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# **Non-motorised crossings of the A40 at Eynsham**

24 April 2020  
**FINAL REPORT**



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Oxfordshire County Council  
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24 April 2020  
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## **Non-motorised crossings of the A40 at Eynsham:**

Mott Macdonald/Knight Architects, Report – 24<sup>th</sup> April 2020

### **Oxfordshire County Council: Officer Response**

**Date: July 2020**

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#### **Background**

Mott MacDonald and Knight Architects were appointed by Oxfordshire County Council (OCC) and West Oxfordshire District Council (WODC) to investigate and advise on a potential solution to deliver a grade-separated crossing for pedestrians and cyclists across the A40 at Eynsham, to support the Oxfordshire Cotswolds Garden Village (OCGV) and the West Eynsham SDA proposals.

The study assessed whether grade separation was technically feasible at one or more locations in the vicinity of Eynsham and considered both bridge and subway options.

An Assessment Framework was developed in order to assess the options, with criteria including land acquisition, the extent to which the crossing location would serve future desire lines, residential amenity, crossing time and level change.

Potential lowering or raising of the A40 carriageway was also considered in order to unlock potential crossing options that would otherwise not be feasible due to the length of approach ramps or other issues.

#### **Conclusions**

The three best performing crossing options that were taken forward to Concept Refinement were:

- **A subway between Old Witney Road and Cuckoo Lane.** A bridge was not considered feasible due to overlooking, residential access issues and land acquisition implications.
- **A bridge near Hanborough Road and the Eynsham roundabout.**
- **A bridge towards the Western Development roundabout.** This option was not considered to be a preferred shorter term solution due to its relatively peripheral location in respect of the allocated sites

The study concluded that the 'best performing option' was a bridge near Hanborough Road and Eynsham Roundabout **with the level of the A40 lowered by 3 metres** through integration of the works taking place as part of the A40 Corridor (HIF) improvements. Without lowering of the A40, this option had issues with overlooking of residential properties and access to existing dwellings.

#### **OCC Officer Response**

Having considered the study findings, OCC officers concluded that lowering the A40 by 3 metres near Hanborough Road was not feasible due to cost and construction implications. It was also considered that a bridge near Hanborough Road was not as well located to meet future pedestrian and cycle desire lines compared to a grade separated crossing at Old Witney Road/Cuckoo Lane, particularly given the proposed locations of the schools within the Garden Village.

**The option to be incorporated as part of the Garden Village proposals is the underpass between Old Witney Road and Cuckoo Lane. OCC are undertaking work to explore how this is best integrated within the A40 Corridor improvements, to be designed in line with best practice place-making principles and in particular with clear sight lines through.**

# Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
1	11/12/2019	CH	CG	CG	Draft Report
2	22/01/2020	CH	CG	CG	Second Draft Report
3	24/04/2020	CH	CG	CG	Final Report
3	29/04/2020	CH	CG	CG	For Publication

Document reference: 414585 |

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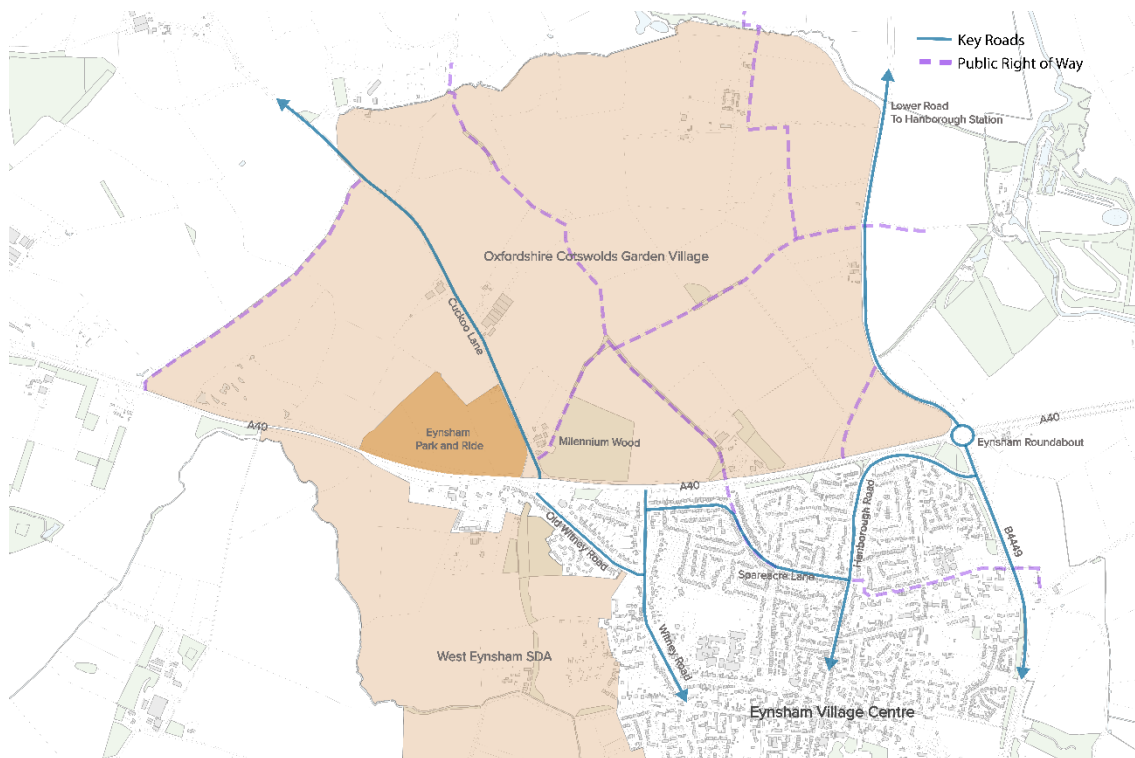
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# 1. Introduction

Mott MacDonald (MM) and Knight Architects (KA) were appointed by Oxfordshire County Council (OCC) and West Oxfordshire District Council (WODC) to investigate and advise on a recommended solution for non-motorised access and linkage across the A40 at Eynsham in support of the Oxfordshire Cotswolds Garden Village (OCGV) Development and the West Eynsham Strategic Development Area (SDA). The Study Area is shown in Figure 1.1.



**Figure 1.1: The Study Area**

The OCGV development will deliver around 2,200 new homes together with a Science Park on a site north of the A40 at Eynsham. WODC is producing an Area Action Plan (AAP) for the site defining how the development will be taken forward including its form, function and general layout.

The AAP forms part of the statutory planning process and WODC and OCC are collaboratively preparing the AAP and the associated evidence base for OCGV. The Garden Village is one of the Government's Garden Communities and is being developed in accordance with garden village principles which are as follows:

- Holistically planned new settlement
- Enhances the natural environment
- High-quality affordable housing & locally accessible work in beautiful, healthy & sociable communities
- Land value capture to benefit the community
- Strong vision, leadership & community engagement
- Community ownership & long-term stewardship of assets
- Genuinely affordable mixed-tenure homes
- Wide range of local jobs in the Garden Village within easy commuting distance of homes
- Beautifully & imaginatively designed homes with gardens
- Healthy communities, including opportunities to grow food
- Provides a comprehensive green infrastructure network & net biodiversity gain
- Use zero-carbon & energy-positive technology to ensure climate resilience
- Strong cultural, recreational and shopping facilities in walkable, vibrant, sociable neighbourhoods
- Integrated and accessible transport systems, with walking, cycling and public transport as the most attractive forms of local transport

A further 1,000 homes are planned as part of the West Eynsham SDA for which WODC is preparing a Supplementary Planning Document (SPD) to guide development and promote integration with both the OCGV and the existing settlement of Eynsham. Infrastructure to support the OCGV and West Eynsham SDA development areas needs to be planned carefully and holistically.

Both developments will be unlocked by major transport improvements along the A40 which are described in Section 2.

The Eynsham Neighbourhood Plan under Policy ENP14 – Sustainable Growth, highlights the importance of providing accessible and safe connectivity between new development and Eynsham for pedestrians, cyclists and riders.

The provision of safe and effective connections for pedestrians, cyclists and other non-motorised movements across the A40 at Eynsham must be included as central objectives of all development and transport improvements in the area. Currently there is only one controlled crossing at the Witney Road traffic lights and four uncontrolled crossings of the A40. These are not considered able to provide safe and direct connections for pedestrian and cyclists given the significant volumes of traffic including Heavy Goods Vehicles (HGVs) and/or high-speed traffic carried by the A40 for large parts of the day. While the current demand for movement is low this will change significantly with the two major development areas both north and south of the A40.

As things stand, the A40 corridor transport improvements incorporate four new at-grade crossings for pedestrians and cyclists, three controlled by traffic signals and one uncontrolled. However, the design of these did not directly consider the future demand likely to be generated by the OCGV or West Eynsham SDA.

## Scope of this Commission

The scope of our commission was “*to thoroughly assess whether grade separation is technically feasible at one or possibly more locations*” within the Study Area and specifically to:

- Review technical notes and relevant documents including the emerging OCGV Masterplan;
- Review the land constraints along the A40 in the vicinity of OCGV;
- Identify potential locations for crossings;
- Establish crossing options, using design and innovation best practice including options to change the alignment of the A40 and to introduce a “Garden Bridge” or iconic structure;
- Advise on whether existing or proposed at-grade crossings should be retained;
- Provide high-level indicative design drawings and costings for the preferred options;
- Provide an overview of construction implications for the A40 and consider how to keep the A40 open to traffic during works.

## Objectives

The objectives of this project are to investigate crossings of the A40 which:

- Provide the safest routes for pedestrians and cyclists crossing the A40 apart from traffic
- Integrate the existing village of Eynsham and West Eynsham SDA with OCGV to the north
- Maximise walking and cycling to fulfil the demand for local trips
- Enable minimum interruption of A40 vehicle flow

## Structure of this Report

This report specifically considers the technical feasibility of either Bridge or Subway crossing options along the length of the A40 in the vicinity of the existing Eynsham settlement, the OCGV and West Eynsham SDA and is organised into the following sections:

1. Introduction
2. Context
3. Methodology
4. Requirements
5. Optioneering, Concept Development and Evaluation
6. Concept Refinement
7. Conclusions



## 2. Context

Eynsham is an ancient village, its historic position near key transport routes – first the River Thames and then the A40 – enabling its steady growth from Saxon times until it has become a village home to around 5000 people.



**Figure 2.1: The centre of Eynsham (images: November 2019)**

The area in the vicinity of Eynsham has been earmarked through local planning for significant growth in housing: the OCGV and West Eynsham SDA. Together, these schemes will increase the number of people living and working around Eynsham.

Through an ongoing planning and consultation process, a vision is emerging for what this area should look like, how people should be able to get around it, and how that relates to the A40 which will bisect Eynsham and West Eynsham SDA from OCGV.

The proposed developments either side of the A40, and planned upgrades to the A40 between Witney and Oxford, mean that there will be a much higher demand for people to be able to cross the road safely and comfortably, while the performance of the A40, as one of the strategic Major Roads in Oxfordshire, needs to be protected as a key transport corridor for people and goods.

In this section we describe first the **existing conditions** in and around Eynsham and the A40, and then go on to describe planned **future changes**.

### Existing Conditions

#### Architectural Setting

Eynsham is a large village between the Cotswolds and Oxford. There are two distinct characters to the village, the traditional centre to the South is comprised of mainly local stone terraced houses with a good range of independent traders. The narrow streets cater for the movement of people and vehicles without the need for intrusive traffic calming measures. The wide use of local stone marries the architecture with the surrounding landscape and creates a strong sense of place.

Over time the village has grown northwards with mainly residential developments but also to provide some strong public amenities such as the secondary school and sports centre. The positive local character has not been maintained in all aspects of the modern architecture. The informal street layout is suited to the residential scale but undermines wayfinding or a sense of



direction, possibly because some of the original streets have been redirected as the village has grown. The style of the newer buildings varies but are mostly more generic than the older buildings and do not use locally sourced materials. Moving through the village as a whole, there is a lack of continuity in the sense of place between the older centre and more modern developments.

The A40 forms a clear boundary condition to the north with a largely defensive relationship between houses and the road. Driving along the A40, there is limited awareness of Eynsham or a sense of place.

To the north of the A40, the currently largely undeveloped land hosts a mixture of land uses including agriculture, woodland, farmsteads and small-scale business uses. It is a popular place for Eynsham residents to benefit from green space, which is somewhat lacking in the village.

### The A40

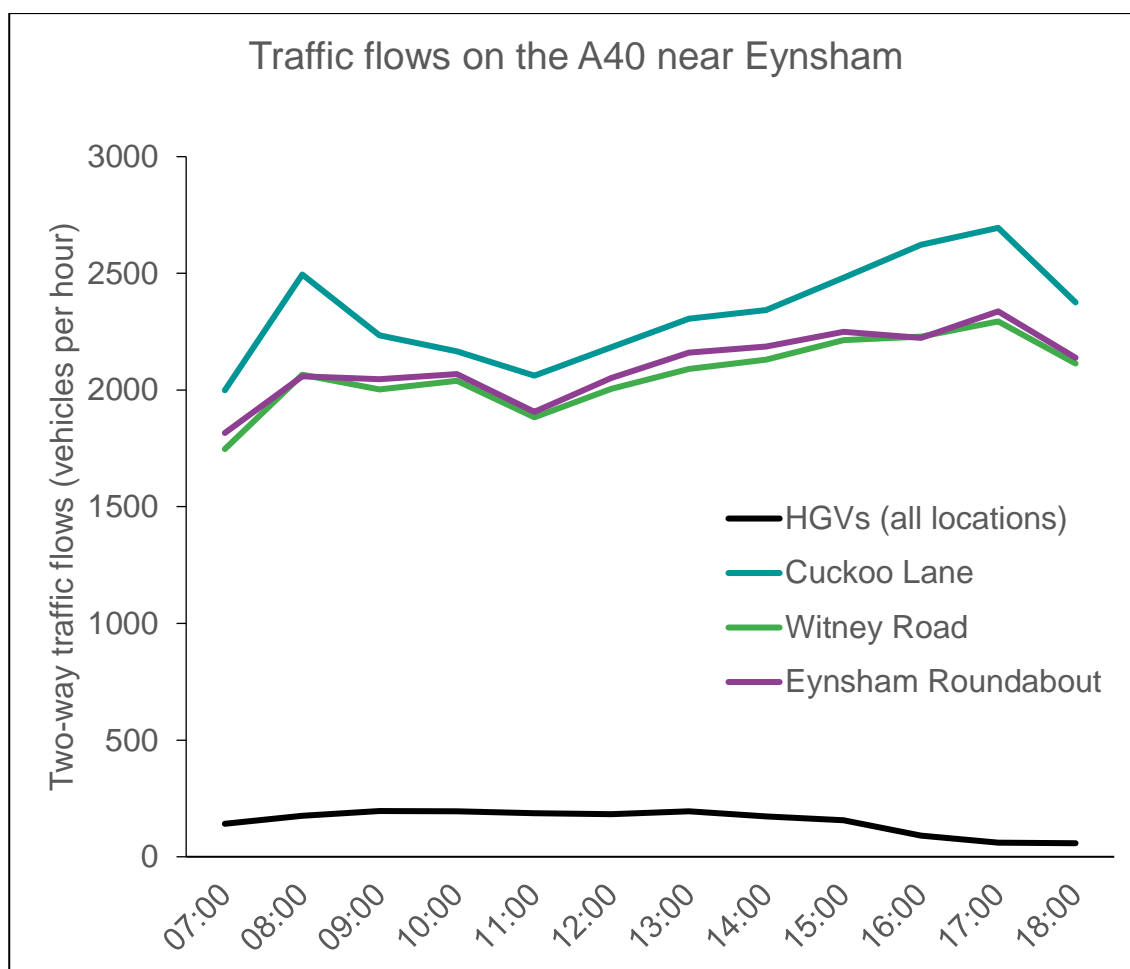
The A40 is a heavily used primary route. It was built past Eynsham around 1935 (bypassing the 18<sup>th</sup> century Swinford toll bridge which was the original A40) and for many years was a trunk road. In 2002 it passed from the Highways Agency to OCC's control. The A40 provides both a local function for trips to Oxford and West Oxfordshire, and a wider strategic function for longer distance trips to the Cotswolds, Cheltenham, Gloucester and beyond to South Wales.

As it passes Eynsham there are only a handful of properties that have direct access onto the A40 including the Evenlode pub, Woodstock Car Sales and the Esso Tesco Express filling station; although around 80 properties' back gardens abut the highway boundary (or that of the nearby and parallel Hanborough Road). This, combined with the National Speed Limit and wide single carriageway, gives the impression of a rural highway, not one forming the northern boundary of a settlement. Most of the properties abutting the A40 were built after it, and face away from it. This reinforces the impression that Eynsham and the A40 are not related.

The A40 experiences significant congestion for much of the day. It carries heavy traffic flows and is limited to a single lane in each direction. For many drivers, the whole distance between Witney to the west and the Wolvercote roundabout to the east represents a slow and congested journey. Bus passengers also suffer from extended delays to their journeys, and there is no bus priority along the corridor.

### Traffic Flows

Traffic flows on the A40 were recorded in May 2018 by surveys commissioned by OCC at the junctions with Cuckoo Lane, Witney Road and the A40 Eynsham roundabout and therefore exclude any traffic generated by future development including the OCGV and West Eynsham SDA. The hourly traffic flow profile for these three locations is shown in Figure 2.2.



**Figure 2.2: Surveyed Traffic Flows on the A40 near Eynsham**

At Cuckoo Lane, hourly traffic flows on the A40 are approximately 2000 to 2700 vehicles per hour taking both directions together. This equates to one vehicle every 1-2 seconds which means that the A40 represents a significant barrier to movement by pedestrians, cyclists and equestrians as there is insufficient gap in the traffic flow to allow crossing. This is a particular issue on this section where no defined crossing point exists and the whole carriageway would need to be crossed in a single movement. As the traffic flows are relatively high through the entire period from 7am to 7pm and the proportion of Heavy Goods Vehicles (HGVs) can reach as much as 13-14 percent, crossing at-grade throughout the day is an extremely difficult proposition even for the most confident.

At Witney Road, hourly traffic flows on the A40 are approximately 1700 to 2300 vehicles per hour taking both directions together. Again, this equates to one vehicle every 1-2 seconds meaning crossing the A40 anywhere away from the existing signalised staggered crossing at the Witney Road signals is extremely difficult. Again, this situation will occur throughout the entire period from 7am to 7pm and be exacerbated by the proportion of HGVs which peaks at nearly 15 percent.

Either side of the Eynsham roundabout, hourly traffic flows on the A40 are approximately 1800 to 2300 vehicles per hour taking both directions together. These flows still represent one vehicle every 1-2 seconds that need to be negotiated by pedestrians, cyclists and equestrians on a section where one uncontrolled crossing without a central island exists.

In summary, the traffic flows across the study area reflect a road which is very busy and challenging to cross at-grade without traffic control.

### Walking and Cycling

Anecdotally, the number of pedestrians and cyclists moving along or across the A40 is low, primarily due to the very limited adjacent development to the north and the lack of connecting routes to the south. Surveys over 7 days in November 2018 undertaken by AECOM recorded between 10 and 20 peak hour trips that crossed the A40 at Eynsham on foot and by bicycle. Existing residents cross the road to gain access to the bus stops for eastbound services, to access Woodstock Car Sales and the Esso Tesco Express Filling station or for recreational access to the Millennium Wood, City Farm and along a number of Public Rights of Way (PROW).

As illustrated in Figure 2.3, and shown in Figure 2.5 there are footways on both sides of the A40 with the northern footway designated as shared use by pedestrians and cyclists. However, both footways are typically less than 2m wide which is substandard for shared use, poorly maintained and located close to passing traffic with users exposed to high levels of traffic pollutants. The footways link to PROW and footways along connecting roads including Cuckoo Lane, Old Witney Road, Witney Road, Spareacre Lane and Hanborough Road which provide access to Eynsham or the open space north of the A40.

Existing crossing facilities along the A40 are limited and of poor standard. There are three designated crossing points for pedestrians and cyclists:

- one signalised crossing incorporating a central island east of the junction with Witney Road
- an uncontrolled crossing marked only by dropped kerbs with no tactile paving or central island in the vicinity of Hanborough Road and an existing PROW crossing the A40
- an uncontrolled crossing marked by dropped kerbs with tactile paving and central island marked with guardrail in the vicinity of the PROW connecting Spareacre Lane with open space to the north of the A40

Some crossing occurs elsewhere on the corridor although this is unsupported by any crossing facilities. This includes crossing in the vicinity of Cuckoo Lane, the Evenlode pub, just to the east of the Esso Tesco Express filling station where there is a traffic (not a pedestrian) island and on the approaches to the A40 Eynsham roundabout which again has traffic islands separating the approaches and exits from the roundabout.

Currently, the road safety record along the A40 reflects the low demand for crossing. From 2013 to 2018 the only reported accidents in the study area affecting cyclists or pedestrians occurred at the Eynsham roundabout, where two cyclists suffered serious injuries and two suffered slight injuries.

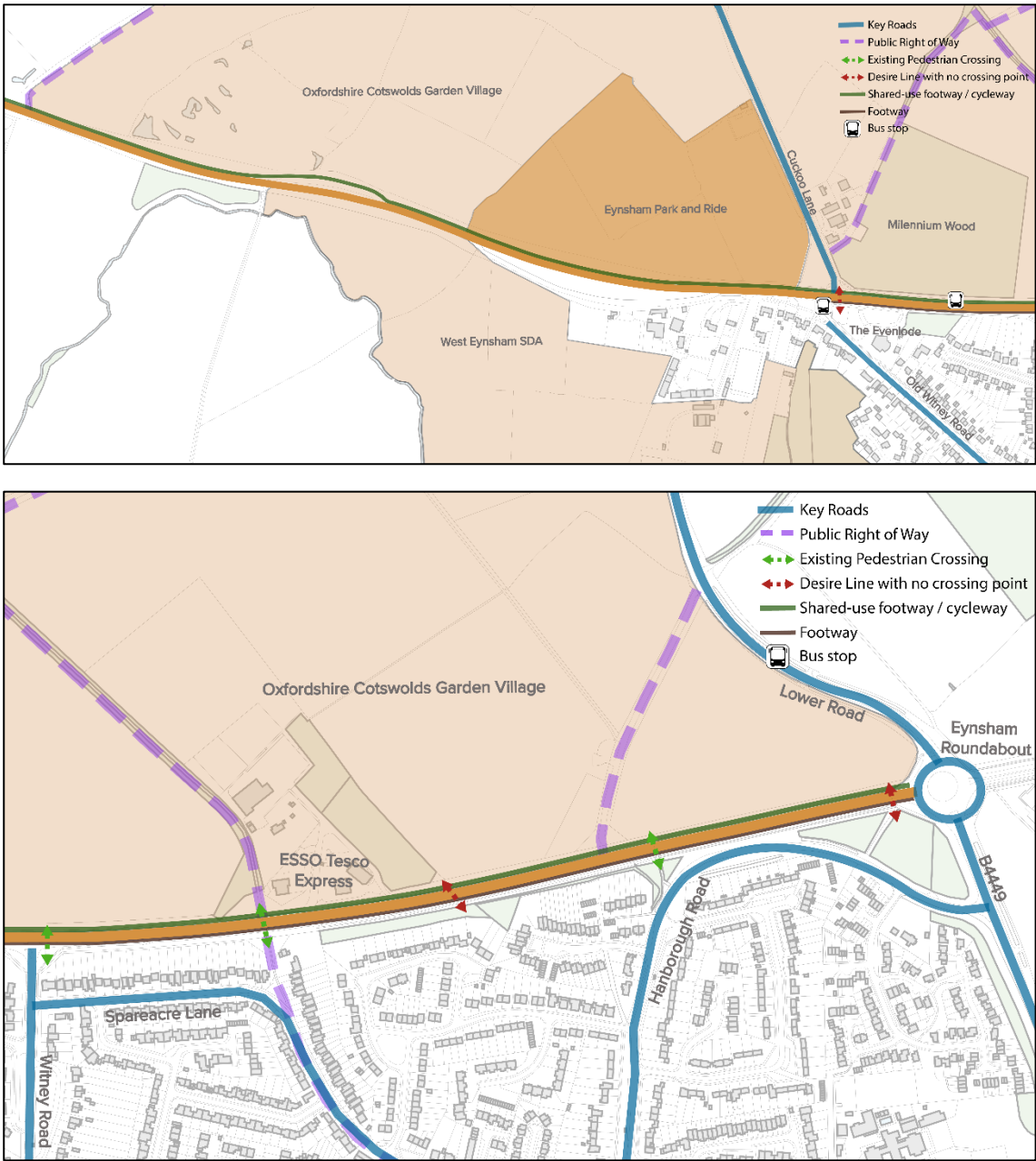


Figure 2.3: Walking, Cycling and Public Transport Facilities along the A40 at Eynsham



On our site visits we encountered the uncontrolled staggered crossing at Spareacre Lane had been struck by a vehicle, causing severe damage to the guard-railing which had been installed at the crossing. (Guard-railing is designed to encourage pedestrians to use particular routes; it does not provide protection.)



**Figure 2.4: Damage to the crossing at Spareacre Lane (image: November 2019)**



**Figure 2.5: Shared-use footway on the north side of the A40 between Cuckoo Lane and Esso Tesco Express Filling Station (images: November 2019)**

## Land Ownership and Highway Boundaries

Land ownership and highway boundary information was sourced from Ordnance Survey plans which are not reproduced here due to copyright restrictions, although the approximate highway boundary is shown on plans and drawings included in subsequent sections of this report.

The highway boundary typically extends for several metres beyond the back of the footway on the A40 in both north and south directions. Beyond the highway boundary on the south side, approximately 80 existing residential properties bound and/or overlook the A40 corridor in the study area defined in Figure 1.1 whilst Eynsham Nursery Garden Centre, the Evenlode pub, Woodstock Car Sales and the Esso Tesco Express Filling Station both bound the A40 and have direct vehicular access from it.

There are also several other pockets of highway land available to help facilitate grade separated crossings as follows:

- To the west of Cuckoo Lane on the north side of the A40
- In the vicinity of Old Witney Road and the Evenlode Pub on the south side of the A40
- To the east and west of the PROW crossing the A40 in the vicinity of Spareacre Lane particularly on the west and north side
- To the east of the PROW crossing the A40 in the vicinity of Hanborough Road

On the north side of the A40, although the majority of the land is not within the highway boundary it is included within either the land allocated for the OCGV or the proposed Park & Ride site and has therefore been considered as available in terms of providing land for grade separated crossings. However, the Millennium Wood and the Esso Tesco Express Filling station on the north side of the A40 have both been identified as key constraints as whilst they are within the indicative boundary of the OCGV AAP, they are not considered appropriate for development.

## Topographical Survey

As part of the work planning the A40 Science Transit 2 Scheme, a topographical survey (which shows levels and locations of the A40 and its surroundings) was supplied by OCC in November 2019. The information from this survey was used to calculate the level changes required for a footbridge or subway at each location. Ordnance Survey base mapping was also supplied, with contour information for the wider area.

## Future Growth

The planned future changes to the Eynsham area are explored below in three sections, relating to OCGV, West Eynsham SDA, and changes to the A40.

### The Oxfordshire Cotswolds Garden Village

The Oxfordshire Cotswolds Garden Village (OCGV) was announced by Government in January 2017, as one of a series across England. This responded to a prospectus on “Locally-led garden villages, towns and cities” published in 2016<sup>1</sup>. Government defines a garden village as having between 1500 and 10000 new homes, as being a “distinct new place with [its] own community facilities, rather than extension to existing urban areas”<sup>2</sup>. The identity of a garden village is focused on being green, sustainable and natural. The principles guiding the development of a garden village are presented in the Introduction.

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<sup>1</sup> <https://www.gov.uk/government/publications/locally-led-garden-villages-towns-and-cities>

<sup>2</sup> <https://www.gov.uk/government/news/first-ever-garden-villages-named-with-government-support>

Garden villages draw on a rich history in British town planning and architecture, with original examples such as Port Sunlight, New Earswick and Letchworth demonstrating principles of sustainable, local development enabling healthy and happy lives for their inhabitants. Many were originally built as “company towns” for large factories.

OCGV has had comprehensive public consultation through its development.

In May 2019 a Community Design Charrette brought together developers with local residents and interested stakeholders to help shape two key documents: the Area Action Plan, advanced by WODC, and the Outline Planning Application, advanced by Grosvenor Developments Ltd (the land promoter).

From August to October 2019 WODC held an Area Action Plan consultation on preferred options for OCGV, setting out a draft vision, themes and objectives, together with potential policy approaches to key themes. This followed previous consultations held on initial issues and options (June to August 2018) and ongoing community engagement. The consultation describes how and why the OCGV site was chosen and developed, what it sets out to achieve, how it links with existing and future developments, its vision and objectives, a strategy for development, the importance of creating and shaping places, the importance of green infrastructure, active living and enhancing the local environment.

As well as meeting housing needs, the AAP will advocate that the OCGV should complement Eynsham, providing new opportunities for existing residents and not competing with businesses and amenities in the existing village.

The draft transport aims of the AAP for OCGV are:

- **GV29** To reduce the overall need to travel by providing a balanced and sustainable mix of uses within the garden village so that the majority of people’s everyday needs are met locally.
- **GV30** To foster an environment in which active and healthy forms of travel (walking, cycling and riding) are the ‘norm’ based on the concept of ‘walkable neighbourhoods’ facilitating simple and sustainable access to jobs, education, and services.
- **GV31** To provide integrated, high quality and convenient public transport choices centred on the proposed Park and Ride, associated improvements to the A40 and future investment at Hanborough Station.
- **GV32** To provide safe and convenient connections to and across the garden village site and the wider area, in particular to Eynsham, Hanborough Station and the open countryside.
- **GV33** To make the most effective use of all available transport capacity through innovative management of the network.
- **GV34** To anticipate, reflect and capitalise on changing travel trends and habits including greater use of home-working and the move towards low carbon technologies as well as shared, connected and autonomous vehicles.

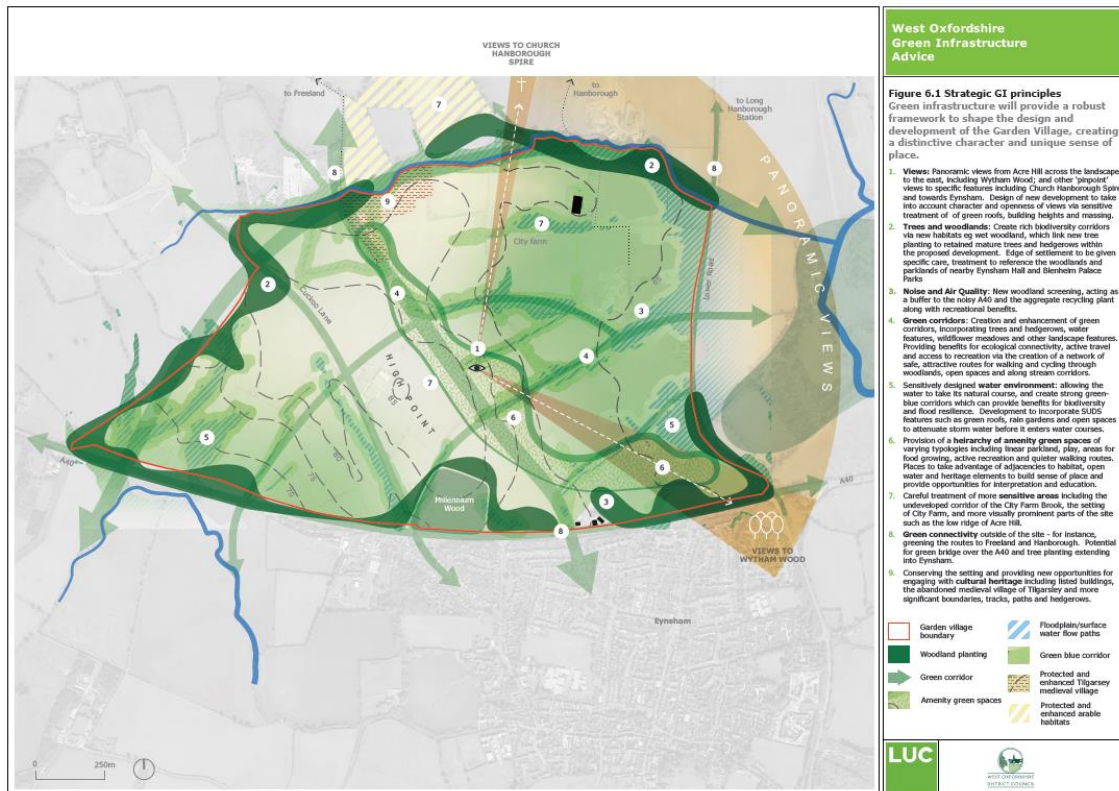
These aims have shaped our work in looking at crossings of the A40 which enhance the environment, foster a sense of place and provide useful and attractive transport links. The West Oxfordshire Local Plan describes aspirations for the area in 2031, to include “an iconic ‘feature bridge’ across the A40 connecting the new village with Eynsham to the south. This will allow existing and new residents and employees convenient access between the two areas and into open countryside beyond”<sup>3</sup>

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<sup>3</sup> Paragraph 7.52



The wider green infrastructure advice developed in support of the OCGV AAP is shown in Figure 2.6. This has also influenced our work assessing the feasibility of grade-separated crossings as it promotes “green corridors” linking the existing settlement of Eynsham with the OCGV, the West Eynsham SDA and surrounding countryside. The strategy implies crossings of the A40 at the western edge of the OCGV and West Eynsham SDA beyond the proposed Park & Ride site and into Eynsham via existing rights of way at Old Witney Road and Witney Road.



**Figure 2.6: Green Infrastructure aspirations for OCGV (WODC)**

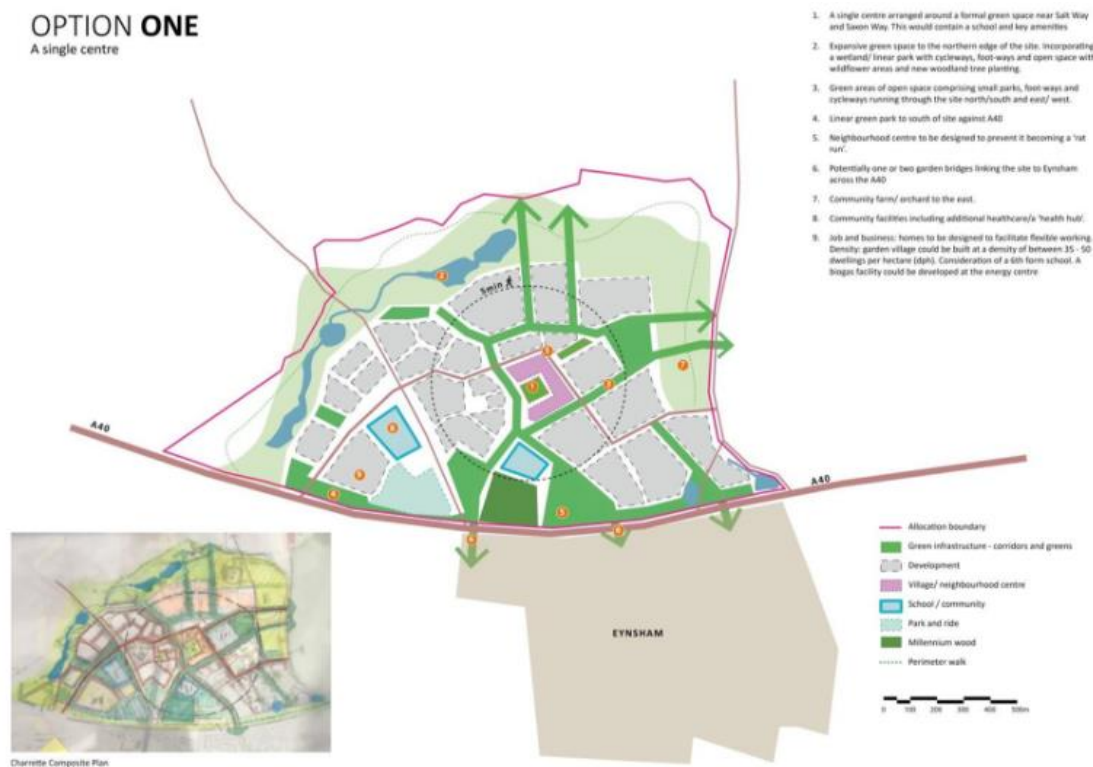
The diagram in Figure 2.7, taken from the AAP consultation, shows one of three illustrative layouts that were developed following the OCGV Design Charrette and which are consistent with the wider landscape strategy.

It is based around promoting three potential crossings of the A40 between the proposed Park & Ride site and Eynsham roundabout, namely:

- A western crossing near Cuckoo Lane and the Park & Ride site.
- A central crossing aligned with either the existing PROW linking with Spareacre Lane or Witney Road
- An eastern crossing aligned closely with the existing PROW linking with Harborough Road

Taken together, the landscape strategy and emerging OCGV plans suggest there could be potential opportunity to link green infrastructure and communities on both sides of the A40 at up to five locations across the study area: at the far west and east extents of the Strategic Growth Area, and three locations mapping onto existing routes into Eynsham.





**Figure 2.7: Potential Emerging Conceptual Layout of OCGV (WODC AAP Consultation 2019)<sup>4</sup>**

### West Eynsham SDA

As well as OCGV, a site to the west of Eynsham has been identified for major housing development. The West Eynsham SDA is earmarked for about 1000 new homes in the WODC local plan. While on a smaller scale than OCGV and linked more closely to Eynsham, the West Eynsham SDA will further increase travel demand in the local area and will mirror OCGV to the south of the A40, where currently OCGV's western extent faces onto fields.

Development at West Eynsham SDA is less well advanced than OCGV but WODC has prepared an SPD Issues Paper<sup>5</sup>, which was consulted on in 2018<sup>6</sup>. Some of the key objectives articulated in the issues paper include the importance of encouraging non-motorised connections through West Eynsham SDA and with neighbouring areas, the provision of a linear park along Chil Brook and highlighting and protecting heritage assets and views.

<sup>4</sup> <https://www.westoxon.gov.uk/media/nazn42qz/garden-village-app-preferred-option-paper-july-2019.pdf>

<sup>5</sup> <https://www.westoxon.gov.uk/media/zqca3zm1/west-eynsham-spd-issues-paper.pdf>

<sup>6</sup> <https://www.westoxon.gov.uk/planning-and-building/planning-policy/supplementary-planning-documents/>

### Other Developments in the Area

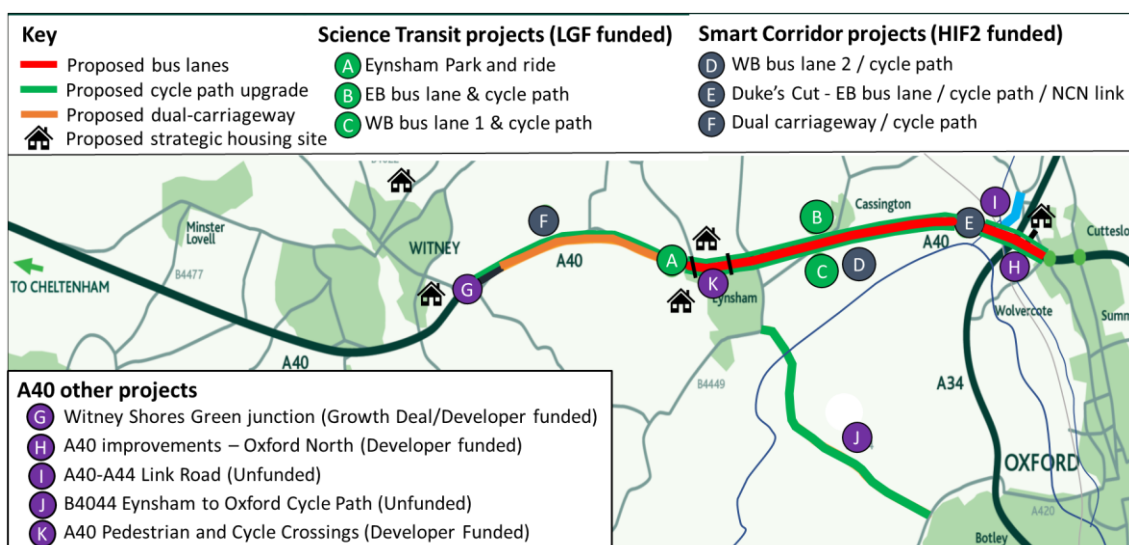
The Eynsham Nursery Garden Centre site is proposed to have new homes built with an access from Old Witney Road (as opposed to directly off the A40 as at present). The site falls within the boundary of the West Eynsham SDA. We have reviewed the planning application documents (ref. 15/00761/FUL) on the WODC website. Principally, the effects of this development would be:

- Higher trip generation during weekday peak hours along Old Witney Road, with 77 new homes as opposed to the existing nursery land use which is accessed directly from the A40.
- The removal of the turning head at the current terminus of Old Witney Road and the removal of the access road to/from the A40.
- Potentially greater demand to cross the A40 at this location, especially to reach the Park & Ride site and amenities in OCGV.

The developer proposes an uncontrolled pedestrian crossing across the A40 with a central island although given the traffic flows described earlier, it is not considered that this would be particularly well used as pedestrians and cyclists crossing would need to give way to traffic.

### Planned Changes to the A40 Corridor

Major transport improvements are planned along the A40 to facilitate both the OCGV and West Eynsham SDA as shown in Figure 2.8. These include the A40 Science Transit 2 Scheme and the A40 Smart Corridor scheme which were presented as part of OCC's consultation in 'Improving the A40' in December 2018 as follows:



**Figure 2.8: Proposed Changes to the A40 Corridor (Image: Oxfordshire County Council)**

A40 Science Transit 2:

- A40 Eynsham Park & Ride site to the west of Cuckoo Lane
- A40 Eastbound Bus Lane from the Park & Ride site to west of the Duke's Cut bridges
- Short sections of A40 westbound bus lane on the approaches to Cassington traffic lights, and Eynsham roundabout

A40 Smart Corridor:

- A40 Dual Carriageway from Witney to the Park & Ride site

- Completing the A40 Westbound Bus Lane from west of Duke's Cut canal and railway bridges to the Park and Ride site
- Completing the A40 Eastbound bus lane over the Duke's Cut and Wolvercote railway bridges
- A40 Cycle link to the National Cycle Route 5 on the Oxford Canal Tow Path

This consultation attracted considerable attention from residents, local authorities, road user groups and other stakeholders. We have reviewed the updated consultation report<sup>7</sup> as part of our work to understand the transport and development context of the area.

Within the Study Area for this commission, these changes will benefit pedestrians and cyclists by upgrading the walking and cycling facilities along the A40 and by lowering the proposed speed limit from the National Speed Limit to 50 mph. The delivery of the Park & Ride site with eastbound and westbound bus lanes are designed to make use of public transport easier, more attractive and more reliable which may increase the number of walking and cycling trips to the Park & Ride site itself and the upgraded bus stops along the A40 between Eynsham and the OCGV. However, the carriageway will be much wider as a result these changes which could increase the difficulty of crossing the A40 unless crossing facilities are significantly upgraded.

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<sup>7</sup> <https://consultations.oxfordshire.gov.uk/qf2.ti/f/979970/53545477.1/PDF/-/report.pdf>

## Context Summary

Our findings from this phase of work identified:

- The current A40 is a primary route used by both longer distance and more local traffic.
- For large parts of the day from 7am to 7pm, total hourly traffic flows on the A40 equate to one vehicle passing every 1-2 seconds, which gives little opportunity to cross the A40 other than at controlled at-grade (or possible future grade-separated) crossings.
- The number of people walking and/or cycling along or across the A40 is very low which reflects the lack of trip generators on the north side and the lack of routes to Eynsham to the south.
- Existing footways on both sides of the A40 are narrow and poorly maintained and existing crossing facilities are limited to one signalised crossing, one uncontrolled crossing marked by guardrail and one uncontrolled crossing only marked by dropped kerbs but no tactile paving.
- The highway boundary of the A40 extends several metres north and south from the back of the footway with direct vehicle access limited to the Eynsham Nursery Garden Centre (to be removed as part of future development), the Evenlode Pub, Woodstock Car Sales and Esso Tesco Express Filling station although around 80 properties currently overlook the corridor.
- The land to the north of the A40 is generally considered to be able to flex to accommodate new grade-separated crossings as (apart from the Millennium Wood and Filling station site which are identified as constraints) it is included within the OCGV. The same applies to the land south of the A40 along the West Eynsham SDA frontage. There are pockets of available highway land near Cuckoo Lane, Old Witney Road, Spareacre Lane and Hanborough Road.
- The OCGV aims to reduce the overall need to travel, foster an environment in which active and healthy forms of travel are the norm by creating safe and convenient connections within the site and with Eynsham.
- The emerging OCGV Masterplan and West Eynsham SDA are based around a series of green loops and links to facilitate active travel, including a green loop crossing the A40 to the west of the OCGV and near Eynsham roundabout, and three more 'central' crossings near Cuckoo Lane, Witney Road or Spareacre Lane and Hanborough Road.
- Planned A40 Corridor transport improvements will benefit pedestrians, cyclists and equestrians by upgrading walking and cycling facilities along the corridor, reducing the speed limit for vehicles and enhancing access to public transport via the Park & Ride site as well as eastbound and westbound bus lane and upgraded stops. However, the carriageway will also be widened which will increase the feeling of severance and potentially make it more difficult to cross the A40 without a significant upgrade to crossing facilities.

## 3. Methodology

In this section we describe the methodology we adopted to identify the feasibility of grade-separated crossings of the A40.

### Requirements

Requirements can be grouped into project objectives, technical requirements set by design standards and guidance related to architecture, structural engineering and designing for walking and cycling. They are described in Section 4.

### Inception and Initial Reviews

In the first stage of work, we met the client team and discussed the aspirations for the area and the project. We also carried out site visits to experience what it is like to walk along and cross the A40 at the moment, and how it relates to the existing village of Eynsham.

We also reviewed a large range of documents, reports, surveys and consultation material which have been prepared to support the development of the area. The outcomes from this stage of work are presented in Section 2.

### Optioneering, Concept Development and Evaluation

For the first phase of investigation work, we examined the Study Area and the feasibility of locating new crossings at sites along it, firstly with the A40 in its current (or planned) configuration, and then with possible changes to the horizontal or vertical alignment.

We developed and used a Multi-Criteria Assessment Framework (MCAF) to compare options and sites. This enabled us to make relative comparisons between crossing locations and types and to identify the strengths and weaknesses of different crossing options.

For each of the sites, the output was a decision either to take it forward for refinement or stop the development process.

Our findings from this phase of work are presented in Section 5.

### Concept Refinement

For the sites which scored the highest on the MCAF, we moved on to develop concept design sketches, exploring a series of factors for each crossing, namely:

- refining and optimising their location and form in relation to other schemes
- refining the layout to optimise benefits for users and minimise impacts for residents.
- exploring how it could be built minimising the impact on the A40
- articulating an architectural style which fulfils the objective of 'iconic' crossings
- understanding an estimate of the construction costs

Our findings from the Concept Refinement work are presented in Section 6.



## 4. Requirements

As stated in the Introduction, the objectives of this project are to investigate crossings of the A40 which:

- Provide the safest routes for pedestrians and cyclists crossing the A40 apart from traffic
- Integrate the existing village of Eynsham and West Eynsham SDA with OCGV to the north
- Maximise walking and cycling to fulfil the demand for local trips
- Enable minimum interruption of A40 vehicle flow

A grade-separated crossing has to be considered carefully to ensure it meets both statutory and technical requirements, maximises benefits for users, minimises impacts on others and considers ongoing maintenance by the asset owner.

Below we explore first the aspects of architectural design considered in this project, including considerations for a “Green Bridge”; secondly, criteria new high-quality crossings should meet; and thirdly the technical requirements and guidance which ensure a crossing is legal and useable.



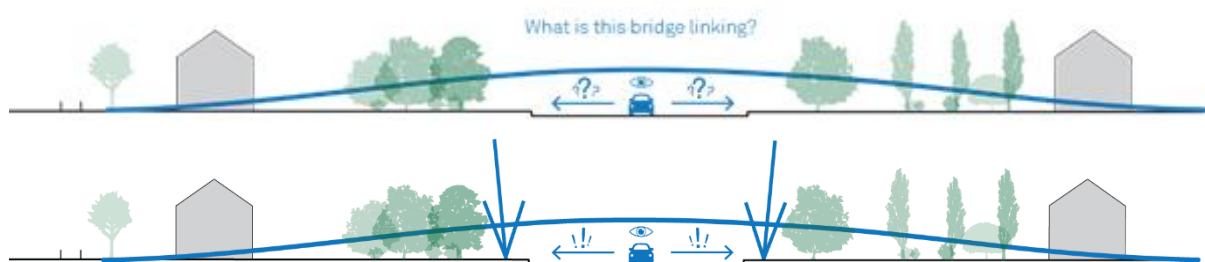
**Figure 4.1: Precedent images of footbridges**

## 4.1 Architectural Design

### Iconic Footbridges as a Gateway

To be 'iconic', we consider bridges must be identifiable as representing the distinctive and unique characteristics of place. In this instance the OCGV and Eynsham, evoking their most unique characteristics. They also serve as gateways, both along the A40 and between the two places for users.

To address the aspirations for connection and landmark, a bridge should have a 'confident' presence along the A40 route that clearly expresses a point of significance. This could be achieved through using a symmetrical tower arrangement to either side of the carriageway, clearly indicating a threshold or gateway through which to pass.



**Figure 4.2: Using bridges to enhance place**

Two defining characteristics of the OCGV are its innovations as a planning model and synthesis of green spaces with modern new homes. To reflect this, a bridge could have sinuous forms and use natural materials as a response to its environment and setting. The bridge's aesthetics, materiality and requirements for maintenance could all be considered in this context. The ramps and landings for the bridge approaches would also need to be considered carefully to sit comfortably within the quiet residential streets of Eynsham.



**Figure 4.3: The centre of Eynsham has historic buildings and natural materials**

## Experience

An 'iconic' bridge should be an important experience for those passing over it and beneath it. For the local communities it will be a link in an important route linking communities. Driving along the A40 the bridge should mark a significant point and signpost the presence of adjacent places: an icon representing Eynsham and the garden village, and their sustainable characteristics. For those passing over the bridge this should form a gateway experience into the places the bridge connects, forming a landing area where people pause to orientate themselves, thereby contributing to legible placemaking.

Elevated bridge structures would provide landmarks to assist people with orientation within local communities, acting as wayfinding elements for walking and cycling— both short and long distance routes including a strategic north-south route from Hanborough station to Oxford via Eynsham and Swinford on the B4044. People crossing the bridge would enjoy unique elevated views of the surrounding area. Gentle ramped access would inclusively provide accessible use for all. Effective lighting which effectively illuminates the span of the bridge would ensure that the crossing looks safe and feels safe.

## Subways

Subways or underpasses suffer a poor public perception with many people, but there are significant benefits to using them where the levels allow much shorter ramps: benefits of connectivity, accessibility, journey times, visibility and safety and security. Again, the experience for users should be one which embodies a sense of connection, of place and of safety. The use of effective lighting to light up the subway at all times will contribute towards the subway being a welcoming and well used piece of infrastructure, knitting into the local street network and ensuring its vital connectivity for the communities nearby.

Although a subway will not create an iconic landmark for those travelling on the A40, its presence can be a statement of intent to those using it. The use of creative exemplary design solutions will potentially provide an enjoyable and safe user experience.

## Green Bridge

One of the considerations for the study area is a landmark crossing or a "Green Bridge".

Green Bridges are increasingly popular across rural main roads in the UK and elsewhere, chiefly because they provide an ecological corridor for protected species to cross the road. They are defined as being "either vegetated or providing some wildlife function"<sup>8</sup>. Typically, they are installed for ecological and active travel reasons although some, for example the A21 Scotney Castle, have been built primarily to link human landscapes and preserve historical character.

In an urban context, a Green Bridge across Mile End Road in east London links two halves of a busy park together and allows pedestrians and cyclists to enjoy the whole park without crossing a major road.

In a rural context, Green Bridges are more commonly used to link together natural habitats for use by wildlife as well as people.

A Green Bridge would be substantially wider than a normal bridge and have approaches with very gentle (or no) gradient. This means that crossings of this sort are significantly more expensive than more typical bridges and, unless they provide quantifiable ecological benefits, are unlikely to

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<sup>8</sup> Green Bridges – a Literature Review, Natural England (2015) <http://publications.naturalengland.org.uk/publication/6312886965108736>



have as good a business case as a 6m wide crossing with landmark architectural design as described above.

## 4.2 Criteria for Cycling and Walking Crossings

A number of guidance documents exist which define what a good-quality cycling or walking route looks and feels like. The new Design Manual for Roads and Bridges document “Designing for cycle traffic” CD 195 (2019) outlines five criteria:

- Safety
- Directness
- Comfort
- Coherence
- Attractiveness

The London Cycling Design Standards (LCDS) (2014) uses six key criteria, adding Adaptability to the list above.

Although these are ostensibly standards for cycling, they apply just as well to pedestrian routes. In this section we explore what each of them means.

### 4.2.1 Safety

The safety of users is typically improved with grade-separated crossings, as they remove the conflict between vehicles and people walking or cycling.

The quality of design is paramount to ensure that security, or the perception of safety, is not worsened by grade-separating the crossing. Research indicates that many people, especially women and older people, are willing to walk for 2-5 minutes to avoid a footbridge or subway in favour of an at-grade crossing<sup>9</sup>. This research generally relates to existing crossings in English urban areas, which are often poorly designed and do not meet the criteria we discuss here.

Guidance documents including Manual for Streets 2 and the LCDS explain that a safe crossing is one with:

- i. Clear sight lines through and beyond the crossing
- ii. No sharp bends or dark corners
- iii. Bright and well-maintained lighting
- iv. No graffiti, excessive litter or standing water
- v. Close and clear links to surrounding streets so that it feels connected
- vi. Natural surveillance

This relates to the Dutch “sustainable safety” model where safety is defined in three ways: **collision risk** (i.e. how likely are you to be in a collision), **perception of safety** (i.e. how safe do you feel) and **social safety** (i.e. does this location help or hinder anti-social behaviour). In the Netherlands, grade-separated crossings for cyclists and pedestrians are often preferred, and well-used; and their designs meet these criteria more often than here in the UK.

Designing for Cycle Traffic (CD 195) includes notes to suggest the following design characteristics to improve the personal security of people cycling:

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<sup>9</sup> <https://www.sciencedirect.com/science/article/pii/S1369847816303369> Estimating preferences for different types of pedestrian crossing facilities (Anciaes and Jones, 2018)

- i. cycle routes within the view of passing people and passing traffic
- ii. lighting
- iii. underbridges that provide cross-sections wider than the specified values with flared wing-walls, good lighting and good sight lines
- iv. vegetation that is a low growing variety (up to 0.8m) on underbridge approaches and adjacent to entries

In our option development, we considered options which meet these requirements and scored them highly. Options which either did not meet these requirements or conflicted with them were scored poorly on safety and security.

#### 4.2.2 Directness

A convenient crossing is fundamentally one which meets people's needs. It should match a desire line closely, avoid extensive and indirect ramps or steep steps, and not take noticeably more time to use than an at-grade alternative, when waiting times are considered. This means that minimising ramp lengths is a key aim for our work to investigate crossing locations and options.

#### 4.2.3 Comfort

Comfort for routes relates to the quality of surfacing and finishes, including any steps or transitions between types of facility. In the context of grade-separated crossings it relates strongly to **accessibility**, and how easy people find it to use. We explore the gradients approaching crossings below.

#### 4.2.4 Coherence

Infrastructure should be legible, intuitive, consistent, joined-up and inclusive. It should be usable and understandable by all users. This means making the use of crossings predictable, and that crossings should link with their surroundings in a way that makes them look and feel as if they are part of the same street network, and not a jarring imposition.

#### 4.2.5 Attractiveness

OCGV has ambitious aspirations. Excellent connectivity with surrounding communities via seamless movement corridors, including welcoming accessible crossing points and legible gateways over the A40 are integral to the exemplar design of the garden village.

#### 4.2.6 Adaptability

A subway or footbridge is likely to last for many years, so it is important to design it fit for future use, as something which will only be built once. Making a crossing adaptable means it is future-proof with sufficient width and capacity to deal with the number of people who could need to use it in future scenarios – allowing for population growth in a variety of settings and at different rates. Adaptability also refers to how the use of the facility could change in future. This means that a choice of crossing type now (between segregated and shared-use, for example) could be changed in future if warranted.

### 4.3 Technical Requirements

#### 4.3.1 Grade separation

The provision of at-grade and grade-separated crossings is dependent on factors including safety, visibility, speed and traffic flow. Designing for Cycle Traffic (CD 195) stipulates that for a road with

40mph or 50mph speed limit and over 6000 vehicles per day, as the A40 at Eynsham will have in future, a grade-separated crossing is preferred, but a signalised at-grade crossing is also permitted. An unsignalised at-grade crossing is not permitted under CD 195 for roads with 40mph or 50mph speed limits unless daily traffic flows are below 10000 and only one lane at a time needs to be crossed.

This means that at Eynsham the at-grade crossings should either be signalised or removed. There is no safety case to require ALL crossings to be grade-separated, but there may be a case for doing so on traffic flow and congestion grounds.

#### 4.3.2 Headroom and Clearance

The required headroom for roads and non-motorised users are substantially different, as are the structural depths for bridges carrying motorised or non-motorised traffic.

##### Footbridges

The A40 forms part of the Major Road Network. It is not a designated route for abnormal loads, but the nearest overbridges (at Witney to the west, and the A34 to the east) have at least 5.1m of clearance.

The Design Manual for Roads and Bridges (DMRB) states that footbridges, because of their slender construction, should have at least 5.7m of clearance from the road beneath, so that any overheight vehicles are less likely to strike and damage them.

Our assumption for option development, agreed with structural engineers, is that a footbridge can have structural depth of around 0.8m, which means the total vertical difference between the carriageway and footbridge should be at least **6.5m**. If any of the grade-separate crossings identified in this report are taken forward it may be possible to adjust some of these dimensions slightly during preliminary or detailed design but they are considered as sensible and robust assumptions for this early stage of optioneering and concept development.

##### Subways

For subways, the absolute minimum headroom required is 2.2m to allow cyclists, with desirable minima of 2.4m for lengths under 23m and 2.7m for longer lengths<sup>10</sup>. Higher headroom improves the sense of space in a subway which is linked to safety and security; so our optioneering is based on allowing 2.8m of headroom, plus (an assumption agreed with structural engineers for option development) 0.7m of structural depth for carriageway – meaning a total vertical difference between subway ‘floor’ and carriageway of **3.5m**. The structural depth of the subway floor would be additional to this depth, requiring additional excavation during construction and this would need to be considered if any of the crossings are progressed further along the design lifecycle.

Headroom requirements for equestrians are 2.7m to allow dismounted horse-riders to walk their horses through and 3.7m for horses to be ridden<sup>11</sup>. This means that our designs for subways would allow dismounted horse-riders, and our designs for bridges with straight ramps would allow horses to be ridden.

#### 4.3.3 Gradients

Ramps or stairs on approach to a grade-separated crossing must be provided.

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<sup>10</sup> CD 195 Designing for Cycle Traffic, Table E/4,35

<sup>11</sup> BD 29/17 Design Criteria for Footbridges, Section 8

A grade-separated crossing accessed only by steps is common for older crossings, but is unlikely to be granted permission in light of the Equalities Act, and the recognition that many people need step-free access at different times or for specific journeys – such as when using a wheelchair or pushing a buggy, or with heavy shopping, or when climbing steps is difficult for health or age reasons. Our work aims to create crossings which are accessible to as many people as possible. As such, the primary means of access must be step-free, and ideally the ramps will be located and designed in a way that a stepped access would not be any faster or more direct to use. Steps could be added as supplementary accesses to crossings at a later stage in design.

The table below shows various guidance documents' recommendations for gradients approaching crossings for pedestrians and cyclists. (Requirements for equestrian gradients are less onerous and not listed here.) Lower gradients mean that crossings are accessible to a wider range of people, if the approach ramps themselves are not overly sinuous or indirect or perceived to be unsafe. However, these lower gradients can often require more land with commensurate increases in cost and complexity.

Guidance	Preferable gradient	Maximum gradient
Manual for Streets 2	1 in 20	1 in 12
Design Criteria for Footbridges (DMRB BD 29/17)	1 in 20	1 in 15 (absolute max 1 in 12) Landings to be provided for any slope steeper than 1 in 20
Cycle Infrastructure Design (LTN 2/08)	1 in 20	1 in 12
Subway design (TD 36/93)	1 in 33	1 in 20 (absolute max 1 in 14)
Designing for cycle traffic (CD 195)	1 in 33 over 80m length 1 in 25 over 50m length 1 in 20 over 30m length	
Oxfordshire County Council		1 in 12

**Table 4.1: Technical standards for gradients**

The experience of using gradients listed here is instructive: even regular cyclists will often choose to eschew gradients of 1 in 20 as too steep, and ramps of around 1 in 30 or 1 in 40 still require considerable effort to cycle up. Conversely, steep downward gradients can allow cyclists to build up considerable speed.

A common theme is that, where steeper gradients are permitted, the requirement for intermediate landings often brings the overall average gradient back down. In this project we aimed to provide crossings with a gradient of **between 3% and 5%** – between 1 in 33 and 1 in 20 – as an appropriate balance between the objectives of accessibility, cost and geographical constraints.

For bridges we have chosen 1 in 20 gradients to minimise ramp length while still being accessible; for subways we have chosen 1 in 33 gradients to best accommodate a wider range of users. These are conservative choices which could be changed at later stages of design, in order to optimise the design and reduce cost by shortening approach ramps.

**Landings** also need to be provided to allow people somewhere to rest if they need: for a 1 in 20 ramp a 5m landing is required every 30m length; for a 1 in 33 ramp landings are not required.

This means that, for a footbridge 6.5m above ground level we have shown a ramp length of 150m; for a subway dropping 3.5m below ground level we have shown a ramp length of 117m. Both of these can change if the ground where the ramp lands is at a different level to the A40. The table below shows these calculations.

Item	Footbridge	Subway
Level difference	6.5m	3.5m
Gradient of ramp	1 in 20	1 in 33
Length of sloping ramp	130m	117m
Landings	4 x 5m = 20m	n/a
Total length	150m	117m

**Table 4.2: Ramp length calculations for footbridges and subways**

Gradients for the carriageway are set out in the Design Manual for Roads and Bridges<sup>12</sup>, and vary according to the speed limit on the road. Our work has assumed a 1 in 50 gradient for the carriageway, to which sag curves and crest curves could need to be added.

To make the ramps shorter, it would be possible either to make the gradients steeper for those crossing the A40, or to change the level of the A40 carriageway so that those crossing have less far to go. We explore these options later in the report.

Stair access to bridges or subways could also be considered. Their utility would depend on the surrounding footways and rights of way, and how direct a ramped approach can be created.

#### 4.3.4 Width and Use

For cycle and pedestrian crossings, the minimum width depends on how the space is allocated<sup>13</sup>:

Formation	Pedestrians (m)	Cyclists (m)	Total width (m)
Unsegregated			3.5
Segregated by white line or colour texture	1.5	2.5	4.0
Segregated by kerb at least 50mm high	2.0	2.7	4.7
Segregated by railings at least 900mm high	2.0	3.0	5.0

**Table 4.3: Width requirements for pedestrian and cycle routes**

Cycle design guidance states that a two-way cycle track should ordinarily be 3m wide. A 3m wide cycle track comfortably allows a cyclist in each direction, even when they are on a slope and the cyclist's "dynamic envelope" width is greater because of weaving. A 3m wide cycleway also allows for a cyclist to overtake another, with a cyclist coming in the opposite direction at the same time.

A new footway should ordinarily be 2m wide, to provide comfortable width for small groups walking together, and to allow people using wheelchairs or buggies to pass each other.

For this reason, and to future-proof the design, the crossings we recommend have a 5m wide space for use: consisting of a 3m wide cycle track with a low kerb separated from a 2m footway – or alternatively a shared-use 5m wide path. Adding parapets and kerbs to this leads to a total deck width of **6m** which also provides 'buffer areas' between the flow of pedestrians and/or cyclists and the physical parapets.

This 6m minimum width requirement applies to both footbridges and subways; the substantive difference between them is that cyclists tend to travel faster through subways than over bridges because gradients allow cyclists to pick up speed on the descent into a subway as opposed to a slow climb to a bridge. The width also allows substantial future growth in use.

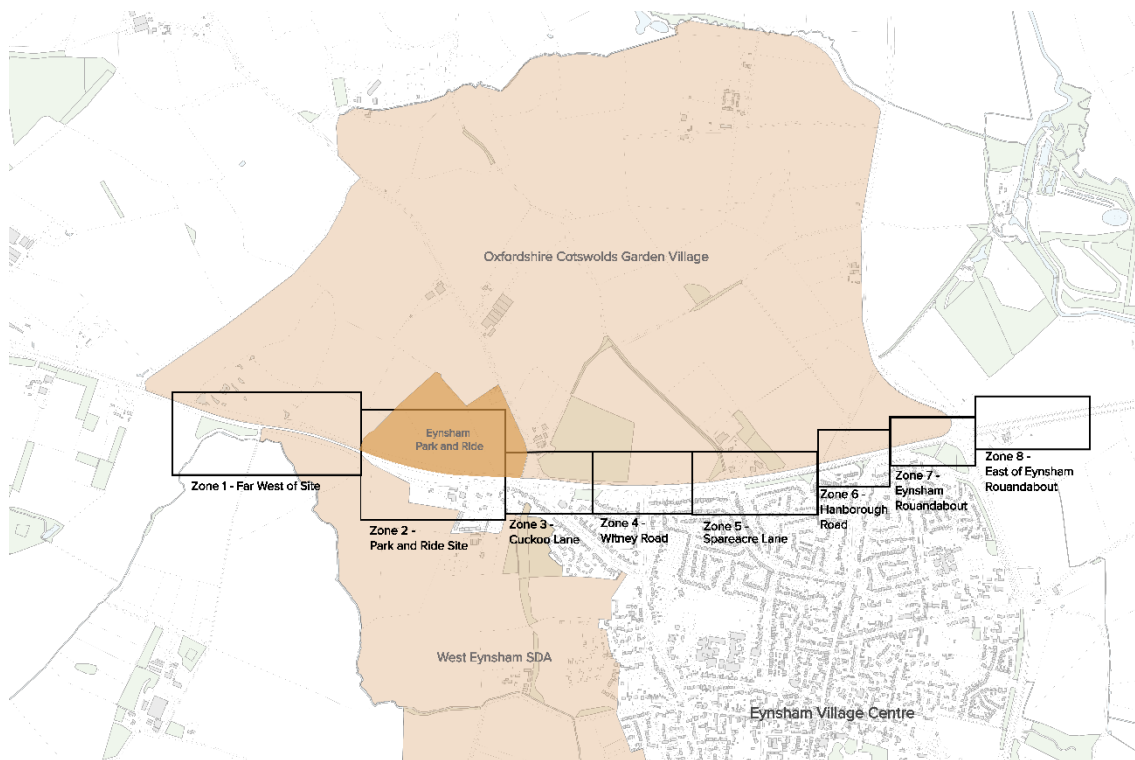
<sup>12</sup> DMRB TD 9/93

<sup>13</sup> DMRB 29/17, Section 12.4

## 5. Optioneering, Concept Development and Evaluation

In order to provide a framework guiding optioneering, we initially divided the A40 corridor in the study area into eight broad potential crossing zones as shown in Figure 5.1, namely:

- Zone 1 – West of Eynsham
- Zone 2 – Old Witney Road Lay-By / Proposed Park & Ride
- Zone 3 – Cuckoo Lane / Old Witney Road / Proposed Park & Ride
- Zone 4 – Witney Road
- Zone 5 – Spareacre Lane / Esso Tesco Express
- Zone 6 – Hanborough Road
- Zone 7 – Eynsham Roundabout
- Zone 8 – East of Eynsham



**Figure 5.1: Optioneering Zones**

For each zone we considered the future and current constraints and opportunities which might support or hinder a grade-separated crossing which could then support the vision of the area.

Using the guidance and standards explained in Section 4, we considered three broad propositions for a grade-separated crossing at each location, namely:

- A bridge with straight ramps at 1 in 20 gradients and 5m landings.
- A bridge with spiral ramps assuming spirals at 11m radii providing 2.8m internal headroom, with ramps at 1 in 20 gradients and 5m landings.
- A subway with ramps at 1 in 33 gradients and 2.8m headroom

The assumptions for each of these would be subject to further refinement should any of them be taken forward to detailed design: including the balance between gradient, cost and geography; the headroom requirement in subways; and the structural depth of carriageways and crossings.

### Scoring using a Multi-Criteria Appraisal Framework

We developed and agreed with OCC and WODC a Multi-Criteria Appraisal Framework by which to assess the options for each site. A set of 15 criteria was agreed with the client team, covering issues shown in Table 5.1.

Our multi-disciplinary team scored the performance of each broad crossing option at each location against each of the criteria evaluating benefits and impacts. Scores range from +3 for strong positive, to -3 for strong negative. Both OCC and WODC have reviewed the scoring outcomes.

Where a score of -3 or strongly negative effects were attributed, the team additionally considered whether the impacts were so severe as to make the crossing option unacceptable in which case a 'red flag' was also applied, effectively operating as a 'Fail' for that crossing option.

The remainder of this section presents for each zone:

- the location context including infrastructure, topography, desire lines and potential for a landmark structure.
- the crossing options including sketches and technical parameters for ramp length, gradient and level change – showing the approximate highway boundary in red.
- the scoring of the Multi-Criteria Appraisal Framework.
- the outcomes and rationale of the scoring exercise.
- the recommendation of whether or not to pursue further option refinement for any crossings in that zone.





**Table 5.1: Multi-Criteria Appraisal Framework – Criteria and Scores:**

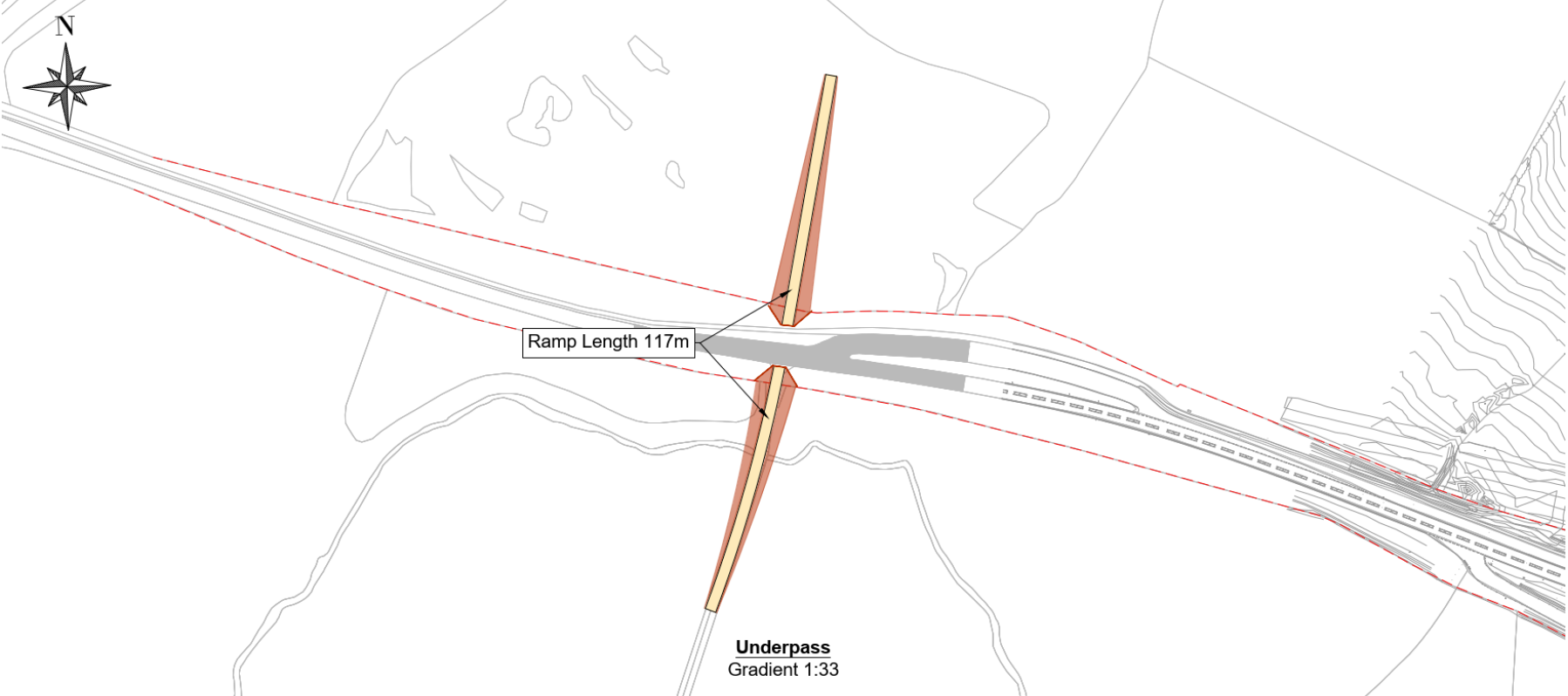
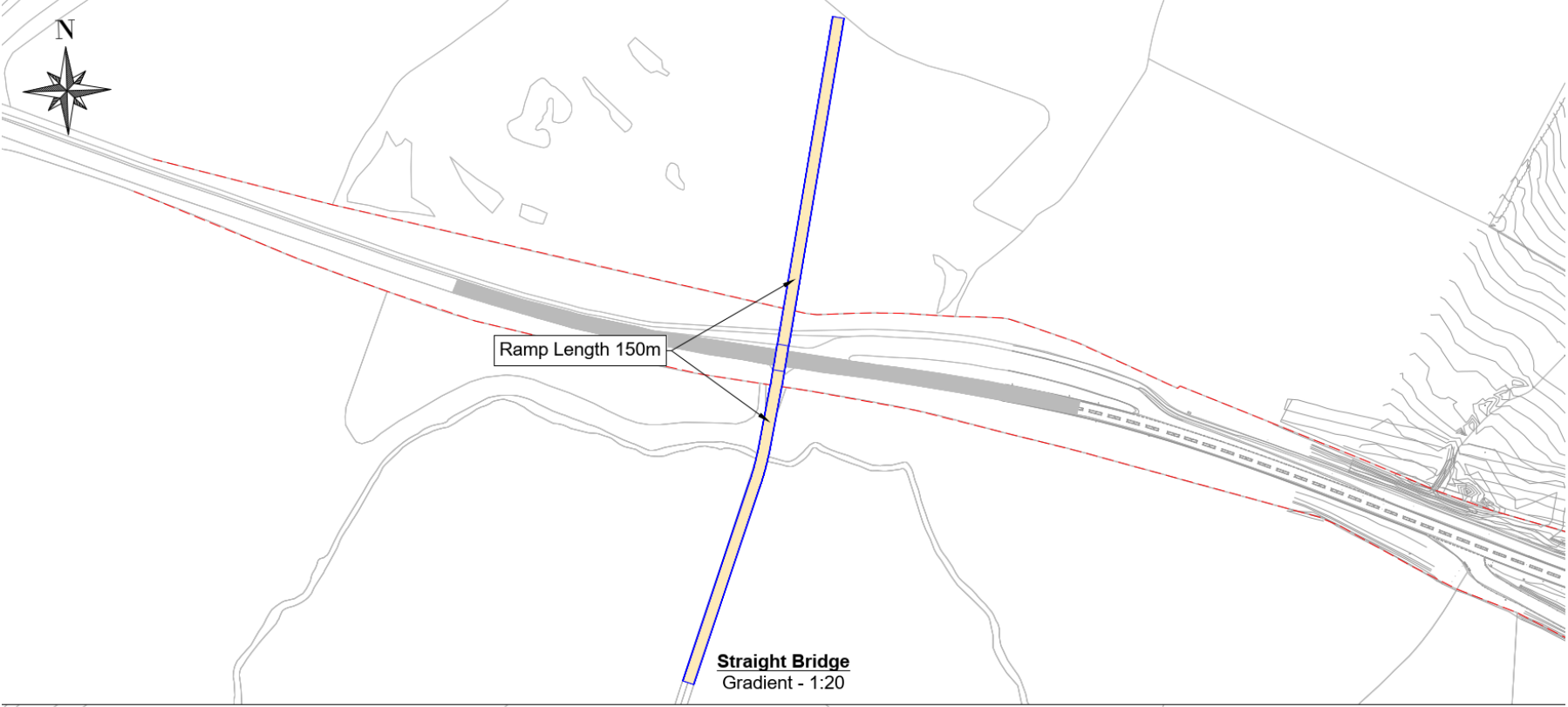
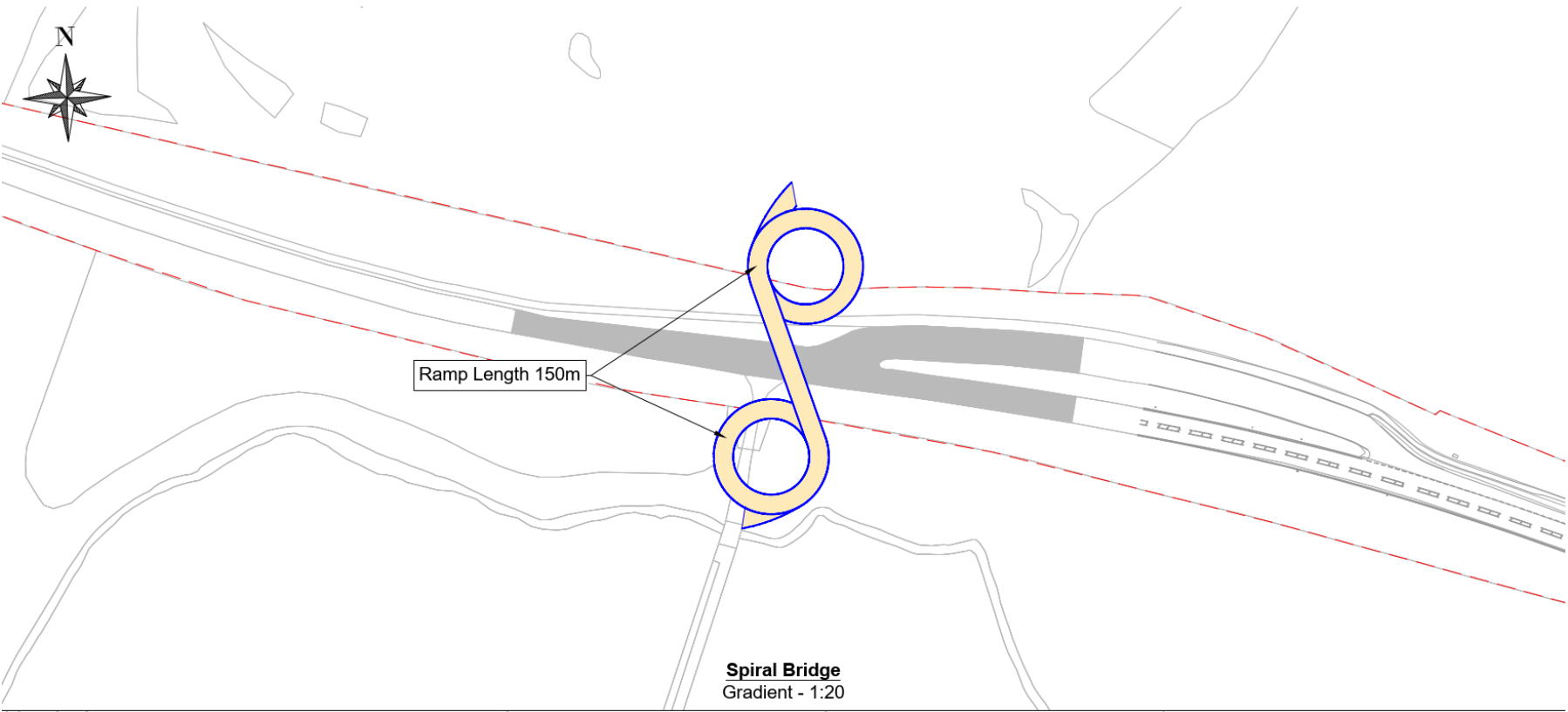
	Value	-3	-3	-2	-1	0	1	2	3	
	Description	Red flag	Strong negative	Negative	Slight negative	Neutral	Slight positive	Positive	Strong positive	Notes
Resident amenity:	Access	Removes residents' ability to access their property for at least one property		Affects gardens or informal access but not main access	Affects one back garden	No effect on resident access				
	Overlooking		4 or more properties overlooked	3 properties overlooked	1 or 2 properties overlooked	No properties overlooked				
Alignment with existing and future desire lines:	Pedestrian					No desire line or outside study area	Moderate or potential desire line	PROW and links to new developments	Very strong existing or future desire line, and links for school children crossing A40	1 point deducted if very long ramps mean not all desire lines served
	Cycle					No desire line or outside study area	Moderate or potential desire line	PROW and links to new developments	Very strong existing or future desire line, and links for school children crossing A40	1 point deducted if very long ramps mean not all desire lines served
	Equestrian									[Equestrian access noted but not scored]
Impact on A40 during construction:	Traffic	New crossing would require a prolonged closure of the A40 to all traffic, with diversion routes needed.	New crossing requires changes to the level of the A40. These changes would be accomplished through multiple phases of construction. Short closures would be required at the start and end of each stage of work, and to install the new crossing.	New crossing is installed with temporary lane closures or restrictions in at least two stages of traffic management, with short closures in between each stage.	New crossing is installed using weekend or overnight closures of the A40.	New crossing is installed with no closures or traffic management needed at all.				For all options: A comprehensive Travel Demand Management campaign of marketing and communications activity, coordinated with operational planning, would minimise the effect of closures.



	Value	-3	-3	-2	-1	0	1	2	3	
	Description	Red flag	Strong negative	Negative	Slight negative	Neutral	Slight positive	Positive	Strong positive	Notes
Impact on A40 during construction:	Buses and other users	As above	As above	As above	As above	As above				Buses, cyclists and pedestrians should be accommodated during the works, and during any temporary closures they should have suitable diversionary routes provided.
Landmark appearance:	From road				A crossing which gives a negative appearance from the road because its location and approaches are clearly poorly located.	A crossing with no landmark appearance from the road.	A crossing with a slight landmark appearance from the road.	A crossing with a strong landmark appearance from the road.		
	For non-motorised users		A subway with narrow, zig-zag approaches with blind corners, which exemplifies poor design.	A subway with long approach ramps with retaining walls, giving the impression of a 'concrete canyon', not good design.	A crossing which does not give the impression of good design.	A crossing which fulfils its function but does not appear in a landmark or positive way.	A crossing with a slight landmark appearance for its users.	A crossing with a strong landmark appearance for its users.		
Land acquisition and ownership		Requires securing or extinguishing main accesses or an entire property or properties	Back garden(s) required	Part of commercial land or small part of residential property required	Small part of commercial land required	No non-public land acquisition required				
Capital cost excluding land			Bridge with long approach ramps (more than 300m in total). Changes to A40 carriageway increase costs but simultaneously deliver savings for steel approach ramp costs.	Bridge with shorter approach ramps (up to 300m in total). Changes to A40 carriageway cost money but save some steel approach ramp costs.	Subway, with no steel approach ramps required. Changes to A40 carriageway cost more but save some excavation costs.					

	Value	-3	-3	-2	-1	0	1	2	3	
	Description	Red flag	Strong negative	Negative	Slight negative	Neutral	Slight positive	Positive	Strong positive	Notes
Safety and security			A subway with narrow, zig-zag approaches with blind corners, unlikely to attract users from a nearby at-grade crossing.		A subway with very long ramps, increasing the sense of isolation and lack of natural surveillance.	A subway using retaining walls which feel more enclosing than cuttings.  A bridge which requires ramps diverting a significant distance from a natural desire line and away from natural surveillance.	A well-designed subway with clear visibility through the crossing and no blind corners. Its lighting should be bright and well-maintained.	A bridge with spiral ramps, on which users would be visible although with a sense of enclosure which could encourage some anti-social behaviour.	A bridge with straight ramps, provided that ramps are on desire lines and give good visibility.	Add a point for options where approaches are very short, enabling better visibility.  Remove a point where subway approaches are either very long or would require retaining walls.
Coordination with other schemes				Crossings not in the study area and therefore not linking with OCGV and West Eynsham SDA		No opportunities to coordinate this work with other schemes. Land availability or the provision of infrastructure would be challenging.	Slight opportunities to coordinate scheme delivery with other schemes.	Good opportunity to coordinate scheme delivery with other schemes.		
Contribution to perception of place			A crossing which very strongly detracts from the perception of place, because its form, location and approaches detract from the surrounding landscape and the ways in which people travel around it.	A crossing which detracts from the perception of place, because its form, location and approaches detract from the surrounding landscape and the ways in which people travel around it.	A crossing which slightly detracts from the perception of place, because its form, location and approaches slightly detract from the surrounding landscape and the ways in which people travel around it.	A crossing which has no impact on the perception of place, either for users or the community.	A crossing which slightly improves the perception of place, because its design and location match the landscape and travel patterns.	A crossing which significantly improves the perception of place through high-quality design and sympathetic location.		
User experience				A crossing with negative user experience as a combination of secluded and indirect approach ramps with harsh retaining walls and no obvious link to the surrounding landscape.	A crossing with a slightly negative user experience because of its location away from desire lines and requiring long and indirect approach ramps.	A crossing with a neutral user experience, neither better nor worse than surrounding options.	A crossing with a slightly positive user experience which shows that desire lines have been considered in its design.	A crossing with a positive user experience because it has well-designed approach ramps.	A crossing with a very positive user experience as a result of short and well-designed approaches which directly meet users' desire lines.	
Total length / time to cross						>350m	250-349m	150-249m	<150m	
Level change			>13m	10-13m	7-10m	4-7m	<4m			

ZONE 1: WEST OF EYNSHAM	
Location description:	<ul style="list-style-type: none"><li>Lies west of the current extents of Eynsham.</li><li>Would provide connections directly into the western area of the OCGV site allocation and into, or in proximity to, the West Eynsham SDA.</li></ul>
Location plan:	
Location photos:	 <p>Looking west on the northern shared-use footway, November 2019</p>
ZONE 1 CONTEXT	
Existing infrastructure considerations:	<ul style="list-style-type: none"><li>Layby located to the north (in the middle of the zone) which is well used by HGVs.</li><li>Watercourse runs to the south of the A40, forming the western boundary of the West Eynsham SDA.</li><li>Greenfield sites to the north and south of the A40; site is unconstrained.</li><li>Public Right of Way (PROW) runs along western boundary of the OCGV, to the north of this zone.</li><li>A shared-use footway runs parallel to A40 on the north side.</li></ul>
Planned infrastructure within zone to be considered:	
HIF/ Science Transit 2	Future dualling of the A40 through Zone 1 brings opportunities for co-ordinating construction of the HIF scheme and any potential new crossing.
Development-related	A new roundabout is proposed to provide access to the OCGV and West Eynsham Strategic Development Areas. Crossing needs to consider any interaction with this.
Topography considerations:	Land is broadly flat to the north and south of the A40.
Compatibility with potential desire lines	<ul style="list-style-type: none"><li>Peripheral to the OCGV SDA and West Eynsham SDA.</li><li>Could provide connectivity for a potential 'green loop' but would serve mainly leisure trips. Connects with a PROW to the north of the A40.</li><li>This zone provides the greatest opportunity for a Green or Garden Bridge.</li></ul>
Fulfil potential of being a 'landmark' structure:	In the future this location will be towards the western extent of OCGV and could connect to West Eynsham SDA. A landmark structure here with high-quality design would provide cues to drivers that there are settlements either side of the road.



**Non motorised crossings of the A40 - Feasibility Study**  
**Zone 1 Optioneering**

Drawing Number: 414585-MMD-00-XX-SK-C-0001  
Scale: N.T.S.

Drawn: J. Man  
Checked: C. Hillcoat  
Approved: C. Greenwood

**M**  
**MOTT**  
**MACDONALD**



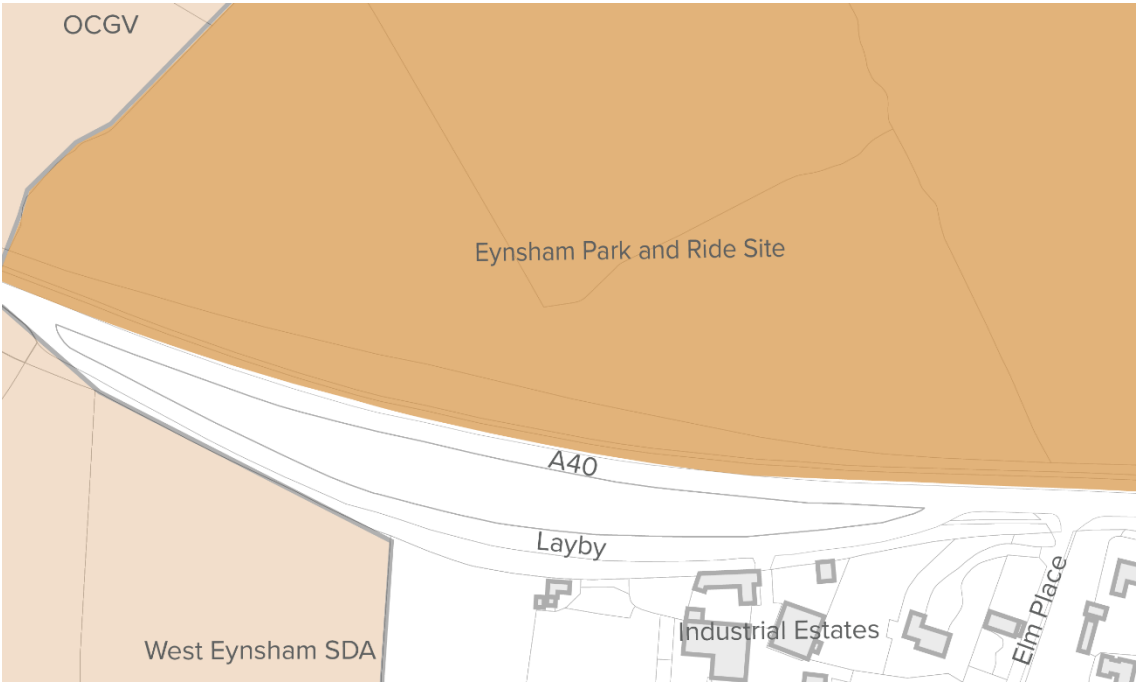
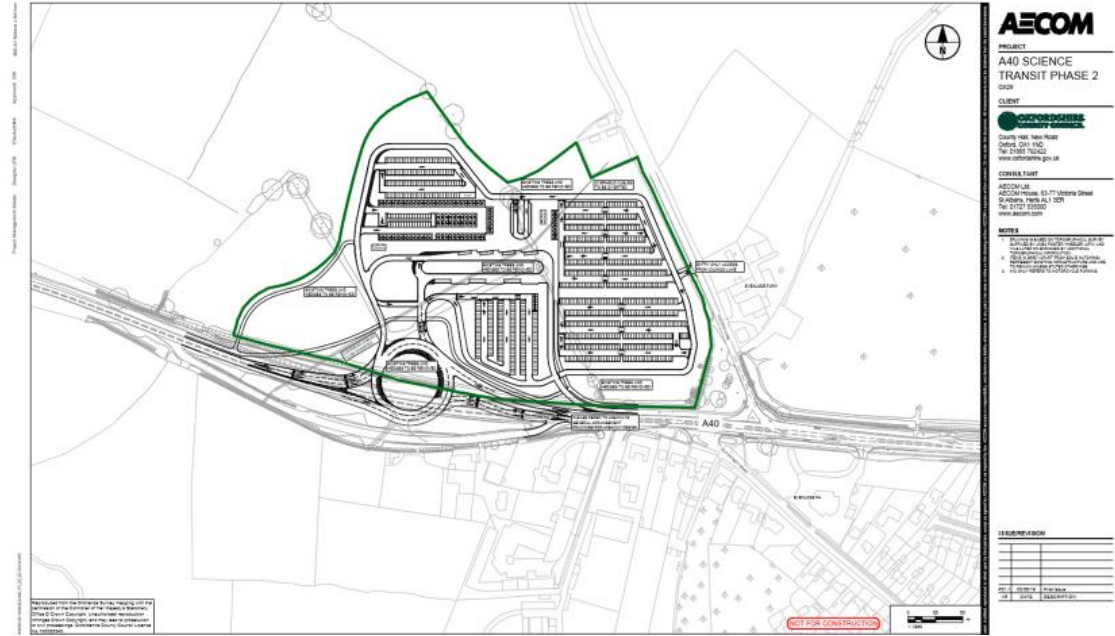
ZONE 1 CROSSING TECHNICAL PARAMETERS				
		BRIDGE (spiral)	BRIDGE (straight)	SUBWAY
Land acquisition/ ownership		Highway / developer land only	Highway / developer land only	Highway / developer land only
Is change in the level of A40 considered?		No	No	No
Ramp gradient assumed		1:20	1:20	1:33
Ramp length (metres)				
South side		150	150	117
North side		150	150	117
Total		300	300	234
Level change (metres)				
South side		6.5	6.5	3.5
North side		6.5	6.5	3.5
Total		13	13	7
Impact on existing residences				
Access implications		None	None	None
No. of properties impacted		None	None	None
Cost comparison		Higher	Higher	Lower
ZONE 1 MULTI-CRITERIA SCORING ASSESSMENT				
Resident amenity:	Access	0	0	0
	Overlooking	0	0	0
Alignment with existing and future desire lines:	Pedestrian	1	1	1
	Cycle	1	1	1
	Equestrian	Must dismount	Can be ridden over	Must dismount
Impact during construction:	Traffic	-1	-1	-2
	Other users	-1	-1	-2
Landmark appearance:	From road	2	2	1
	For users	2	2	1
Land acquisition and ownership		0	0	0
Capital cost excluding land		-2	-2	-1
Safety and security		2	3	1
Coordination with other schemes		1	1	1
Contribution to perception of place		2	2	1
User experience		2	2	1
Total length / time to cross		1	1	2
Level change		-3	-3	0
Total score		7	8	5
ZONE 1 MULTI-CRITERIA SCORING OUTCOME				
Ranking of scores		2	Best (1)	3

A bridge with straight approach ramps is preferred and performs slightly better than a bridge with spiral ramps due to better perceived safety and security. This assumes that the Masterplan for West Eynsham can be shaped around the new bridge link aligning desire lines with the straight approach ramps.

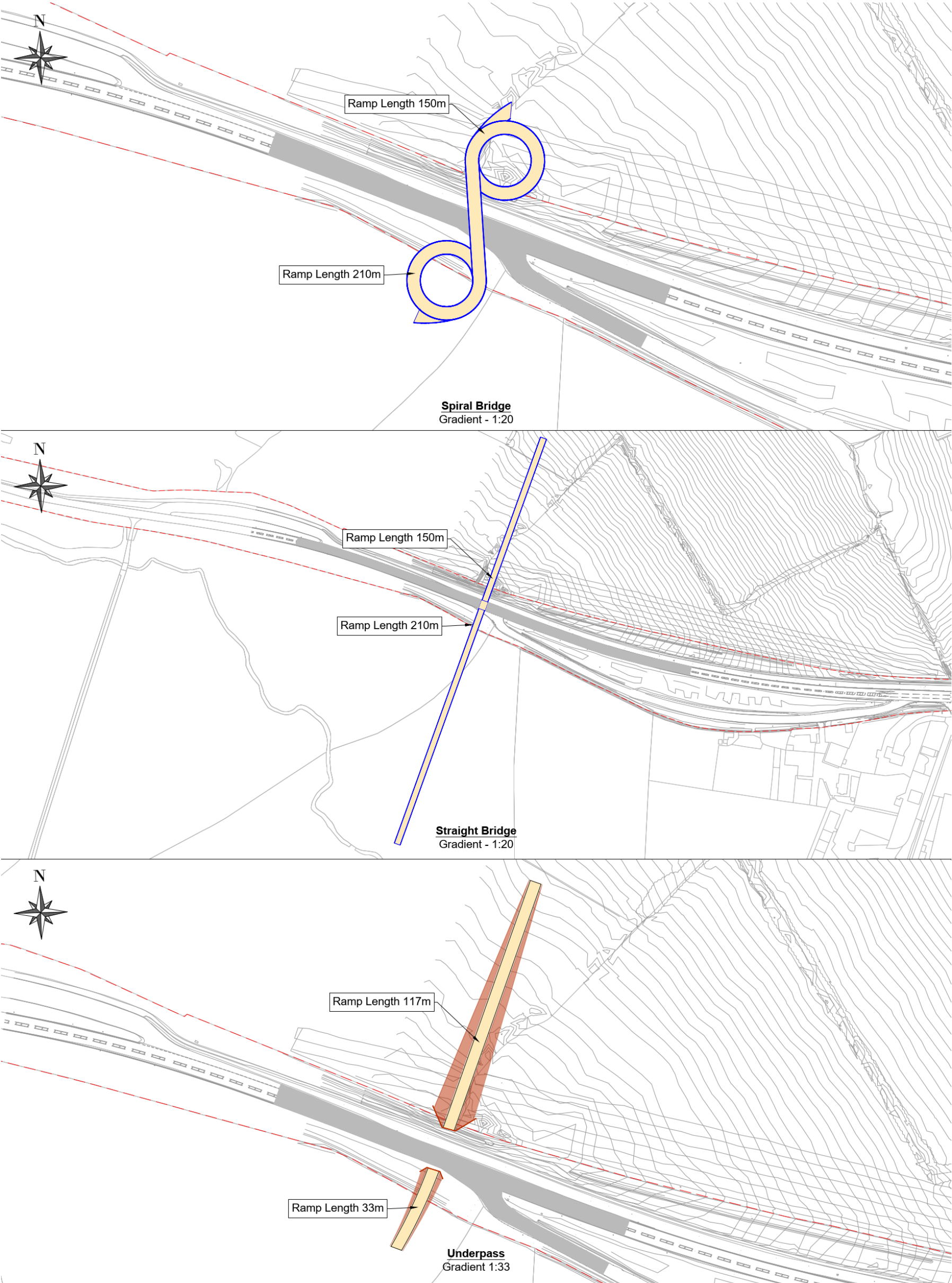
A subway is considered to perform less well as it has a higher impact on the A40 during construction because of more complex traffic management. It scores more poorly than a bridge for landmark appearance, the perception of place and user experience. However, it would cost less than a bridge and would have shorter ramps and therefore a shorter distance and time to cross the A40.

**TAKE FORWARD:**

We present other crossing options for other zones that perform better than any of the crossing options considered for this zone. This reflects the fact that the current location would not provide a connection for any existing settlements although in the longer term would connect OCGV and West Eynsham SDA. The zone does present the opportunity to provide a 'landmark' crossing including a potential 'Green Bridge', unconstrained by current development but in the longer term. Accordingly, the Bridge with straight approach ramps in Zone 1 was selected as an option for further refinement.

ZONE 2: OLD WITNEY ROAD LAY-BY / PROPOSED PARK & RIDE	
Location description:	<ul style="list-style-type: none"><li>Lies west of the current extents of Eynsham.</li><li>Bounded to the east by Elm Place and some residential developments.</li><li>To the north, the Eynsham Park &amp; Ride site is proposed.</li></ul>
Location plan:	
Location photos:	 <p>Eynsham Park &amp; Ride site plan (A40 Science Transit 2 Transport Assessment)</p>
ZONE 2 CONTEXT	
Existing infrastructure considerations:	<ul style="list-style-type: none"><li>The West Eynsham SDA abuts the layby to the south of the A40 in Zone 2. The layby is set back from the A40 and is well used by HGVs.</li><li>Land to the west of the A40 southern layby, on the south side of the A40 is currently undeveloped. To the east, housing and other developments mean that a crossing would be more difficult to achieve without affecting accesses or property.</li><li>Land to the north of the A40 in Zone 2 is currently unconstrained but there is a live planning application for the Park &amp; Ride associated with the site.</li><li>A shared-use footway runs parallel to A40 on the north side.</li><li>There are no PROW or bridleways in Zone 2.</li></ul>
Planned infrastructure within zone to be considered:	
HIF/ Science Transit 2	<ul style="list-style-type: none"><li>The proposed Eynsham Park &amp; Ride is located within Zone 2, to be accessed by a new 3-arm roundabout.</li><li>New bus lanes and upgraded cycle and pedestrian facilities will be provided to the east of the new roundabout.</li><li>The dualling of the A40 between Witney and the new Park &amp; Ride roundabout will be completed as part of HIF2.</li><li>A new pedestrian crossing is proposed in the east of this Zone.</li></ul> <p>In future, the A40 will be much wider in this area particularly in the vicinity of the new roundabout.</p>
Development-related	<p>In future, part of West Eynsham SDA will abut the southern layby.</p>
Topography considerations:	<p>Land is broadly flat to the north of the A40. To the south, levels are up to 2.5m below the A40.</p>
Compatibility with potential desire lines	<ul style="list-style-type: none"><li>A crossing in this Zone was considered to be most feasible to the west of the southern layby.</li><li>A crossing in Zone 2 could serve both the West Eynsham SDA and the OCGV SDA although this location is not as convenient for the existing Bartholomew School compared with other potential locations.</li><li>A crossing would provide connectivity to the Park &amp; Ride and the frequent bus services operating from the site.</li><li>The considerable ramp lengths for a bridge coupled with the layout of the Park &amp; Ride, could lead to a journey feeling indirect and circuitous and hence less attractive than either an at-grade crossing or a crossing at a neighbouring location where a more direct option is available.</li></ul>
Fulfil potential of being a ‘landmark’ structure:	<p>The Park &amp; Ride roundabout will terminate a relatively long stretch of dual carriageway from the west and could provide an opportunity for highlighting the change in location and enhancing a sense of place. A landmark structure at, or near, this location could exemplify the OCGV vision of a sustainable and well-designed place; and provide residents, workers and visitors with the opportunity to travel actively between settlements, green spaces and the Park &amp; Ride site.</p>





ZONE 2 CROSSING TECHNICAL PARAMETERS				
		BRIDGE (spiral)	BRIDGE (straight)	SUBWAY
Land acquisition/ ownership		Highway / developer land only	Highway / developer land only	Highway / developer land only
Is change in the level of A40 considered?		No	No	No
Ramp gradient assumed		1:20	1:20	1:33
Ramp length (metres)				
South side		210	210	33
North side		150	150	117
Total		360	360	150
Level change (metres)				
South side		9	9	1
North side		6.5	6.5	3.5
Total		15.5	15.5	4.5
Impact on existing residences				
Access implications		None	None	None
No. of properties impacted		None	None	None
Cost comparison		Higher	Higher	Lower
ZONE 2 MULTI-CRITERIA SCORING ASSESSMENT				
Resident amenity:	Access	0	0	0
	Overlooking	0	0	0
Alignment with existing and future desire lines:	Pedestrian	1	1	1
	Cycle	1	1	1
	Equestrian	Must dismount	Can be ridden over	Must dismount
Impact during construction:	Traffic	-1	-1	-2
	Other users	-1	-1	-2
Landmark appearance:	From road	2	2	1
	For users	2	2	0
Land acquisition and ownership		0	0	0
Capital cost excluding land		-3	-3	-1
Safety and security		2	3	1
Coordination with other schemes		1	1	1
Contribution to perception of place		2	2	0
User experience		2	2	1
Total length / time to cross		0	0	3
Level change		-3	-3	0
Total score		5	6	4
ZONE 2 MULTI-CRITERIA SCORING OUTCOME				
Ranking of scores		2	Best (1)	3

A bridge with straight approach ramps is preferred and performs slightly better than a bridge with spiral ramps due to better perceived safety and security.

A subway is considered to perform less well as it has a higher impact on the A40 during construction because of more complex traffic management. It scores more poorly than a bridge for landmark appearance, the perception of place and user experience. However, it would cost less than a bridge and would have shorter ramps and therefore a shorter distance and time to cross the A40. The topography to the south means that a subway would have a very short approach ramp.

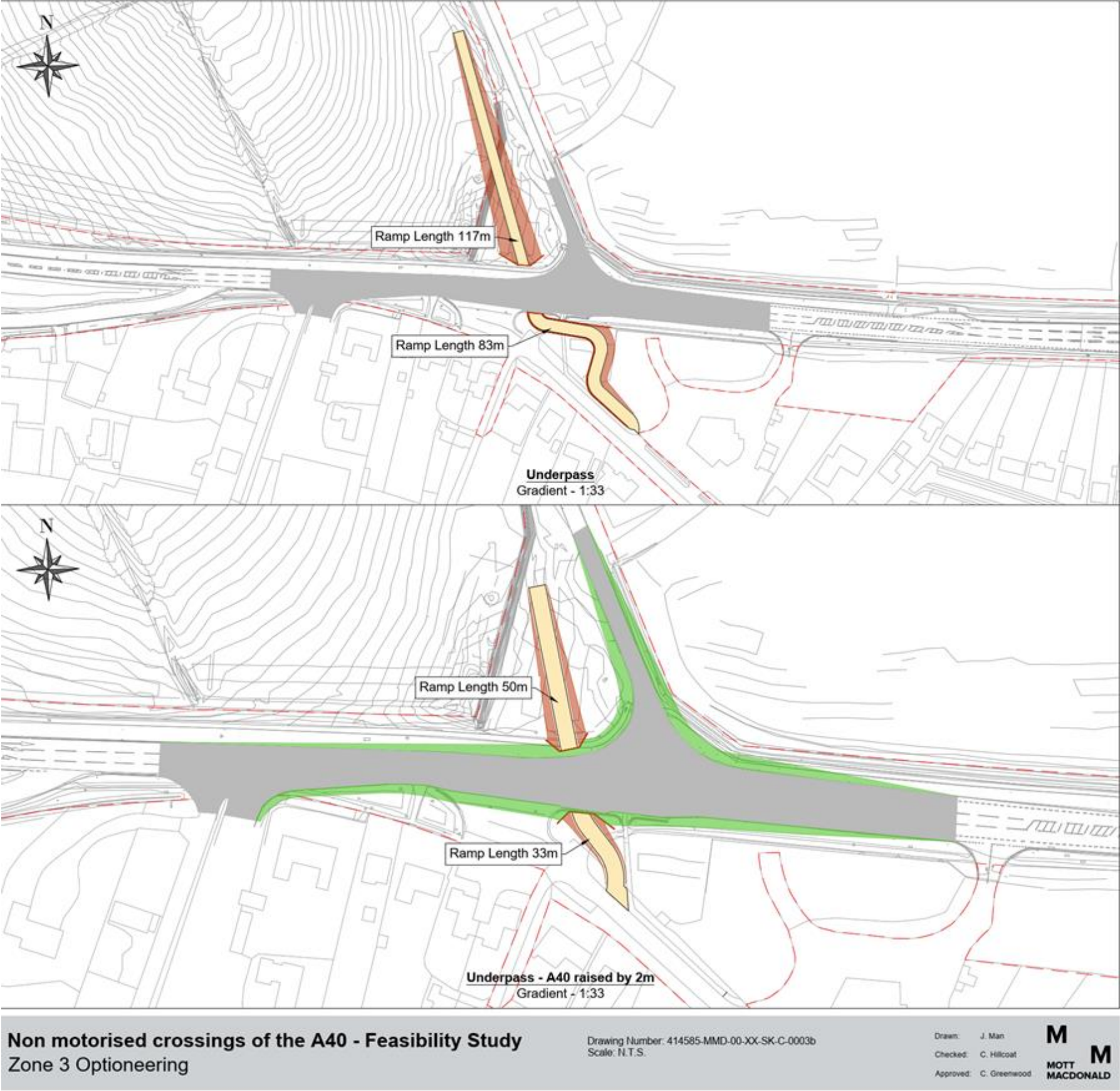
TAKE FORWARD COMBINED WITH ZONE 1:

The preferred bridge with straight approach ramps performs similarly to the bridge with straight approach ramps for zone 1. This zone provides an opportunity to provide a ‘landmark’ crossing in tandem with the proposed changes to the A40 and the delivery of the Park & Ride site.



ZONE 3: CUCKOO LANE / OLD WITNEY ROAD / PROPOSED PARK & RIDE	
Location description:	<ul style="list-style-type: none"><li>A short stretch of the A40 around its junctions with Cuckoo Lane to the north and accesses to the Evenlode pub and Old Witney Road to the south.</li><li>The Millennium Wood is to the north-east of the zone.</li><li>To the north-west, the Eynsham Park &amp; Ride site is proposed.</li></ul>
Location plan:	
Location photos:	<p>Old Witney Road looking north-west, November 2019</p>
ZONE 3 CONTEXT	
Existing infrastructure considerations:	<ul style="list-style-type: none"><li>The A40 is a single carriageway with turning and acceleration lanes making the carriageway approximately 14-15m wide.</li><li>Cuckoo Lane joins from the north at an all movement priority junction but is currently lightly trafficked. Right turns into and out of Cuckoo Lane can be difficult manoeuvres.</li><li>On the south side, Old Witney Road no longer joins the A40 and is currently a cul-de-sac. It provides a link to Eynsham via Witney Road and passes Bartholomew School.</li><li>The Evenlode pub has an access from the A40 as well as off Old Witney Road.</li><li>Land to the north of the A40 west of Cuckoo Lane is currently unconstrained but there is a live planning application for the Park &amp; Ride associated with the site.</li><li>A shared-use footway runs parallel to A40 on the north side. A footway runs on the south side.</li><li>A PROW joins Cuckoo Lane near its junction with the A40.</li></ul>
Planned infrastructure within zone to be considered:	
HIF/ Science Transit 2	<ul style="list-style-type: none"><li>The proposed Eynsham Park &amp; Ride is located to the west of this zone, to be accessed by a new 3-arm roundabout in Zone 2. An access into the site from Cuckoo Lane is also proposed.</li><li>The A40 Science Transit 2 Scheme will add eastbound and westbound bus lanes plus a wider northern shared footway-cycleway together with modifications to the junction with Cuckoo Lane. This zone will become more important as a crossing location in future between Eynsham, the OCGV, West Eynsham SDA, the Park &amp; Ride Site and the Millennium Wood.</li></ul>
Development-related	<ul style="list-style-type: none"><li>A planning application for 77 new homes accessed off Old Witney Road has been approved after appeal (planning reference 15/00761/FUL). This development would mean some additional traffic along Old Witney Road and the removal of the turning head at its current terminus near the A40; and the removal of the existing vehicular access point adjacent to Elm Place on the A40.</li></ul>

Topography considerations:	Land is broadly flat to the north of the A40. To the south, levels are around 1m below the A40.
Compatibility with potential desire lines	<ul style="list-style-type: none"><li>• A crossing in this Zone was considered to be most feasible if it connects Old Witney Road with Cuckoo Lane.</li><li>• A crossing here would provide useful links to school facilities as well as to the Park &amp; Ride site from Eynsham.</li><li>• The potential reconfiguration of Cuckoo Lane as part of the A40 Science Transit 2 Scheme offers the opportunity to 'land' the bridge or subway on either the western or eastern side. Consideration will need to be given to crossing Cuckoo Lane as an integrated part of any future design work and access plans.</li><li>• Major construction changes to the A40 are planned here to accommodate new bus lanes which could provide the opportunity to adjust the vertical alignment of the carriageway to shorten approach ramp lengths for either bridge or subway. Potential changes to the horizontal alignment are limited due to the location of the Millennium Wood on the north side of the A40. Raising or lowering the carriageway by 2m which would still allow the A40 to tie into the existing accesses to the south of the A40 either side of Cuckoo Lane would result in a shortening of the approach ramps.</li></ul>
Fulfil potential of being a 'landmark' structure:	A crossing here is likely to be delivered as part of an early phase of the OGGV because of its relatively central location. It would also be well used and therefore the possibility of a landmark structure could be investigated. The topography lends itself to a subway here rather than a bridge, which is more difficult to notice from the road than a bridge passing over. It would also be well used and therefore the possibility of a landmark structure could be investigated.







ZONE 3 CROSSING TECHNICAL PARAMETERS						
		BRIDGE (spiral)	BRIDGE (straight)	SUBWAY	BRIDGE (A40 lowered)	SUBWAY (A40 raised)
Land acquisition/ ownership		Part of Evenlode garden	Part of Evenlode garden and two houses' front gardens	Small part of Evenlode garden	Part of Evenlode garden	Highway / P&R site land only
Is change in the level of A40 considered?		No	No	No	Yes, lowered 2m	Yes, raised 2m
Ramp gradient assumed		1:20	1:20	1:33	1:20	1:33
Ramp length (metres)						
South side		175	175	83	125	33
North side		150	150	117	105	50
Total		325	325	200	230	83
Level change (metres)						
South side		7.5	7.5	2.5	5.5	1
North side		6.5	6.5	3.5	4.5	1.5
Total		14	14	6	10	2.5
Impact on existing residences						
Access implications		None	Two houses on Old Witney Road	None	None	None
No. of properties overlooked		Three	Four	None	Two	Two
Cost comparison		Higher	Higher	Lower	Higher	Medium
ZONE 3 MULTI-CRITERIA SCORING ASSESSMENT						
Resident amenity:	Access	0	-3 Red flag	0	0	0
	Overlooking	-2	-3	0	-1	-1
Alignment with existing and future desire lines:	Pedestrian	3	2	3	3	3
	Cycle	3	2	3	3	3
	Equestrian	Must dismount	Can be ridden over	Must dismount	Can be ridden over	Must dismount
Impact during construction:	Traffic	-1	-1	-2	-3	-3
	Other users	-1	-1	-2	-3	-3
Landmark appearance:	From road	2	2	1	2	1
	For users	2	2	1	2	2
Land acquisition and ownership		-2	-3 Red flag	-2	-1	0
Capital cost excluding land		-3	-3	-1	-3	-2
Safety and security		2	3	1	3	3
Coordination with other schemes		2	2	2	2	2
Contribution to perception of place		2	2	1	2	1
User experience		2	2	1	2	2
Total length / time to cross		1	1	2	2	3
Level change		-3	-3	0	-1	1
Total score		7	1 (Red flag)	8	9	12
ZONE 3 MULTI-CRITERIA SCORING OUTCOME						
Ranking of scores		4	5 (Red flag)	3	2	Best (1)

A subway where the A40’s level is raised by 2m performs the best of all options (acknowledging that construction challenges and utilities diversions are associated with this), followed by a bridge where the A40’s level is lowered by 2m. A subway where the A40’s level is not changed also scores well.



A bridge with straight approach ramps compromises residential property accesses and so was given a red flag as an undeliverable option.

Because of topography, the subways have much shorter approach ramps than the bridges. The option where the A40’s level is raised has the lowest total level change of any option considered in the study area. The implications of raising the A40’s level would include utility diversions, a longer construction period and more complexity.

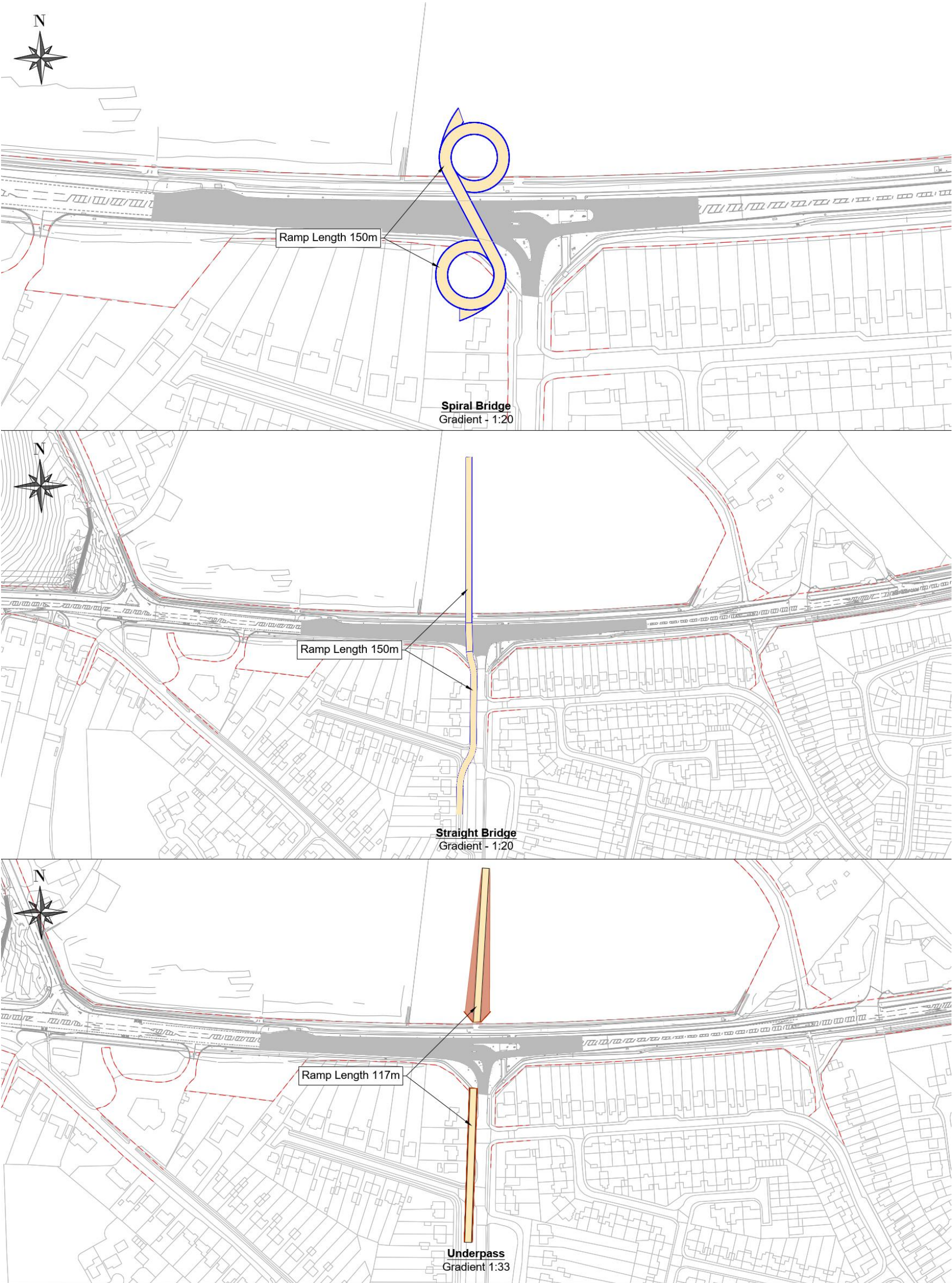
TAKE FORWARD:

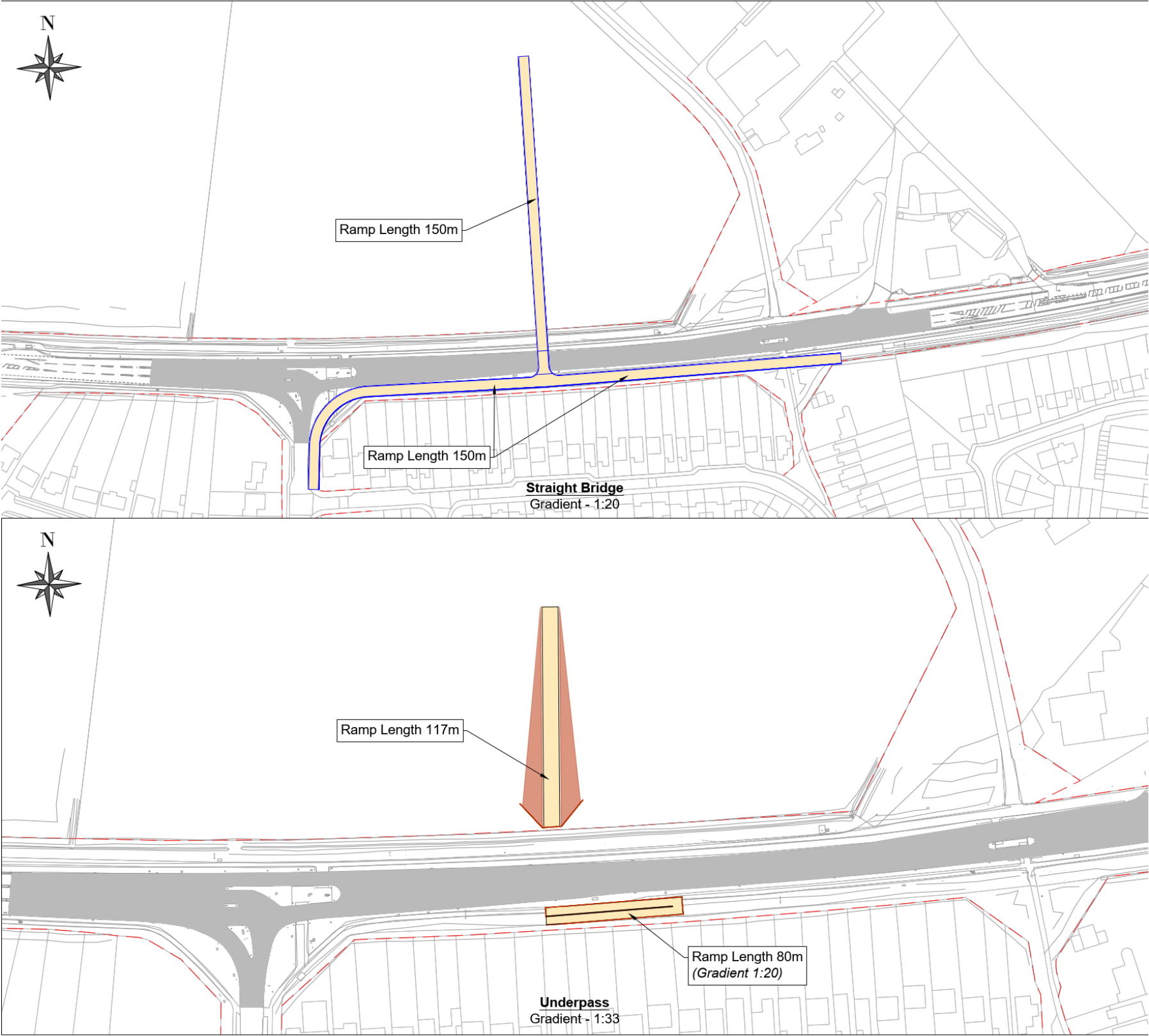
The subway with the A40’s level raised performs very well and is taken forward for refinement in the next stage of work.



ZONE 4: WITNEY ROAD	
Location description:	<ul style="list-style-type: none"><li>A zone centred around the existing signalised junction of the A40 and Witney Road, where traffic from the east and west can access Eynsham via Witney Road although traffic from Eynsham can only turn westbound.</li><li>The Millennium Wood is to the north-west of the zone.</li><li>Houses about the highway boundary to the south.</li></ul>
Location plan:	
Location photos:	 <p>Pedestrians crossing the A40 using the signalised crossing at Witney Road, November 2019</p>
ZONE 4 CONTEXT	
Existing infrastructure considerations:	<ul style="list-style-type: none"><li>The A40 is a single carriageway with a right turn lane to allow the eastbound right turn into Witney Road.</li><li>There is a signalised toucan crossing at Witney Road – the only controlled crossing facility of the A40 in the study area.</li><li>The signalised junction with Witney Road will remain in its existing or a modified layout in the future.</li><li>The S1 bus uses the junction to enter Eynsham from the west.</li><li>There is open land around Witney Road which could be used for some of the space requirements of a bridge or subway.</li><li>Land to the north is currently undeveloped but will form part of OCGV in future.</li><li>A shared-use footway runs parallel to A40 on the north side. A footway runs on the south side.</li><li>There are no PROWs in this zone.</li></ul>
Planned infrastructure within zone to be considered:	
HIF/ Science Transit 2	<ul style="list-style-type: none"><li>The A40 Science Transit 2 Scheme will add eastbound and westbound bus lanes plus a wider northern shared footway-cycleway together with modifications to the junction with Witney Road to suit.</li></ul>
Development-related	<ul style="list-style-type: none"><li>n/a</li></ul>
Topography considerations:	Land is broadly flat to the north and south of the A40.
Compatibility with potential desire lines	<ul style="list-style-type: none"><li>The opportunity for a signalised at-grade crossing of the A40 will remain as the junction with Witney Road will remain in place with traffic signals.</li><li>A crossing here would provide useful links to Bartholomew School as well as to the OCGV.</li><li>Major construction changes to the A40 are planned here to accommodate new bus lanes but there is no scope for changes to the A40's vertical alignment because of the Witney Road junction. Potential changes to the horizontal alignment are limited due to the location of the Millennium Wood on the north side of the A40.</li><li>A footbridge or subway accessed only by steps (with no ramps) would be easier to accommodate here but its use would be greatly limited both by its inaccessibility to large numbers of people, and by the parallel at-grade crossing which is protected by traffic signals.</li><li>It would be possible to locate a crossing halfway between Witney Road and the footway link to Spareacre Lane to the east (Zone 5). Such a crossing would be significantly away from the desire lines from either Witney Road or Spareacre Lane so is unlikely to be more popular than crossing at grade using the traffic signals at Witney Road. Sketches for this location are shown below.</li></ul>
Fulfil potential of being a 'landmark' structure:	Because of its relatively central location, a crossing here would be well used and therefore the possibility of a landmark structure could be investigated. The layout and limited land availability mean that any crossing would have either sinuous zig-zag ramps, would require the purchase of private land or blocking of accesses, and would resemble a “traditional” grade-separated crossing which is not designed for the comfort and convenience of those using it.









ZONE 4 CROSSING TECHNICAL PARAMETERS						
		BRIDGE (spiral)	BRIDGE (straight)	SUBWAY	BRIDGE (east of Witney Road)	SUBWAY (east of Witney Road)
Land acquisition/ ownership		One back garden	Four front gardens	Four front gardens	Part of one side garden	Highway land only
Is change in the level of A40 considered?		No	No	No	No	No
Ramp gradient assumed		1:20	1:20	1:33	1:20	1:20 south; 1:33 north
Ramp length (metres)						
South side		150	150	117	150	80
North side		150	150	117	150	117
Total		300	300	234	300	197
Level change (metres)						
South side		6.5	6.5	3.5	6.5	3.5
North side		6.5	6.5	3.5	6.5	3.5
Total		13	13	7	13	7
Impact on existing residences						
Access implications		One back garden	Four on Witney Road between Tilgarsley Road and A40 (assume Tilgarsley Road access diverted via service road)	Four on Witney Road between Tilgarsley Road and A40 (assume Tilgarsley Road access diverted via service road)	None	None
No. of properties overlooked		Three	Four	None	Approximately 12	None
Cost comparison		Higher	Higher	Lower	Higher	Higher
ZONE 4 MULTI-CRITERIA SCORING ASSESSMENT						
Resident amenity:	Access	-2	-3 (Red flag)	-3 (Red flag)	0	0
	Overlooking	-2	-3	0	-3	0
Alignment with existing and future desire lines:	Pedestrian	3	2	2	1	1
	Cycle	3	2	2	1	1
	Equestrian	Must dismount	Can be ridden over	Must dismount	Can be ridden over	Must dismount
Impact during construction:	Traffic	-1	-1	-2	-1	-2
	Other users	-1	-1	-2	-1	-2
Landmark appearance:	From road	2	2	0	-1	0
	For users	2	2	-2	-1	-3
Land acquisition and ownership		-3	-3 (Red flag)	-3 (Red flag)	-2	0
Capital cost excluding land		-2	-2	-1	-2	-2
Safety and security		2	3	0	0	-3
Coordination with other schemes		1	1	1	0	0
Contribution to perception of place		1	2	-3	-1	-3
User experience		1	2	-2	-1	-2
Total length / time to cross		1	1	2	1	2
Level change		-3	-3	0	-3	0
Total score		2	1 (Red flag)	-11 (Red flag)	-13	-13
ZONE 4 MULTI-CRITERIA SCORING OUTCOME						
Ranking of scores		Best (1)	2 (Red flag)	3 (Red flag)	4=	4=



A bridge with spiral ramps is the only option to score positively and have no red flags. It would require the acquisition of part of one back garden but no further access restrictions. However, it would not provide an attractive crossing option compared with the existing signalised at-grade crossing at the Witney Road junction and hence is unlikely to be well used.

A bridge or subway with straight approach ramps compromise residential property accesses and so were given a red flag as undeliverable options.

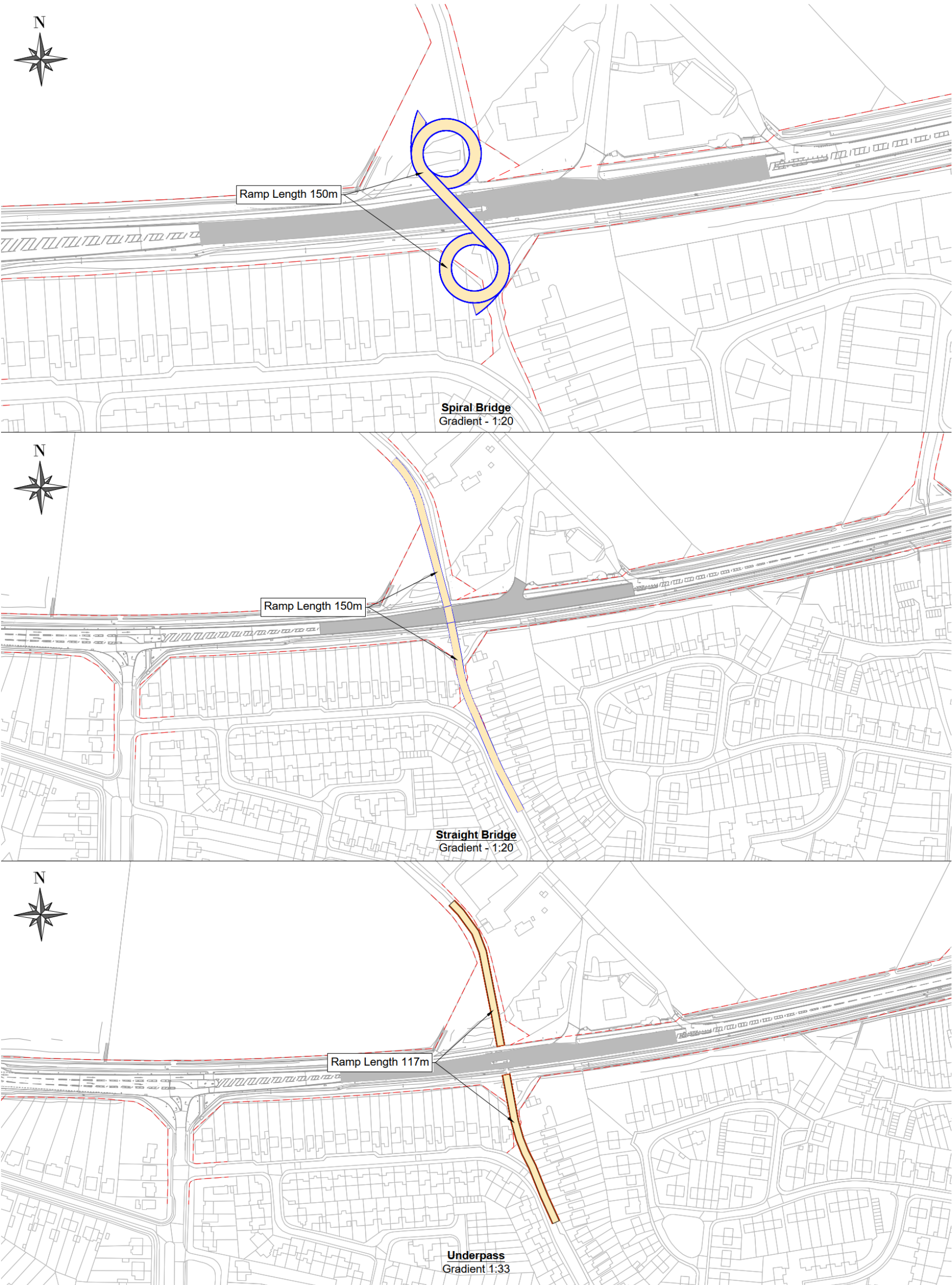
Options to the east of Witney Road, between there and Spareacre Lane, are technically deliverable but would be visually unappealing and a long way from a desire line and hence unlikely to be well-used compared with the signalised crossing.

DO NOT TAKE FORWARD:

No option here scores well compared with high-scoring options elsewhere, so no further option refinement took place.

ZONE 5: SPAREACRE LANE / ESSO TESCO EXPRESS	
Location description:	<ul style="list-style-type: none"><li>A zone to the east of Witney Road, incorporating Spareacre Lane and other residential streets to the south and Esso Tesco Express to the north.</li><li>Land on the north side either side of Esso Tesco Express is not currently developed but will form part of OCGV.</li><li>Houses about the highway boundary to the south. There is one pedestrian access point to Spareacre Lane.</li></ul>
Location plan:	
Location photos:	 <p>Shared-use footway on the north side of the A40 near Esso Tesco Express, November 2019</p>
ZONE 5 CONTEXT	
Existing infrastructure considerations:	<ul style="list-style-type: none"><li>The A40 is a single carriageway with a right turn lane to allow the westbound right turn into the Esso Tesco Express filling station and the car showroom. Exits from there are only permitted as left turns.</li><li>The Esso Tesco Express access will remain in the future.</li><li>A shared-use footway runs parallel to A40 on the north side. A footway runs on the south side.</li><li>A PROW crosses the A40 in this zone, with an uncontrolled pedestrian crossing with a central refuge island – shown in the plan above.</li></ul>
Planned infrastructure within zone to be considered:	
HIF/ Science Transit 2	<ul style="list-style-type: none"><li>The A40 Science Transit 2 Scheme will add eastbound and westbound bus lanes plus a wider northern shared footway-cycleway. The highway boundary is quite tight at this location meaning that provision of new facilities may be a challenge.</li></ul>
Development-related	<ul style="list-style-type: none"><li>n/a</li></ul>
Topography considerations:	Land is broadly flat to the north and south of the A40.
Compatibility with potential desire lines	<ul style="list-style-type: none"><li>A PROW crosses the A40 here, providing a link between the OCGV and Eynsham.</li><li>Major construction changes to the A40 are planned here to accommodate new bus lanes but there is no scope for changes to the A40's vertical or horizontal alignment because of the access to the north.</li><li>A footbridge or subway accessed only by steps (with no ramps) would be easier to accommodate here but its use would be greatly limited both by its inaccessibility to large numbers of people, and by the parallel at-grade crossing which is protected by traffic signals.</li></ul>
Fulfil potential of being a 'landmark' structure:	Because of its relatively central location, a crossing here would potentially be well used and therefore the possibility of a landmark structure could be investigated. – as long as its accesses were not limited to stairs only. The layout and limited land availability mean that any crossing would have either sinuous zig-zag ramps, would require the purchase of private land or blocking of accesses, and would resemble a "traditional" grade-separated crossing which is not designed for the comfort and convenience of those using it.







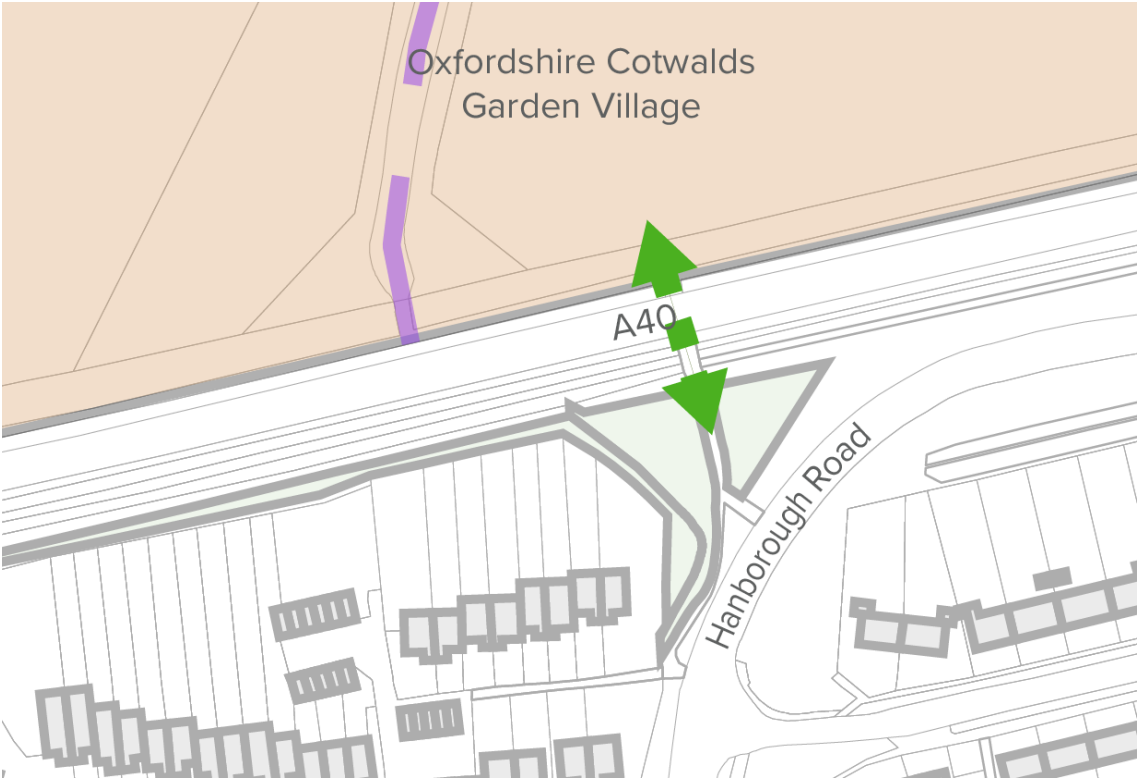

ZONE 5 CROSSING TECHNICAL PARAMETERS				
		BRIDGE (spiral)	BRIDGE (straight)	SUBWAY
Land acquisition/ ownership		Three back gardens	Up to 17 houses CPO	Up to 13 houses CPO
Is change in the level of A40 considered?		No	No	No
Ramp gradient assumed		1:20	1:20	1:33
Ramp length (metres)				
South side		150	150	117
North side		150	150	117
Total		300	300	234
Level change (metres)				
South side		6.5	6.5	3.5
North side		6.5	6.5	3.5
Total		13	13	7
Impact on existing residences				
Access implications		One back garden	17 houses	13 houses
No. of properties impacted		Circa five	Circa 12	None
Cost comparison		Higher	Higher	Lower
ZONE 5 MULTI-CRITERIA SCORING ASSESSMENT				
Resident amenity:	Access	-1	-3 (Red flag)	-3 (Red flag)
	Overlooking	-3	-3	0
Alignment with existing and future desire lines:	Pedestrian	2	1	1
	Cycle	2	1	1
	Equestrian	Must dismount	Can be ridden over	Must dismount
Impact during construction:	Traffic	-1	-1	-2
	Other users	-1	-1	-2
Landmark appearance:	From road	2	2	0
	For users	2	2	-2
Land acquisition and ownership		-3	-3 (Red flag)	-3 (Red flag)
Capital cost excluding land		-2	-2	-1
Safety and security		2	3	0
Coordination with other schemes		0	0	0
Contribution to perception of place		1	1	-3
User experience		2	2	-2
Total length / time to cross		1	1	2
Level change		-3	-3	0
Total score		0	-3 (Red flag)	-14 (Red flag)
ZONE 5 MULTI-CRITERIA SCORING OUTCOME				
Ranking of scores		Best (1)	2 (Red flag)	3 (Red flag)

A bridge with spiral ramps is the only option to have no red flags. It would require the acquisition of land from three back gardens although would have no further access restrictions.

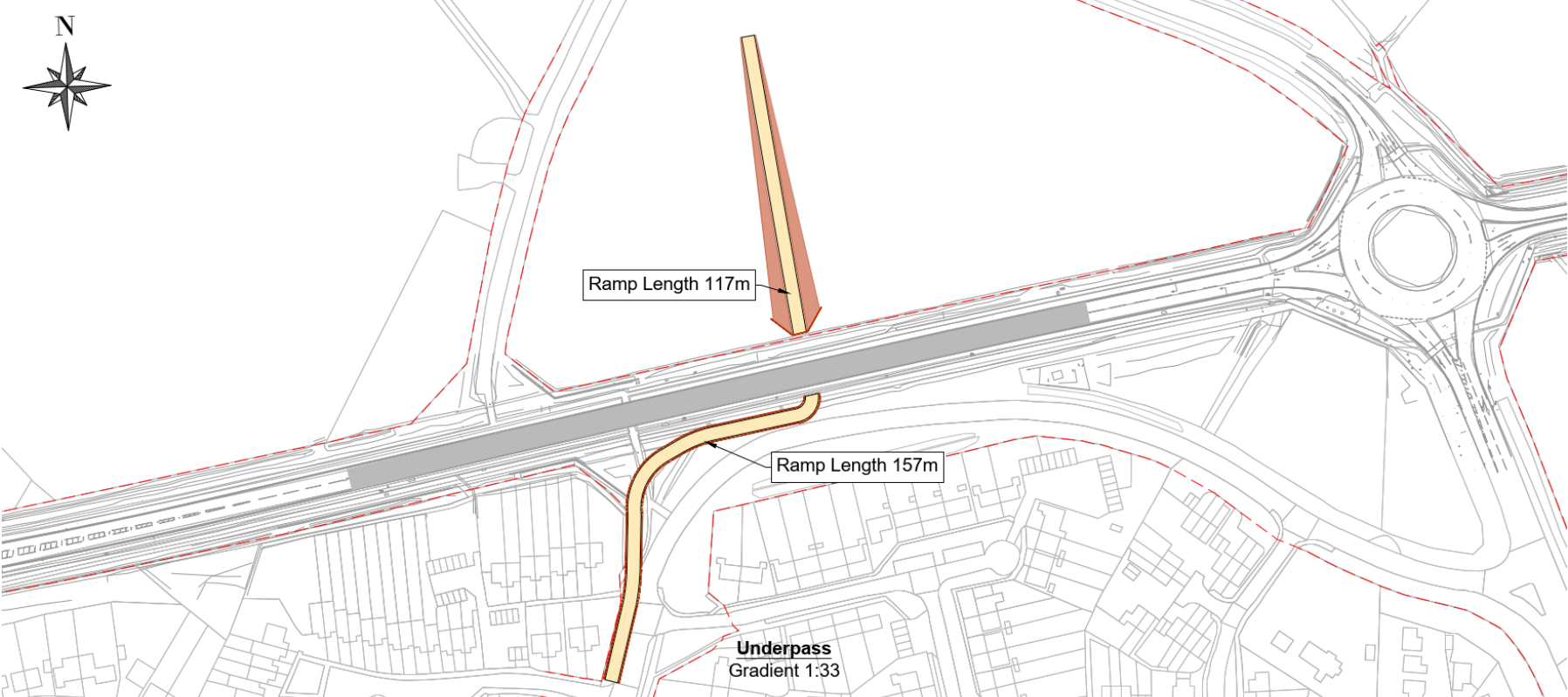
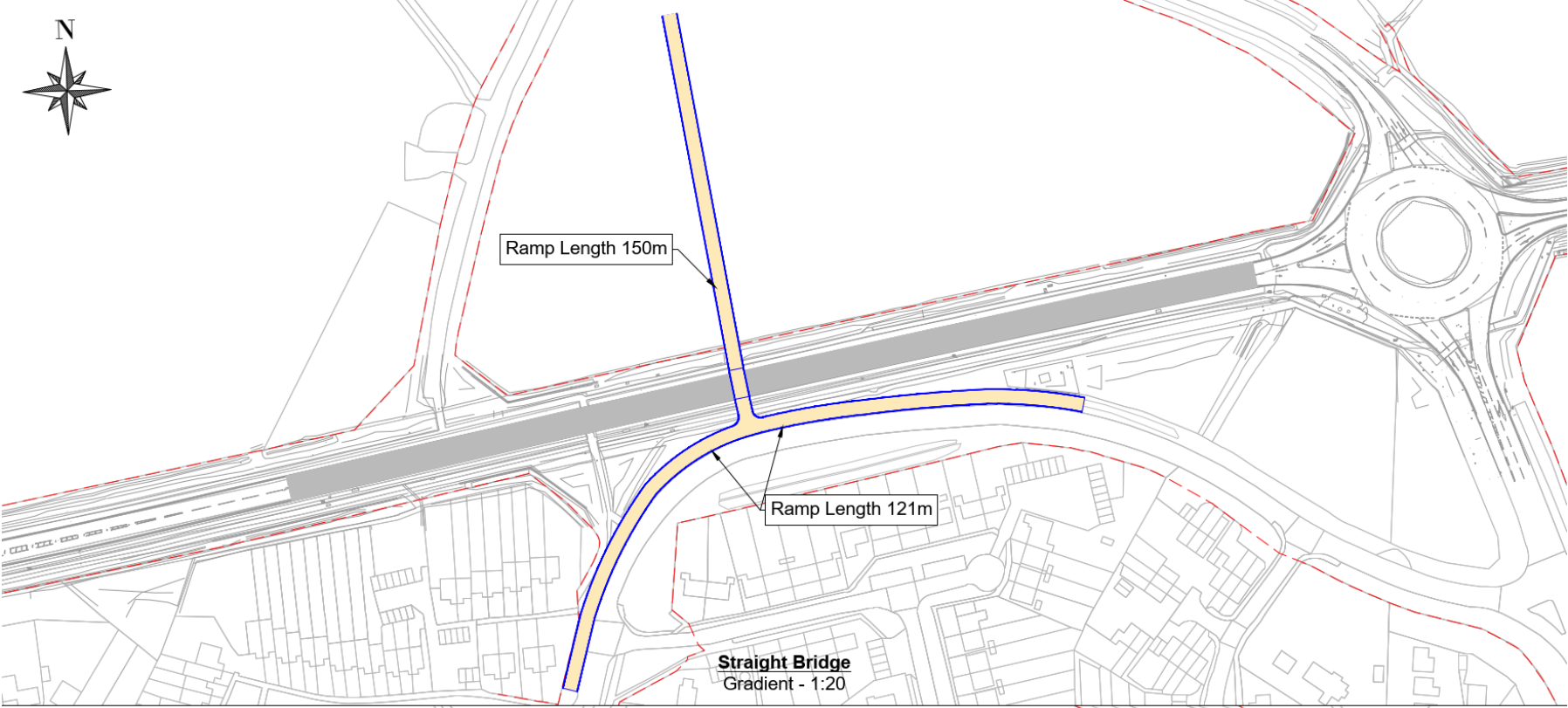
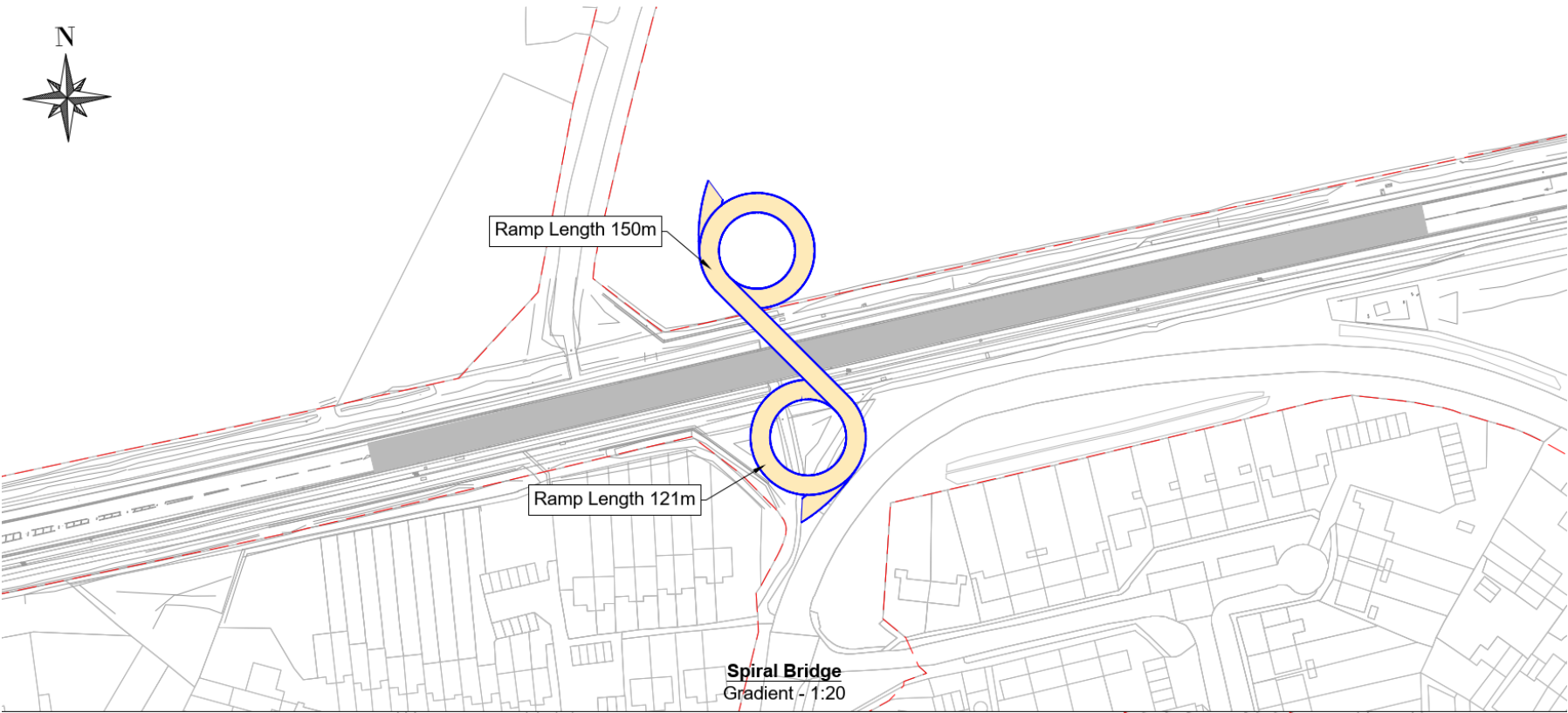
A bridge or subway with straight approach ramps compromise residential property accesses and so were given a red flag as undeliverable options.

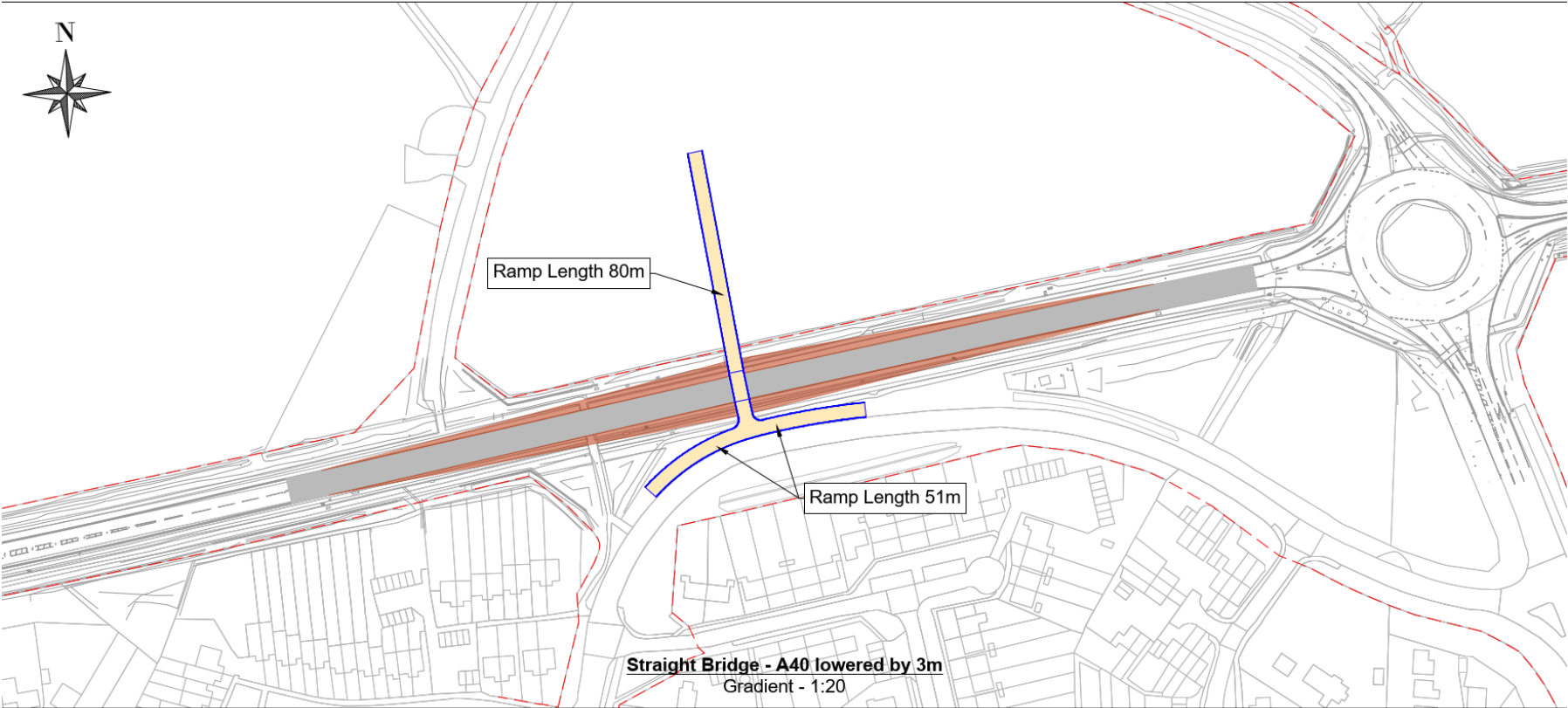
DO NOT TAKE FORWARD:

No option here scores well compared with high-scoring options elsewhere, so no further option refinement took place.

ZONE 6: HANBOROUGH ROAD	
Location description:	<ul style="list-style-type: none"><li>A zone centred around the original alignment of Hanborough Road linking to Mill Lane across the A40, running east as far as the Eynsham roundabout.</li><li>Land on the north side is not currently developed but will form part of OCGV.</li><li>Houses about the highway boundary to the south. There is one pedestrian access point to Hanborough Road.</li></ul>
Location plan:	 <p>The map shows the A40 running horizontally. To the north is the Oxfordshire Cotswolds Garden Village, indicated by an orange-shaded area. A purple line marks a boundary or path. To the south of the A40, Hanborough Road runs diagonally. Green arrows indicate a crossing point from the A40 towards Hanborough Road. Buildings are shown along Hanborough Road.</p>
Location photos:	 <p>A photograph showing a dirt path covered in fallen yellow and brown leaves, leading through trees and greenery. In the background, a road sign is visible. The path appears to lead south towards Hanborough Road.</p> <p>Looking south towards Hanborough Road from the A40, November 2019</p>
ZONE 6 CONTEXT	
Existing infrastructure considerations:	<ul style="list-style-type: none"><li>The A40 is a single carriageway for a 500m stretch between Esso Tesco Express and the Eynsham roundabout.</li><li>There is an uncontrolled pedestrian crossing connecting Hanborough Road to Mill Lane, but it is only marked by dropped kerbs and no meaningful infrastructure.</li><li>A shared-use footway runs parallel to A40 on the north side. A footway runs on the south side.</li><li>Hanborough Road runs to the south of the A40 but was diverted away, to the B4449, some years ago.</li></ul>
Planned infrastructure within zone to be considered:	
HIF/ Science Transit 2	<ul style="list-style-type: none"><li>The A40 Science Transit 2 Scheme will add eastbound and westbound bus lanes plus a wider northern shared footway-cycleway.</li></ul>
Development-related	<ul style="list-style-type: none"><li>n/a</li></ul>
Topography considerations:	Land is broadly flat to the north of the A40. To the south the land is about 1.2m higher than the A40.
Compatibility with potential desire lines	<ul style="list-style-type: none"><li>A PROW runs north from the A40 in this zone towards Mill Lane.</li><li>The proposed B4044 Cycle Path, located close to this zone, would provide a link to Oxford Swinford toll bridge; the intention is that this Cycle Path would connect to a cycle route leading north along Lower Road to Hanborough station.</li><li>Hanborough Road provides good access into the centre of Eynsham for local services and shops.</li></ul>
Fulfil potential of being a 'landmark' structure:	<p>This location provides a good opportunity for a landmark structure, as it benefits from a relatively unconstrained section of the A40 for 500m, and is well located for links between Eynsham and OCGV. Land to the north is currently undeveloped which enables approaches to be designed largely without constraint.</p> <p>The level of the A40 could potentially be changed to accommodate shorter approach ramps for those crossing the road. Given the topography a lowering of the A40 would permit a bridge with short ramps, which is not feasible elsewhere in the study area.</p>







ZONE 6 CROSSING TECHNICAL PARAMETERS					
		BRIDGE (spiral)	BRIDGE (straight)	SUBWAY	BRIDGE (A40 lowered)
Land acquisition/ ownership		Highway land only	Highway land only	Highway land only	Highway land only
Is change in the level of A40 considered?		No	No	No	Yes, lowered 3m
Ramp gradient assumed		1:20	1:20	1:33	1:20
Ramp length (metres)					
South side		112	121	157	51
North side		150	150	117	80
Total		262	271	274	131
Level change (metres)					
South side		5.3	5.3	4.7	2.3
North side		6.5	6.5	3.5	3.5
Total		11.8	11.8	8.2	5.8
Impact on existing residences					
Access implications		None	One informal access on Hanborough Road	One informal access on Hanborough Road	None
No. of properties overlooked		Three	Four	None	None
Cost comparison		Higher	Higher	Lower	Higher
ZONE 6 MULTI-CRITERIA SCORING ASSESSMENT					
Resident amenity:	Access	0	-2	-2	0
	Overlooking	-2	-3	0	0
Alignment with existing and future desire lines:	Pedestrian	2	2	2	2
	Cycle	2	2	2	2
	Equestrian	Must dismount	Can be ridden over	Must dismount	Can be ridden over
Impact during construction:	Traffic	-1	-1	-2	-3
	Other users	-1	-1	-2	-3
Landmark appearance:	From road	2	2	1	2
	For users	2	2	-2	2
Land acquisition and ownership		0	0	0	0
Capital cost excluding land		-2	-2	-1	-2
Safety and security		2	3	-1	3
Coordination with other schemes		1	1	1	1
Contribution to perception of place		2	2	-2	2
User experience		2	2	-2	3
Total length / time to cross		1	1	1	3
Level change		-2	-2	-1	0
Total score		8	6	-8	12
ZONE 6 MULTI-CRITERIA SCORING OUTCOME					
Ranking of scores		2	3	4	Best (1)

Bridge options at this zone all score well, because the topography and layout mean they could provide a high-quality crossing without very long approach ramps.

The bridge with the A40 lowered scores the best – indeed this is the best scoring of any option in the study area. It outscores the other bridge options on overlooking and access changes, safety, user experience and the shortness of ramps. It would be more complex to install because of the traffic management required to change the A40’s level.



A subway is technically feasible but scores very poorly because of its negative user experience, landmark appearance and contribution to perception of place. It would also require long approach ramps so is not preferred at this location, even though it would be a cheaper option.

TAKE FORWARD:

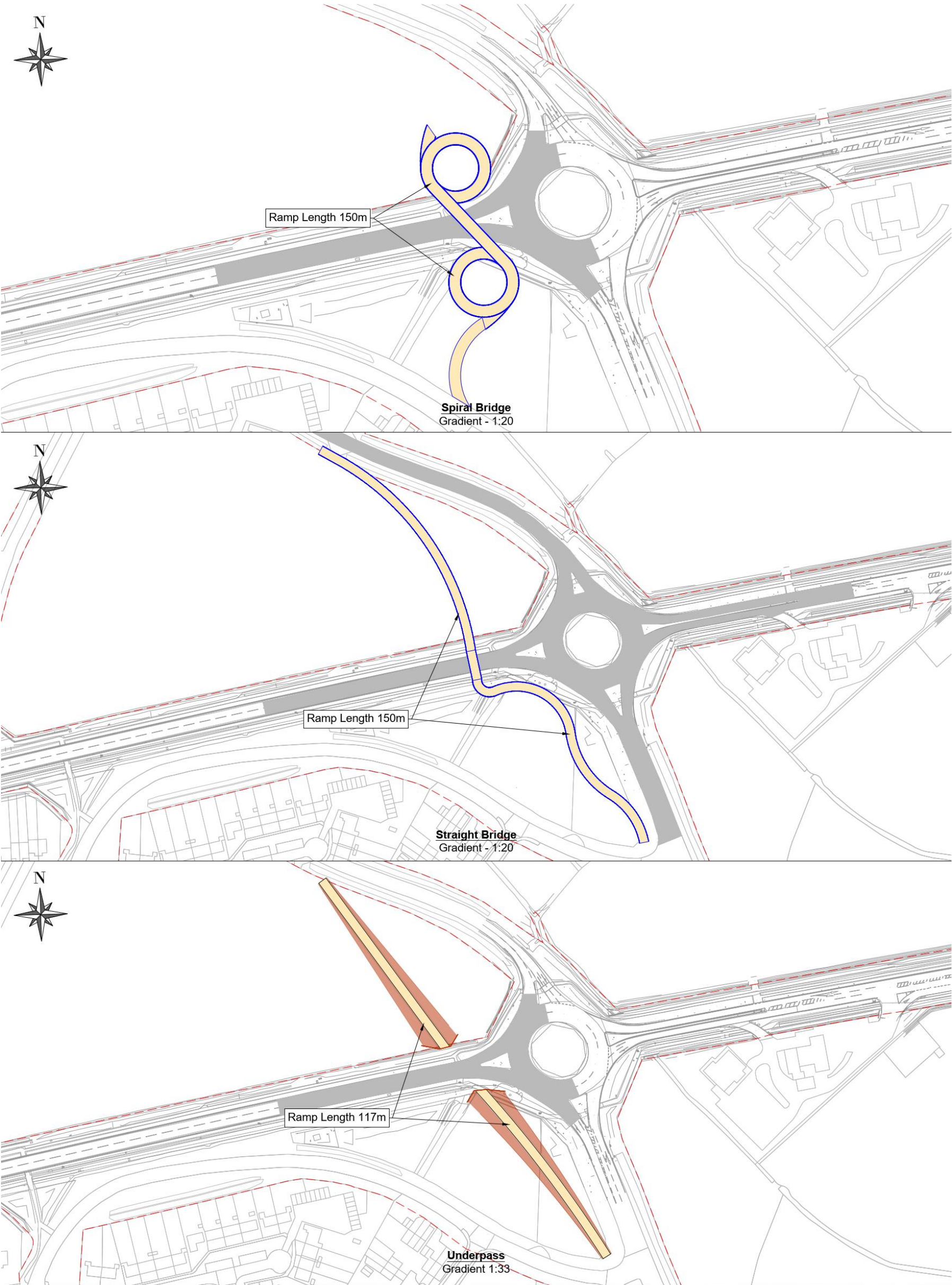
The bridge with the A40’s level lowered scored very well and was taken forward for further refinement. Approaches from the south-east and north-east would link it more closely with the B4044 Cycle Path and routes to Hanborough station and Oxford. In the next section of the report we explore options around the extent of level change to the A40, acknowledging that it is a significant engineering requirement.

Fundamentally, lowering a road to introduce a grade-separated crossing is not functionally different from introducing a new two-level junction - but without the motor vehicle interaction. We note that there is a broad cost equivalence between wide steel approach ramps (which are very expensive per square metre) and changes to the levels of the main carriageway.



ZONE 7: EYNSHAM ROUNDABOUT	
Location description:	<ul style="list-style-type: none"><li>The Eynsham roundabout forms the eastern boundary of the strategic growth area and the study area.</li><li>Land on the north-west side is not currently developed but will form part of OCGV.</li><li>There is some open space to the south which is highway land, and footways linking to Hanborough Road.</li></ul>
Location plan:	
Location photos:	<div></div> <div>Heavy traffic and unappealing footways on the A40 at Eynsham roundabout (looking west), November 2019</div>
ZONE 7 CONTEXT	
Existing infrastructure considerations:	<ul style="list-style-type: none"><li>The A40 meets Lower Road and the B4449 at a four-arm roundabout.</li><li>Pedestrians and cyclists have no priority to cross any of the roundabout arms. Heavy traffic flows in all directions make crossing the roundabout feel quite hazardous.</li><li>A shared-use footway runs parallel to A40 on the north side. A footway runs on the south side.</li><li>Lower Road links up towards Hanborough station to the north. The B4449 acts as an eastern bypass of Eynsham.</li></ul>
Planned infrastructure within zone to be considered:	
HIF/ Science Transit 2	<ul style="list-style-type: none"><li>The A40 Science Transit 2 Scheme will add eastbound and westbound bus lanes plus a wider northern shared footway-cycleway. Minor changes to the roundabout are proposed as part of the scheme.</li></ul>
Development-related	<ul style="list-style-type: none"><li>n/a</li></ul>
Topography considerations:	Land is broadly flat to the north and south of the A40.
Compatibility with potential desire lines	<ul style="list-style-type: none"><li>The B4044 Cycle Path is planned to link Hanborough Station, Swinford toll bridge and Oxford, and passes through this zone.</li></ul>
Fulfil potential of being a 'landmark' structure:	The Eynsham roundabout is a long-standing feature for drivers on the A40 and already anchors what sense of place there is – although none of the built-up area is clearly visible from the roundabout. A landmark structure here would link clear north-south desire lines and increase the perception of place.





**Non motorised crossings of the A40 - Feasibility Study**  
**Zone 7 Optioneering**

Drawing Number: 414585-MMD-00-XX-SK-C-0007  
Scale: N.T.S.

Drawn: J. Man  
Checked: C. Hillcoat  
Approved: C. Greenwood



ZONE 7 CROSSING TECHNICAL PARAMETERS				
		BRIDGE (spiral)	BRIDGE (straight)	SUBWAY
Land acquisition/ ownership		Highway land only	Highway land only	Highway land only
Is change in the level of A40 considered?		No	No	No
Ramp gradient assumed		1:20	1:20	1:33
Ramp length (metres)				
South side		150	150	117
North side		150	150	117
Total		300	300	234
Level change (metres)				
South side		6.5	6.5	3.5
North side		6.5	6.5	3.5
Total		13	13	7
Impact on existing residences				
Access implications		None	None	None
No. of properties impacted		None	None	None
Cost comparison		Higher	Higher	Lower
ZONE 7 MULTI-CRITERIA SCORING ASSESSMENT				
Resident amenity:	Access	0	0	0
	Overlooking	0	0	0
Alignment with existing and future desire lines:	Pedestrian	1	1	1
	Cycle	2	2	2
	Equestrian	Must dismount	Can be ridden over	Must dismount
Impact during construction:	Traffic	-1	-1	-2
	Other users	-1	-1	-2
Landmark appearance:	From road	2	2	0
	For users	2	2	1
Land acquisition and ownership		0	0	0
Capital cost excluding land		-2	-2	-1
Safety and security		2	3	1
Coordination with other schemes		0	0	0
Contribution to perception of place		2	2	1
User experience		2	2	1
Total length / time to cross		1	1	2
Level change		-3	-3	0
Total score		7	8	4
ZONE 7 MULTI-CRITERIA SCORING OUTCOME				
Ranking of scores		2	Best (1)	3

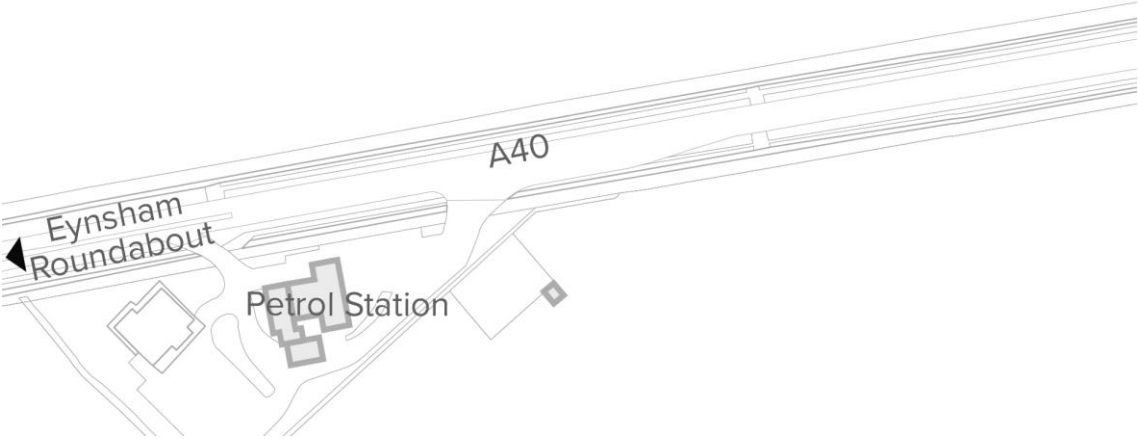

A bridge with straight ramps scored the best in this zone, followed by a bridge with spiral ramps. The bridge with straight ramps scored well for safety and security, and both bridge options contribute well to a perception of place and user experience.

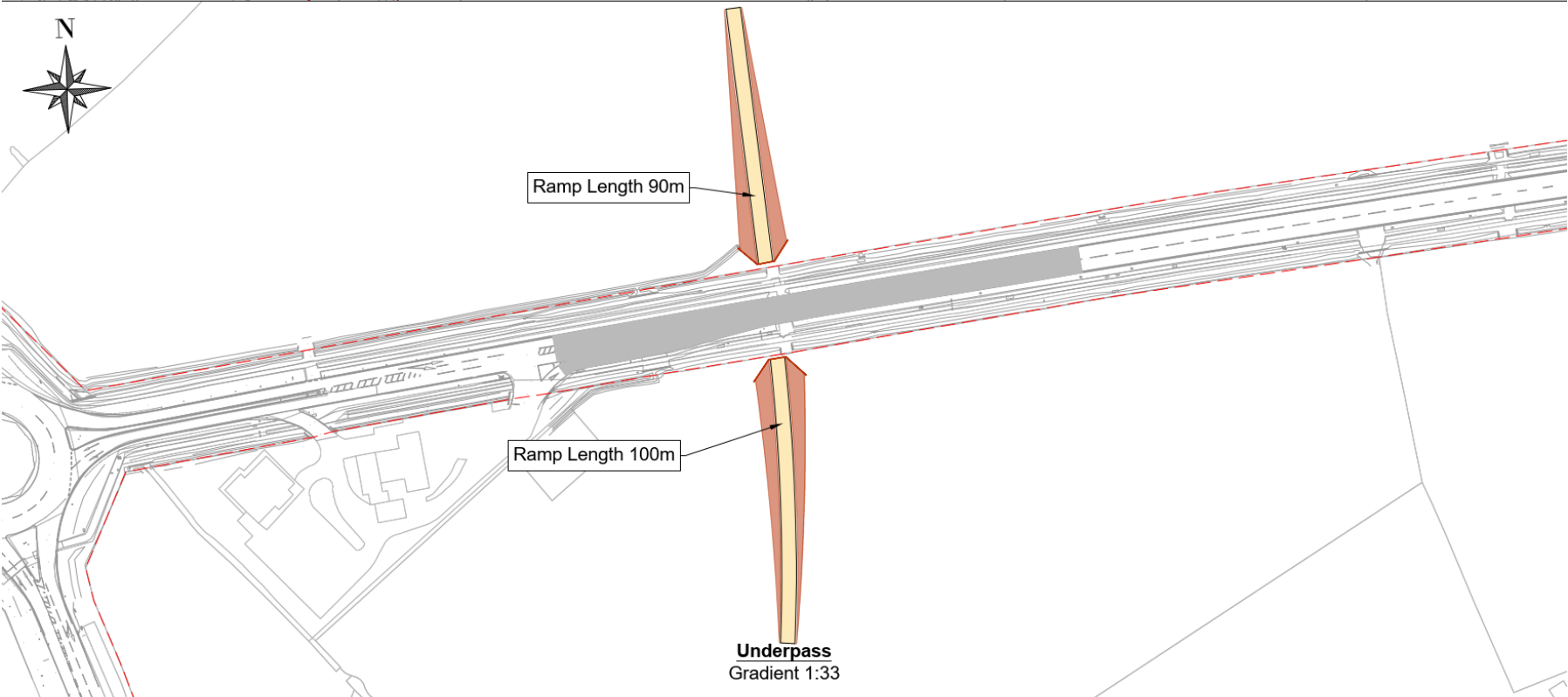
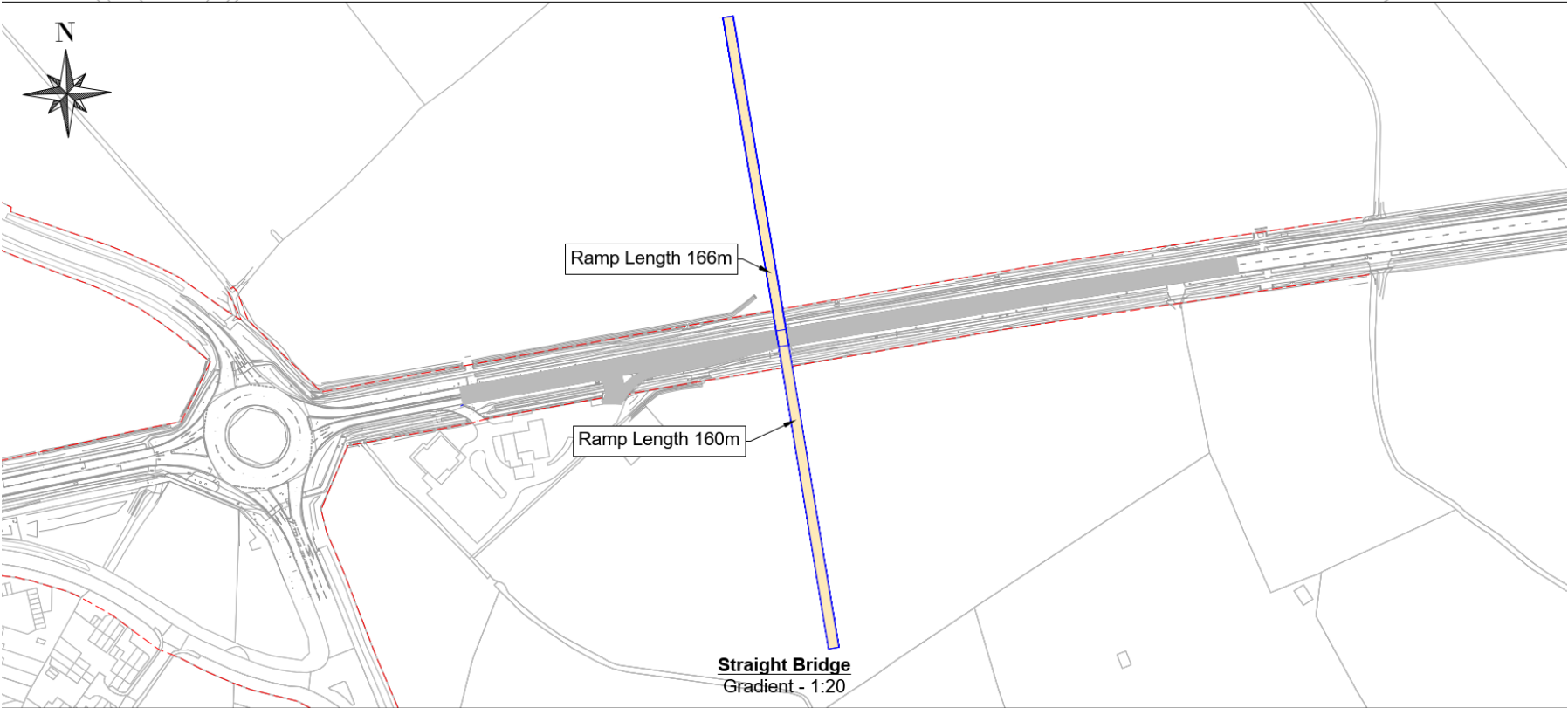
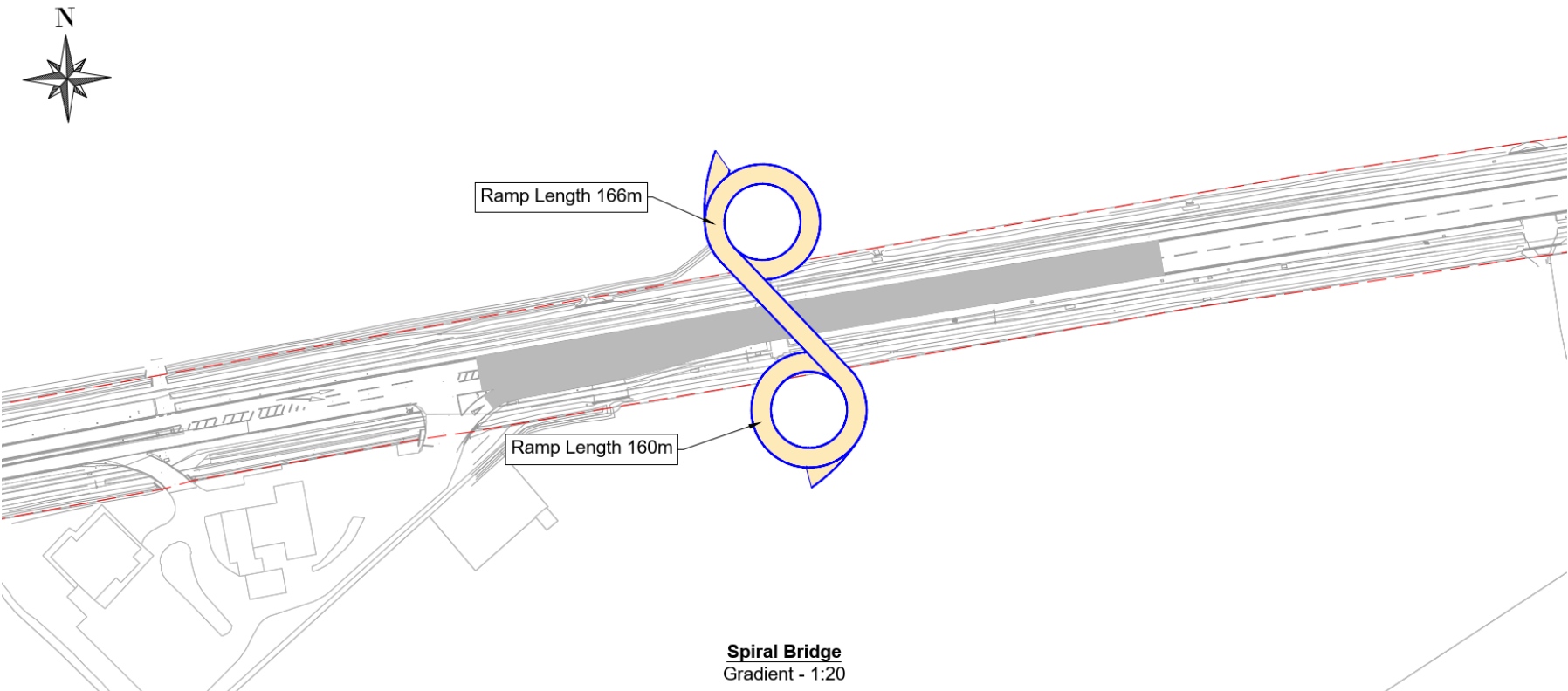
A subway is also feasible here and would fit within available land well but would not give a landmark appearance or contribute to a perception of place.

COMBINE WITH ZONE 6:

A bridge option here performs very well, and its proximity to Zone 6 means that a combined crossing there, with links to the roundabout, would fulfil many objectives of this project.



ZONE 8: EAST OF EYNSHAM	
Location description:	<ul style="list-style-type: none"><li>A zone lying to the east of the study area and the strategic growth area.</li><li>Land on the north side is not currently developed and will not form part of OCGV.</li><li>A petrol filling station to the south has an access and egress point on the A40.</li></ul>
Location plan:	
Location photos:	<div></div> <div>Heavy traffic and unappealing footways on the A40 east of Eynsham roundabout (looking east), November 2019</div>
ZONE 8 CONTEXT	
Existing infrastructure considerations:	<ul style="list-style-type: none"><li>The A40 forms a single carriageway with access permitted into the petrol filling station for both eastbound and westbound traffic. Vehicles exiting must turn left and use the roundabout for onward journeys.</li><li>A shared-use footway runs parallel to A40 on the north side. A footway runs on the south side. Neither is well-maintained or very comfortable to use.</li></ul>
Planned infrastructure within zone to be considered:	
HIF/ Science Transit 2	<ul style="list-style-type: none"><li>The A40 Science Transit 2 Scheme will add eastbound and westbound bus lanes plus a wider northern shared footway-cycleway.</li></ul>
Development-related	<ul style="list-style-type: none"><li>n/a</li></ul>
Topography considerations:	Land either side of the A40 is slightly lower than the level of the road.
Compatibility with potential desire lines	<ul style="list-style-type: none"><li>This zone is outside of the study area and would not meet future desire lines.</li></ul>
Fulfil potential of being a 'landmark' structure:	A landmark structure could be constructed here, but as it is beyond the strategic growth area it would not connect any significant developments or built-up areas.



**Non motorised crossings of the A40 - Feasibility Study**  
**Zone 8 Optioneering**

Drawing Number: 414585-MMD-00-XX-SK-C-0008  
Scale: N.T.S.

Drawn: J. Man  
Checked: C. Hillcoat  
Approved: C. Greenwood

**M**  
**MOTT**  
**MACDONALD**

ZONE 8 CROSSING TECHNICAL PARAMETERS				
		BRIDGE (spiral)	BRIDGE (straight)	SUBWAY
Land acquisition/ ownership		Highway land only	Highway land only	Highway land only
Is change in the level of A40 considered?		No	No	No
Ramp gradient assumed		1:20	1:20	1:33
Ramp length (metres)				
South side		160	160	100
North side		166	166	90
Total		326	326	190
Level change (metres)				
South side		7	7	3
North side		7.3	7.3	2.7
Total		14.3	14.3	5.7
Impact on existing residences				
Access implications		None	None	None
No. of properties impacted		None	None	None
Cost comparison		Higher	Higher	Lower
ZONE 8 MULTI-CRITERIA SCORING ASSESSMENT				
Resident amenity:	Access	0	0	0
	Overlooking	0	0	0
Alignment with existing and future desire lines:	Pedestrian	0	0	0
	Cycle	0	0	0
	Equestrian	Must dismount	Can be ridden over	Must dismount
Impact during construction:	Traffic	-1	-1	-2
	Other users	-1	-1	-2
Landmark appearance:	From road	2	2	0
	For users	2	2	1
Land acquisition and ownership		0	0	0
Capital cost excluding land		-2	-2	-1
Safety and security		2	3	1
Coordination with other schemes		-2	-2	-2
Contribution to perception of place		1	1	0
User experience		2	2	1
Total length / time to cross		1	1	2
Level change		-3	-3	0
Total score		1	2	-2
ZONE 8 MULTI-CRITERIA SCORING OUTCOME				
Ranking of scores		2	Best (1)	3

No crossing option in this zone meets existing or future desire lines for strategic crossings of the A40.

A bridge with straight ramps scored the best in this zone, followed by a bridge with spiral ramps. Both options still score poorly because they do not meet a need for a crossing.

A subway is also feasible here and would fit within available land well but would not give a landmark appearance or contribute to a perception of place.

DO NOT TAKE FORWARD:

None of the options developed at this location meet a need for a grade-separated crossing and score poorly compared to nearby options at Hanborough Road and Eynsham roundabout. They were therefore discounted.

## 6. Concept refinement

The optioneering, concept development and evaluation stage described in the previous section identified three potential crossing options that should be refined and developed further:

- A subway between Old Witney Road and Cuckoo Lane (Zone 3)
- A bridge near Hanborough Road and Eynsham Roundabout (Zone 6 and 7)
- A bridge to the west of Eynsham (Zone 1 or Zone 2)

This section describes how the feasibility of these options has been investigated in order to:

- Maximise the positive and minimise the negative scores for each shortlisted option.
- Explore the buildability and technical engineering complexities, including issues of temporary works on the A40 to build each crossing and the diversion of utilities.
- Make crossings well-aligned to desire lines and accessible to as many people as possible.
- Estimate, in broad terms, the approximate cost ranges of each option.

### Cost estimates

In the sections below we present cost ranges for the three options developed. These costs have general assumptions as follows:

- Base date of the estimate is 2019
- Other than the installation of the main bridge span over the A40 the works are expected to be carried out in normal working hours 08:00 to 18:00, Monday to Friday with traffic management in place.
- Allowances for constructing in uncertain circumstances have been included where we have not received sufficient information to allow us to price the works confidently. These will require validation when further information becomes available if any of the crossing options are taken forward into later stages of design.
- All excavated and disposed material is assumed as 80% inert or suitable for recycling and 20% non-hazardous.
- Allowance (2.5% of the Base Cost Estimate) for environmental mitigation measures is included.
- Initial construction start date is not known. No inflation applied. This will need to be revisited when schedule information becomes available.
- All footbridges have a cable stayed main span over A40.
- Ramps are standard steel construction and 6m wide.
- All indirect costs are percentage based with historical projects being used to determine this.
- Where not shown on drawings, new ramps tie into existing footpaths.



The costs also have general exclusions as follows:

- Optimism Bias
- VAT
- 3rd party compensation costs
- Planning and approval charges
- Land purchase or rental
- Costs associated with Statutory Fees (e.g. HMRI, Local Authority, etc.)
- Costs associated with taxes, levies and licences
- Costs associated with changes in legislation and any form of applicable standards
- Allowances for unforeseen ground conditions / provisions for ground stabilisation
- Christmas, Easter and Bank Holiday working
- Archaeological digs
- Works that have not been specifically included for in the estimate
- Diversion or protection of existing utilities (described in more detail below)

The cost estimates are prepared by quantifying the volume of materials needed to construct the bridge, and then adding indirect costs as follows:

- Traffic management
- Contractor's general preliminaries and temporary works
- Contractor's overhead and profit
- Design fees
- Project management costs
- Environmental mitigation costs
- A range of contingencies

It should be noted that the costs provided in this Report are indicative, high level costs. More detailed costings will be developed during the proceeding design stages, for the option(s) to be taken forward.

## Utilities

In the section below we outline some of the utilities which may be affected by these proposals based on surveys of the study area. As well as the specific issues highlighted, these assumptions apply for all sites:

- It is assumed that any utility services currently beneath the public highway will not be affected where no level change is proposed;
- Where a level change of the A40 is proposed, some utilities will be affected and may need to be raised or lowered accordingly;
- Consideration should however be given where utilities are to be diverted to ensure that safe and protected access by nominated contractors can be maintained;
- New service utility works to facilitate both the Park and Ride site and development site will be carried out and may affect the extent and number currently present.

## 6.1 Subway at Old Witney Road and Cuckoo Lane

### Concept Refinement

The potential subway with straight approach ramps between Cuckoo Lane and Old Witney Road was based on raising the carriageway level of the A40 which was considered possible given that the A40 has no side road junctions or accesses between the Evenlode pub access to the east and layby access to the west; and the Cuckoo Lane junction which will be modified as part of the A40 Science Transit 2 Scheme. The potential for refining the proposed subway is based primarily on the way in which the A40 is raised which influences the precise subway location, ramp lengths and orientation, footway arrangement and land acquisition. Other factors affecting the proposed subway and the construction of it include:

- The A40 occupies a wide highway boundary but cannot be expanded beyond without encroaching on the Millennium Wood or the Evenlode's grounds
- The A40's level dips at the Cuckoo Lane junction, with high points either side at the layby access to the west and the Evenlode access to the east – see Figure 6.1 below
- There are plans to expand the A40 to include bus lanes in each direction and a wider shared-use footway on the northern side
- The proposed Park & Ride site roundabout just to the west of this site could allow some access to and from Cuckoo Lane, meaning changes to the Cuckoo Lane / A40 junction are possible
- The land to the south, on Old Witney Road, lies 1m lower than the A40 – see Figure 6.2 below
- There are utilities in the southern verge which could be expensive, time-consuming and complex to move
- A development of the Eynsham Nursery site plans to extend Old Witney Road to the west and south, removing the turning head



**Figure 6.1: The level of the A40 dips at Cuckoo Lane (image: November 2019)**



**Figure 6.2: Old Witney Road seen from the A40 (image: November 2019)**

We have used as constraints for refining this option the need not to encroach on Millennium Wood to the north, and to tie-in to existing junctions at the new Park & Ride roundabout to the west and the Evenlode access to the east.

We have assumed that the speed limit on this section of the A40 could potentially be reduced to 40mph, which allows tighter accesses and steeper gradients along the road. The speed limit along the stretch of the A40 will have to be considered as part of the design process.

Taking these constraints and assumptions together, we have developed an option where the A40 is raised by 2m and a subway is installed beneath.



**Figure 6.3: A pre-cast concrete subway nearing completion, 4m wide and 4m high**



## Concept Design

The drawing in Figure 6.4 below shows a concept for a subway beneath the A40 at Cuckoo Lane, and incorporates:

- A pre-cast concrete subway of 5m width allowing a 3m cycleway and 2m footway or shared use facility with 1m clearance to the subway walls each side.
- Straight ramps of 1 in 33 gradient on both north and south sides to serve desire lines and provide clear visibility straight through the subway.
- Short access ramps of 33m on the south and 50m to the north. The ramps and subway are completely straight meaning it is possible to see straight through the subway, even though it is relatively long.
- The subway on a skew to the road; this could be made more perpendicular through shifting Cuckoo Lane's junction to the west and bringing the subway to the east – a second subway could then also pass beneath Cuckoo Lane to provide access to the Park & Ride site. The arrangement of Cuckoo Lane and the subway could be decided in the design process, once aspects of OCGV's layout such as school locations are clearer.
- The carriageway level of the A40 raised by a maximum of 2m requiring changes over a 200m section between the layby access / new Park & Ride roundabout to the west and the Evenlode access to the east; and the level of Cuckoo Lane raised by up to 2m over a 100m stretch.
- Bus lanes in each direction along the A40, which would be delivered as part of the A40 Science Transit 2 scheme.
- A shared use cycleway – footway on the north side and a footway on the south side as prescribed in the A40 Science Transit 2 scheme. Connections between these footways and the subway should be considered in future design stages.
- Minimal or no land-take either side of the highway boundary, because the existing highway and boundary is generously proportioned.
- Cuckoo Lane's access changed to be left-in and left-out only. Right turns could be accommodated via the Park & Ride site and roundabout.
- A reduction in speed limit to 40mph on this section (potentially between the Park & Ride roundabout and Witney Road junction) to accommodate the realigned access to Cuckoo Lane and less strict requirements for gradients and crest curves on the A40. This would give the road a more urban feel.
- Old Witney Road continuing to the west and then the south to reach the Eynsham Nursery development of 77 homes. The Elm Place access could either be a left-in, left-out junction on the A40 or a continuation of Old Witney Road.





## Architectural Design

Subways can suffer from poor public perception as places which look and feel unsafe and which are less attractive than crossing at grade. In many urban areas, subways are typically removed in favour of at-grade crossings.

Although a subway cannot easily be seen from the road and therefore could not be a landmark structure in the same way as the bridge described above, it could be an embodied demonstration of the commitment of Eynsham and the OCGV to sustainable growth.

The design of the subway reflects the OCGV principles by:

- enhancing the natural environment.
- being beautifully and imaginatively designed.
- building climate resilience.
- providing an integrated and accessible transport network.

It also meets the transport aims as expressed in the AAP for OCGV by:

- fostering an environment where active travel is the norm.
- providing safe and convenient connections to and across the garden village site and the wider area.

## Estimated Cost

The preliminary estimated cost for a subway at Cuckoo Lane is **£4-5 million**.

This cost:

- Builds on the assumptions, exclusions and indirect costs listed at the start of Section 6
- Assumes a pre-cast concrete subway 5m wide and 25m long
- Assumes the A40 and Cuckoo Lane are raised by up to 2m and the approach ramps are earthworks
- Includes adding bus lanes in both directions and providing shared use footway-cycleways for the 200m section of A40 affected by this scheme
- Includes direct and indirect construction costs, design, project and traffic management and environmental mitigation costs and contingency
- Excludes any land acquisition, which would be minimal
- Excludes the cost of diverting utilities (see below)

## Construction

We have assumed that one lane of traffic in each direction will need to be maintained during construction given the high traffic flows on this part of the A40 for large parts of the day and lack of suitable diversion routes. Much of the construction programme would involve raising the carriageway of the A40 and Cuckoo Lane rather than installing the subway and ramps. It involves using in-situ construction and pre-cast concrete units wherever possible to minimise transport and temporary land-take.

The outline construction and temporary traffic management phasing would be as follows:

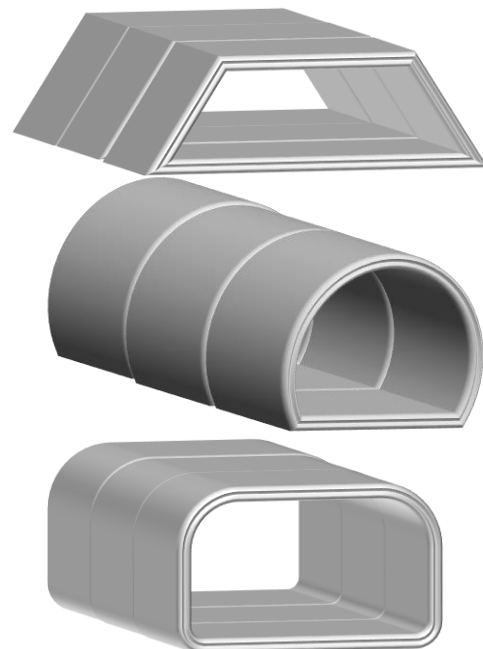
- Close Cuckoo Lane to traffic temporarily.
- Narrow the existing carriageway providing one lane of traffic in each direction of approximate 3.25m width each adjacent to the existing southern kerbline.
- Allowing safety margins, excavate to the north of the active carriageway to the level of the subway, and use sheet piles and roof slabs to construct the subway structure.
- Plane out existing carriageway and construct the new 7.3m wide eastbound part of the wider carriageway proposed as part of the A40 Science Transit 2 Scheme up to 2m above the level of the adjacent existing carriageway using embankments and/or retaining walls.
- Construct temporary tie-ins of the above and the existing carriageway at either end.
- Transfer two-way traffic to the new raised carriageway.
- Excavate to form the southern half of the subway structure as described above.
- Construct second westbound part of the carriageway on the current alignment of the A40 but up to 2m above the existing level. Infill to join the two carriageways.
- Excavate inside the subway structure to create the subway, including waterproofing, drainage, lighting, surfacing and cladding.
- Fully open both carriageways to traffic and provide the bus lanes as proposed by the A40 Science Transit 2 Scheme.

Raising the A40 by 2m could be by several methods, including earth embankments at 1:2 slope (i.e. 4m wide and 2m tall at their highest), batter slopes at 1:1.5 (i.e. 3m wide and 2m tall), reinforced earth embankments at steeper than 1:1, or retaining walls which are vertical. Combinations of these options could be used at different points or on different sides of the road,

depending on the space available, the interaction with utilities and other infrastructure, cost, and aesthetic appearance.

There are several ways to build a subway: either the footway is boxed in under the road using a variety of methods explained below, or the road could be put onto a bridge over the top. We explored these options:

- Pre-cast portal units – Off the shelf but needs a large excavation to install it, then large cranes due to the weight of the units.
- Pre-cast modular systems – Proprietary System, needs large excavation, but comes in smaller modular wall and roof units with smaller cranes required. They can be ordered in widths up to 5m and come in segments 2-4m long, meaning they can be installed in sections across the road while keeping traffic moving; and can come in bespoke shapes.
- Pile wall abutment with a deck – Install Piles to form a Secant or Contiguous pile wall in two rows across the carriageway, approx. 7m apart. Construct a capping beam and then place pre-cast beams on top and cast a monolithic deck. Then excavate beneath the deck to form the underpass, construct facing walls and a base slab. Repeat the exercise on the other half of the carriageway.
- Off-line construction and jacking into place – To the north construct a jacking / reaction slab, on which a concrete box structure is constructed. The carriageway levels would then need to be raised by 2.0m. When this is complete the box structure can be jacked forward, with the carriageway being excavated as it is advanced forward. This could potentially be undertaken in open cut and cover or completely as a buried structure. The costs and impacts of this option are much higher than others. The concrete for subway could be clad, or patterned or pigmented.



**Figure 6.5: Non-rectangular pre-cast subway options**

- Construct the carriageway as a bridge over the top of the footway and cycleway, with the impression that non-motorised users are travelling at grade and those in vehicles experience a level change (see Figure 6.6 below).





**Figure 6.6: A bridge passing over a cycle path**

We investigated an option where the A40 bridges over an excavated footway on two bridges, with a gap between the carriageways to create a lightwell which could, if designed well, enhance the sense of space beneath the road. The bridges are also relatively long which again creates more space beneath them. However, the depth of construction on the bridges means that the light reaching the footway beneath would be limited and it extends the span considerably (by 6m extra width as shown above). Creating two bridges could be considered simpler from a construction point of view but creates two structures to maintain. It also increases the land requirement for this crossing option. This option is shown in Figure 6.7.

The approach from the south is not straight on this two-bridge option, because the location of the bridges dictates a crossing further west than a precast concrete subway. This angled approach is less good for safety and security.

For these reasons our recommended option at this location is a pre-cast concrete subway.

To mitigate the effects of constructing this crossing an integrated Travel Demand Management campaign could be designed and delivered. More details of this are listed in Section 7.



## Utilities

Based upon information provided a number of utility services will be affected as a result of the proposed NMU crossing works at Cuckoo Lane. Currently utility services are present along both sides of the A40 corridor with a few crossing at the Cuckoo Lane junction location. It is envisaged that those services running alongside the A40 will need to be diverted to beyond the extent of revised highway corridor physical works. Those crossing the A40 will need to be diverted to accommodate any changes to finished carriageway levels. However, further consideration could be given to the viability of incorporating the diverted services into the proposed subway design which will cross underneath the A40.

Based upon drawing 60551821-ACM-VUT-A40\_SW\_ZZ\_ZZ-DR-CU-0104 & 60551821-ACM-VUT-A40\_SW\_ZZ\_ZZ-DR-CU-0105 prepared by AECOM the following statutory undertakers may be affected:

- Gas
- SSE Electric
- BT
- Virgin Media
- Thames Water

The extents of the required diversions will depend on the further development of the scheme. Some utilities may not need to be diverted when the level of the A40 is raised. Others would be affected over a length of up to 200m. Those utilities crossing the carriageway in the affected 200m may also need to be diverted.

At present there is a watercourse close to Cuckoo Lane. The diversion of a watercourse is possible but will need further consideration with regards to topography, drainage and environmental issues. A new low point can usually be introduced to intercept flow, but this would need to be considered at a more detailed design phase.

## 6.2 Bridge at Hanborough Road

### Concept Refinement

A potential bridge with straight approach ramps in the vicinity of Hanborough Road was based on lowering the carriageway level of the A40 which was considered possible given that the A40 has no side road junctions or accesses for the 500m section between the Esso Tesco Express Petrol Filling station and Eynsham roundabout. The potential for refining the proposed bridge is based primarily on the extent to which the A40 could be lowered which influences the precise bridge location, ramp lengths and orientation, footway arrangement and land acquisition. Other factors affecting the proposed bridge and the construction of it include:

- The existing highway boundary extends around 12m from the back of carriageway on both the north and south sides.
- The OCGV could be adjusted to accommodate a northward shift in the alignment of the A40 by around 10m.
- The land to the south in the vicinity of Hanborough Road is around 1.2m higher than the A40 carriageway.
- The location of residential accesses.
- There are existing utilities in the southern verge of the A40 which could require diverting which would add to the capital cost including gas equipment.

The potential for lowering the carriageway level of the A40 is defined by two “bookends” within which a range of height changes might be possible: one where the carriageway level is unchanged; and one where the carriageway level is lowered by 5.3m so that the Bridge crosses the A40 at the same level as the land on the south side. This is shown in Table 6.1 which focusses on the level change and approach ramp length on the south side. The approach ramps would be approximately 25m longer in all cases.

	No change to A40	Max change to A40
Level change to road	0	-5.3m
Level change to footbridge	5.3m	0m
Ramp length on south side	129m	0m
Max width of cutting each side	0m	10.6m each side
Length of A40 changed	0m	500m (petrol station to roundabout)

**Table 6.1: “Bookend” options for footbridges at Hanborough Road**

With these “bookends” established, we considered three level change variations as shown in Table 6.2 noting that:

- Ramp lengths can be accommodated for any of the level change variations: the advantage of the greater level changes is shorter ramps that stay closer to the desire line from Hanborough Road – either the 3m drop or 4m drop options keep the ramp length on the desire line.
- Minimising level changes makes the crossing more attractive and accessible to users, especially those from the east who have the alternative of crossing at-grade at the roundabout.



- Whilst there is sufficient length available to accommodate the ramp gradients on the A40 to facilitate the level change, it is sensible to minimise the volume of material that needs to be excavated which will reduce cost.
- Greater level change means wider cuttings which in turn requires greater land acquisition from the OCGV on the north side. Although retaining walls could be used as an alternative to cuttings to reduce the width requirement, they would add cost.

	A40 2m drop	A40 3m drop	A40 4m drop
Level change to road	-2m	-3m	-4m
Level change to footbridge	3.3m	2.3m	1.3m
Ramp length on south side	76m	51m	26m
Max width of cutting each side	4m	6m	8m
Length of A40 changed	200m	300m	400m

**Table 6.2: “Central” options for footbridges at Hanborough Road**

### Concept Design

From a functionality perspective, we progressed an option involving lowering the carriageway level of the A40 by 3m. A conceptual design drawing is presented in Figure 6.8 and incorporates:

- A bridge of 6m width allowing a 3m cycleway and 2m footway or shared use facility with 1m buffer to the bridge parapets. The bridge could be either curved or straight.
- Two ramps of 1 in 20 gradient on both north and south sides to serve desire lines.
- The carriageway level of the A40 lowered by a maximum of 3m requiring changes over a 300m section between the Tesco Express Petrol Filling station and Eynsham roundabout.
- A shared use cycleway – footway on the north side and a footway on the south side at approximately the same level as the existing A40, since this provides additional separation from traffic and required headroom to the bridge can still be accommodated.
- Acquisition of up to 12m land on the north side from the OCGV to accommodate the cuttings on the north and south side of the A40. This land-take could be reduced in subsequent design stages through the use of retaining walls, steeper cuttings or less level change. Ramps on the north side would also need to be accommodated within OCGV development land.



## Architectural Design

The proposed design addresses the aspirations for connection and landmark in several different ways. With a strong vertical profile, the bridge has a confident presence along the A40 route that clearly expresses a point of significance. The symmetrical tower arrangement draws a clear portal through which to pass, clearly indicating a gateway.



**Figure 6.9: Render of example footbridge near Hanborough Road**

The design of the bridge reflects the Garden Village principles by:

- enhancing the natural environment
- being beautifully and imaginatively designed
- building climate resilience
- providing an integrated and accessible transport network

It also meets the transport aims as expressed in the AAP for OCGV by:

- fostering an environment where active travel is the norm
- providing safe and convenient connections to and across the garden village site and the wider area

The combination of steel cable stay towers with a laminated timber deck would be a UK first and noticeably differentiate the bridge from any other structures along the local A40 corridor. Whilst the striking steel towers are synonymous with iconic modern bridge design, the laminated timber deck is an innovation that recognises the sustainable aspirations of the development.

Whether viewed from the highway or deck, sinuous and organic shapes evoke the same meandering qualities of the development and wider natural landscape.

## Context

The bridge would be located at an interface between two distinct settlements – the existing settlement of Eynsham and the OCGV, each with their own distinct characters – and the well-used A40. Within the design there are considerations for these in aesthetics and materiality but also in considering maintenance and safety. The ramps would encroach upon the relatively confined spaces around the existing residential area to the south and screening would need to be provided to avoid overlooking issues into private areas.

It is important that the bridge synthesises Eynsham and the garden village, providing a continuity of route that encourages communities to benefit from each by using the bridge. A typical highway structure would feel intrusive as it landed within the intimate surroundings of the residential areas. Landscaping around the ramps will be an important future requirement that marries the structure to the ground condition.

Safety and maintenance in context are also important, if invisible considerations. As well as its appropriateness in materiality and aesthetic the timber deck provides other benefits, needing minimal maintenance unlike a painted steel deck that would require future closure of the A40 for repainting. Additionally, locating the towers towards the sides of the highway helps protect them from impact as well as allowing for safer inspection. Other bridge typologies such as an arch can often create opportunity for inappropriate social behaviours such as climbing the superstructure or graffiti where enough surface area is provided.



**Figure 6.10: Arch structures can create opportunities for inappropriate behaviour such as graffiti and climbing**

## Experience

For those using the bridge, the design will provide a safe and enjoyable crossing of the A40. From a distance the elevated towers reinforce a perception of route acting as wayfinding elements from multiple directions. The curved plan form of the deck is informal and sympathetic to the wider routes of the local areas. Following the deck's curve, a series of changing views across the area will appear for users, with a unique elevated position in the landscape. Gentle ramped access from either end encourages all types of users and ties in carefully with cycle lanes and footways to avoid sudden changes in direction. Lighting incorporated into the parapets is unobtrusive yet provides lighting to faces and footway such that the space is and importantly feels safe.



Considered besides other local structures crossing the A40 the bridge is a new typology with unique appearance. An appropriate but exciting icon that represents Eynsham and the garden village or a distinctive landmark that punctuates a journey.



**Figure 6.11: Render of example footbridge near Hanborough Road**



**Figure 6.12: Render of example footbridge near Hanborough Road at night**

## Estimated Cost

The preliminary estimated cost for a bridge at Hanborough Road is **£14-17 million**.

This cost:

- Builds on the assumptions, exclusions and indirect costs listed at the start of Section 6
- Assumes a cable-stayed steel bridge 6m wide and 20m long
- Assumes the four approach ramps are made of steel, not earthworks, and are 6m wide
- Assumes the A40 is lowered by up to 3m
- Includes adding bus lanes in both directions and providing shared use footway-cycleways for the 300m section of A40 affected by this scheme
- Includes direct and indirect construction costs, design, project and traffic management and environmental mitigation costs and contingency
- Excludes any land acquisition, which could be approximately 1800m<sup>2</sup> from land parcels ON245907 and ON290973
- Excludes the costs of diverting utilities (see below)

It is worth noting that this cost is lower than the preliminary estimated cost for a bridge where the A40 is not lowered. This is because the quantity of steel approach ramps is greatly increased when the A40 is left in situ, and the cost of these steel ramps is greater than the cost of excavating and constructing new carriageway.

Although lowering the level of the A40 would be a significant engineering requirement, it is not different from constructing a new grade-separated junction by dropping the road into an underpass. It is an innovative approach for non-motorised user crossings in the UK but would provide a very high-quality outcome for users.

## Construction

We have assumed that one lane of traffic in each direction will need to be maintained during construction given the high traffic flows on this part of the A40 for large parts of the day and lack of suitable diversion routes. The majority of the construction programme would involve lowering the carriageway of the A40 rather than installing the bridge and ramps themselves. The outline construction and temporary traffic management phasing would be as follows:

- Narrow the existing carriageway providing one lane of traffic in each direction of approximate 3.25m width each adjacent to the existing southern kerbline.
- Construct the new 7.3m wide eastbound part of the wider carriageway proposed as part of the A40 Science Transit 2 Scheme up to 3m below the level of the adjacent existing carriageway using cuttings and/or retaining walls.
- Construct temporary tie-ins of the above and the existing carriageway at either end.
- Transfer two-way traffic to the new lowered carriageway.
- Construct second westbound part of the carriageway on the current alignment of the A40 but up to 3m below the existing level.
- Fully open both carriageways to traffic and provide the bus lanes as proposed by the A40 Science Transit 2 Scheme.

During this programme, access for construction vehicles and the workforce will need to be provided not only for the above works but also for construction of the bridge approach ramps. It has been assumed that the bridge itself would be constructed off-site and installed using a

weekend / Sunday / overnight closure of the A40. This will need to be programmed at an appropriate time within the above construction phasing.

To mitigate the effects of constructing this crossing an integrated Travel Demand Management campaign could be designed and delivered. More details of this are provided in Section 7.

## Utilities

Based upon information provided a number of utility services will be affected as a result of the proposed crossing works at Hanborough Road. Currently utility services are present along both sides of the A40 corridor with a few crossing at or close to the proposed bridge location. It is envisaged that those services running alongside the A40 will need to be diverted to beyond the extent of revised highway corridor physical works. Those crossing the A40 will need to be diverted to accommodate any changes to finished carriageway levels. However, further consideration could be given to the physical structure of the bridge and associated foundations as these may also affect existing service utility corridors.

Based upon drawing 60551821-ACM-VUT-A40\_SW\_ZZ\_ZZ-DR-CU-0111 prepared by AECOM the following statutory undertakers may be affected:

- Gas
- SSE Electric
- BT
- Virgin Media
- Thames Water

The extents of the required diversions will depend on the further development of the scheme. Those in the southern footway and verge should be unaffected by the A40 level change, but those under the carriageway or the northern verge would be affected over a length of up to 300m. Those utilities crossing the carriageway in the affected 300m may also need to be diverted.

## 6.3 Bridge west of Eynsham

### Concept Refinement

The potential bridge with straight approach ramps west of Eynsham was based on the future developments either side of the A40. The potential for refining the proposed bridge is based primarily on the location of the bridge in relation to future developments which influences the precise bridge location, ramp lengths and orientation. Other factors affecting the proposed bridge and the construction of it include:

- The desire to create a landmark structure exemplifying the sense of place and quality of design in OCGV and West Eynsham SDA.
- The integration with the dualling of the A40 planned for this location, and the phasing of its delivery potentially to come later in the programme of crossings.
- The strongly expressed desire in the Design Charrette for a “green loop” allowing journeys around the periphery of the greater OCGV / West Eynsham SDA / Eynsham area.
- The currently undeveloped land either side of the A40 allowing ramps to be aligned and raised or lowered to match desires for “linear parks” in West Eynsham SDA and OCGV – the design of which could be considered to integrate with this crossing.
- The possibility of lowering the level of the A40 during its dualling to reduce the level change of the footbridge.

Both the location, the form and the approaches to this bridge are subject to further development. What we present here is a concept sketch; without some of the methodology or design development of the other options – those have been prepared in response to the site constraints.

### Concept Design

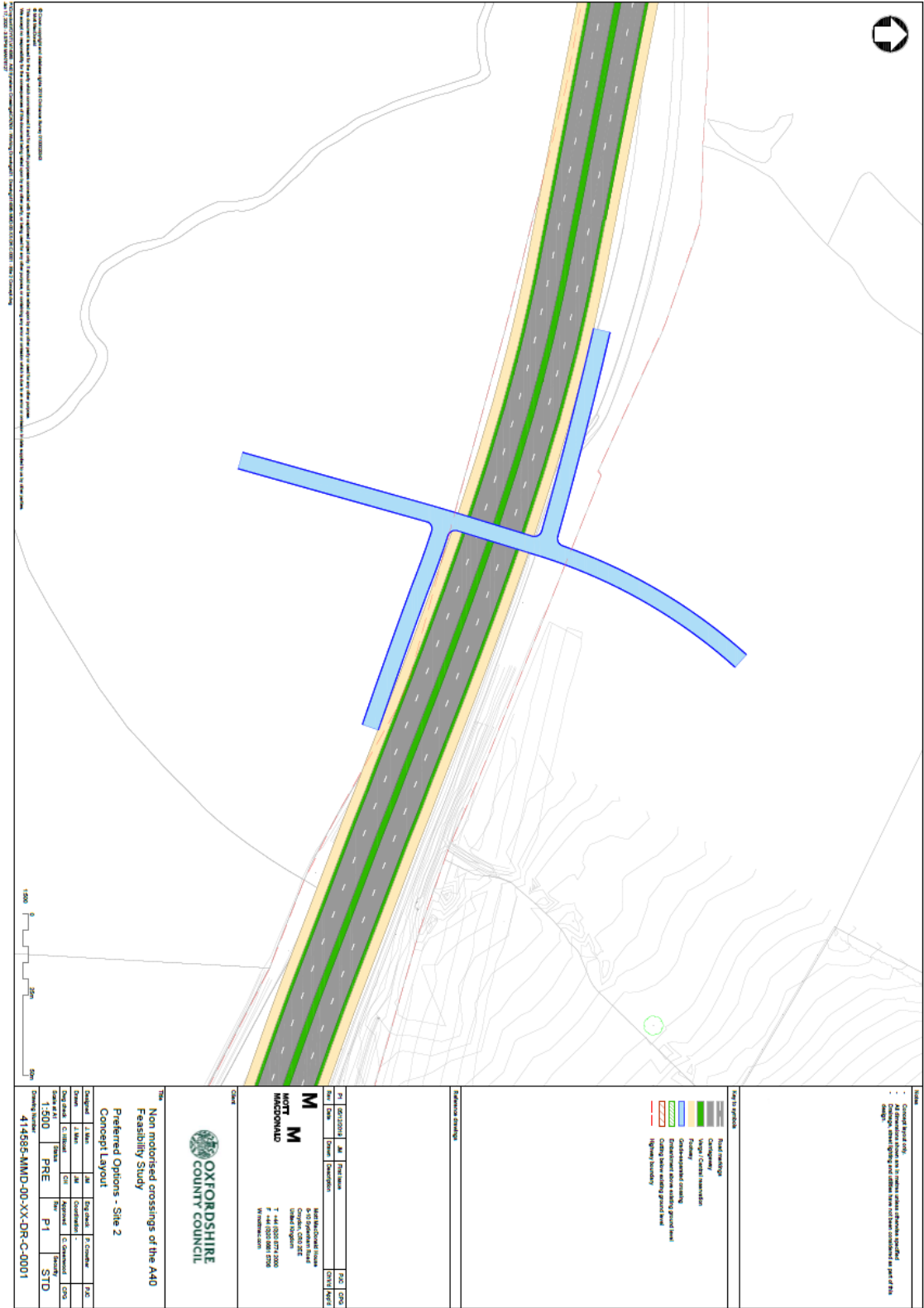
The drawing in Figure 6.14 below shows a conceptual indicative design for a bridge at this location and features:

- Two ramps on either side to link to multiple desire lines, including the linear park proposed as part of the West Eynsham SDA site, and the “green loop” around OCGV
- A 6m wide structure allowing 5m of width for cycling and walking and 1m of buffer to the bridge parapets
- Ramps at 1:20 gradient
- The A40 converted to a dual carriageway, as planned in the A40 Smart Corridor Scheme





**Figure 6.13: Photos from around the West of Eynsham site along the A40 (images: November 2019)**



## Architectural Design

The concept for this location is less well-advanced than the other two crossings presented above. Both the exact location, the alignment of the bridge and ramps, and the arrangement with proposed and possible access roads and roundabouts for OCGV and West Eynsham SDA would need to be developed in further detail.

However, a bridge at this location would also seek to follow the Garden Village principles and AAP transport objectives:

- enhancing the natural environment
- being beautifully and imaginatively designed
- building climate resilience
- providing an integrated and accessible transport network
- fostering an environment where active travel is the norm
- providing safe and convenient connections to and across the garden village site and the wider area

Following the approach of a “family” of crossings, a similar materials palette of wood and steel could be used here which would provide the sensation of a green and sustainable crossing, linking seamlessly with the “green loop” around the west of Eynsham and the garden village.

## Estimated Cost

The preliminary estimated cost for a bridge west of Eynsham is **£19-23 million**.

This cost:

- Builds on the assumptions, exclusions and indirect costs listed at the start of Section 6
- Assumes a cable-stayed steel bridge 6m wide and 20m long
- Assumes the four approach ramps are made of steel, not earthworks, 6m wide
- Excludes any costs relating to converting the A40 to dual carriageway and providing shared use footway-cycleways for the section of A40 affected by this scheme
- Includes direct and indirect construction costs, design, project and traffic management and environmental mitigation costs and contingency
- Excludes any land acquisition, which would be required for approach ramps
- Excludes the costs of diverting utilities (see below)

This is the highest cost of the three options we considered, chiefly because it does not change the level of the A40 and therefore requires long steel approach ramps.

Substantial reductions to the cost of this bridge would be made by rationalising the length or width of ramps on approach, and to use earthwork embankments rather than steel structures for as much of the approaches as possible. Lowering the level of the A40 could also reduce this cost but could increase the costs of diverting utilities.

If it was desired to have this crossing as a Green Bridge then we would envisage increases to the cost of the crossing, because of the substantially wider bridge deck required.



## Construction

We have assumed that one lane of traffic in each direction will need to be maintained during construction given the high traffic flows on this part of the A40 for large parts of the day and lack of suitable diversion routes. The outline construction and temporary traffic management phasing would be as follows:

- Construct the A40 dual carriageway according to designs progressed by the A40 Smart Corridor Scheme, and allowing for bridge landings and pylons.
- Install the footbridge during a night or weekend closure of the A40.
- Construct the ramps and/or embankments for accesses to the footbridge on each side of the road.

During this programme, access for construction vehicles and the workforce will need to be provided not only for the above works but also for construction of the bridge approach ramps. It has been assumed that the bridge itself would be constructed off-site and installed using a weekend / Sunday / overnight closure of the A40. This will need to be programmed at an appropriate time within the above construction phasing.

To mitigate the effects of constructing this crossing an integrated Travel Demand Management campaign could be designed and delivered. More details of this are listed in Section 7.

## Utilities

No utility drawings have been provided for this location, but we envisage that the arrangement of utility infrastructure here is similar to elsewhere in the study area, and hence the following may be located in the highway:

- Gas
- SSE Electric
- BT
- Virgin Media
- Thames Water

The extents of the required diversions will depend on the further development of the scheme. For this option we have not considered changing the level of the A40 which means that the only utilities affected would be by the installation of the bridge piers.



## 7. Conclusions

Mott MacDonald and Knight Architects were appointed by Oxfordshire County Council (OCC) and West Oxfordshire District Council (WODC) to investigate and advise on a recommended solution for non-motorised access and linkage across the A40 at Eynsham in support of the Oxfordshire Cotswolds Garden Village (OCGV) Development and the West Eynsham SDA.

The scope of our commission was “to thoroughly assess whether grade separation is technically feasible at one or possibly more locations” and specifically to:

- Review technical notes and relevant documents including the emerging OCGV Masterplan;
- Review the land constraints along the A40 in the vicinity of OCGV;
- Identify potential locations for crossings;
- Establish crossing options, using design and innovation best practice including options to change the alignment of the A40 and to introduce a “Garden Bridge” or iconic structure;
- Advise on whether existing or proposed at-grade crossings should be retained;
- Provide high-level indicative design drawings and costings for the preferred options;
- Provide an overview of construction implications for the A40 and consider how to keep the A40 open to traffic during works.

This report has considered the technical feasibility of either bridge or subway crossings along the length of the A40 from a point west of both the existing Eynsham settlement and the West Eynsham SDA in the west to just east of the Eynsham roundabout in the east.

### Optioneering, Concept Development and Evaluation

Following a review of the background documentation, movement data, land ownership information and site investigations we conducted an optioneering exercise which involved the transport planners, highway designers, structural engineers and bridge architect members of the project team with some involvement from the client team at OCC and WODC.

For the purposes of optioneering and concept development, the Study Area was divided into eight zones, namely:

- Zone 1 – West of Eynsham
- Zone 2 – Old Witney Road Lay-By / Proposed Park & Ride
- Zone 3 – Cuckoo Lane / Old Witney Road / Proposed Park & Ride
- Zone 4 – Witney Road
- Zone 5 – Spareacre Lane / Esso Tesco Express
- Zone 6 – Hanborough Road
- Zone 7 – Eynsham Roundabout
- Zone 8 – East of Eynsham

For each zone we considered the future and current constraints and opportunities which might support or hinder a grade-separated crossing which could support the vision of the area as articulated in the Area Action Plan and form part of a package of high-quality crossings which contribute to a sense of place including supporting the vision for a “Green Loop” around the whole of Eynsham and its future neighbouring settlements. We considered three broad propositions for a grade-separated crossing at each location, namely:

- A bridge with straight ramps at 1 in 20 gradients and 5m landings as required
- A bridge with spiral ramps on the same basis as above, assuming spirals at 11m radii providing 2.8m internal headroom where spirals overlap
- A subway with ramps at 1 in 33 gradients and 2.8m headroom

Potential lowering or raising the carriageway of the A40 was also considered to unlock potential crossing options if otherwise not feasible as well as to minimise approach ramp lengths and enhance visibility of the proposed crossing from the approaches. A Multi-Criteria Assessment Framework was developed in order to qualitatively assess the performance of the options against a range of criteria, namely:

- Residential amenity
- Alignment with desire lines
- Land acquisition
- Capital cost
- Impact on traffic and buses during construction
- Safety and security
- Coordination with other schemes
- Landmark appearance
- Contribution to perception of place
- User experience
- Total time to cross
- Level change

The best performing crossing options that were taken forward into Concept Refinement were considered as:

- A subway between Old Witney Road and Cuckoo Lane (Zone 3)
- A bridge near Hanborough Road and the Eynsham roundabout (Zone 6 or Zone 7)
- A bridge to the west of Eynsham (Zone 1 or Zone 2)

A number of crossing options were considered as undeliverable due to unacceptable impacts on residents, significant land acquisition and demolition requirements. These included:

- Most options in the vicinity of Witney Road and Spareacre Lane (Zones 4 and 5)
- A bridge with straight approach ramps between Old Witney Road and Cuckoo Lane (Zone 3)

Other crossing options were considered to perform poorly against many of the criteria. These included:

- A subway west of Eynsham (Zone 1 and Zone 2)
- A spiral-ramped bridge at Witney Road
- A spiral-ramped bridge at Spareacre Lane
- Either a bridge or a subway between Witney Road and Spareacre Lane
- A subway at Hanborough Road (Zone 6)
- A subway at Eynsham roundabout (Zone 7)
- All potential crossing options east of the Eynsham Roundabout (Zone 8)

The only location where a subway was considered viable was between Old Witney Road and Cuckoo Lane.

## Concept Refinement

Based on the optioneering, concept development and evaluation described above, the subway between Old Witney Road and Cuckoo Lane, the bridge near Hanborough Road and Eynsham roundabout, and the bridge west of Eynsham were selected for further refinement.

### Subway between Old Witney Road and Cuckoo Lane

Concept refinement of the subway between Old Witney Road and Cuckoo Lane focussed on enabling the approach ramps to be as straight as possible in order to maximise visibility for users thereby optimising perceived safety and security. Further investigation of the potential for 'opening' out the crossing to further improve safety and security was undertaken including developing a hybrid option of two road overbridges with gap in between as an alternative to a single concrete subway. Our preferred option is a pre-cast concrete structure with the carriageway level of the A40 raised by 2m to facilitate:

- A subway of 5m width allowing a shared use facility.
- Single ramps of 1 in 33 gradient on both north and south sides.
- The bus lanes, shared use cycleway-footway on the north side and a footway on the south side proposed as part of the A40 Science Transit 2 Scheme.

The high-level estimated cost of the subway based on the consultant team's professional experience and known costs of precedent projects is £4-5m. However, this assumes that cost savings are gained through integrated construction of the subway with the A40 Science Transit 2 Scheme bus lanes to maintain two-way traffic along the A40 during the construction programme apart from weekend / overnight closure(s) required to install the concrete subway structure. Costs do not allow for e.g. moving utilities additional to those that need to be moved for bus lane construction.

Further refinements to this option could include changing the gradient of approach ramps to be steeper than 1:33; reducing or eliminating the level change on the A40; and changing Cuckoo Lane's role as a traffic through route.

### Bridge near Hanborough Road and Eynsham Roundabout

Of all the options developed, the bridge near Hanborough Road was considered to perform the best assuming that the level of the A40 carriageway is lowered to minimise the length of the approach ramps (and corresponding land acquisition, cost and related criteria). Considering this, concept refinement focussed on re-evaluating the optimum level change for the A40 carriageway which significantly influences the precise bridge location, ramp lengths and orientation, footway arrangement and land acquisition. Considering all of these factors the consultant team's preferred option involves lowering the carriageway level of the A40 by approximately 3m to facilitate:

- A bridge of 6m width allowing a 3m cycleway and 2m footway or shared use facility with 1m buffer to the bridge parapets
- Two 6m wide ramps of 1 in 20 gradient on both north and south sides to serve desire lines
- A shared use cycleway-footway on the north side and a footway on the south side at approximately the same level as the existing A40

The high-level estimated cost of the bridge based on professional experience and known costs of precedent projects is £14-17m. Construction of the bridge could be coordinated with the delivery of the A40 Science Transit 2 Scheme bus lanes to maintain two-way traffic along the A40 during the construction programme apart from weekend / overnight closure(s) required to install the bridge structure.

## Bridge west of Eynsham

Minimal concept refinement was undertaken on this option since the surrounding land is relatively unconstrained although the option takes account of the delivery of the A40 Smart Corridor scheme between Eynsham and Witney. The consultant team's preferred option was based on the current carriageway level of the A40 and includes:

- A bridge of 6m width allowing a 3m cycleway and 2m footway or shared use facility with 1m buffer to the bridge parapets.
- Two ramps of 1 in 20 gradient on both north and south sides to serve desire lines.
- The dual carriageway proposed as part of the A40 Smart Corridor scheme.

The high-level estimated cost of the bridge based on professional experience and known costs of precedent projects is £19-23m. Construction of the bridge could be coordinated with the delivery of the A40 Smart Corridor Scheme dual carriageway during the construction programme apart from weekend / overnight closure(s) required to install the bridge structure.

## Travel Demand Management

To mitigate the temporary disruption caused by the road closures needed to build these crossings, an integrated Travel Demand Management plan involving operational changes, network management, incident management, marketing, communications and stakeholder engagement could be undertaken.

Integrating this plan in the Command, Control and Coordination function brings benefits that everyone in responsible organisations has access to the same information and "lines to take", that coordination builds consensus and trust across the industry, and that stakeholders and customers will be given more reliable information and travel advice in enough time to act.

Some customers will be both willing and able to change behaviour if they are given actionable advice in the right format and at the right time. In examples of major road works in London, traffic reductions of 5-10% have been achieved, reducing congestion on the road network.

The proposals for this approach would be developed closer to the time of construction, but should start at least 12 months prior to the first closure or significant work on the A40 in order to give time to go through a four-stage process:





