

Bicester London Road Level Crossing Alternatives

Stage 1 - Engineering Feasibility Assessment

Oxfordshire County Council

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ATKINS

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Introduction

This document is a review of alternative routes to London Road, Bicester.

Preliminary Designs for all schemes have been prepared along with Works Costs Estimates, Programme of Works and Risks associated with each project.

Executive summary

The scope of this scheme is to investigate alternative routes to the level crossing on London Road in Bicester Town. The Bicester area is expected to grow and the number of trains crossing the level crossing is expected to increase leading to excessive delays on London Road. Five options to bypass the crossing have been considered. A layout drawing, cost estimate and outline construction programme have been produced for each solution to the proposed options.

The options considered are:

Option A – All purpose overbridge

Option B – Pedestrian Footbridge

Option C – Underpass

Option D – Link road from London Road to A41

Option E – Link road from Launton Road to A4421

1. Introduction

1.1. Objective

Atkins has been commissioned by Oxfordshire County Council (OCC) to consider a range of possible alternative options to bypass the London Road Level crossing in Bicester Town. This is in anticipation of an increase in rail traffic expected to lead to excessive delays on London Road and future developments leading to a forecasted doubling of the population by the year 2033.

This report will consider transportation routes for 5 alternative options. Each option has at least 1 proposed alignment with drawings displaying the horizontal layout and the works required to achieve the proposed option. This report will describe each proposed option and comment on the pros & cons, safety aspect and cost estimation.

Other studies have been undertaken to consider the development along the Chiltern railway and associated infrastructure. This report (with the agreement of OCC) intended to take an independent view of possible alternative solutions without the influence of the previous reviews.

1.2. Development in Bicester

Bicester Town is located in the Cherwell District, 12 miles from Oxford. Significant development is planned in Bicester including a large site south of Bicester at Graven Hill which will generate a large travel demand between south east Bicester and the town centre.

1.3. Train Service

The railway crossing London Road is part of the Chiltern Railway network and runs through the south east part of Bicester. The line services the Bicester Town station which is located south of the level crossing at London road. The station consists of a single platform catering for passenger trains from Oxford to Bicester. Currently, passenger trains do not travel east of the station and only one scheduled freight train per weekday traverses the level crossing.

2. The Site, Issues and Constraints

2.1. London Road

The B4100 London Road is a two lane single carriageway which runs in a generally north-south direction. There are footways located on both sides of the road with residential houses and a number of access roads. London Road intersects the Chiltern railway line just north of the Bicester Town Station. The intersection is currently controlled by an at grade level crossing with full carriageway width automatic electric gates. London Road provides an important link for local movement between the south east section of Bicester and the rest of the town which is separated by the railway and serves as an important route for local bus service. London Road is one of 3 roads which cross the railway. The other two roads are the A41 and A4421 which are located on the perimeter of Bicester Town.



Station Approach/London Road Junction (left), and London Road north of the level crossing (right).



London Road south of the level crossing.

2.2. Chiltern Railway

The railway runs from Bicester town to Oxford and is expected to be upgraded. At the moment, only one set of tracks cross London Road at the level crossing. It is anticipated that this will be upgraded to two sets of

railway tracks and will be electrified sometime in the future. Potential solutions will need adequate span and headroom to facilitate these improvements.

Bicester Town station will also be improved as part of the development. The site extents identified for station development have been highlighted in each option layout. It is understood that a second platform will be added to the station for westbound trains. Station Approach is also understood to be realigned to the western extent of the development site. Proposed options will need to take into consideration the new station arrangements.



Bicester Town Railway station looking south towards the A41 (left), and looking north towards London Road level crossing (right).

2.3. Potential Stakeholders

The location of the level crossing is in a developed part of Bicester Town. There are a number of stakeholders who may be affected by any proposed solutions.

Bicester Outlet Village

The Bicester Outlet Village is a retail park located southwest of Bicester Town station which attracts a large number of visitors to Bicester especially during weekends and the holiday season. In addition to the site of the Village, parking facilities for the Outlet are located west of the railway line adjacent to the station development. These facilities include a two storey car park and an open area for further parking (over-spill parking).

Business Parks and Residential Estates

There are a number of business parks and residential estates in the area with direct links to London Road or Station Approach that may be affected. Some of the potential stakeholders are:

Business Park

- Talisman Business Centre which is located on the east side of the railway line opposite the railway station and has access to London Road via the roundabout just outside the business park.
- McKay Trading Estate which is located west of the station and has direct access to Station Approach. Part of the business park is located within the area marked for Bicester Town station development. Access to the remaining plot of the business park will need to be provided.

Residential

- Westholmes Court which is located opposite Station approach on the north side of the level crossing. This is the only access to the residential estate.

- Coach House Mews which is located adjacent the petrol station on the south side of the level crossing. This is the only access to the residential estate.
- A Grade II listed building is located just west of the level crossing.
- There are a number of residences with direct access to London Road

3. Proposed Alternative Options

Oxfordshire County Council has proposed 5 alternative route corridors to bypass the existing level crossing at London Road. The options are considered in this section.

Design Parameters

All proposed options have been designed in accordance with the Highways Agency Design Manual for Roads and Bridges (DMRB). The Network Rail – Track Design Handbook has been used to determine the minimum headroom for a structure over the railway, 5.45m (for Trans-European Transport Networks). The Railway Group Standard – Rail Traffic Loading Requirements for the Design of Railway Structures has also been used. This standard dictates that the supports of structures should be offset 4.5m from the railway to avoid the requirements for impact loading design.

NOTE: The minimum headroom over the railway line is 5.45m as advised in the Network Rail Design Handbook. In the event that the railway is electrified before the closure of the level crossing, then the track clearance may need to be increased to 7m as the 25kv overhead cables will need to cross the road at a height appropriate for HGV's. This may increase the cost of the options.

Cost Estimation

Works costs have been estimated from Spon's – Civil Engineering and Highway Works Price Book 2013 based on the expected elements in each solution. C2 Statutory Undertaker returns have not been obtained for this study and a contingency cost has been estimated for each solution to allow for utility diversion. The estimate for design fees is a prorata cost of construction (please note this is not a quotation).

A preliminary estimate of the cost associated with land acquisition and compensation has been included but a full assessment of land value and negotiation with affected land owners will be necessary as this value is subject to significant variation. For the purpose of this report, a review has been done on the existing exchange price offers (via internet searches) for fields, industrial buildings and commercial buildings in the Bicester area. These figures have been used to estimate a rate for undeveloped land, industrial building and commercial building purchases.

It must be noted that the estimates in this report may differ greatly from actual costs.

Indicative Construction Programme

An indicative construction programme has been estimated based on typical levels of productivity. The duration of activities can vary greatly depending on factors such as, ground conditions, working space, and permitted working hour limitations (particularly relating to track possession).

3.1. Option A

Option A routes consider crossing the railway line by providing an all-modes overbridge sited off-line to the existing London Road alignment. For the purpose of this report all options will consist of a route with standard 7.3m wide carriageway with a 2m wide footway on both verges. The minimum headroom over the railway line is 5.45m as advised in the Network Rail Design Handbook which is the minimum clearance to comply with a designated TENs route.

The speed limit of the route is assumed to be 30mph and due to the urban area, the design speed will also be taken as 30mph. The alignment for the options has been designed against the requirements set out in the Highways Agency – Design Manual for Roads and Bridges.

3.1.1. Option A1

The alignment for option A1 follows the outline proposed in the client brief (refer to drawing number S-5121910-FEA-000-001). The bridge is positioned approximately 180m southwest of the existing crossing and ties-in the original alignment at the London Road/Station Road junction to the north, and at the roundabout opposite Talisman Business Centre to the south. This proposed alignment will require the demolition of an existing building in the Talisman Business Centre. Entry into the business centre will not be available from the existing roundabout. An alternate entry point will be constructed for the business centre on the north side of the site to provide direct access to London Road.

The alignment runs through the Talisman Business centre and the area of the proposed railway station. Land will need to be acquired from both parties and compensation paid to affected businesses. It has been assumed that the approaches to the railway crossing will be constructed as a viaduct to minimise the footprint on the Talisman Business Centre and the Network Rail station area as it will permit the release of areas under the structure for the use of the landowners (such as parking and through access), but will increase construction cost.

The proposed horizontal alignment in Option A1 is compliant with standards. The vertical gradients on the north approach and south approach are 6% and 8.3% respectively. The desired maximum grade for a single carriageway is 6% with gradients steeper than 8% requiring a departure from standard.

It is proposed that when option A1 is implemented, the existing level crossing will be closed. Local alterations to the existing highway infrastructure are required to provide turnaround facilities.

Road Safety Audit Comments

The combination of 8.3% gradient, 50m horizontal radius, and proximity to the roundabout on the southern approach to the bridge is a safety issue. Heavy vehicles may lose control when braking and turning while approaching the roundabout. This arrangement is not advisable.

It is not advisable to use this overbridge as a pedestrian route. The 8% gradient is difficult to negotiate for wheelchair users. The route is also a long detour from the original desire line.

Works and Design Cost Estimate

The Works Cost Estimate for Option A1 is in the order of £36,250,000. The breakdown is summarised below:

- Works Cost - £18,600,000
- Statutory Undertakers - £50,000
- Design Fees - £1,900,000
- Site Supervision Fees - £1,400,000
- Land Acquisition - £3,100,000
- Optimism Bias at 45% - £11,200,000

Indicative Construction Programme

An indicative construction programme for this option is included in appendix C. The overall construction programme is 29 months. The construction period for the viaduct could be shortened if work is progressed at multiple locations, however this may increase the cost of construction. Limited access due to possession restrictions over the railway line would increase the duration of works. Two site compounds may also be required due to restricted access over the railway line.

Summary Commentary on Option A1

The main pros for this option include:

- This solution provides a direct alternative to bypass the level crossing in close proximity to the existing desire line
- Use of the existing Talisman Business Centre roundabout
- Mainly offline construction simplifies traffic management and reduces user delays

The main cons for this option include:

- The gradient of the road is more than 8% on the southern side which will be a departure from standards, this combined with the relaxation on the horizontal curve at the immediate approach to the Talisman roundabout is a significant safety concern
- Restricting the use of the train station land and conflicts with new proposed station layout
- Demolition of existing business park building required
- Disruption of businesses in Talisman Business centre and compensation/relocation payment for affected businesses
- Vehicle movement within the business park would be disrupted

3.1.2. Option A2 and A3

Variations to the layout in Option A1 were considered (see Options A2 and A3 as shown on drawing number S-5121910-FEA-000-001). These options all produced substandard gradients on the southern approach to the Talisman roundabout (steeper than 8%) and impact severely on the additional parking area for the Village Retail Park. Options A2 and A3 were not considered further for cost estimation or delivery programme.

3.1.3. Option A4

Option A4 requires realignment of the Talismans Business Centre roundabout to accommodate a new arm to the west (refer to drawing number S-5121910-FEA-000-002). This alignment ties-in at the Talisman roundabout to the south of the railway and follows the edge of the business centre site crossing the railway via an overbridge approximately 370m southwest of the existing level crossing. The alignment runs along the western extent of the shopping village (over-spill) car park and ties into the proposed alignment of Station Approach.

The alignment is intended to reduce the impact on commercial and retail parking areas as it runs along the south perimeter of the business centre, west perimeter of the Outlet Village car park, and proposed railway station site. Land is to be acquired from all affected parties and compensation may be required for the Outlet Village car park area. The north approach is proposed to be a viaduct to minimise the footprint on the Village car park. The south approach is proposed to be a viaduct over the extent of the business centre, with retaining walls constructed on the tie-in to the roundabout to minimise land acquisition. Where headroom permits, land under the viaduct can be reverted back to parking.

The proposed horizontal alignment is compliant with standards. Some local widening may be required on either side of the railway crossing to accommodate turning movement of long vehicles. The vertical gradients on the north and south approaches are approximately 6% (desired maximum grade for a single carriageway).

It is proposed that when option A4 is implemented, the existing level crossing will be closed. Local alterations are required to provide turnaround facilities.

Road Safety Audit Comments

It is not advisable to use this overbridge for pedestrian use. The route is a long detour for pedestrians with no opportunity to leave the route.

Works and Design Cost Estimate

The Works Cost Estimate for Option A4 is in the order of £38,550,000. The breakdown is summarised below:

- Works Cost - £20,100,000
- Statutory Undertakers - £50,000
- Design Fees - £2,000,000
- Site Supervision Fees - £1,500,000
- Land Acquisition - £2,900,000
- Optimism Bias at 45% - £12,000,000

Indicative Construction Programme

An indicative construction programme for this option is in appendix C. The overall construction programme is 31 months. The construction period for the viaduct could be shortened if work is progressed at multiple locations, however this may increase the cost of construction. Limited access over the railway line would increase the duration of works. Two site compounds may also be required due to limited access over the railway line.

Commentary on Option A4

The main pros for this option include:

- This solution provides a direct alternative to bypass the level crossing in close proximity to the existing desire line
- Existing buildings would not need to be demolished
- Less disruption to Bicester train station the Option A1 as the proposed road travels along the northern boundary.

The main cons for this option include:

- Long structure and high works cost
- Disruption to Village car park and compensation payment would be required
- Roundabout realignment would cause traffic disruption
- Elongated roundabout may cause safety concerns due to increase circulating speeds

3.2. Option B

Option B considers footbridges in place of the closed level crossing; each bridge complies with the DMRB BD29/04 Design Criteria for Footbridges. The recommended gradient for the ramp is 1:20, however a gradient of 1:15 may be used with the agreement of the overseeing organisation and with the provision of rest areas.

It is assumed that the footbridge options will be implemented at the same time as one of the highway solutions. Cost estimates and the construction programme assume the site compounds will be in place to construct the highway solutions.

3.2.1. Option B1

The alignment for option B1 follows the outline proposed in the client brief (refer to drawing number S-5121910-FEA-000-003). The bridge will provide for passengers using the railway, and pedestrians using London Road. Passengers using the railway will use the stairs or a stair lift (not included in this estimate). The London Road pedestrians will be able to use either stairs or a 1:20 (or 1:15) ramp.

There will be no direct access from London Road to the railway platform, as users would be separated by a fence on the bridge deck. The total width of the footbridge is 5m. The length of ramp for a 1:20 gradient is 138m. The length of ramp for a 1:15 gradient is 101m.

Road Safety Audit Comments

There were no comments resulting from the Road Safety Audit for this proposal.

Works and Design Cost Estimate

This cost estimate is based on a 1:15 gradient ramp. The Works Cost Estimate for Option B1 is in the order of £4,500,000. The breakdown is summarised below:

- Works Cost - £2,600,000
- Design Fees - £300,000
- Site Supervision Fees - £200,000
- Optimism Bias at 45% - £1,400,000

Indicative Construction Programme

An indicative construction programme for this option is in appendix C. The overall construction programme is 8 months.

Commentary on Option B1

The main pros for this option include:

- Stairs and ramps available for users using London Road
- No impact protection needed to the bridge supports as they are 4.5m from the railway tracks
- No existing buildings would need to be demolished if the ramps are 1:15

The main cons for this option include:

- The high cost due to the length of the ramps
- Increase of journey time to users due to the long ramps
- Requires repositioning of the west station platform

3.2.2. Option B2

This option will not facilitate passenger movement within the station as the bridge will be too far away from the train station (refer to drawing number S-5121910-FEA-000-004). As there is a grade 2 listed building in the area the bridge will require footpaths from London road to the foot of the stairs/ramps. The total width of the footbridge is 2m. The length of the ramp for a 1:20 gradient is 128m. The length of ramp for a 1:15 gradient is 94m.

Road Safety Audit Comments

There were no comments resulting from the Road Safety Audit for this proposal.

Works and Design Cost Estimate

This cost estimate is based on a 1:15 gradient ramp. The Works Cost Estimate for Option B2 is in the order of £3,600,000. The breakdown is summarised below:

- Works Cost - £2,100,000
- Design Fees - £200,000
- Site Supervision Fees - £200,000
- Optimism Bias at 45% - £1,100,000

Indicative Construction Programme

An indicative construction programme for this option is in appendix C. The overall construction programme is 8 months.

Commentary on Option B2

The main pros for this option include:

- Footbridge does not deviate significantly from the original desire line for London Road
- No impact protection needed to the bridge supports as they are 4.5m from the railway tracks

The main cons for this option include:

- The bridge does not readily accommodate passengers trying to cross the railway line as the bridge will be too far away
- High cost due to the length of ramps
- Increase of journey time to users due to the long ramps

3.3. Option C

Option C considers an underpass beneath the railway on the current horizontal alignment (refer to drawing number S-5121910-FEA-000-005) of London Road. The required headroom at the underpass is 5.8m in accordance with the DMRB TD 27/05. The width of the underpass will be 7.3m and will be a single carriageway. The underpass will only accommodate vehicles as pedestrians movement will be provided by footbridges (see option B). The underpass will only extend the width of the railway line. The carriageway approaching the underpass will be lowered with the cutting supported by retaining walls either side.

The drawing indicates the extent of carriageway to be lowered. This alignment has been designed against the maximum permitted 6% gradient recommended in the DMRB. The horizontal alignment will follow the existing London Road alignment; however the construction will be in the very close proximity of the Grade 2 listed building near the railway lines and it may be difficult to construct a retaining wall near this area without damaging the integrity of the building.

The cutting extends a distance along Station Approach and Priory Road to provide a compliant gradient for the carriageway. This will however leave a level difference of 4m on the side road to the residential estate on Westholmes Court. Vehicle access to existing houses, buildings and shops will be removed along London Road along the extent of the cutting due to the level difference. There is no alternative access provision without significant clearance of other properties. Due to the lack of access, it is expected that properties and estates will need to be purchased.

There is limited space currently available between the edge of the carriageway and many of the building frontages on London Road; this will be further reduced with the retaining structure. The land/properties along London Road acquired through purchasing will be available for conversion to pedestrian access. Land acquired along the east side of London Road will also allow the carriageway to be realigned and provide further clearance to the listed building. Any resale value of land has not been included.

It will be necessary to close London Road during the construction period. Traffic diversions will be needed during construction works.

Road Safety Audit Comments

The Station Approach/London Road junction in this proposal is expected to be a give-way junction. Vehicles are required stop and start on a 6% incline. This is a safety concern.

Works and Design Cost Estimate

The Works Cost Estimate for Option C is in the order of £49,900,000. The breakdown is summarised below:

- Works Cost - £11,500,000
- Statutory Undertakers - £200,000
- Design Fees - £1,200,000
- Site Supervision Fees - £900,000
- Land Acquisition - £17,500,000
- Optimism Bias at 45% - £18,600,000

Indicative Construction Programme

An indicative construction programme for this option is included in appendix C. The overall construction programme is 28 months.

Commentary on Option C

The main pros for this option include:

- Provision along existing London Road.

The main cons for this option include:

- High construction cost
- Large number of affected stakeholders leading to many parties to negotiate with
- On-line works requiring significant diversion during construction.

3.4. Option D

Option D routes consider providing a link from London Road to the A41 which in turn will provide access to Bicester on the south side of the railway. The road link will be a single carriageway 7.3m wide with no pedestrian provision.

The speed of the route is assumed to be 30mph. The alignment for the options has been designed in accordance with the requirements set out in the Highway Agency – Design Manual for Roads and Bridges.

3.4.1. Option D1

This alignment links the A41 to London Road with a route on the west side of the railway (refer to drawing S-5121910-FEA-000-006). The junction with the A41 is proposed to be a signalised junction. The road alignment will run parallel to the railway line and travel along the eastern boundary of the parking area for the village. A roundabout will be provided to link this proposed road to realigned Station Approach and access to the existing multi-storey car park, and a new multi-storey car park.

The proposed highway will travel through the east side of the Village Retail Park on a viaduct to allow the car parking/delivery area to remain operational. The alignment will tie in the new roundabout using a 6% gradient from the viaduct. The approach to the viaduct will be supported by retaining walls. This proposal compensates for the loss of parking area and disruption to the outlet village by including a new multi-storey car park at the site of the existing over-spill car park.

Road Safety Audit Comments

A signalised junction on the A41 may increase the likelihood of nose to tail collisions.

Works and Design Cost Estimate

The Works Cost Estimate for Option D1 is in the order of £37,500,000. The breakdown is summarised below:

- Works Cost - £14,300,000
- Statutory Undertakers - £100,000
- Design Fees - £1,400,000
- Site Supervision Fees - £1,100,000
- Land Acquisition - £9,000,000
- Optimism Bias at 45% - £11,600,000

Indicative Construction Programme

An indicative construction programme for this option is in appendix C. The overall construction programme is 22 months.

Commentary on Option D1

The main pros for this option include:

- Little disruption to existing buildings as it travels along the boundaries
- Very little disruption to existing roads
- No new crossing of the railway

The main cons for this option include:

- Disruption to the shopping village
- The A41 would need to be widened to accommodate proposed junction
- Traffic signals on the A41 junction would need to be installed which would affect traffic flow
- Does not provide a direct bypass for the original London Road crossing

3.4.2. Option D2

This option is similar to D1 however the A41 junction will be on the eastern side of the railway line as there is more available space which will mean less disruption to the shopping village (refer to drawing S-5121910- FEA-000-007). There will be earthworks and retaining walls supporting the proposed highway south-west of the roundabout which will raise the road from ground level to bridge level at a gradient of 6%.

This option will avoid constructing a large the viaduct through the existing Village Retail Park, but it will take up a small amount of space of a car park in the corner of the Talisman Business Centre.

The junction with the A41 is proposed to be signalized.

The proposed highway will extend over a parking area in the Talisman Business Centre, the small area will not be useable as earthworks and a retaining wall will be constructed. There will be a bridge that will extend over the railway before it reaches more earthworks and retaining walls which will travel through the existing parking area for the village.

Due to the disruption that the road will cause for the existing parking area for the village, an additional multi-storey car park has been proposed which can also be seen on the drawing. Access to the multi storey will be via the new roundabout.

Road Safety Audit Comments

A signalised junction on the A41 may increase the likelihood of nose to tail collisions.

Works and Design Cost Estimate

The Works Cost Estimate for Option D2 is in the order of £27,000,000. The breakdown is summarised below:

- Works Cost - £8,700,000
- Statutory Undertakers - £50,000
- Design Fees - £900,000
- Site Supervision Fees - £700,000
- Land Acquisition - £8,400,000
- Optimism Bias at 45% - £8,300,000

Indicative Construction Programme

An indicative construction programme for this option is in appendix C. The overall construction programme is 22 months.

Commentary on Option D2

The main pros for this option include:

- Little disruption to existing buildings as it travels along the boundaries
- Earthworks will be used to shorten the length of the viaduct
- Limited impact on the operation of the Shopping Village

The main cons for this option include:

- Bridge approaches will be constructed in car parking areas
- The A41 would need to be widened to accommodate proposed junction
- Traffic signals on the A41 junction would need to be installed which would affect traffic flow
- Does not provide a direct bypass for the original London Road crossing

3.5. Option E

Option E considers relieving the traffic demand on London Road by providing a link from Launton Road to Charbridge Lane. Two sub-options have been considered which include a bridge over the railway lines, and extensions to the existing culverts to accommodate earthworks. New signalised junctions are required at the tie-ins to Launton Road and Charbridge Lane.

3.5.1. Option E1

The junction would be just north of the London to Birmingham Main Line and will run directly parallel to it (refer to drawing S-5121910-FEA-000-008). At the Launton Road junction an existing building will need to be demolished to create room for the supporting earthworks. From Launton Road to the railway line the distance is approximately 180m, the alignment has been designed to a 6% gradient on both approaches to the bridge.

The bridge will have a span of 30m and has been designed using the DMRB and Network Rail Track Design Handbook so the correct height has been achieved for trains travelling below.

As the London to Birmingham line is of strategic importance, it is not considered advisable to disturb the existing earthworks slope. As a consequence the footprint of this proposal is located beyond the extent of the earthworks. The resulting position of the proposed carriageway would require the demolition of an existing industrial building. There may be significant cost in purchasing and compensation.

Road Safety Audit Comments

The proposed junction at Launton Road is located at the bottom of the approach to the railway bridge. There is increased potential for nose to tail collisions.

Works and Design Cost Estimate

The Works Cost Estimate for Option E1 is in the order of £51,800,000 the breakdown is summarised below:

- Works Cost - £3,900,000
- Statutory Undertakers - £50,000
- Design Fees - £400,000
- Site Supervision Fees - £300,000
- Land Acquisition - £31,100,000
- Optimism Bias at 45% - £16,100,000

Indicative Construction Programme

An indicative construction programme for this option is in appendix C. The overall construction programme is 13 months.

Commentary on Option E1

The main pros for this option include:

- Little disruption to the east side of the proposed road
- The route is directly in between London Road and the A4421 which will relieve traffic on these two stretches

The main cons for this option include:

- Major disruption to the existing industrial unit on the Launton Road.
- Significant cost in purchase and compensation to the affected unit.
- The existing culvert would need to be extended slightly to accommodate the proposed earthworks.

3.5.2. Option E2

Refer to drawing number S-5121910-FEA-000-009. This option will be further north than option E1, but still between Launton Road and Charbridge Lane. The route will overlay the existing Jarvis Lane and will follow that route to tie into Charbridge Way. There will be a 25m span bridge crossing the railway line

Currently the access to the Bibby Distribution Unit is at the end of Charbridge Lane, it is proposed that this entrance is moved further east along Charbridge Way.

The highway works will end just east of the Bibby Distribution unit, and traffic modelling would be required to determine whether traffic signals is needed on the junction of Charbridge Way and Charbridge Lane.

Road Safety Audit Comments

There were no comments resulting from the Road Safety Audit for this proposal.

Works and Design Cost Estimate

The Works Cost Estimate for Option E2 is in the order of £6,300,000. The breakdown is summarised below:

- Works Cost - £3,000,000
- Statutory Undertakers - £50,000
- Design Fees - £300,000
- Site Supervision Fees - £200,000
- Land Acquisition - £800,000
- Optimism Bias at 45% - £2,000,000

Indicative Construction Programme

An indicative construction programme for this option is in appendix C. The overall construction programme is 11 months.

Commentary on Option E2

The main pros for this option include:

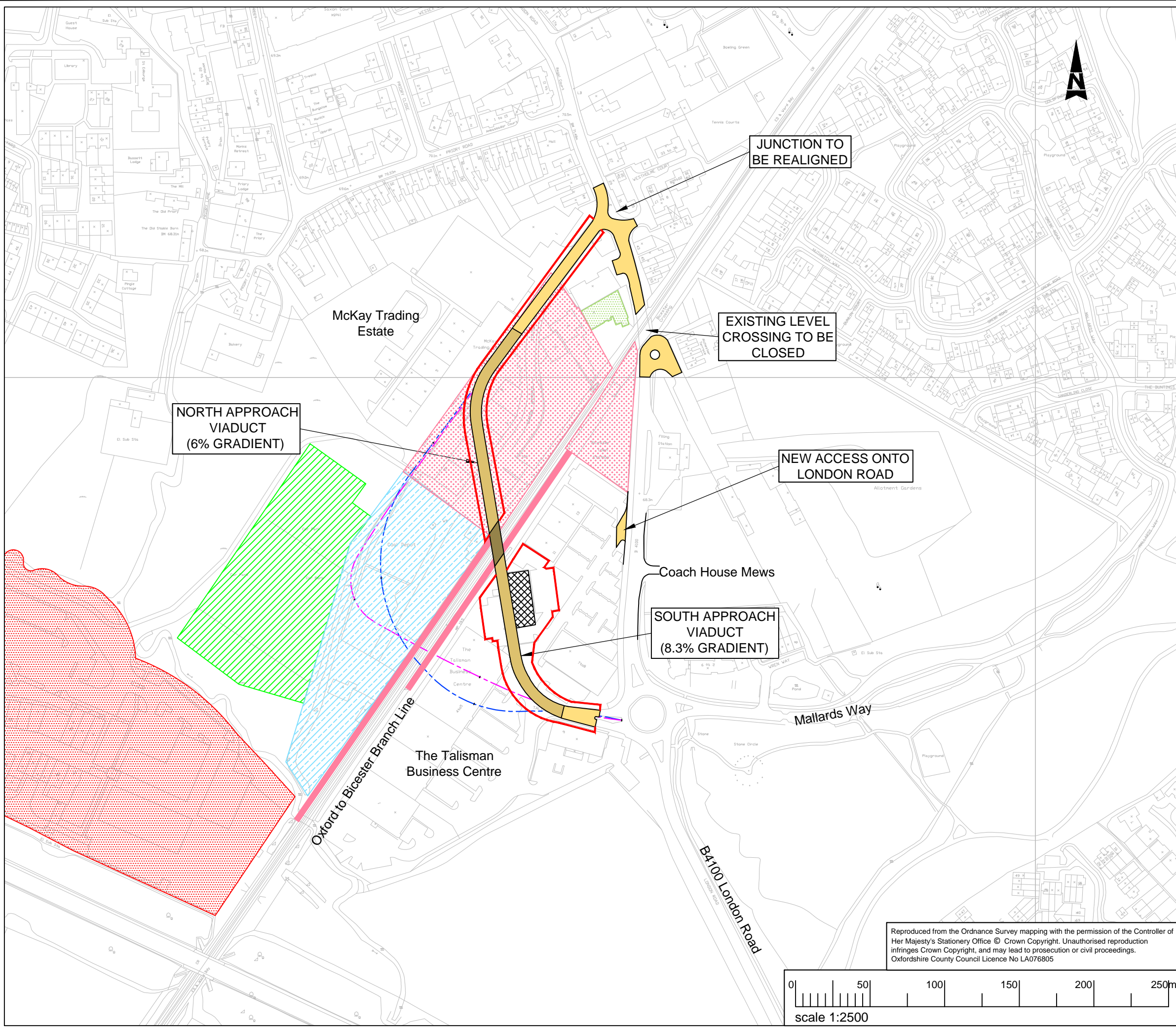
- Good use of existing roads (Jarvis' Lane and Charbridge Way)
- Does not need to demolish any structure
- Low cost compared to other options

The main cons for this option include:

- Access to Bibby's Distribution would need to be altered slightly
- It may have little effect to traffic problems as it is remote from the main generators.

Appendices

Appendix A. Option Layouts



KEY

- The Village Retail Park
- The Village Multi-storey Car Park
- Footprint of Bicester Town Station and Platforms
- Building to be Demolished
- Listed Building
- Additional Parking Area for The Village
- Area Subject to Compulsory Purchase Order
- Extent of Highway Works (At Existing Ground Level)
- Extent of Structure
- Extent of Structure Over Railway
- Centre Line of Option A2
- Centre Line of Option A3

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION		
Unknown		
MAINTENANCE/CLEANING		
Unknown		
USE		
Unknown		
DECOMMISSIONING/DEMOLITION		
Unknown		

Rev.	Date	Purpose of revision	Drawn	Checked	Approved
A	16/08/13	Original Issue	MJG	AL	PRM

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Project title

**BICESTER TRANSPORT PROJECTS
LONDON ROAD LEVEL CROSSING**

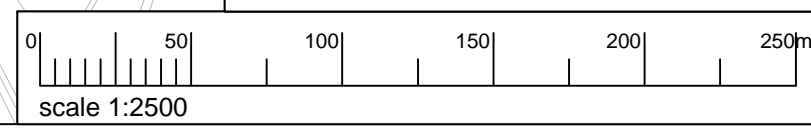
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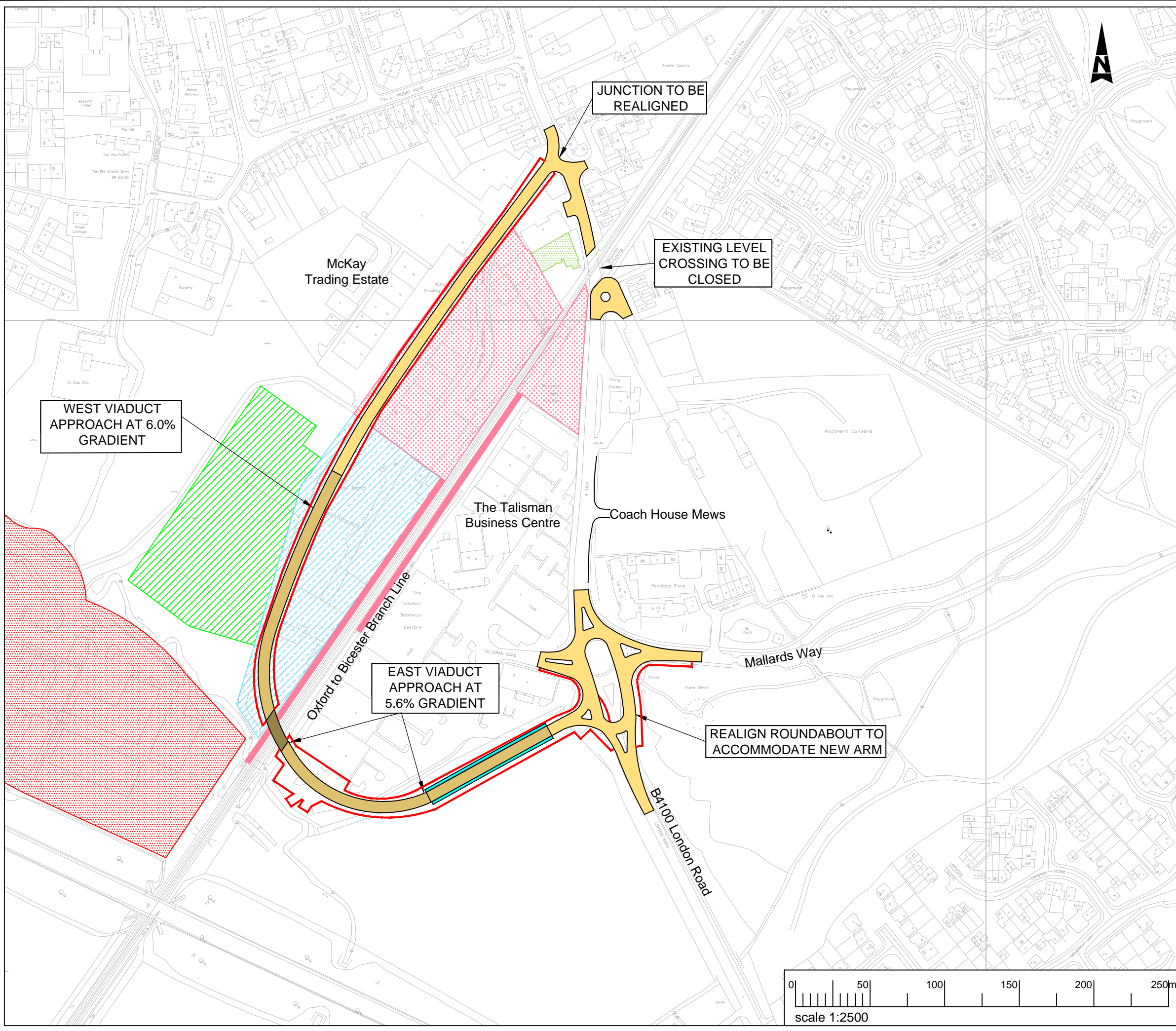
OPTION A1

Drawing Status

Scale @ A3	Drawn by	Checked by	Approved by
1: 2500	MJG	AL	PRM
	Date drawn	Date checked	Date approved
	16/08/13	16/08/13	19/08/13

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KEY

- The Village Retail Park
- The Village Multi-storey Car Park
- Footprint of Bicester Town Station and Platforms
- Listed Building
- Additional Parking Area for The Village
- Area Subject to Compulsory Purchase Order
- Extent of Highway Works at Ground Level
- Extent of Retaining Wall
- Extent of Structure
- Extent of Structure Over Railway

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

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MAINTENANCE/CLEANING	Unknown
USE	Unknown
DECOMMISSIONING/DEMOLITION	Unknown

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Project title
**BICESTER TRANSPORT PROJECTS
LONDON ROAD LEVEL CROSSING**

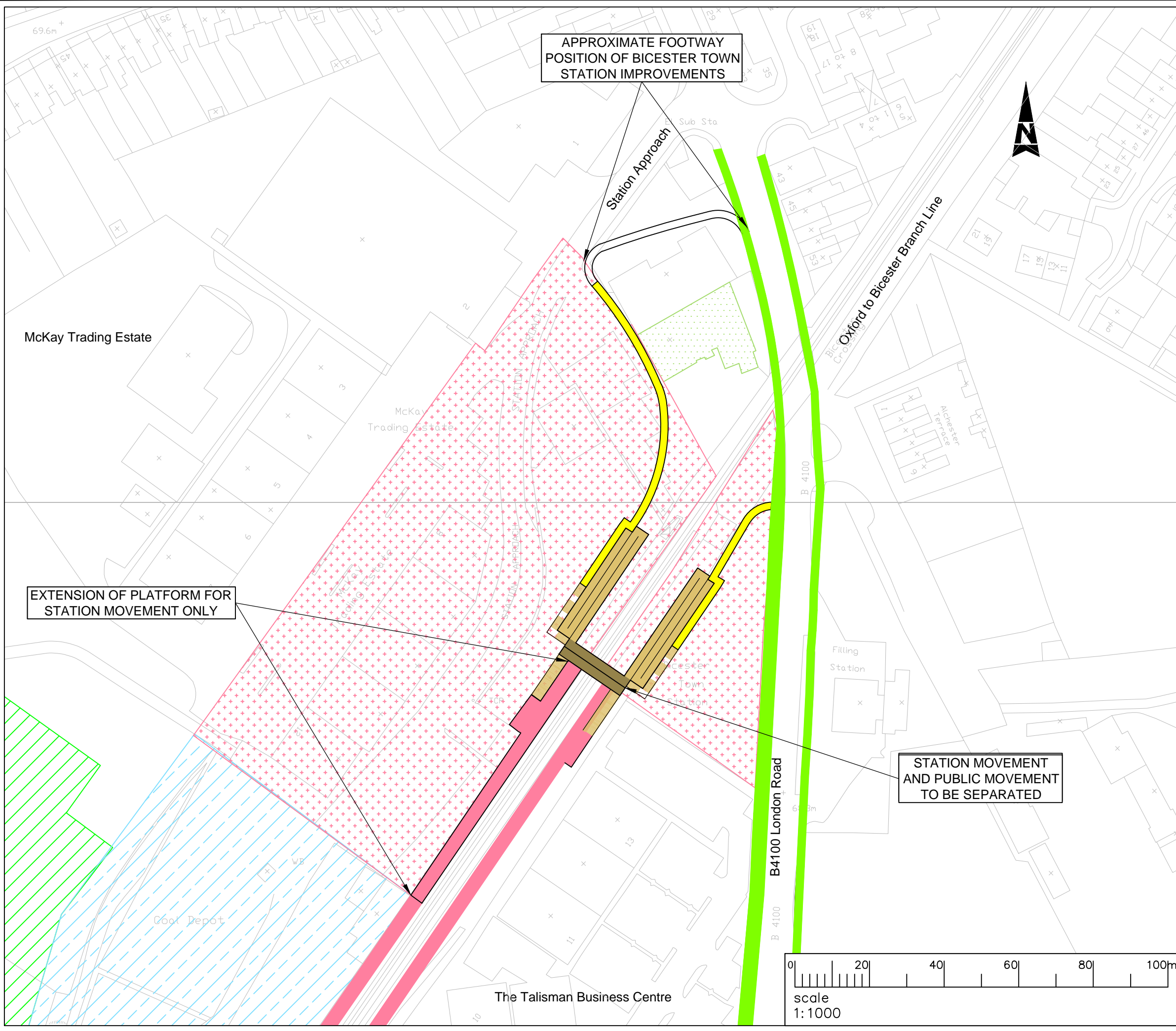
Drawing title
OPTION A4

Drawing Status

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1:2500	Date drawn 16/08/13	Date checked 16/08/13	Date approved 19/08/13

Oxfordshire Project No. & File Ref
8002970





KEY

- Listed Building
- Footprint of Bicester Town Station and Platforms
- The Village Multi-storey Car Park
- Additional Parking Area for The Village
- Existing Footway
- Extent of Footway Diversion
- Extent of Footbridge Over Railway
- Extent of Approach Ramps
- Extent of Steps and Landings

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION	Unknown
MAINTENANCE/CLEANING	Unknown
USE	Unknown
DECOMMISSIONING/DEMOLITION	Unknown

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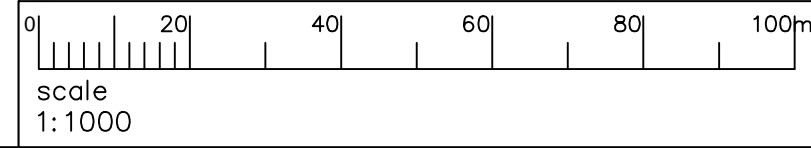
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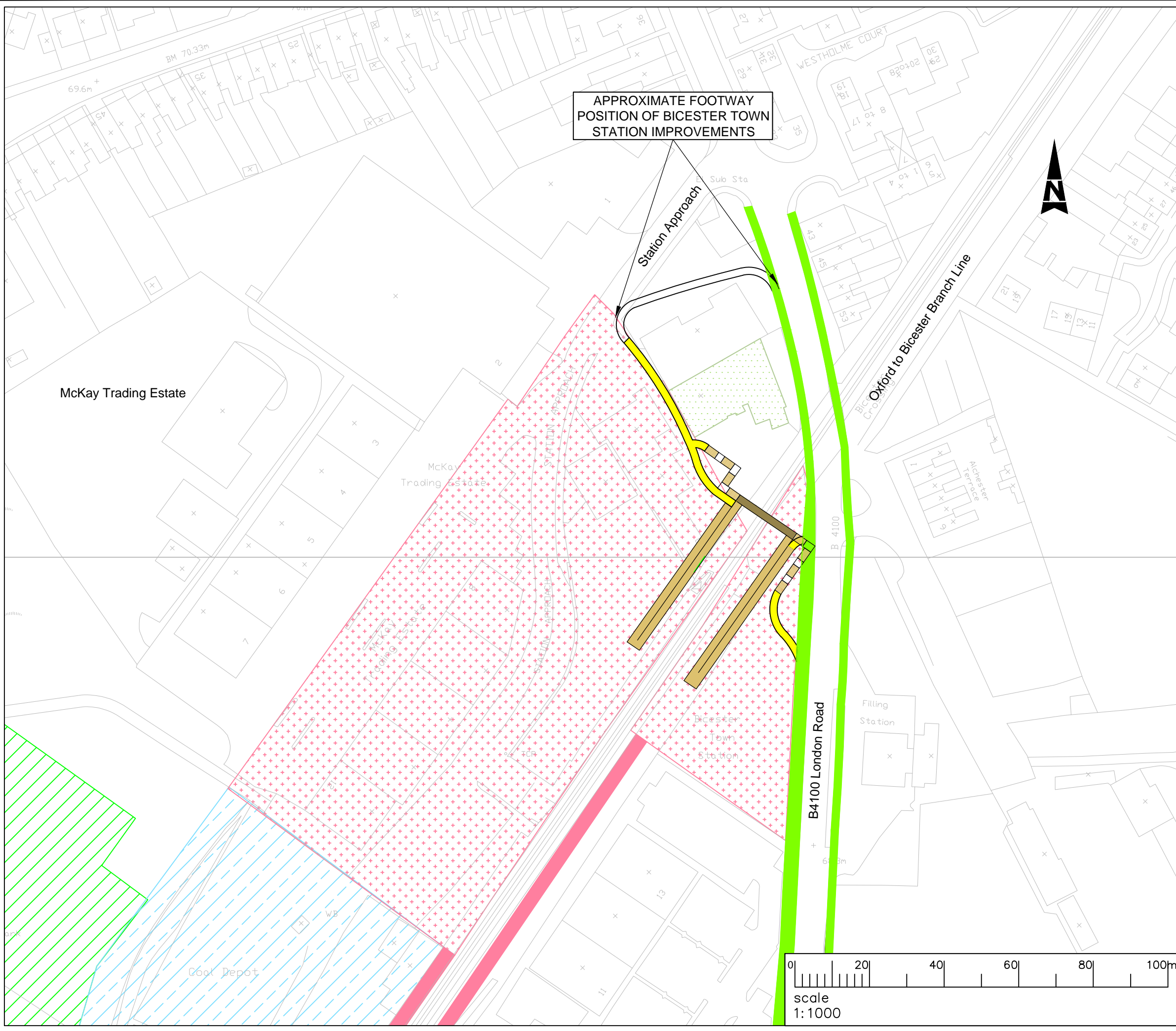
Project title
**BICESTER TRANSPORT PROJECTS
LONDON ROAD LEVEL CROSSING**

Drawing title
OPTION B1

Drawing Status **DRAFT**

Scale @ A3	Drawn by MJG	Checked by AL	Approved by PRM
1:1000	Date drawn 16/08/13	Date checked 16/08/13	Date approved 19/08/13





KEY

- Listed Building
- Footprint of Bicester Town Station and Platforms
- The Village Multi-storey Car Park
- Additional Parking Area for The Village
- Existing Footway
- Extent of Footway Diversion
- Extent of Footbridge Over Railway
- Extent of Approach Ramps
- Extent of Steps and Landings

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION
Unknown
MAINTENANCE/CLEANING
Unknown
USE
Unknown
DECOMMISSIONING/DEMOLITION
Unknown

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Project title

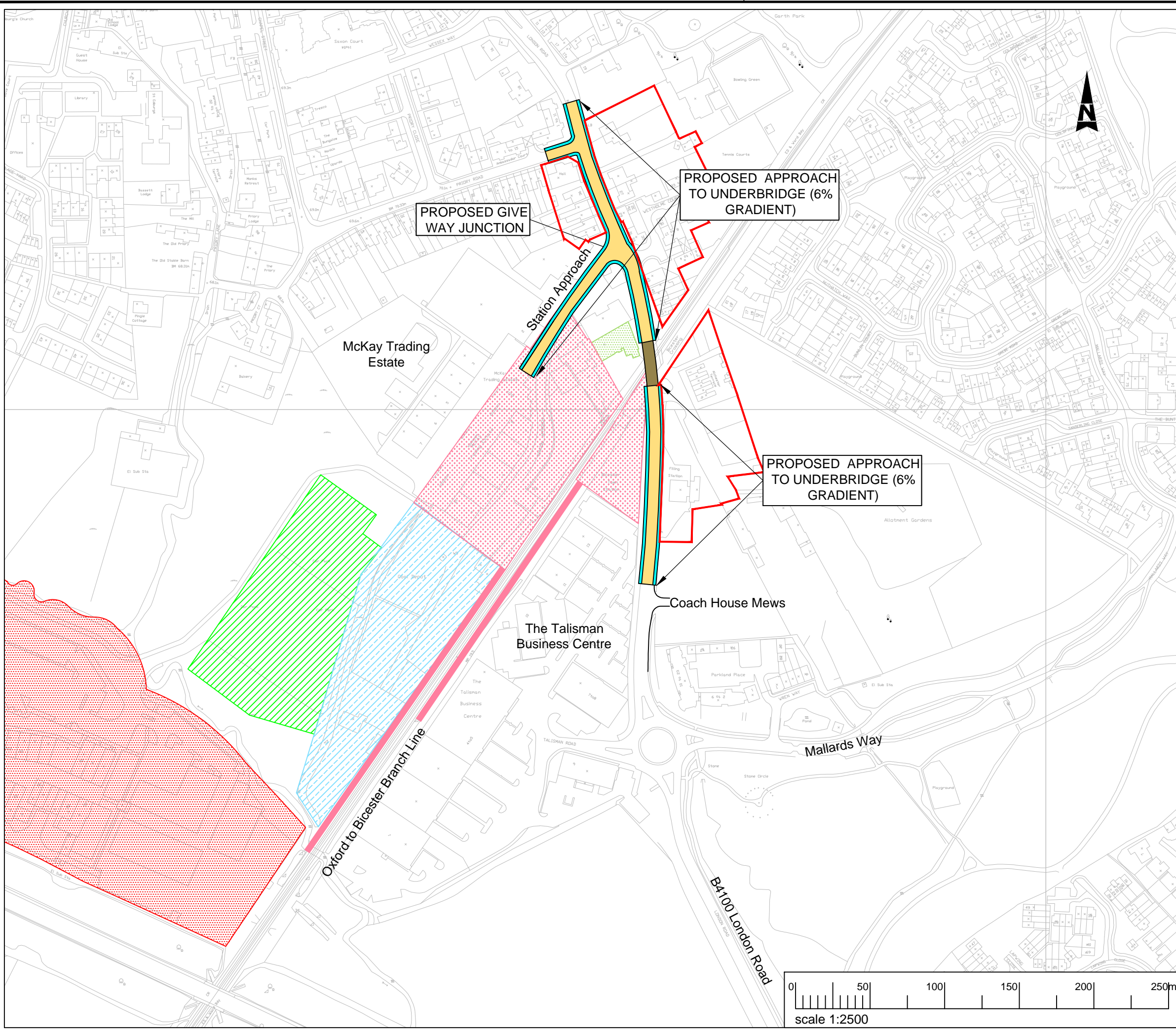
**BICESTER TRANSPORT PROJECTS
LONDON ROAD LEVEL CROSSING**

Drawing title

OPTION B2

Drawing Status DRAFT			
Scale @ A3	Drawn by MJG	Checked by AL	Approved by PRM
1: 500	Date drawn 16/08/13	Date checked 16/08/13	Date approved 19/08/13

Oxfordshire Project No. & File Ref **8002970**



- KEY**
- The Village Retail Park
 - The Village Multi-storey Car Park
 - Footprint of Bicester Town Station and Platforms
 - Listed Building
 - Additional Parking Area for The Village
 - Extent of Highway to be Lowered
 - Extent of Structure Under Railway
 - Extent of Retaining Wall
 - Areas Subject to Compulsory Purchase Order.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION	Unknown
MAINTENANCE/CLEANING	Unknown
USE	Unknown
DECOMMISSIONING/DEMOLITION	Unknown

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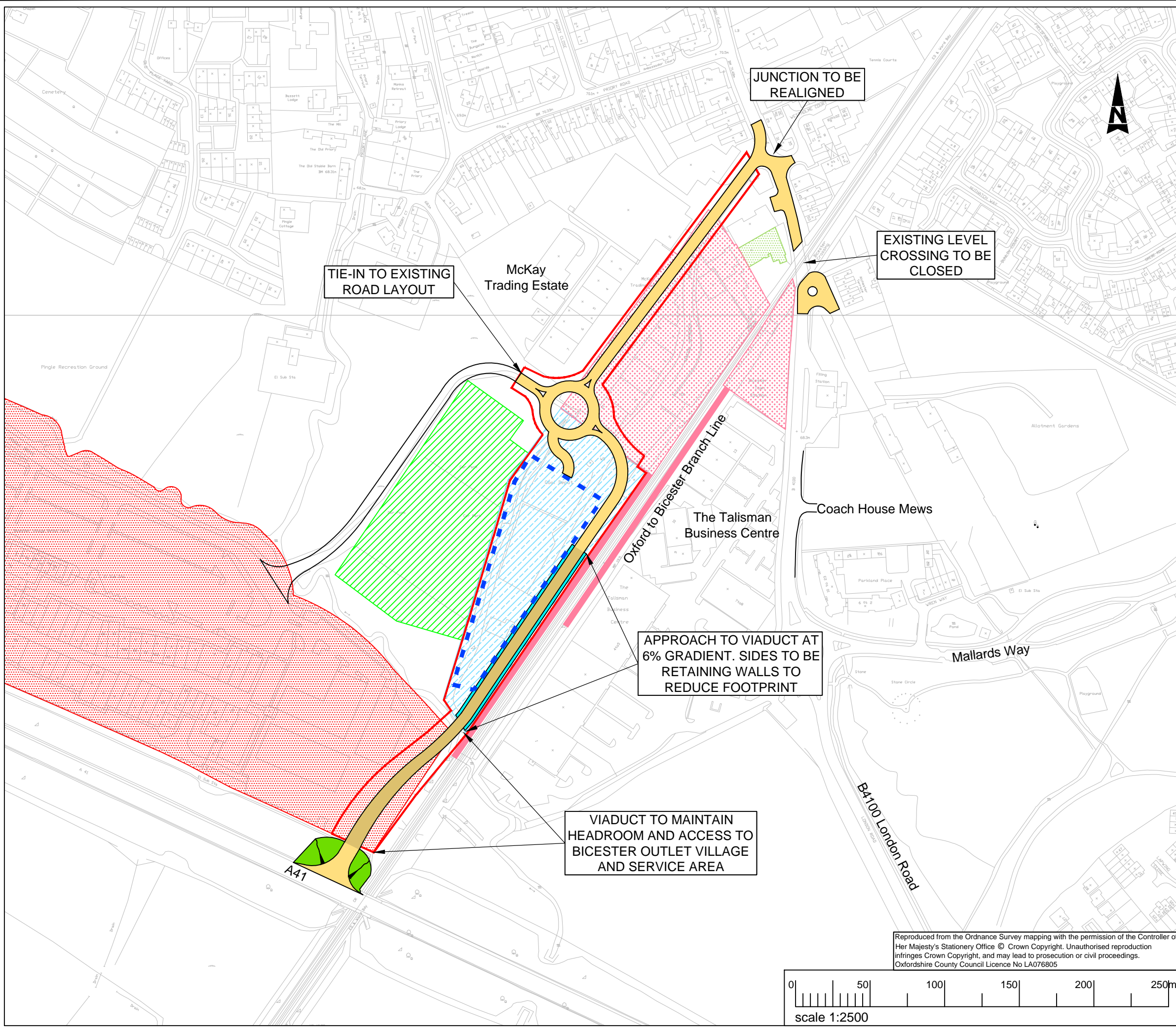
Project title
**BICESTER TRANSPORT PROJECTS
 LONDON ROAD LEVEL CROSSING**

Drawing title
OPTION C

Drawing Status **DRAFT**

Scale @ A3 1: 2500	Drawn by MJG Date drawn 16/08/13	Checked by AL Date checked 16/08/13	Approved by PRM Date approved 19/08/13
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Oxfordshire Project No. & File Ref
8002970



KEY

- The Village Retail Park
- The Village Multi-storey Car Park
- Footprint of Bicester Town Station and Platforms
- Listed Building
- Existing Parking Area for The Village
- Extent of Highway Works (at Existing Ground Level)
- Extent of Structure
- Extent of Earthworks
- Area Subject to Compulsory Purchase Order
- Proposed Additional Multi-Storey Car Park
- Extent of Retaining Wall

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION				
Unknown				
MAINTENANCE/CLEANING				
Unknown				
USE				
Unknown				
DECOMMISSIONING/DEMOLITION				
Unknown				

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Project title
**BICESTER TRANSPORT PROJECTS
LONDON ROAD LEVEL CROSSING**

Drawing title
OPTION D1

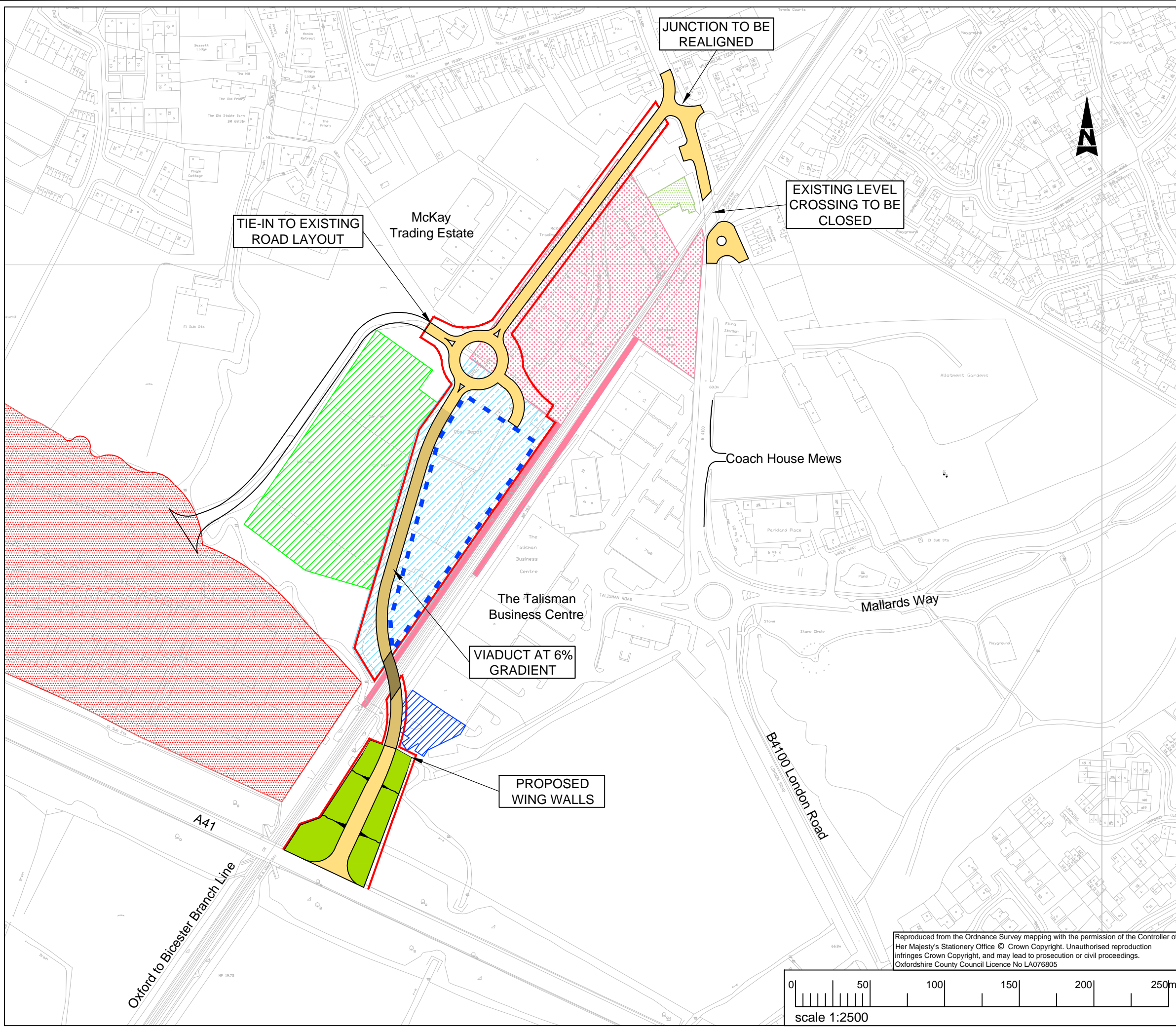
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Scale @ A3 1:2500	Drawn by MJG	Checked by AL	Approved by PRM
	Date drawn 16/08/13	Date checked 16/08/13	Date approved 19/08/13

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KEY

- The Village Retail Park
- The Village Multi-storey Car Park
- Footprint of Bicester Town Station and Platforms
- Listed Building
- Existing Parking Area for The Village
- Extent of Highway Works (At Existing Ground Level)
- Extent of Structure
- Extent of Structure Over Railway
- Extent of Earthworks
- Area Subject to Compulsory Purchase Order
- Proposed Additional Multi-Storey Car Park

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

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CONSTRUCTION					
Unknown					
MAINTENANCE/CLEANING					
Unknown					
USE					
Unknown					
DECOMMISSIONING/DEMOLITION					
Unknown					

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Project title
**BICESTER TRANSPORT PROJECTS
LONDON ROAD LEVEL CROSSING**

Drawing title
OPTION D2

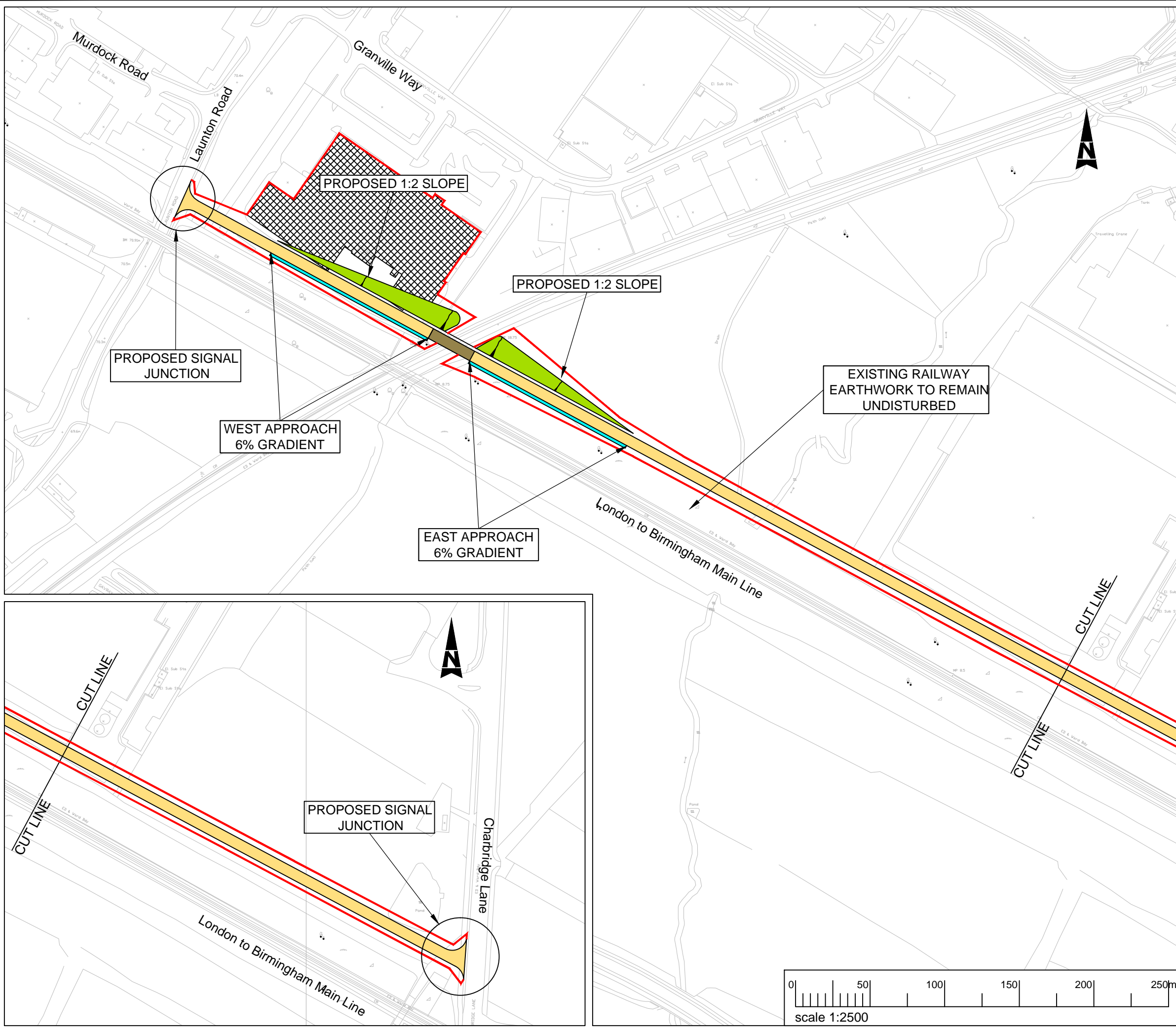
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Scale @ A3 1: 2500	Drawn by MJG Date drawn 16/08/13	Checked by AL Date checked 16/08/13	Approved by PRM Date approved 19/08/13
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KEY

- Area Subject to Compulsory Purchase Order
- Building to be Demolished
- Extent of Highway Works
- Extent of Bridge Over Railway
- Extent of Earthworks
- Extent of Retaining Wall

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

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MAINTENANCE /CLEANING	Unknown
USE	Unknown
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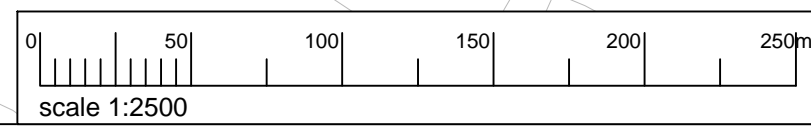
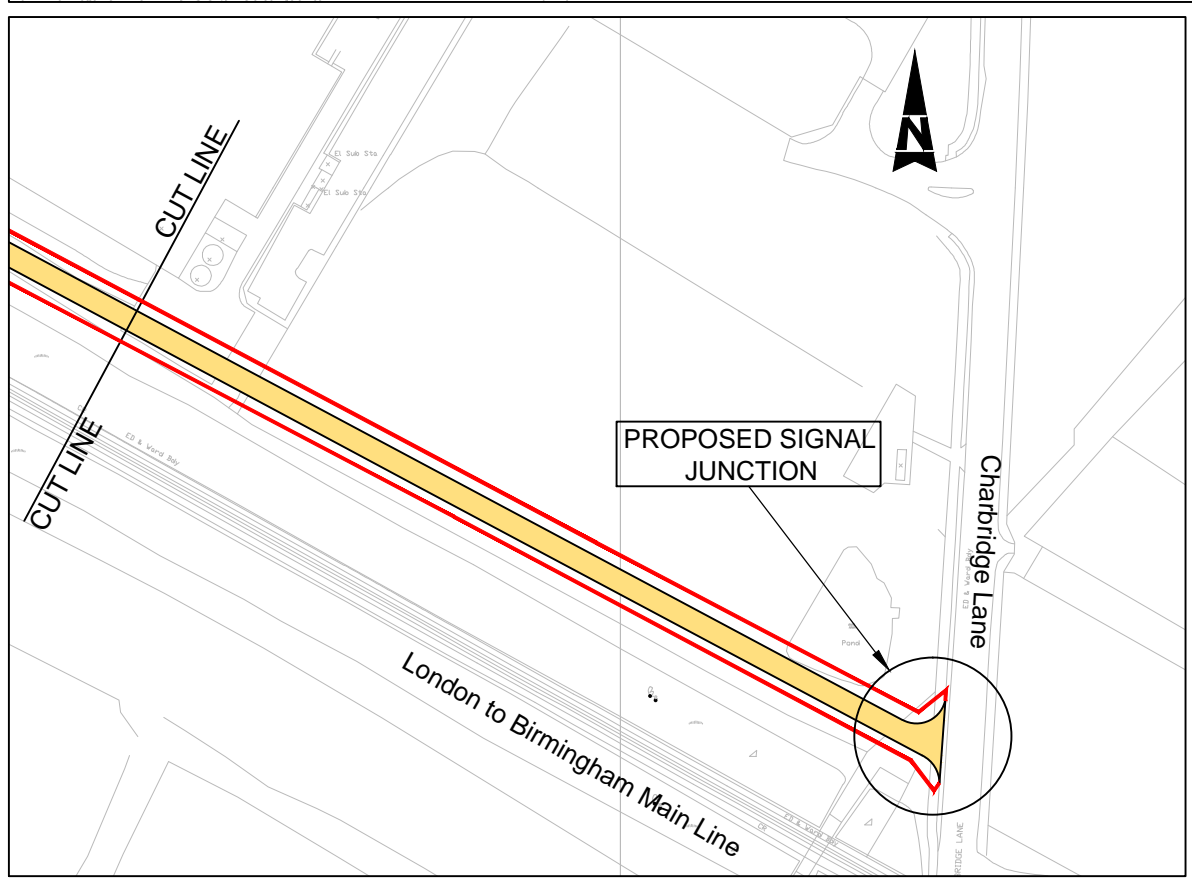
Project title
**BICESTER TRANSPORT PROJECTS
LONDON ROAD LEVEL CROSSING**

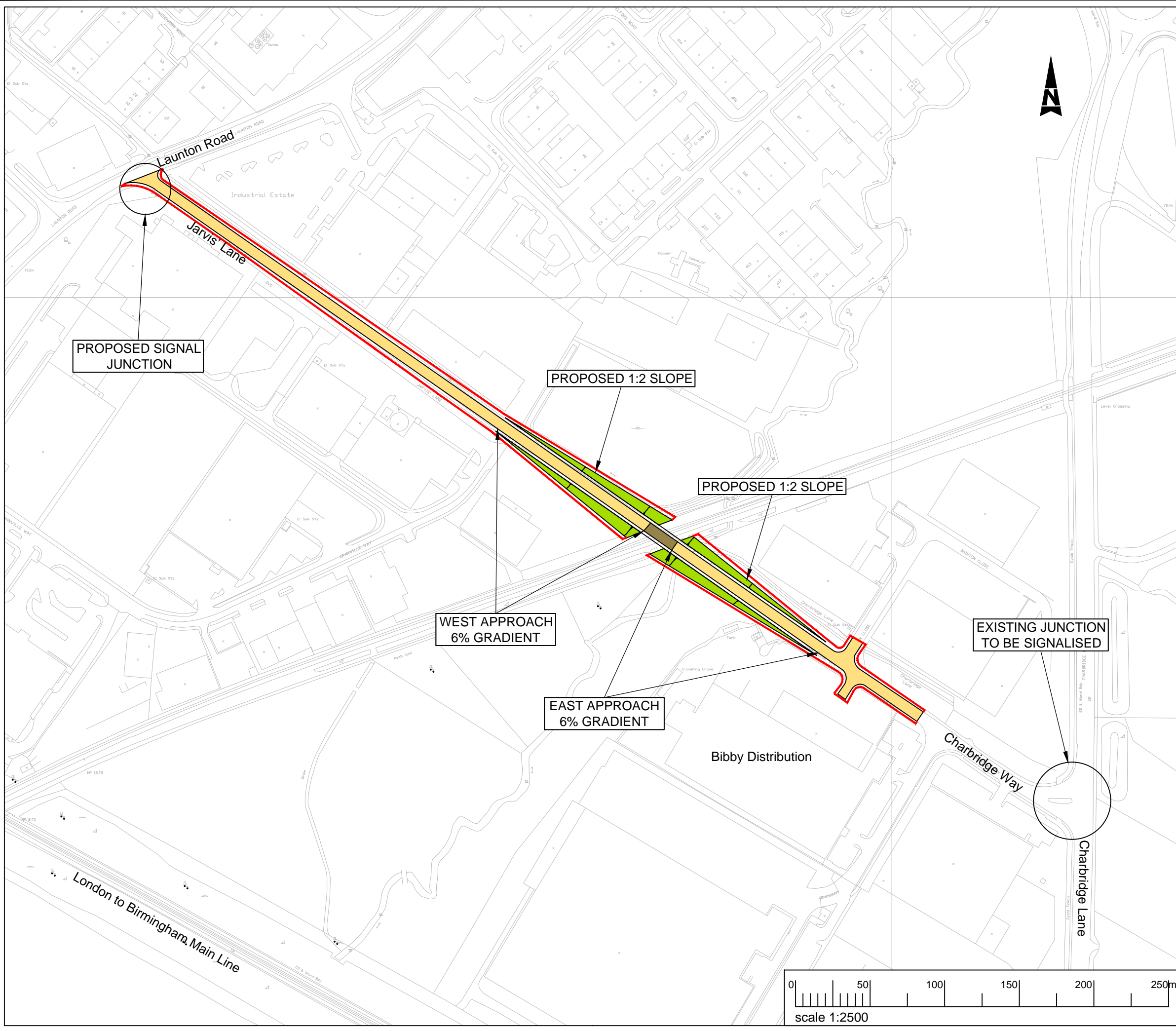
Drawing title
OPTION E1

Drawing Status **DRAFT**

Scale @ A3	Drawn by MJG	Checked by AL	Approved by PRM
1: 2500	Date drawn 16/08/13	Date checked 16/08/13	Date approved 19/08/13

Oxfordshire Project No. & File Ref
8002970





KEY

- Extent of Highway Works
- Extent of Bridge Over Railway
- Extent of Earthworks
- Area Subject to Compulsory Purchase Order

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION	Unknown
MAINTENANCE/CLEANING	Unknown
USE	Unknown
DECOMMISSIONING/DEMOLITION	Unknown

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Project title
**BICESTER TRANSPORT PROJECTS
LONDON ROAD LEVEL CROSSING**

Drawing title
OPTION E2

Drawing Status: **DRAFT**

Scale @ A3	Drawn by	Checked by	Approved by
1:2500	MJG	AL	PRM
	Date drawn	Date checked	Date approved
	16/08/13	16/08/13	19/08/13

Oxfordshire Project No. & File Ref
8002970



Appendix B. Works Cost Estimate

Level 1 - Works Cost Estimate

Scheme Title: Level Crossing Option A1
Drawing Number: S-5121910-FEA-000-001
Design Office: Chelmsford
Date: 09/08/2013
Estimator: Rhys Proctor
Checked: Aaron Leung

Item	Description	Unit	Cost £
1.0	Preliminaries	sum	£312,315
2.0	Site Clearance	sum	£129,096
3.0	General civil engineering costs	sum	£449,514
4.0	Structures	sum	£17,716,728
5.0	Statutory Undertakers	sum	£50,000
6.0	Design Fees	sum	£1,865,765
7.0	Site Supervision	sum	£1,399,324
8.0	Land acquisition	sum	£3,064,830.00
9.0	Optimism Bias	45%	£11,244,407
TOTAL			£36,231,979

Level 1 - Works Cost Estimate

Scheme Title: Level Crossing Option A4
Drawing Number: S-5121910-FEA-000-002
Design Office: Chelmsford
Date: 09/08/2013
Estimator: Rhys Proctor
Checked: Aaron Leung

Item	Description	Unit	Cost £
1.0	Preliminaries	sum	£334,233
2.0	Site Clearance	sum	£12,182
3.0	General civil engineering works	sum	£1,503,380
4.0	Structures	sum	£18,259,670
5.0	Statutory Undertakers	sum	£50,000
6.0	Design Fees	sum	£2,015,947
7.0	Site Supervision	sum	£1,511,960
8.0	Land acquisition	sum	£2,923,200.00
9.0	Optimism Bias	45%	£11,974,757
TOTAL			£38,585,329

Level 1 - Works Cost Estimate

Scheme Title: Level Crossing Option B1
Drawing Number: S-5121910-FEA-000-003
Design Office: Chelmsford
Date: 09/08/2013
Estimator: Rhys Proctor
Checked: Aaron Leung

Item	Description	Unit	Cost £
1.0	Preliminaries	sum	£0
2.0	Site Clearance	sum	£0
3.0	General civil engineering works	sum	£13,673
4.0	Structures	sum	£2,633,917
5.0	Statutory Undertakers	sum	£0
6.0	Design Fees	sum	£264,759
7.0	Site Supervision	sum	£198,569
8.0	Land acquisition	sum	£0.00
9.0	Optimism Bias	45%	£1,399,913
TOTAL			£4,510,832

Level 1 - Works Cost Estimate

Scheme Title: Level Crossing Option B2
Drawing Number: S-5121910-FEA-000-004
Design Office: Chelmsford
Date: 09/08/2013
Estimator: Rhys Proctor
Checked: Aaron Leung

Item	Description	Unit	Cost £
1.0	Preliminaries	sum	£0
2.0	Site Clearance	sum	£0
3.0	General civil engineering works	sum	£3,965
4.0	Structures	sum	£2,098,410
5.0	Statutory Undertakers	sum	£0
6.0	Design Fees	sum	£210,238
7.0	Site Supervision	sum	£157,678
8.0	Land acquisition	sum	£0.00
9.0	Optimism Bias	45%	£1,111,631
TOTAL			£3,581,922

Level 1 - Works Cost Estimate

Scheme Title: C
Drawing Number: S-5121910-FEA-000-005
Design Office: Chelmsford
Date: 09/08/2013
Estimator: Rhys Proctor
Checked: Aaron Leung

Item	Description	Unit	Cost £
1.0	Preliminaries	sum	£374,304
2.0	Site Clearance	sum	£12,182
3.0	General civil engineering works	sum	£1,547,837
4.0	Retaining Structure/Underpass	sum	£9,599,416
5.0	Statutory Undertakers	sum	£200,000
7.0	Design Fees	sum	£1,173,374
9.0	Site Supervision	sum	£880,030
10.0	Land acquisition	sum	£17,516,000.00
11.0	Optimism Bias	45%	£14,086,415
TOTAL			£45,389,558

Level 1 - Works Cost Estimate

Scheme Title: Level Crossing Option D1
Drawing Number: S-5121910-FEA-000-006
Design Office: Chelmsford
Date: 15/08/2013
Estimator: Mark Gearing
Checked: Aaron Leung

Item	Description	Unit	Cost £
1.0	Preliminaries	sum	£238,503
2.0	Site Clearance	sum	£12,182
3.0	General civil engineering works	sum	£1,378,106
4.0	Structures	sum	£12,679,189
5.0	Statutory Undertakers	sum	£100,000
6.0	Design Fees	sum	£1,440,798
7.0	Site Supervision	sum	£1,080,598
8.0	Land acquisition	sum	£8,957,400.00
9.0	Optimism Bias	45%	£11,649,049
TOTAL			£37,535,825

Level 1 - Works Cost Estimate

Scheme Title: Level Crossing Option D2
Drawing Number: S-5121910-FEA-000-007
Design Office: Chelmsford
Date: 15/08/2013
Estimator: Mark Gearing
Checked: Aaron Leung

Item	Description	Unit	Cost £
1.0	Preliminaries	sum	£238,503
2.0	Site Clearance	sum	£12,182
4.0	General civil engineering works	sum	£2,636,263
5.0	Structures	sum	£5,811,873
6.0	Statutory Undertakers	sum	£50,000
8.0	Design Fees	sum	£874,882
10.0	Site Supervision	sum	£656,162
11.0	Land acquisition	sum	£8,376,900.00
12.0	Optimism Bias	45%	£8,288,217
TOTAL			£26,944,982

Level 1 - Works Cost Estimate

Scheme Title: Level Crossing Option E1
Drawing Number: S-5121910-FEA-000-008
Design Office: Chelmsford
Date: 09/08/2013
Estimator: Mark Gearing
Checked: Aaron Leung

Item	Description	Unit	Cost £
1.0	Preliminaries	sum	£142,039
2.0	Site Clearance	sum	£52,241
4.0	General civil engineering works	sum	£2,142,668
5.0	Structures	sum	£1,542,450
6.0	Statutory Undertakers	sum	£50,000
8.0	Design Fees	sum	£392,940
10.0	Site Supervision	sum	£294,705
12.0	Land acquisition	sum	£31,054,000.00
11.0	Optimism Bias	45%	£16,051,969
TOTAL			£51,723,013

Level 1 - Works Cost Estimate

Scheme Title: Level Crossing Option E2
Drawing Number: S-5121910-FEA-000-009
Design Office: Chelmsford
Date: 09/08/2013
Estimator: Rhys Proctor
Checked: Aaron Leung

Item	Description	Unit	Cost £
1.0	Preliminaries	sum	£122,054
2.0	Site Clearance	sum	£6,091
4.0	General civil engineering woks	sum	£1,812,433
5.0	Structures	sum	£1,034,176
6.0	Statutory Undertakers	sum	£50,000
8.0	Design Fees	sum	£302,475
10.0	Site Supervision	sum	£226,857
11.0	Land acquisition	sum	£825,000.00
12.0	Optimism Bias	45%	£1,970,589
TOTAL			£6,349,675

Appendix C. Indicative Construction Programme

Scheme Title: Level Crossing Option A1
Drawing Number: S-5121910-FEA-000-001
Date: 09/08/2013

		Months																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Mobilisation and Site Set-up	█	█																				
2	Site Clearance			█	█																		
3	Deconstruct Building (Talisman Business Centre)			█	█																		
4	Construct Approach to Viaduct					█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
5	Construct Viaduct					█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
6	Construct Railway Crossing															█	█	█	█				
7	Highway Approaches to Structure																						
8	Tie-in and Alterations at London Road North of Railway																						
9	New Talisman Business Centre/London Road Access																						
10	Close Existing Level Crossing																						
11	Turnaround Facilities at Old Level Crossing																						

		Months						
		23	24	25	26	27	28	29
1	Mobilisation and Site Set-up							
2	Site Clearance							
3	Deconstruct Building (Talisman Business Centre)							
4	Construct Approach to Viaduct							
5	Construct Viaduct	█						
6	Construct Railway Crossing							
7	Highway Approaches to Structure		█	█				
8	Tie-in and Alterations at London Road North of Railway				█	█		
9	New Talisman Business Centre/London Road Access	█						
10	Close Existing Level Crossing					█		
11	Turnaround Facilities at Old Level Crossing							█

Scheme Title: Level Crossing Option D1
Drawing Number: S-5121910-FEA-000-006
Date: 15/08/2013

		Months																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Mobilisation and Site Set-up	█	█																
2	Site Clearance			█	█														
3	Construct Approach to Viaduct					█	█	█	█										
4	Construct Viaduct					█	█	█	█	█	█	█	█	█	█				
5	Construct Tie-in to A41									█	█	█	█	█					
6	Construct Multi-Storey Car Park															█	█	█	█
7	Construct New Roundabout															█	█	█	
8	Construct Ground Level Highway Works																		█
9	Close Existing Level Crossing																		
10	Turnaround Facilities at Old Level Crossing																		

		months			
		19	20	21	22
1	Mobilisation and Site Set-up				
2	Site Clearance				
3	Construct Approach to Viaduct				
4	Construct Viaduct				
5	Construct Tie-in to A41				
6	Construct Multi-Storey Car Park	█	█		
7	Construct New Roundabout				
8	Construct Ground Level Highway Works	█	█		
9	Close Existing Level Crossing			█	
10	Turnaround Facilities at Old Level Crossing				█

Scheme Title: Level Crossing Option D2
Drawing Number: S-5121910-FEA-000-007
Date: 15/08/2013

		Months																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Mobilisation and Site Set-up	■	■																
2	Site Clearance			■	■														
3	Construct Approach Railway Crossing					■	■	■	■	■									
4	Construct Earthworks Adjacent A41									■	■	■							
5	Construct Bridge Over Railway											■	■	■					
6	Construct Multi-Storey Car Park															■	■	■	■
7	Construct New Roundabout															■	■	■	
8	Construct Ground Level Highway Works																		■
9	Close Existing Level Crossing																		
10	Construct Turnaround Facilities																		

		Months			
		19	20	21	22
1	Mobilisation and Site Set-up				
2	Site Clearance				
3	Construct Approach Railway Crossing				
4	Construct Earthworks Adjacent A41				
5	Construct Bridge Over Railway				
6	Construct Multi-Storey Car Park				
7	Construct New Roundabout				
8	Construct Ground Level Highway Works	■	■		
9	Close Existing Level Crossing			■	
10	Construct Turnaround Facilities				■

Scheme Title: Level Crossing Option E2
Drawing Number: S-5121910-FEA-000-009
Date: 09/08/2013

		Months										
		1	2	3	4	5	6	7	8	9	10	11
1	Mobilisation and Site Set-up											
2	Site Clearance											
4	Construct Earthworks Approach to Bridge											
5	Construct Bridge Over Railway											
6	Construct Highway Link											
7	Construct Access to Industrial Units on Charbridge Way											
9	Construct Tie-in at Launton Road											
10	Construct Tie-in at Charbridge Lane											

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