such as Culham and Clifton Hampden) will benefit through reduced through traffic improving the urban environment. A new bridge over the River Thames would be a noticeable feature potentially visible from along a large stretch of the public rights of way that are present around it. The design of the bridge should be of high enough quality to enable it to be a positive feature of the view and as 'lightweight' in appearance as possible. However, it is likely that traffic passing along the bridge and approaches would remain visible resulting in unavoidable adverse visual effects.		Some of the historic villages located in Science Vale (such as Culham and Clifton Hampden) will benefit through reduced through traffic improving the urban environment. This option would pass in close proximity to the south of the Grade I Registered Park and Garden at Nuneham Courtenay. Whilst there are some blocks of woodland along the southern edge there may be views from the Park and Garden towards the Scheme which would need avoiding or mitigating, as well as clear views from public rights of way leading to and from it. This option would also result in the creation of a new road corridor to the west of Clifton Hampden resulting in some potentially significant impacts for residents in properties along the western and northern edges		Will improve streetscape and urban environment near to Culham and Didcot stations. Grove Station and associated infrastructure can be designed such that it will add to the streetscape and urban environment
	E5. Well-being	E5.1	Physical Activity	Health benefits	2	4	This scheme would deliver health benefits through increased physical activity and improved air quality. These benefit individuals, businesses (reduced absenteeism) and	4	This scheme would deliver health benefits through increased physical activity and improved air quality. These benefit individuals, businesses (reduced absenteeism) and	4	This scheme would deliver health benefits through increased physical activity and improved air quality. These benefit individuals, businesses (reduced	4	This scheme would deliver health benefits through increased physical activity and improved air quality. These benefit individuals, businesses (reduced absenteeism) and	4	This scheme would deliver health benefits through increased physical activity and improved air quality. These benefit individuals, businesses (reduced absenteeism) and

							wider society (reduced healthcare costs)		wider society (reduced healthcare costs)		absenteeism) and wider society (reduced healthcare costs)		wider society (reduced healthcare costs)		wider society (reduced healthcare costs)
		E5.2	Injury or deaths	Impact on number of accidents			This scheme will have an impact on a higher accident rate due to increased number of vehicles on the network, although severity of these accidents may decrease due to the lower speed of the road.		This scheme will have an impact on a higher accident rate due to increased number of vehicles on the network, although severity of these accidents may decrease due to the lower speed of the road.		This scheme will have an impact on a higher accident rate due to increased number of vehicles on the network		This scheme will have an impact on a higher accident rate due to increased number of vehicles on the network		This scheme will increase safety, as it promotes modal shift
		E5.5	Access to services	Access to a range of goods, services, people and places Education etc?			This scheme will have a positive impact on service accessibility as it will generate the need for new school places in all sectors – early years, primary, secondary and special needs (SEN) and health care centres		This scheme will have a positive impact on service accessibility as it will generate the need for new school places in all sectors – early years, primary, secondary and special needs (SEN) and health care centres		This scheme will have a positive impact on service accessibility as it will generate the need for new school places in all sectors – early years, primary, secondary and special needs (SEN) and health care centres		This scheme will have a positive impact on service accessibility as it will generate the need for new school places in all sectors – early years, primary, secondary and special needs (SEN) and health care centres		This scheme will positively impact accessibility of services such as schools, health care centres
		E5.6	Severance	Severance			Although this scheme is focused on road infrastructure, provision of pedestrian and cycling paths is also included.		Although this scheme is focused on road infrastructure, provision of pedestrian and cycling paths is also included. This would provide the following benefits: The new Science Bridge, connecting locations either side of the Great Western Railway, providing a direct routeing and reducing the		Although this scheme is focused on road infrastructure, provision of pedestrian and cycling paths is also included. This would provide the following benefits: The new Culham to Didcot crossing, which will provide for more direct and therefore shorter		Although this scheme is focused on road infrastructure, provision of pedestrian and cycling paths is also included.		Improves severance at Culham Rail Station through provision of a segregated footpath to access Culham Science Centre

									severance caused by the railway line.		routeing between areas that currently are affectively severed in terms of their ability to provide for walking and cycling movements.				
		E5.7	Expected VfM	Benefits for £1 of costs			High Benefit Cost Ratio 3.6:1. Non-monetised impacts include walking benefits, benefits to local Public Transport, wider “connectivity” benefits relating to “agglomeration” or “clustering” benefits that arise from firms and workers being located “closer” to one another as a result of improvements in transport connectivity, together with labour supply effects and benefits from increased market competition.		High Benefit Cost Ratio 3.6:1. Non-monetised impacts include walking benefits, benefits to local Public Transport, wider “connectivity” benefits relating to “agglomeration” or “clustering” benefits that arise from firms and workers being located “closer” to one another as a result of improvements in transport connectivity, together with labour supply effects and benefits from increased market competition.		High Benefit Cost Ratio 3.6:1. Non-monetised impacts include walking benefits, benefits to local Public Transport, wider “connectivity” benefits relating to “agglomeration” or “clustering” benefits that arise from firms and workers being located “closer” to one another as a result of improvements in transport connectivity, together with labour supply effects and benefits from increased market competition.		High Benefit Cost Ratio 3.6:1. Non-monetised impacts include walking benefits, benefits to local Public Transport, wider “connectivity” benefits relating to “agglomeration” or “clustering” benefits that arise from firms and workers being located “closer” to one another as a result of improvements in transport connectivity, together with labour supply effects and benefits from increased market competition.		High Benefit Cost Ratio 3.6:1. Non-monetised impacts include walking benefits, benefits to local Public Transport, wider “connectivity” benefits relating to “agglomeration” or “clustering” benefits that arise from firms and workers being located “closer” to one another as a result of improvements in transport connectivity, together with labour supply effects and benefits from increased market competition.
	Score - Economic Case				**8**	**19**		**18**		**19**		**19**		**18**	

Management Case	M1. Deliverability	M1.1		Timescales for implementing the option, from inception to delivery	5	4	This option scores positively for deliverability as designs have been produced and whilst this is dependent on the other HIF schemes and stakeholders, it is not as complex as other options. Scheme timetable 2-5 years	3	Designs have been produced, this is a complex scheme which is dependent on the other HIF schemes and stakeholders. For example this bridge crosses the Great Western Mainline and will require engagement with Network Rail and other stakeholders. Further work is required to determine deliverability. Scheme timetable 2-5 years	3	Designs have been produced, this is a complex scheme which is dependent on the other HIF schemes and stakeholders. For example, this option crosses the River Thames and will therefore require stakeholder agreement from the Canal and River Trust amongst other environmental stakeholders. Further work is required to determine deliverability. Scheme timetable 2-5 years	4	This option scores positively for deliverability as designs have been produced and whilst this is dependent on the other HIF schemes and stakeholders, it is not as complex as other options. Scheme timetable 2-5 years	3	Although the scheme is potentially deliverable, capacity issues would remain along the Didcot to Oxford line, which might require additional improvements that could affect deliverability. Scheme timetable 5-10 years and would need to fit in with rail investment programme
	M2. Public Acceptability	M2.1	Public acceptability / interest	Public view on scheme components. Earlier consultation responses may help inform this. Views are relevant when related to the actual scheme impacts e.g. traffic flows, congestion, noise, air quality etc, rather than whether the scheme enables more development	1	5	This scheme is expected to have high public acceptability as it does not require any behavioural changes.	4	This scheme is expected to have high public acceptability as it does not require any behavioural changes. However, it is possible that the public would prefer other schemes as this option is less flexible.	4	This scheme is expected to have high public acceptability as it does not require any behavioural changes. However, uncertainties involved in providing an “iconic” structure and the increased noise that might be experienced by nearby villages could reduce public acceptability.	4	This scheme is expected to have high public acceptability as it does not require any behavioural changes. However, it is possible that the public would prefer other schemes as this option is less flexible and requires building a new road in open country that would attract additional traffic to the A4074.	3	This scheme is expected to have fair public acceptability as it does not require any behavioural changes. However, it is possible that the public would prefer other schemes as the extent to which this scheme will deal with all the issues in Didcot and the surrounding area is not clear.

	M3. Practical Feasibility	M3.1	Scheme Feasibility	Design and Construction - Include programme etc. design standards	5	5	Although this option is constrained by existing, permitted, or planned development on either side, land referencing and negotiations to acquire land by agreement wherever possible have commenced. A potential Compulsory Purchase Order is also planned to run in parallel, which increases its feasibility.	3	This option is feasible, however the practicalities of engaging with Network Rail, and seeking necessary approvals, may pose some issues in relation to programme and deliverability. Furthermore, this option is constrained by development sites on either side of the Bridge which could affect its feasibility.	4	This option is expected to be feasible, although crossing the river is likely to pose engineering and environmental challenges.	4	This scheme is within the Green Belt, which may impact its feasibility.	3	Although the scheme is potentially feasible, capacity issues would remain along the Didcot to Oxford line, which might require additional improvements that could affect feasibility.
	M4. Supporting Evidence	M4.1	Modelling Outputs/Previous Experience		1	5	OCC has a successful track record delivering over infrastructure since 2012 and has a high performing team who have experience on a variety of project types delivered outputs to achieve benefits and contribute to the outcomes required for growing and improving Oxfordshire's economy and quality of life. Feasibility design, transport assessment and transport modelling have already been undertaken for this scheme. Transport modelling was undertaken using the Oxfordshire Strategic Model (OSM -	5	OCC has a successful track record delivering over infrastructure since 2012 and has a high performing team who have experience on a variety of project types delivered outputs to achieve benefits and contribute to the outcomes required for growing and improving Oxfordshire's economy and quality of life. Feasibility design, transport assessment and transport modelling have already been undertaken for this scheme. Transport modelling was undertaken using the Oxfordshire Strategic Model (OSM -	5	OCC has a successful track record delivering over infrastructure since 2012 and has a high performing team who have experience on a variety of project types delivered outputs to achieve benefits and contribute to the outcomes required for growing and improving Oxfordshire's economy and quality of life. Feasibility design, transport assessment and transport modelling have already been undertaken for this scheme. Transport modelling was undertaken using	5	OCC has a successful track record delivering over infrastructure since 2012 and has a high performing team who have experience on a variety of project types delivered outputs to achieve benefits and contribute to the outcomes required for growing and improving Oxfordshire's economy and quality of life. Feasibility design, transport assessment and transport modelling have already been undertaken for this scheme. Transport modelling was undertaken using the Oxfordshire Strategic Model (OSM -	4	Little modelling work has been done for this scheme, however OCC has a successful track record delivering over infrastructure since 2012 and has a high performing team who have experience on a variety of project types delivered outputs to achieve benefits and contribute to the outcomes required for growing and improving Oxfordshire's economy and quality of life.

							SATURN), while the DGT Paramics model was used for the Option Appraisal. Hence, the quality of evidence is considered to be high		SATURN), while the DGT Paramics model was used for the Option Appraisal. Hence, the quality of evidence is considered to be high		the Oxfordshire Strategic Model (OSM - SATURN), while the DGT Paramics model was used for the Option Appraisal. Hence, the quality of evidence is considered to be high		SATURN), while the DGT Paramics model was used for the Option Appraisal. Hence, the quality of evidence is considered to be high		
	M5. Key Risks	M5.1	Implementation Risks	Identified risks and Management.	2	3	Risks consider land acquisition and construction within a Flood Zone 2, which could affect the deliverability of the scheme.	3	Risks consider land acquisition, construction within a Flood Zone 2, and engaging with Network Rail for necessary approvals, which could affect the deliverability of the scheme,	2	Risks consider land acquisition, construction within a Flood Zone 2, and engaging with Canal and River Trust for necessary approvals, which could affect the deliverability of the scheme. As this is the largest scheme, its complexity might have a disproportionate effect on deliverability if these risks are not addressed. River crossing costs difficult to predict and may increase if iconic structure is required to get public and/or institutional	3	Risks consider land acquisition and construction within a Flood Zone 2, which could affect the deliverability of the scheme.	3	Would need to fit in with rail investment programme; uncertainty over operators' willingness to run additional/new services

											acceptance; additional traffic drawn into corridor could trigger additional infrastructure requirements on A4074 and in Abingdon.				
	Score - Management Case				**14**	**22**		**18**		**18**		**20**		**16**	
Financial Case	**F1. Affordability**	F1.1	Available Funds	Available Funds	5	5	This option is affordable as HIF funding has been secured.	5	This option is affordable as HIF funding has been secured.	5	This option is affordable as HIF funding has been secured.	5	This option is affordable as HIF funding has been secured.	3	Improvements to Culham and Didcot stations are likely to be affordable, however a new station at Grove would be very expensive.
	F2 Capital Costs (£m)	F2.1	Infrastructure capital costs, operating and	Infrastructure capital costs, operating and maintenance costs	3	5	Infrastructure cost: £22.672m	3	Infrastructure cost: £57.995m	2	Infrastructure cost: £125.948m	4	Infrastructure cost: £27.844m	2	£70m

	F3. Revenue Costs	F3.1	Revenue Costs	All running costs to keep the scheme in operation	4	3	Assumed at 10% of capital cost Revenue costs are associated with the ongoing maintenance and renewal of the scheme. Also, Central government capital allocations and grants issued as “not ring-fenced” will be allocated in line with OCC’s priorities. OCC could maximise capital receipts from the disposal of surplus land and buildings, but it could be that another option gives greater overall benefits and will be investigated. Prudential borrowing will be used to fund invest to save schemes where the cost of borrowing is met from future revenue savings by services. Other revenue avenues would be indirect tax from increased road demand. However, some of the revenue budgets include a level of uncertainty.	3	Assumed at 10% of capital cost Revenue costs are associated with the ongoing maintenance and renewal of the scheme. Also, Central government capital allocations and grants issued as “not ring-fenced” will be allocated in line with OCC’s priorities. OCC could maximise capital receipts from the disposal of surplus land and buildings, but it could be that another option gives greater overall benefits and will be investigated. Prudential borrowing will be used to fund invest to save schemes where the cost of borrowing is met from future revenue savings by services. Other revenue avenues would be indirect tax from increased road demand. However, some of the revenue budgets include a level of uncertainty.	3	Assumed at 10% of capital cost Revenue costs are associated with the ongoing maintenance and renewal of the scheme. Also, Central government capital allocations and grants issued as “not ring-fenced” will be allocated in line with OCC’s priorities. OCC could maximise capital receipts from the disposal of surplus land and buildings, but it could be that another option gives greater overall benefits and will be investigated. Prudential borrowing will be used to fund invest to save schemes where the cost of borrowing is met from future revenue savings by services. Other revenue avenues would be indirect tax from increased road demand. However, some of the revenue budgets include a level of uncertainty.	3	Assumed at 10% of capital cost Revenue costs are associated with the ongoing maintenance and renewal of the scheme. Also, Central government capital allocations and grants issued as “not ring-fenced” will be allocated in line with OCC’s priorities. OCC could maximise capital receipts from the disposal of surplus land and buildings, but it could be that another option gives greater overall benefits and will be investigated. Prudential borrowing will be used to fund invest to save schemes where the cost of borrowing is met from future revenue savings by services. Other revenue avenues would be indirect tax from increased road demand. However, some of the revenue budgets include a level of uncertainty.	3	10% of capital cost

	F4. Cost Profile and Risks	F4.1	Cost Profile and Risks	Costs to local businesses	2	4	Cost profile considered project management fees, site visits, design of all individual elements of the scheme such as bus stops, road alignment, pedestrian paths etc, land ownership, traffic modelling, production of reports, workshops, drainage and ground investigation, planning advice, air quality and noise modelling, heritage archive and aquatics ecology and flood investigation, public consultation and stakeholder workshops. There is clearly a degree of uncertainty about the level of future construction cost inflation for this scheme. A market adjustment to scheme costs to reflect indirect taxation has not been applied	4	Cost profile considered project management fees, site visits, design of all individual elements of the scheme such as bus stops, road alignment, pedestrian paths etc, land ownership, traffic modelling, production of reports, workshops, drainage and ground investigation, planning advice, air quality and noise modelling, heritage archive and aquatics ecology and flood investigation, public consultation and stakeholder workshops. There is clearly a degree of uncertainty about the level of future construction cost inflation for this scheme. A market adjustment to scheme costs to reflect indirect taxation has not been applied	4	Cost profile considered project management fees, site visits, design of all individual elements of the scheme such as bus stops, road alignment, pedestrian paths etc, land ownership, traffic modelling, production of reports, workshops, drainage and ground investigation, planning advice, air quality and noise modelling, heritage archive and aquatics ecology and flood investigation, public consultation and stakeholder workshops. There is clearly a degree of uncertainty about the level of future construction cost inflation for this scheme. A market adjustment to scheme costs to reflect indirect taxation has not been applied	4	Cost profile considered project management fees, site visits, design of all individual elements of the scheme such as bus stops, road alignment, pedestrian paths etc, land ownership, traffic modelling, production of reports, workshops, drainage and ground investigation, planning advice, air quality and noise modelling, heritage archive and aquatics ecology and flood investigation, public consultation and stakeholder workshops. There is clearly a degree of uncertainty about the level of future construction cost inflation for this scheme. A market adjustment to scheme costs to reflect indirect taxation has not been applied	4	
	Score - Financial Case				**14**	**17**		**15**		**14**		**16**		**12**	

Commercial Case	C1. Flexibility	C1.1	Option Flexibility	Purpose, alignment, capacity	1	5	This option is flexible, as the second lane of the dual carriageway could be used as a bus lane to facilitate more sustainable modes.	4	This option is relatively flexible as the provision of additional capacity would enable changes to the use of the bridge, but the location of the physical infrastructure could not be changed.	4	This option is future-proofed and could be used for sustainable modes in the future. However, the location of the crossing is not flexible.	4	This option is flexible as there is the opportunity to implement more sustainable modes along the bypass in the future.	3	Different elements could be pursued independently, partial upgrade might give some benefits
	C2. Funding (£m)	C2.1	Funding source	Qualitative assessment of the way the option will be financed	5	5	HIF Funding has been estimated at £218,017,000. This includes the costs for Schemes 1, 2,3 and 4 (HIF Business Case) 25% from local sources and 75% from government grant	5	HIF Funding has been estimated at £218,017,000. This includes the costs for Schemes 1, 2,3 and 4 (HIF Business Case) 25% from local sources and 75% from government grant	5	HIF Funding has been estimated at £218,017,000. This includes the costs for Schemes 1, 2,3 and 4 (HIF Business Case) 25% from local sources and 75% from government grant	5	HIF Funding has been estimated at £218,017,000. This includes the costs for Schemes 1, 2,3 and 4 (HIF Business Case) 25% from local sources and 75% from government grant	2	Funding for this scheme would be coming from the rail industry
	C3. Income (£m)	C3.1	Income	Income Generation	2	3	Indirect tax from increased road demand	3	Indirect tax from increased road demand	3	Indirect tax from increased road demand	3	Indirect tax from increased road demand	2	Income will be generated, however its source is currently unknown
	Score - Commercial Case				**8**	**13**		**12**		**12**		**12**		**7**	
	Total - Score				*56*	*121*		*112*		*112*		*117*		*88*	

Appendix F Didcot Garden Town HIF1 Modelling

In addition to the transport modelling discussed in the main body of this report, further modelling has been undertaken to assess the HIF1 schemes. In order to give context to how the HIF schemes were initially identified, the transport modelling undertaken as part of the Local Plan process (ETI) should be considered.

Initially, OCC's Local Transport Plan 3 identified the requirement for Relief to Manor Bridge, called 'Science Bridge', as described above in section 3.4.30. Further to this, the VoWHDC Local Plan (2016) identified the requirement for all four HIF schemes, as part of a wider package of schemes. The SODC Local Plan (2020) then increased the amount of housing to higher levels than in the VoWHDC Local Plan, which further reinforced the need for the four HIF schemes.

The **Didcot Microsimulation Model: Didcot HIF Option Appraisal** (February 2019) used the 2017 Didcot Microsimulation Paramics Discovery Base Model as the starting point for creating the models for testing. The model area extends from the A417 near East Hendred in the west, through to A4130 Hadden Hill in the East. The network includes the A34 (Chilton through to Milton Interchange), and up to A4074 Golden Balls Roundabout in the north. The model was developed in Paramics Discovery version 19. OCC instructed Systra use the Paramics model to assess the future year of 2033 in various scenarios, including the do-minimum scenario without the HIF schemes. The outcome of this assessment is described below.

Three options were modelled as part of this work:

- 2033 Option 1 – With Requested HIF Funding: this scenario reflects the full requested HIF funding and the full development.
- 2033 Option 2 – With Reduced HIF Funding: this scenario has a reduced amount of HIF funding and only partial development coming forward, and as such included only the Didcot to Culham River Crossing and Clifton Hampden Bypass.
- 2033 Option 3 – Do-Nothing: this scenario has no HIF schemes.

The networks for the above scenarios include some additional transport mitigation measures compared to the Base Model, as described in the report.

Table 9-1 below shows the measures included in each modelled scenario, and the optimisation, if any, used for that scenario.

Table 9-1 Measures and optimisation considered in the Didcot Microsimulation Model

Measures	2033 Option 1	2033 Option 2	2033 Option 3
	Access junctions associated with development sites	Access junctions associated with development sites	Access junctions associated with development sites
	Power Station/Manor Bridge Roundabout improvements	Power Station/Manor Bridge Roundabout improvements	Power Station/Manor Bridge Roundabout improvements
	Featherbed Lane Improvements	Featherbed Lane Improvements	Featherbed Lane Improvements
	Harwell Link Road	Harwell Link Road	Harwell Link Road
	Northern Perimeter Road 3	Northern Perimeter Road 3	Northern Perimeter Road 3
	Valley Park Spine Road	Valley Park Spine Road	Valley Park Spine Road
	Milton Interchange improvements	Milton Interchange improvements	Milton Interchange improvements

Measures	2033 Option 1	2033 Option 2	2033 Option 3
	New Culham Crossing (HIF Scheme)	New Culham Crossing (HIF Scheme)	Cow Lane Closure
	Clifton Hampden Bypass (HIF Scheme)	Clifton Hampden Bypass (HIF Scheme)	Hitchcock Way realignments
	A4130 widening (HIF Scheme)		
	Didcot Science Bridge (HIF Scheme)		
Optimisation undertaken on the following junctions	New Culham Crossing North Roundabout	New Culham Crossing North Roundabout	*No optimisations*
	New Culham Crossing/Appleford/B4106 Roundabout	New Culham Crossing/Appleford/B4106 Roundabout	
	New Culham Crossing A4130/Collet Roundabout	New Culham Crossing A4130/Collet Roundabout	
	Didcot Science Bridge A4130/Purchas Road Roundabout		

The models were run 10 times for each time period and compared using the average network journey time and speed, as well as using journey time analysis.

In addition to background growth, the 2033 Option models included traffic related to proposed developments in the study area. Options 1 and 3 considered the same level of housing growth (17,326 units). Further information can be found in the Didcot Microsimulation Model: Didcot HIF Option Appraisal report.

A trip rate was assigned for each development, which was used to calculate the hourly trip rate. The AM peak period was set to 07:00-10:00 and the PM peak period to 16:00-19:00. It is understood from OCC that, through HIF co-development, a reduction in demand in Paramics was required. This was to take into account suppressed demand; mode shift (due to interventions associated with HIF and development interventions for walking, cycling and public transport); locating new homes closer to jobs (especially at Culham and Berinsfield) and future travel habits and innovation. Development-related demands were subsequently reduced to 60%. Each development was also assigned a new, individual Paramics model zone. The distribution of trips to and from the developments was derived from the OSM.

The 2033 Option 1 model, which considers the full development package at 60% demand and all four HIF schemes suggests some areas of congestion. In both the AM and PM peaks, this congestion is most significant at the Goldenballs Roundabout and Milton Interchange, away from the HIF schemes. The proposed Culham Crossing and Clifton Hampden Bypass, along with the optimised associated junctions, combined show relatively low levels of queueing on the A415 and the Culham crossings in the AM peak.

The 2033 Option 2 model, which considers the partial development package at 60% demand and reduced HIF funding, suggests some areas of high congestion. In the AM and PM peaks, congestion is most significant on the A4130, and at the A4074 Golden Balls Roundabout and A34 Milton Interchange. The Option 2 model has little congestion on the A415, but significant queueing on the A4130, as this model does not benefit from the inclusion of the Didcot Science Bridge or the A4130 widening. Queueing is also suggested in both peaks at the A4130/B4493 roundabout and at the A4130/Milton Road roundabout. Congestion on the A4130 in this option model causes increased queueing on the existing Culham crossing southbound. This increased queueing is due to vehicles rerouting via Harwell Road and through Sutton Courtenay (as opposed to the B4016 and Lady Grove route via Appleford) to avoid the congestion on the A4130. This means that there are fewer gaps for

vehicles to turn out of Abingdon Road onto the B4016 Appleford Road, which causes the increase in queueing on the Abingdon Road.

The 2033 Option 3 model, which considers the full development package at 60% demand but with no HIF infrastructure, suggests very high levels of congestion starting from early on in each of the AM and PM peak periods and continuing throughout. Congestion in both peak periods is suggested to be caused from vehicles queueing back on the B4016 Lady Grove from the junction with Sires Hill (Lady Grove is the minor side-arm at the junction). This queue extends back to the A4130 on the eastern edge of Didcot, causing model gridlock in the town centre. The gridlock in the Option 3 model means it is not possible to extract realistic results from these model runs, as there are large numbers of vehicles queueing on and off the network at the end of the simulation period. Therefore, results extracted would not accurately reflect the length of delay on the network. The gridlock also suggests the network would be over capacity and would cease to function as usual, creating long queues and delays.

The average network statistics for the AM and PM peak periods can be found in Table 9-2 and Table 9-3 below. These show that Option 1 has higher average journey times and lower average speeds than Option 2 in both the AM and PM peaks. This is because in Option 2 fewer homes are delivered as part of developments which means that not as many people would be using the network as in Option 1, and therefore reduces delay. Note that without the HIF schemes (Option 3), results cannot be extracted due to the model gridlock.

Table 9-2 AM Network Average Statistics

	Option 1	Option 2	Option 3
Average Journey Time (s)	752	705	N/A
Average Speed (mph)	21.46	23.03	N/A

Source: Didcot Microsimulation Model: Didcot HIF Option Appraisal Report (February 2019)

Table 9-3 PM Network Average Statistics

	Option 1	Option 2	Option 3
Average Journey Time (s)	803	776	N/A
Average Speed (mph)	19.94	21.04	N/A

Source: Didcot Microsimulation Model: Didcot HIF Option Appraisal Report (February 2019)

Journey time analysis has been undertaken, and information was collected for four specific routes, each in both directions within the study area. The routes are shown in Figure 9-1 and outlined below:

- A4130 – Between Sir Frank Williams Ave and Abingdon Road
- A415 – Between Tollgate Road and A4074 Oxford Road
- High Street/Oxford Road – Between Sires Hill and Golden Balls
- Culham Bridge – Harwell Rd/Milton Rd/High Street and Appleford Road

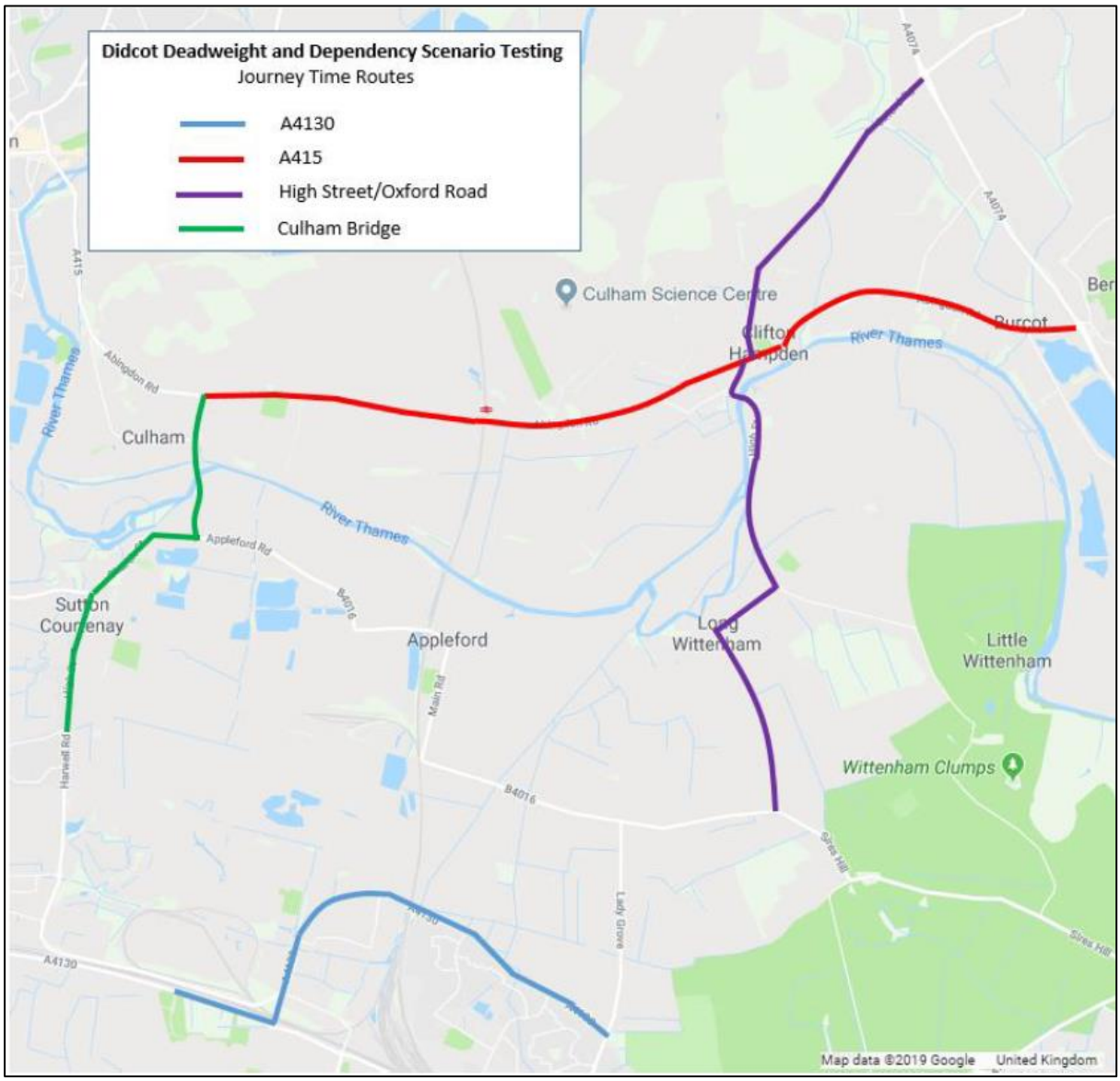

Figure 9-1 Journey Time Routes

As noted above, it was not possible to extract results for the do-minimum (Option 3). Overall, the journey time analysis shows that the A4130 journey times are lower in Option 1 than in Option 2 in the westbound direction. In the eastbound direction, the Option 1 journey time is lower than Option 2 in the AM and similar to Option 2 in the PM. Journey times on the A4130 westbound are lower in Option 1, as vehicles can reroute using Didcot Science Bridge, which alleviates congestion.

Journey times on the A415 are generally higher in Option 1 than in Option 2. This is owed to Option 1 having a higher level of demand than Option 2, even though both models consider the same

infrastructure on this route. Journey time in the westbound direction during the PM peak is higher in Option 2 than in Option 1, as vehicles in Option 2 reroute to avoid the A4130 congestion.

The journey times along High Street/Oxford Road between Sires Hill and Golden Balls Roundabout are higher in Option 1 on the northbound path due to the higher level of demand in this model.

The Culham Bridge journey times are higher in Option 2 than in Option 1 in the PM peak, due to vehicles rerouting to avoid the A4130 congestion in the Option 2 model. Full journey time analysis can be found in the Didcot Microsimulation Model: Didcot HIF Option Appraisal Report.

In summary, the modelling shows that the road network would be significantly over capacity in future without the HIF Schemes.

It should be noted that there was an earlier (January 2019) version of this report which was the first iteration. The second iteration (February 2019) included some optimisations to some of the HIF interventions to identify if these operate better. This is the analysis which has been described above, and demonstrates that the optimisations of the schemes lead to better operation and therefore have been carried through to design.

OSM

As outlined in the Access to Science Vale OAR Part 1 (March 2018), the OSM was run to understand the impact of 2013-2031 growth across Didcot and Science Vale. For the future year scenarios, the models have been run with all assumed growth in the Districts' Local Plans, but without any major improvements in the Didcot area (excluding the committed Northern Perimeter Road phase 3 scheme).

The model demonstrated that there would be around 25% traffic growth in the AM and PM peaks in Didcot area, while in the interpeak, traffic growth could be up to 45%. Considerable traffic growth variation is suggested across the area, with the Northern Perimeter Road having the highest growth, while Station Road/Hitchcock Way (through the centre of Didcot) shows considerable reduction in flow as a consequence.

In Didcot Town Centre, traffic flows in Lower Broadway are predicted to increase by around 20% in the peaks and over 40% in the interpeak. In particular, traffic flow crossing the railway through the Cow Lane Tunnel is predicted to rise by 20-30%, while traffic flow on the A4130 Link Road to the A34 is predicted to increase by 30-40% in the peaks and by over 50% in the interpeak.

Traffic flows on the existing river crossing are also forecast to increase by around 30% in the peak periods and around 40% in the interpeak[65] at Culham Bridge and Clifton Hampden Bridge. Flows on Abingdon Bridge are predicted to rise less but with still significant increases of nearly 20% in the peak periods and 35% in the interpeak.

A more recent run of the OSM, as outlined in the successful HIF Bid (2019), identifies similar results as the Paramics modelling. High level observations are summarised below based on the 2041 Scenario C. Vehicle volumes are not so pronounced on the northern section of the proposed Didcot to Culham River Crossing. Vehicles are attracted to the link road as a competitive alternative to other river crossings, whilst the proposed housing development in Culham generates trips to employment sites in Didcot. The impact of the increase in capacity is similar during both peak periods.

The observations for the AM Peak are as follows:

- due to the increase in capacity, more traffic is drawn to Didcot to Culham Crossing from competing river crossings; and
- there is a reduction in delay southbound on Culham Crossing, but a slight increase in delay northbound. This equates to a more balanced level of delay, with a 40-50 second

[65] Although technically the bridges are already at capacity in the base year the model would continue to assign additional traffic to these routes if alternative routes are not available. This would be likely to result in predicted queueing times beyond what would be acceptable. In practice the likely behavioural response would be a switch by some drivers to earlier or later journey times and a consequent extension of the duration of peak conditions

delay in both directions, which is likely to be a more representative reflection of conditions that are forecast in 2041.

The observations for the PM Peak are as follows:

- akin to the AM peak, more traffic is drawn to Culham Crossing from competing river crossings; and
- there is a reduction in delay southbound on Culham Crossing, but a slight increase in delay northbound. This means there is nearly two minutes of delay on the northbound approach to the A415 in the PM peak. However, reflecting the nature of the local highway network, the Culham Crossing is likely to remain an attractive alternative. Therefore, some degree of delay can be expected, especially considering the network is facing further strain from additional demand assigned to the network in 2041.

Inevitably, given the scale of growth and the current issues across the network, congestion to a certain degree cannot be removed entirely.

As discussed above, this work has since been superseded by the modelling undertaken using the Paramics model. However, the OSM modelling is still of value as it gives a broader context to the modelling.

Junction Capacity Modelling

In addition to the junction capacity modelling described in the main body of this OAR, a fuller assessment of the impact of the HIF schemes has been undertaken. This has included modelling of the junctions impacted by the HIF schemes, as well as junctions across the wider study area. Junctions were assessed with and without the HIF schemes in 2024 and 2034, and network-wide statistics with and without the HIF schemes were analysed. Further information on the junction capacity modelling can be found in the Didcot Garden Town Transport Assessment (2021).

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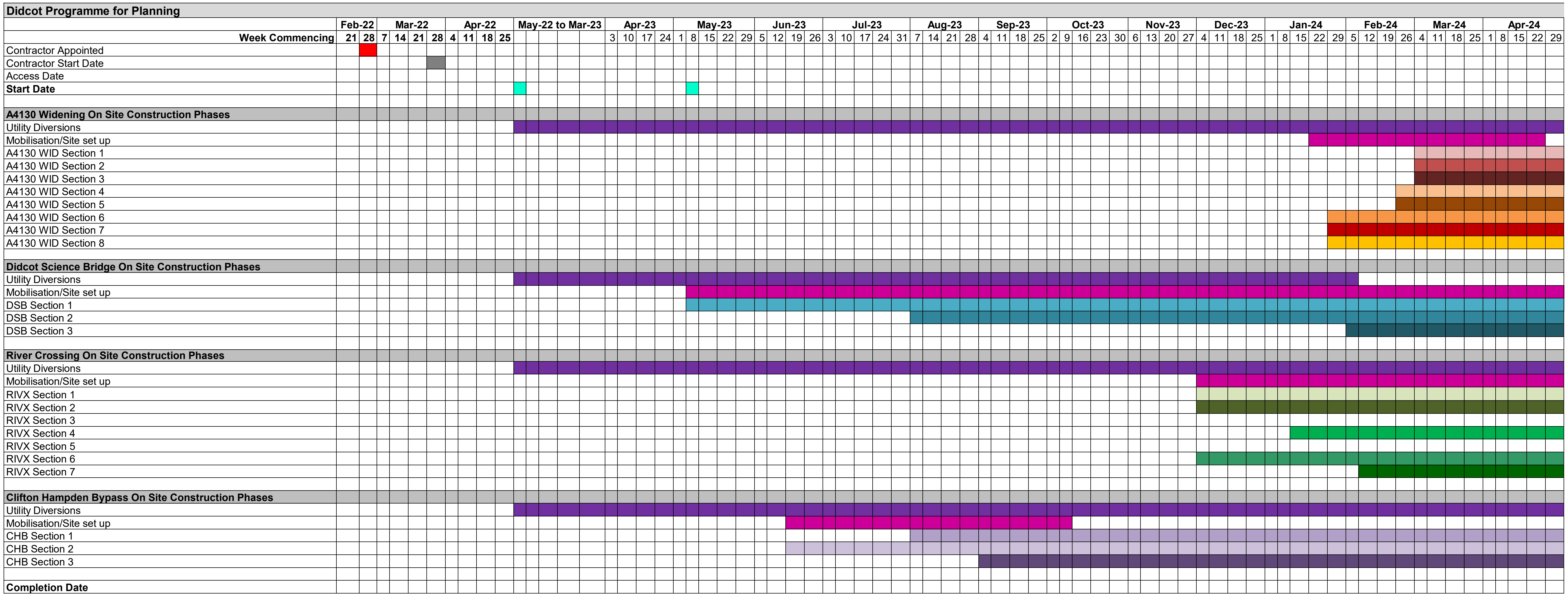
Appendix B Construction Programme


Didcot Programme for Planning
Feb-22 Mar-22 Apr-22 May-22 to Mar-23 Apr-23 May-23 Jun-23 Jul-23 Aug-23 Sep-23 Oct-23 Nov-23 Dec-23 Jan-24 Feb-24 Mar-24 Apr-24
Week Commencing
21 28 7 14 21 28 4 11 18 25 3 10 17 24 1 8 15 22 29 5 12 19 26 3 10 17 24 31 7 14 21 28 4 11 18 25 2 9 16 23 30 6 13 20 27 4 11 18 25 1 8 15 22 29 5 12 19 26 4 11 18 25 1 8 15 22 29
Contractor Appointed
Contractor Start Date
Access Date
Start Date
A4130 Widening On Site Construction Phases
Utility Diversions
Mobilisation/Site set up
A4130 WID Section 1
A4130 WID Section 2
A4130 WID Section 3
A4130 WID Section 4
A4130 WID Section 5
A4130 WID Section 6
A4130 WID Section 7
A4130 WID Section 8
Didcot Science Bridge On Site Construction Phases
Utility Diversions
Mobilisation/Site set up
DSB Section 1
DSB Section 2
DSB Section 3
River Crossing On Site Construction Phases
Utility Diversions
Mobilisation/Site set up
RIVX Section 1
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RIVX Section 4
RIVX Section 5
RIVX Section 6
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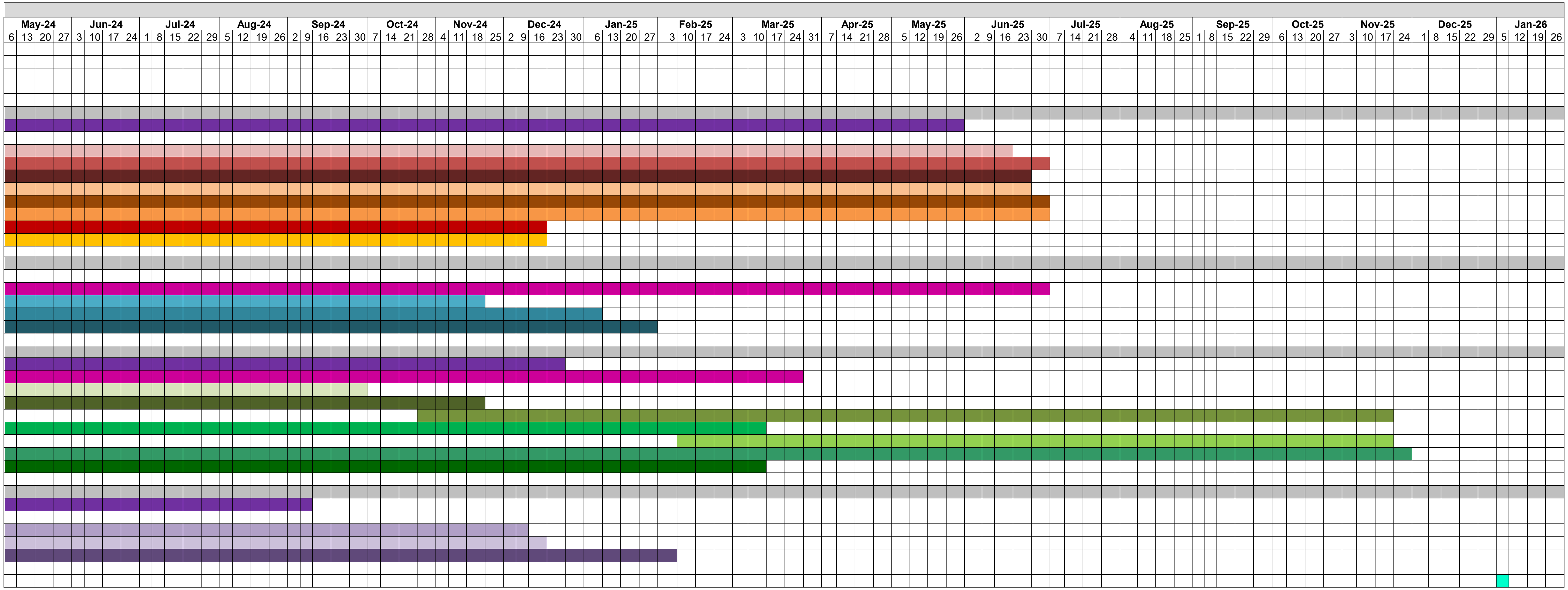
CHB Section 1
CHB Section 2
CHB Section 3
Completion Date


May-24 Jun-24 Jul-24 Aug-24 Sep-24 Oct-24 Nov-24 Dec-24 Jan-25 Feb-25 Mar-25 Apr-25 May-25 Jun-25 Jul-25 Aug-25 Sep-25 Oct-25 Nov-25 Dec-25 Jan-26
6 13 20 27 3 10 17 24 1 8 15 22 29 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25 2 9 16 23 30 6 13 20 27 3 10 17 24 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 1 8 15 22 29 5 12 19 26