



NET Phase Two

Extension to Kimberley and Giltbrook Retail Park

August 2015

305248-AC-DOC-001



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Nottingham City Council, Loxley House, Station Street, Nottingham, NG2 3NG

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Content

Chapter	Title	Page
	Executive Summary	i
1.	Introduction	1
1.1	General	1
1.2	Structure of report	1
2.	Description of the area and development proposals in the vicinity of the route	3
3.	Commentary on Scheme Proposals	5
3.1	Initial option identification	5
3.1.1	Common section for all options	6
3.1.2	Option 1	8
3.1.3	Option 1A	13
3.1.4	Option 1B	13
3.1.5	Option 2	14
3.1.6	Option 2A	18
3.1.7	Option 2B	18
3.2	Trackform	19
3.3	Tramstops	19
3.4	Structures	20
4.	Key Environmental Issues	22
4.1	Introduction	22
4.2	Limitations	22
4.3	Review of Options	22
4.3.1	Common Section	22
4.3.2	Option 1	25
4.3.3	Option 1A	28
4.3.4	Option 1B	29
4.3.5	Option 2	31
4.3.6	Option 2A	33
4.3.7	Option 2B	35
4.4	Proposed Route Options Summary	36
5.	High Level Traffic Assessment	41
5.1	Assessment of Initial Option	41
5.1.1	Option 1	41
5.1.2	Option 1A	41
5.1.3	Option 1B	42
5.1.4	Option 2	42
5.1.5	Option 2A	43
5.1.6	Option 2B	43
5.1.7	Park and Ride Sites	43
5.2	Refinement of Options	44
5.2.1	Option 1	44

5.2.2	Option 1B _____	45
5.2.3	Option 2 _____	45
5.2.4	Option 2B _____	45
5.3	Order of route preference from a traffic perspective (suggestion by Nottinghamshire County Council) _	46
5.4	Alternative Network Improvements _____	46
6.	Park and Ride sites	47
6.1	Park and ride facility off Low Wood Road _____	47
6.2	Park and ride facility off Gin Close Way _____	47
7.	Geotechnical Ground Risk	48
8.	Cost Estimates	49
8.1	Cost estimates _____	49
8.2	Assumptions and exclusions _____	49
9.	Programme	51
9.1	General _____	51
9.2	Potential programme _____	54
10.	Operational Issues	55
10.1	Run time _____	55
10.2	Operating service pattern _____	55
11.	Potential Future Extension	57
11.1	General _____	57
12.	Key Risks / Opportunities and Conclusions	58
	Appendices	62
	Appendix A. Scheme Drawings _____	63
	Appendix B. Cost Estimates _____	64
	Appendix C. TWA Programme _____	65

Executive Summary

The Nottingham NET Line One system currently has a terminus at Phoenix Park with an accompanying park and ride facility. In association with Broxtowe Borough Council, Nottingham City Council has commissioned Mott MacDonald to undertake a feasibility study for a potential extension from Phoenix Park towards Kimberley and Giltbrook retail park.

Six route alignment options were identified in the first stage of this study. Following a review with Broxtowe Borough Council, two options were parked from further more detailed study with the four remaining options preferred at this stage. The excluded options included a route alignment which terminated within Kimberley School grounds, and another option which ran on-street along Kimberley Road, Nottingham Road and Main Street.

For the four options taken to the next stage of study, the route consists of approximately 6km of double track alignment which mainly travel along former railway corridors. Capital cost estimates range from £135 - £168 million at 2Q2015 (excluding any client/sponsor costs, optimism bias and inflation). Potential run times range from 12 minutes 2 seconds to 12 minutes 16 seconds from Phoenix Park to Giltbrook retail park. All route options appear technically feasible although more detailed study would be required at major constraints such as the existing A610 bridge and the area surrounding the historic Kimberley station building. A new skewed tramway bridge would be required in three of the options over the A610.

A separate desk-study and report has been produced to assess geotechnical and geo-environmental risks to the route options. Key risks highlighted in this study include construction on landfill sites (generally ground of unknown nature), potential contaminated material, which poses the risk of a waste disposal liability, and historical shallow coal mines.

At this stage of scheme development, it has not been possible to identify a clear order of preference for the four shortlisted options. Further technical work including 3-dimensional alignment development, environmental assessment and consultation would be required to provide a robust basis for preferred option selection.

Should the extension be progressed further, key further work will include consideration of operating pattern, patronage and economic/business case – along with further more detailed discussions with the representatives of new residential developers which the tramway will interface with to secure suitable safeguarded corridors through the developments. The key project and technical risks and opportunities identified within this

study, together with recommendations for next steps to address these, are highlighted as follows:

Risk / Opportunity	Impacts	Suggested actions to mitigate
Technical complexity of connection to NET Line One	Unexpected difficulties in tying in with NET Line One. Could result in greater disruption to NET Line One services and a less than optimum operational arrangement	Use topographical survey to inform more detailed investigation of existing track and surrounding park and ride levels. Determine optimum layout for modification of park and ride access
Significant environmental issue identified	Acceptability of NET extension questioned. Significant environmental mitigation required	Progress environmental studies including desktop and baseline surveys. To include in particular interface with SSSI in former LMS railway corridor
Interfaces with residential development sites	Planning applications for new developments progressed with limited allowance / safeguarding for NET extension	Ongoing discussions with BBC and developers / stakeholders, including agreeing what further information is needed. Likely to include further iteration on tramway and highway interface arrangements
Operating pattern, patronage and business case undefined	Strength of business and economic case for extension called into question. Difficulties in securing funding. Additional services to Kimberley and Giltbrook retail park may create a strain on single track section between Phoenix Park and Highbury Vale	Initial patronage / business case work, including consideration of different scenarios in relation to tram operating patterns. Ongoing discussion with Tramlink Nottingham
Vertical alignment proves more difficult than expected	Current design based on OS mapping with assumptions on relative ground levels. Detailed consideration results in more complex / more costly / slower track alignment geometry	Further design development against topographical survey information, particularly in areas identified as constraints. Including in particular height clearance under A610 bridge (Options 1, 1B, 2B) and at bridge over Main Street (Option 2)
Objection from major stakeholder	Sustained opposition to scheme proposals, including through TWA process	Further design development (utilising topographical survey) to confirm potential impacts on landowners and other stakeholders. Initial discussions with stakeholders.
Highway layout and junction capacity	Reduced tramway operating speeds through residential developments. Reduced priority to trams at existing Line One junctions due to increase in tram frequency generally. Exacerbating traffic conditions at peak hours	Further discussions with BBC and developers in relation to highway interface. Traffic assessment to be undertaken
Opportunity to improve the case for the extension proposition through further expansion	Improved case for extension	Consider in further detail potential onward expansion to Langley Mill and Amber Valley

1. Introduction

1.1 General

In association with Broxtowe Borough Council (BBC), Nottingham City Council (NCiC) commissioned Mott MacDonald to undertake a feasibility study for a potential extension of the NET Line One tramway to serve Kimberley town centre and Giltbrook Retail Park.

The potential route would extend westwards from the existing Line One Phoenix Park Park and Ride terminus, crossing under Low Wood Road and the M1 motorway, heading towards Kimberley town centre and terminate within Giltbrook Retail Park. A number of options, including routes via the London North Eastern Railway (LNER) and London Midland Scottish (LMS) former railway corridors, will be assessed as part of this study. The route would be approximately 6.5km long, depending on the option.

The brief for this study was set out in our proposal letter to NCiC dated 18 November 2014. In summary the scope of works includes:

- Initial scoping stage to collate information on potential constraints and existing conditions
- Agree core route options following initial scoping based on technical and operational feasibility
- Develop outline 2D alignments for route options confirmed as part of scoping study, with consideration given to available widths within existing corridors and basic vertical alignment issues
- Identify all infrastructure requirements including structures and tramstops. Short commentaries will be provided on likely forms of structure and outline construction methodology.
- Highway and traffic interface with consideration given to existing and potential levels of congestion and implications on other highway users such as pedestrians, cyclists and service facilities for shops
- Identification of potential park and ride sites
- Review and comment on likely environmental issues
- Undertake initial geotechnical assessment
- Prepare initial high level capital cost estimate
- Calculate tram run time and identify any additional fleet requirement based on existing service frequency to Phoenix Park
- Comment on potential implications on operational viability and implications for existing depot
- Prepare outline programme
- Recommendations for next steps to develop the project

Overall the purpose of this study is to assess the technical feasibility of the various identified options for a potential extension of the tramway from Phoenix Park to Kimberley and Giltbrook Retail Park.

1.2 Structure of report

This report is structured as follows:

- Section 2 – Description of surrounding areas for potential routes
- Section 3 – Commentary on scheme proposals
- Section 4 – Environmental impacts
- Section 5 – High Level Traffic assessment
- Section 6 – Park and ride sites
- Section 7 – Capital cost estimates
- Section 8 – Overall programme with indication of likely construction period

- Section 9 – Operational issues including run time
- Section 10 – Potential future extensions
- Section 11 – Conclusions, recommendations and risks

We have also prepared a geotechnical study including geotechnical risk identification. This is reported separately.

2. Description of the area and development proposals in the vicinity of the route

This potential extension to the Nottingham tram system commences from Phoenix Park park and ride and travels westwards towards Kimberley town centre, eventually terminating at Giltbrook retail park. A common section is proposed for all options between Phoenix Park and the M1 motorway, which passes through the Hemphill Hall residential development, crosses under Low Wood Road and subsequently travels on Green Belt land towards the former London North Eastern Railway (LNER) corridor. The proposed route then passes under the M1 motorway using an existing bridge structure. Beyond this point, the route splits into six options into Kimberley, with some extending to Giltbrook retail park.

Following consultation with Broxtowe Borough Council (BBC), there are a number of developments in the vicinity that may interface with a proposed tramway extension. These are listed below with brief descriptions of each development:

- Hemphill Hall residential development – The developer proposes to construct 116 dwellings in an approximately 6.5 ha area lying to the east of Low Wood Road. This development wraps around the western and southern sides of Hemphill Hall, a Grade II listed building. Vehicular access to this development will be provided via Low Wood Road. This proposal has been granted outline planning permission and has safeguarded a tramway corridor which would travel along the spine road towards a new structure under Low Wood Road. Consideration will be given to whether a proposed tramstop within the development is beneficial for future residents.
- Oxylane Sports Village – This planning application is currently pending consideration. The developer proposes to construct a sports village on an approximately 22.1 ha site adjacent to Junction 26 of the M1 motorway in Nuthall. The site is bounded on two sides by the M1 and the A610. Vehicular access will be provided via a new junction off the A610. The site is located a considerable distance away from the proposed tramway but according to supporting information for the planning application, there will be new pedestrian and cycle links from the sports village to Kimberley Road. This will in turn provide better links to the tramway. There is no intention to provide a spur to the sports village at present but if planning permission is granted, there will be scope to provide shuttle bus links to the village from one of the future proposed tramstops.
- Redevelopment of Kimberley Brewery site – This planning application is currently pending consideration. The developer proposes to construct 78 dwellings in a site which forms part of the former Hardy and Hanson Brewery estate and is located north of Kimberley town centre. Vehicular accesses into the site are proposed via Eastwood Road and Hardy Street. Whilst there are no details of a safeguarded tramway route within the planning application, BBC has stated that a route has been earmarked for the tramway in the design. It is apparent from reviewing the 'Masterplan' drawing (drawing ref: 2080-PL01) that the spine road alignment appears to be such that a tramway can be routed through without significant alignment issues in future. This site is in close proximity to all tramway options studied and will therefore benefit from better transport links to Nottingham city and Giltbrook retail park. Consideration will be given to locate the best position for a tramstop to serve residents in this area.
- Hardy Close residential development – The developer proposes to construct 22 dwellings in an area opposite the existing Kimberley Brewery site, north of Hardy Street and west of Hardy Close. Access to this development is proposed via Hardy Close. This development has been granted conditional permission and during a recent site visit, it is observed that construction activities have already commenced on site. Similar to the above residential development proposed in the Kimberley Brewery

site, future residents of the Hardy Close development will also benefit from better transport links to Nottingham city centre and Giltbrook retail park.

- Church Hill residential development – This planning application is currently pending consideration. The developer proposes to construct 108 dwellings and a community park on the edge of Kimberley town centre. The site lies to the north of A610 and is bounded by Church Hill to the east and the former LNER corridor to the south. Vehicular access into the site is proposed via Church Hill. This site is in close proximity to all tramway options studied and will therefore benefit from better transport links to Nottingham city and Giltbrook retail park. As this site is located close to the Kimberley Brewery development, it is considered that a future tramstop located strategically will serve both residential estates.
- Gin Close Way residential development – This planning application is currently pending consideration. The developer proposes to construct 55 dwellings adjacent to Gin Close Way, Awsworth. The development site is located on the edge of Awsworth with vehicular access being provided off the A6096 / Gin Close Way roundabout. The site is bounded by an existing builder's yard on the northern and eastern extents. This site is in close proximity to 2 of the options studied (within 250m) and will therefore benefit from a better transport link to Nottingham city.
- Kimberley Depot – Following discussions with Broxtowe Borough Council (BBC), it is known that the current Kimberley Depot site is earmarked for future residential development. The layout and scale of the development are not known at this point in time. The proposed tramway route is shown on the northern extent of the depot site, coinciding with the current depot access road. An alternative route to the north of the depot site is also shown but this would require land acquisition from Kimberley Caravan Centre,

Apart from the potential developments listed above, the proposed tramway extension will serve the existing population in Kimberley of approximately 6,500 residents and also people wishing to travel to Giltbrook retail park from Nottingham city centre. An additional park and ride site, potentially situated to the south of the A610, could attract more people travelling towards Nottingham city from Eastwood, Langley Mill and Amber Valley to use the tram. This, coupled with the number of additional housing development projects scheduled to take place within Kimberley and Eastwood, would increase the patronage base for the potential extension and enhance the business case from a funder's perspective.

It should also be noted that the proposed tramway extension may interface with the planned High Speed 2 (HS2) railway. An indicative HS2 route is shown on the Route Options Overview drawing (MMD-305248-AC-DWG-001). Detailed HS2 alignment drawings are currently unavailable but a study of a publicly available preliminary HS2 vertical alignment drawing indicates that the railway would be at an approximately similar height to the M1 motorway. On the assumption that a railway bridge structure is constructed over the proposed tramway route, it is not anticipated that there will be significant difficulties from a construction perspective.

3. Commentary on Scheme Proposals

3.1 Initial option identification

This report studies the feasible options for an extension of the NET Line One tramway from Phoenix Park park and ride towards Kimberley and ideally, onwards to Giltbrook retail park. The previous Atkins 2001 report highlighted two main routes to Kimberley. An initial review with Broxtowe Borough Council (BBC) identified four further variants to Giltbrook retail park to be considered in this study.

The following provides a commentary on the six route options agreed for consideration against the following headings:

- Tramway alignment
- Tramstops
- Structures
- Additional infrastructure requirements

All route alignment options are indicated in the 'Route Options Overview' drawing MMD-305248-AC-DWG-001 in Appendix A. All options begin from Phoenix Park park and ride to Kimberley and onwards to Giltbrook retail park with the exception of one option, which terminates near Kimberley town centre.

A common section for all options has been proposed from Phoenix Park towards the former LNER railway corridor and M1 motorway. This common section has been taken as a given in this study due to the required tie-in with the Line One Phoenix Park terminus to provide continuity of tram services, the safeguarded route through the Hemphill Hall development and use of the existing M1 bridge structure. There are no clear alternative routes for this section apart from running the proposed tramway to the south along the heavily trafficked A610.

Following the common section, the route then splits into the various options studied within this report. The two base options used for this study (Option 1 and Option 2A) are derived from the 2001 Atkins report. All options are summarised below:

- Option 1 diverges from the former LNER railway corridor west of the M1 to pick up the former LMS railway corridor further to the north. This route was one of the alignments in the original study by Atkins carried out in 2001.
- Option 1A diverges from Option 1 immediately after the M1 and heads south to join Kimberley Road. The route then runs on-street along Kimberley Road, Nottingham Road and Eastwood Road before re-joining Option 1 just before it crosses the A610 via a new structure.
- Option 1B diverges from Option 1 further to the west where the route meets Eastwood Road. Instead of crossing Eastwood Road and proceeding into the Kimberley Depot site, this option looks at the alternative of running on-street along Eastwood Road until it reaches the Eastwood Road / Nottingham Road roundabout, where it crosses the roundabout via a new signalised crossing and heads into the Giltbrook retail park.
- Option 2 follows the former LNER railway corridor up to where it meets Option 1 just to the north of Awsworth Lane.

- Option 2A studies a possible alternative of terminating the proposed tramway extension within existing school grounds to serve Kimberley town centre. This is one of the alignments considered in the Atkins 2001 report.
- Option 2B follows Option 2 up to the Main Road junction where it turns onto Main Road for a short section of on-street running before it turns off to join Option 1 running in the former LMS corridor.

The options listed above are discussed in more detail in the following sub-sections.

3.1.1 Common section for all options

Drawing numbers MMD-305248-AC-DWG-002 to 005

All proposed tramway extension options start from the existing Phoenix Park tramstop. The current tramstop comprises a single island platform arrangement, where the tracks are set significantly lower than the surrounding park and ride levels. Existing retaining walls retain the level difference. In order to avoid substantial engineering works required in remodelling the levels of the park and ride site, the existing tramway tracks may have to be re-designed so that both 'inbound' and 'outbound' tracks are ascending at an acceptable gradient to meet the surface levels of the surrounding park and ride site. The tracks will then cross the park and ride access road at grade, with remodelling of the adjacent roundabout likely to involve signalisation to incorporate the tramway crossing. After crossing the access road, the tramway alignment will keep within the boundary of the park and ride site but routed as near as possible to the southern extent so that the impact on parking capacity can be minimised. It is estimated that the routing of the tramway extension through the park and ride site and the subsequent redesigning of the parking layout would cause an approximately 10 – 15% reduction in parking capacity.

The tramway alignment will extend westwards beyond the park and ride site along the verge adjacent to Millennium Way West. Some ground re-profiling along the route will be required to accommodate a new tramway. The photo below shows a typical cross section of this area:



Figure 3.1: Verge adjacent Millenium Way West

The tramway alignment will pass several industrial facilities on the opposite side of Millennium Way West while travelling on this verge.

As the tramway alignment approaches the Hemphill Hall residential development, the existing vegetation is observed to be thick and dense. Substantial site clearance will be required to route a tramway through this area. When the alignment reaches the end of the industrial facility, it enters the proposed Hemphill Hall residential development and utilises the spine road to head towards Low Wood Road. The planning application documents for this development show a safeguarded route for a future tram extension. Work undertaken by Mott MacDonald for the development planning appeal inquiry highlighted that while the access road alignment is suitable for the tramway, there may be further land-take required. The proposed tramway will be on-street for this section and the alignment is shown on drawing MMD-305248-AC-DWG-003 in Appendix A. Drawing MMD-305248-AC-DWG-004 currently shows a proposed tramstop and park and ride facility to the west of Low Wood Road. The area shown on the drawing would allow for a facility with a parking capacity of approximately 500 vehicles. An indicative access to the park and ride is shown via Low Wood Road. The impact on existing traffic by situating a park and ride facility in this location is considered in Section 5. It is understood that the Phoenix Park park and ride facility is currently heavily used, and therefore an additional facility to the west of Low Wood Road would offer a potential solution and also cater for future demand for more parking spaces.

The tramway alignment passes under a new bridge structure for Low Wood Road and continues westwards on green-belt land towards the former LNER corridor. The alignment then joins the corridor and passes under the M1 motorway via an existing structure. It should be noted that a recent site visit showed that the former railway corridor could now be used as a drainage feature. It was observed that there are a number of existing pipes discharging into the corridor, forming a stream along an adjacent footpath. A potential culvert structure would be required if the drainage feature is to be retained in this area. Existing site conditions and a typical discharge pipe are shown in the photo below:



Figure 3.2: Existing condition of former LNER railway corridor

The photo below shows the existing structure for the M1 motorway:



Figure 3.3: Existing M1 bridge

The existing width between the bridge abutments is approximately 10m and the height clearance from footpath / cycle track level is approximately 6.5m. The height clearance of the structure would allow the tramway and its associated overhead line equipment to be constructed without significant difficulty. The existing width of the structure is just sufficient to construct a tramway and a 2.5m wide shared footpath / cycle track adjacent to it. It is recommended that a straight section of embedded slab track construction is proposed as the tramway passes the underside of the bridge to limit the tram DKEs to fit within the tight corridor. An additional speed restriction for trams (35kph assumed in run-time model developed in Section 9 of report) could be introduced to reduce overall DKE width. A proposed cross section is shown on drawing MMD-305248-AC-DWG-101 in Appendix A. As can be seen from the photo above, an existing drainage channel runs under the M1 motorway bridge alongside the footpath. If this channel is to be retained in this location, a new culvert would be required and would run beneath the proposed tramway and footway arrangement. A more detailed assessment will have to be carried out to ascertain the existing drainage system in the area and to explore other alternatives including diversion of the drainage channel.

As shown on drawing MMD-305248-AC-DWG-001, the indicative route of HS2 is immediately east of the M1 motorway. According to publicly available preliminary HS2 vertical alignment drawings, the level of the railway appears to be approximately similar to the M1. It would be prudent to make the necessary bodies aware of the intention of a future tramway extension along this route so that the vertical alignment of the railway could be designed to take into account the tramway and all associated overhead equipment. This would ensure that extensive reconstruction is not required should HS2 be constructed prior to the tramway extension.

3.1.2 Option 1

M1 Motorway to Main Road – Drawing numbers MMD-305248-AC-DWG-006 to 007

Option 1 continues along the former LNER corridor after passing under the M1 motorway bridge heading towards New Farm Lane. The existing topography in this area has been significantly modified in recent years. A highway bridge along New Farm Lane that previously existed over the railway has been filled in. The current site topography is shown in the following photo:



Figure 3.4: Existing topography of former LNER corridor leading to New Farm Lane

As can be seen from the photo, the footpath / cycle track and drainage channel continue from under the M1 bridge structure towards New Farm Lane. The footpath / cycle track rises on a gradient to meet New Farm Lane while the drainage channel feeds into underground drainage infrastructure.

The proposed tramway alignment would climb on a constant gradient once it passes the M1 motorway to enable an at-grade crossing of New Farm Lane. It is envisaged that some minor highway works would be required to New Farm Lane so that the levels of the highway could tie in with proposed track levels. The existing parapet arrangement would be demolished and any remaining bridge structure buried under the landfill would have to be removed for construction of the tramway.

After crossing New Farm Lane and passing to the south of Redfield House Farm, the tramway alignment travels in a north-westerly direction towards the former LMS railway corridor. The route passes a coal storage site situated to the east of the bakery site. There may be ground contamination issues in this area discussed in more detail within the geotechnical desk study. Beyond the coal storage site, the alignment joins the former LMS railway corridor and crosses Main Road via a new signalised at-grade crossing. An approximately 1.2km length of the former LMS railway corridor is designated as a 'Site of Special Scientific Interest' (SSSI). The implications of this are discussed in Section 4 of this report. If this route is chosen as the preferred option, more work will be required to demonstrate that it either does not affect the site's designation or that the scheme, including its incorporated mitigation, outweighs any adverse impacts.

Main Road to Kimberley Depot – Drawing numbers MMD-305248-AC-DWG-008 to 009

Land acquisition would be required from property nos. 1, 2, 3, 4 Omer Court, 83a Main Road and 131, 133 Newdigate Road to route the proposed tramway through the back of these properties. The extent of land-take from some of these properties may result in the properties needing to be acquired and demolished. A previous railway tunnel existed across Main Road travelling under the above referenced properties. It is

unclear if this tunnel structure remains in place, therefore demolition of the tunnel may be required prior to construction of the tramway.

The proposed alignment then continues along the former LMS railway corridor to the west of the above mentioned properties and towards Hardy Street. The railway cutting in this area has been maintained and consists of a wide base. Dense vegetation and trees currently exist on the side slopes of the cutting. The photo below provides an indication of the existing cross section of the cutting:



Figure 3.5: Existing condition of former LMS railway corridor (SSSI area)

Due to the existing wide base of the cutting that has been preserved, it would be possible to route the tramway through this corridor and retaining most of the current trees / landscaping that currently exist on the sides. There could also be potential to construct a footpath / cycle track alongside the tramway with pedestrian links to surrounding residential estates.

Prior to its junction with Hardy Street, the tramway would pass through the arches of an existing pedestrian footbridge connecting the residential estates on both sides of the former railway cutting. The span of a single arch appears to be approximately 9m wide (estimated from OS mapping), therefore it is envisaged that both inbound and outbound tracks would fit within a single arch. The height of the arch appears to be sufficient to enable the overhead line equipment to be constructed without significant difficulty. The photo below shows the construction of the bridge:



Figure 3.6: Existing pedestrian footbridge over former LMS railway corridor

Once the proposed tramway alignment passes under the footbridge, it would climb on a constant gradient over a length of approximately 150m to cross Hardy Street at-grade via a new signalised junction. Significant earthworks may be required to infill the existing cutting for the tramway to reach the existing road level.

The Kimberley brewery site to the south of Hardy Street has been earmarked for residential development. There is a current planning application in place to construct 87 dwellings, as described in Section 2 of this report. A review of the planning application documents suggests that there has been consideration given to accommodate a future tramway within the development, although no details have been provided. On the assumption that the proposed tramway can be routed through the development without major difficulties, the proposed tramway alignment proceeds towards Eastwood Road. Dependent on the finished levels of the residential development within the Kimberley brewery site, significant highway works on Eastwood Road may be required for the tramway alignment to cross Eastwood Road at-grade. The existing abutment from the previous railway bridge would need to be demolished.

After crossing Eastwood Road, the proposed tramway alignment continues through the existing Kimberley depot site. The tramway is currently shown on the northern extent of the depot site but as this site is earmarked for future development (details of the development provided in Section 2), the alignment in this area may vary to suit future development proposals. An alternative route is also shown to the north of the depot but this would require land acquisition from Kimberley Caravan Centre. This alternative route is entirely out of the depot site and therefore would not hinder any proposed development.

Bridge over A610 to Giltbrook Retail Park – Drawing numbers MMD-305248-AC-DWG-010 to 011

Beyond the depot, the proposed alignment continues along the former LMS railway corridor. Sections of the old railway embankment still exist and could potentially be reused on the approach to a new bridge structure across the A610. The proposed structure would be on a skew and measure approximately 80m long. The tramway would remain on an elevated level on a new railway embankment after passing the A610 bridge heading towards Awsworth Lane. Another bridge structure would be required over Awsworth Lane spanning approximately 30m. Once the tramway passes Awsworth Lane, it would descend on a slope to meet existing ground levels.

The proposed tramway alignment would run adjacent to the access road leading into the Buildbase industrial site and cross Gin Close Way via a new signalised crossing. The proposed alignment then turns north heading towards the A610. A new culvert structure would be required for Gilt Brook. The route would cross the A610 slip roads at-grade via new signalised junctions. The vertical profile of the slip roads are not known at this stage of the study, therefore the extent of reconstruction required to the slip roads to accommodate the tramway crossings is uncertain.

The existing bridge structure (photo shown below) would have to be modified significantly to accommodate the new tramway running adjacent to the carriageway. There is also uncertainty on whether conventional overhead line equipment would fit within the restricted height clearance under this structure but there is potential to lower the overhead line equipment locally to overcome this constraint. However this may give rise to potential clearance issues where the tramway crosses the adjacent slip roads. At these crossings an OLE constant wire height of a minimum of 5.8m would normally be required. Should the proposals be progressed further, this issue will require detailed investigation.



Figure 3.7: Existing A610 bridge

Once the proposed tramway crosses the northern slip road, it terminates within the Giltbrook retail park.

An alternative scenario to the route described above would be to terminate Option 1 just before the A610 bridge (alternative terminus location shown on drawing MMD-305248-AC-DWG-011). This could result in significant cost savings by avoiding the modification of the existing A610 bridge structure to accommodate the tramway. The disadvantage of this scenario would be that tram passengers wishing to travel to the retail park have a longer walking distance. Pedestrian links to the retail park would have to be improved with this scenario.

Option 1 will be taken forward to the next stage for a more detailed analysis on capital cost, traffic impacts and operational modelling (run time).

3.1.3 Option 1A

The proposed alignment for Option 1B deviates from Option 1 immediately after passing under the M1 motorway bridge. The route makes a sharp left turn and heads in a southerly direction towards Back Lane, Watnall Road and Kimberley Road. Existing widths for both Back Lane and Watnall Road are not adequate for the proposed tramway, therefore land acquisition would be required from properties along these two streets.

The proposed alignment turns into Kimberley Road from Watnall Road and continue running on-street along Kimberley Road, Nottingham Road and Main Street. Kimberley Road is currently made up of 1 traffic lane in each direction with a wide central hatched area, used for right / left turn pockets and uncontrolled pedestrian crossing refuges where required. A typical section across Kimberley Road measures approximately 9.5m wide from kerb to kerb, which would be adequate for an on-street tramway.

As the tramway alignment proceeds into Nottingham Road, the existing road width narrows moderately. Similar to Kimberley Road, Nottingham Road consists of 1 traffic lane in each direction but the central hatched area present on Kimberley Road does not exist on this section. The typical width along Nottingham Road narrows to approximately 8.5m but this would still be adequate for an on-street tramway without significant alterations to the existing highway layout.

As the proposed tramway approaches Kimberley town centre, the existing cross section reduces noticeably and would need significant land acquisition from properties along Main Street to construct the tramway. As with Kimberley Road and Nottingham Road, Main Street consists of 1 traffic lane in each direction but the typical existing kerb to kerb width along Main Street is considerably narrower at approximately 6m. The existing footways on either side of Main Street are approximately 2m wide, reducing the scope of any highway widening without land acquisition and demolition. The mini roundabout which currently exists at the Main Street / Greens Lane / Victoria Street intersection would have to be converted into a signalised junction for the proposed tramway. Beyond the town centre, the proposed route continues onto Eastwood Road and re-joins Option 1 at the Kimberley Depot site.

This option comprises an approximately 2.5km section of on-street running. Notwithstanding higher costs associated with the construction of the on-street section, there will also be a greater level of disruption caused to the general public, highway users, residents and business owners in the area during construction. In addition, significant land acquisitions will be required from property owners to achieve the required minimum cross section for the tramway along the route. The number of tight radii proposed for this option as it diverges from Option 1, coupled with a considerable length of on-street running may also prove to be an obstacle due to longer run-times.

Due to the complexity and low operational efficiency of Option 1A in comparison with other potential options running largely off street, it will not be taken forward to the next stage of this study.

3.1.4 Option 1B

Drawing numbers MMD-305248-AC-DWG-012 to 014

The proposed alignment for Option 1B deviates from Option 1 when it reaches Eastwood Road. Instead of crossing Eastwood Road towards the Kimberley depot site, Option 1B joins Eastwood Road via a new signalised junction and runs on-street towards Giltbrook retail park. Dependent on the finished levels of the residential development within the Kimberley brewery site, significant highway works on Eastwood Road may be required for the tramway alignment to join Eastwood Road at-grade. It would be prudent to ensure that a route is safeguarded for the tramway within the brewery development and the proposed finished levels for the development enable the tramway to join Eastwood Road at-grade without the need for major reconstruction of Eastwood Road. Eastwood Road is one of the main roads in Kimberley serving a number of residential estates to the north and south while providing access to Giltbrook retail park. There are a number of businesses serving the local community with their shop frontage facing Eastwood Road (six in total). The existing widths of Eastwood Road and Gilt Hill are generally adequate for an on-street tramway (please refer to drawing MMD-305248-AC-DWG-103 in Appendix A for a proposed cross section). It has been observed that there are currently no parking restrictions along Eastwood Road, therefore any residents parking on-street will lose this facility when a tramway is introduced.

As the proposed tramway alignment approaches Giltbrook retail park roundabout, the inbound and outbound tracks diverge. The outbound track would make use of the existing central reservation while the inbound track would travel along the northern verge of the carriageway. Both tracks then converge to cross the roundabout via a new signalised junction. All the existing roundabout arms would be signalised as part of the tramway works. Beyond the roundabout, the proposed alignment travels south and eventually terminates within the retail park. Please refer to drawings MMD-305248-AC-DWG-014 and MMD-305248-AC-DWG-104 in Appendix A for details of the route and a proposed cross section in this area. It should be noted that the above described route and the route shown on drawing MMD-305248-AC-DWG-014 is an indicative arrangement. There are various other alternatives that could be explored, including the possibility of routing the entire tramway alignment to the north or south of Gilt Hill as it approaches the roundabout. Further study will be required to study the merits of each alternative and determine which junction arrangement produces the optimum run time and results in the least impact on existing traffic flows.

This option comprises an approximately 1.2km section of on-street running tramway. As stated in Option 1A, construction costs are generally higher for on-street track construction and can typically create a greater level of disruption affecting businesses and residents during construction. However the on-street section for this option is relatively short and does not directly affect a high number of businesses. An added benefit for this option is that it would not require a new bridge structure over the A610.

Option 1B will be taken forward to the next stage for a more detailed analysis on capital cost, traffic impacts and operational modelling (run time).

3.1.5 Option 2

Drawing numbers MMD-305248-AC-DWG-015 to 019

Option 2 deviates from Option 1 just south of Redfield House Farm. The proposed alignment continues along the former LNER corridor heading towards Main Road. A landscaping bund measuring approximately 5m in height at its peak currently exists to the north of Buckingham Way. This bund provides some screening for the residential properties located to the south of Buckingham Way to conceal the industrial bakery situated to the north of the bund. In order to construct the proposed tramway alignment, the existing bund would be removed; replacement landscaping features may need to be considered.

The proposed route would cross Main Road at-grade via a new signalised junction and continue running on a segregated section to the south of Corbiere Avenue. It was observed that the available cross section widths between some of the properties along Corbiere Avenue and the school grounds narrowed considerably in certain areas, and therefore may result in the requirement for small quantities of land acquisition from property nos. 20, 22, 24, 26 and 28 Chestnut Drive and Kimberley school. Details of land acquisitions and the proposed tramway alignment through this area are shown on drawings MMD-305248-AC-DWG-016 and MMD-305248-AC-DWG-017.

A footpath currently exists along the proposed tramway route, connecting Main Road and Newdigate Road. There would be scope to construct a similar footpath running adjacent to the tramway as part of the tramway construction works but this could potentially require more land acquisition from the above mentioned properties and Kimberley School. Alternatively, the existing footway along Corbiere Avenue could be extended beyond Corbiere Avenue to connect with Newdigate Street to provide a similar pedestrian link. The following photo shows the typical cross section in this area:



Figure 3.8: Existing footpath link between Main Road and Newdigate Road

At the end of Corbiere Avenue, the proposed alignment crosses Newdigate Road at-grade via a new signalised crossing and proceeds through the existing 'Kimberley Nature Area'. This area is currently made up of trees and dense vegetation, with a footpath heading in a westerly direction towards Station Road. The old railway cutting was previously present in this area but as the location was used as a landfill site in recent years, an approximately 100m section of the railway cutting has been filled in.

Approximately 100m west of the Newdigate Road crossing, within the 'Kimberley Nature Area', the old railway cutting still exists and is set at a much lower level than the current levels of the landfill site. A flight of steps had been constructed to connect the top of the landfill site to the bottom of the old railway cutting. The level difference observed is approximately 5m. The photo below shows the existing site topography:



Figure 3.9: Existing steps within 'Kimberley Nature Area'

Significant earthworks and a ramp structure would be required in this area to allow the proposed tramway alignment to descend to the lower levels of the old railway cutting.

It has been observed that the former railway cutting had been renewed recently to make it a recreational facility for residents in the area. A stream currently runs down the centre of the old railway corridor with footpaths and dense vegetation on both sides of the stream. The footpaths on either side are connected at various points with footbridges. The photo below shows the existing condition of the former railway corridor:

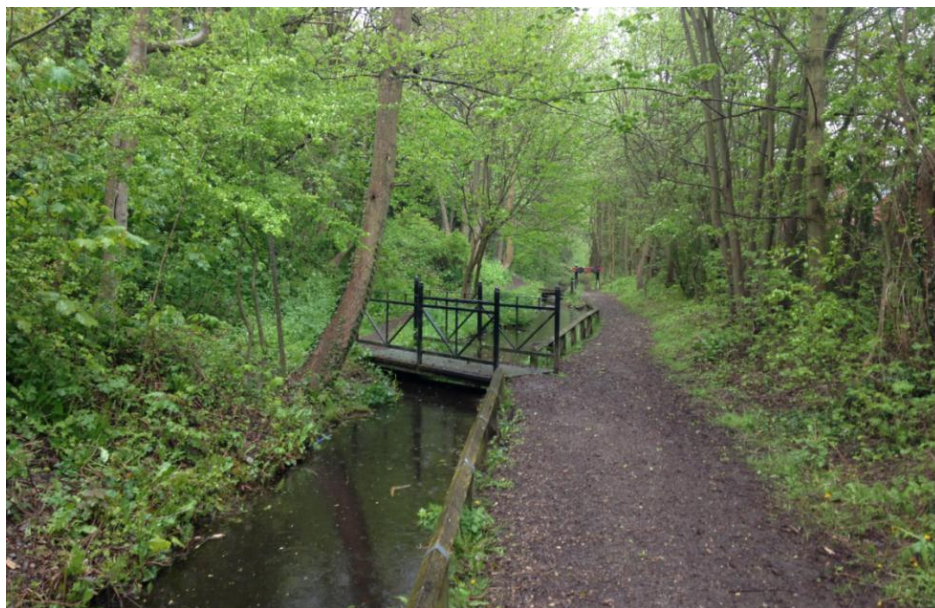


Figure 3.10: Existing condition of former LNER corridor within 'Kimberley Nature Area'

It would appear that there is sufficient width to construct the proposed tramway along this corridor once some of the existing trees and vegetation are cleared. There would also be scope to construct a shared footway / cycleway alongside the tramway to retain a pedestrian link. Replacement landscaping features may also need to be considered.

A culvert structure would have to be introduced to divert the water feature from or possibly under the proposed tramway. A more comprehensive study on the existing drainage arrangements will have to be carried out to consider the options available.

A former station building and two properties along Station Road (No.1 and 1a) would have to be demolished as the proposed route continues westwards from the 'Kimberley Nature Area' (refer to drawing MMD-305248-AC-DWG-017). The proposed alignment would cross both Station Road and Main Street within close proximity. The existing highway arrangement splits into two levels at the Main Street / Station Road junction. Both Main Street and Station Road run almost parallel to each other but Main Street runs on a descending gradient from east to west, while Station Road runs on an ascending gradient. This creates a level difference between the two roads which is currently retained by an existing wall. It was observed that at the point of the tramway crossing, the existing height difference between Station Road and Main Street is approximately 4m, and therefore not sufficient for a bridge to be constructed over Main Street without consequent highway works. Significant works would be required to the surrounding highway layout in this area to create the minimum headroom required for the structure. One possible scenario would be to stop up Station Road on either side of the tramway crossing to enable the tracks to be raised on an approach ramp structure to the bridge over Main Street. This would allow the bridge to be constructed without significant modification to Main Street but consequently, Station Road would be severed into two sections. However existing properties in this area would still be accessible provided that a change in traffic circulation is approved.

If Option 2 is taken forward to the next stage, it should be noted that this area may prove to be a major challenge. This is due to the surrounding area consisting of narrow residential streets and compactly constructed residential properties. A topographical survey will be required to understand the level differences in greater detail and more work will be required to determine the optimum highway layout resulting in the least impact on surrounding properties. The following photo shows the existing topography in this area:



Figure 3.11: Existing level difference between Main Street and Station Road

The proposed tramway alignment continues in a south-westerly direction after bridging over Main Street utilising the former railway corridor. Demolition of property no.1 Church Hill may be required to accommodate the tramway (refer to drawing MMD-305248-AC-DWG-017) but there could be a potential alternative to route the alignment to the south. This alternative would require land acquisition from Ashfield House/Farm located on the opposite side of Church Hill. A new bridge structure would be required over Church Hill as the proposed alignment head towards the A610. Similar to Option 1, this option would require a new bridge structure on a skew over the A610. Beyond A610, the proposed route continues along the former railway corridor and crosses Awsworth Lane at-grade via a new signalised crossing. This option re-joins Option 1 just to the north of Awsworth Lane.

Option 2 will be taken forward to the next stage for a more detailed analysis on capital cost, traffic impacts and operational modelling (run time).

3.1.6 Option 2A

Option 2A diverts from Option 2 approximately 200m west of the Main Road crossing. The proposed tramway alignment turns left and heads south towards a proposed terminus located within an existing school field.

Although the terminus proposed for this option is relatively closer to Kimberley town centre than the other options, it will require new footway links to connect the proposed terminus to Kimberley high street. In addition, the location of the tramstop and the proposed alignment requires a significant amount of land acquisition from the school. This would involve extensive negotiations with various authorities and potentially raise a large number of objections. The potential for an onward route to Giltbrook retail park or a further extension towards Langley Mill and Amber Valley would also be restricted by this option.

Due to the implications on the school site and the lack of opportunity for a further extension, Option 2A will not be taken forward to the next stage of this study.

3.1.7 Option 2B

Drawing number MMD-305248-AC-DWG-020

Option 2B diverts from Option 2 at the Main Road junction. The proposed tramway alignment turns right to join Main Road via a new signalised junction. The proposed route would run on-street along Main Road for approximately 130m. The existing cross section along this section of Main Road is adequate for an on-street tramway construction subject to some minor highway widening works. Drawings MMD-305248-AC-DWG-020 and MMD-305248-AC-DWG-102 in Appendix A show the proposed alignment and proposed cross section in this area. This option turns left to join Option 1 just to the north of Newdigate Road.

This section of Main Road currently serves residential properties and an industrial bakery. Similar to previously proposed on-street sections, construction costs are generally higher for on-street track construction and can typically create a greater level of disruption affecting businesses and residents during construction. However the on-street section for this option is relatively short and would therefore have a relatively short construction period, reducing impacts on residents and the bakery.

Option 2B will be taken forward to the next stage for a more detailed analysis on capital cost, traffic impacts and operational modelling (run time).

3.2 Trackform

For off-street sections of all proposed tramway options, ballast track is considered the most appropriate trackform as it is relatively lower in cost and also offers a higher speed of construction, which would in turn contribute to a shorter construction programme.

For on-street sections and at level crossings, embedded slab track (similar to the trackform for all other on-street tramway in Nottingham) would be the main trackform.

In areas where the proposed tramway is in close vicinity to residential properties, businesses and education facilities, there may be a requirement for a floating slab track which would reduce any noise and vibration generated by a moving tram. This requirement would be identified when a more detailed noise and vibration study is carried out.

3.3 Tramstops

5 potential tramstop locations are shown for each route option taken forward to the next level of study (excluding Phoenix Park tramstop). These include tramstop location proposals for Options 1, 1B, 2 and 2B. The following table details the locations of proposed tramstops for each option:

Table 3.1 Proposed tramstop locations

Option	Tramstop location	Tramstop type	Drawing reference
Common Section	West of Low Wood Road	Off-street tramstop / Potential park and ride site	MMD-305248-AC-DWG-004
1	East of Main Road	Off-street tramstop	MMD-305248-AC-DWG-007
	East of Hardy Street	Off-street tramstop	MMD-305248-AC-DWG-009
	East of Gin Close Way	Off-street tramstop / Potential park and ride site	MMD-305248-AC-DWG-011
	Giltbrook Retail Park	Off-street tramstop	MMD-305248-AC-DWG-011
1B	East of Main Road	Off-street tramstop	MMD-305248-AC-DWG-007
	East of Hardy Street	Off-street tramstop	MMD-305248-AC-DWG-009
	Eastwood Road	On-street tramstop	MMD-305248-AC-DWG-013
	Giltbrook Retail Park	Off-street tramstop	MMD-305248-AC-DWG-014

Option	Tramstop location	Tramstop type	Drawing reference
2	East of Main Road / North of Buckingham Way	Off-street tramstop	MMD-305248-AC-DWG-016
	East of Station Road / Old station building	Off-street tramstop	MMD-305248-AC-DWG-017
	East of Gin Close Way	Off-street tramstop / Potential park and ride site	MMD-305248-AC-DWG-011
	Giltbrook Retail Park	Off-street tramstop	MMD-305248-AC-DWG-011
2B	Main Road	On-street tramstop	MMD-305248-AC-DWG-020
	East of Hardy Street	Off-street tramstop	MMD-305248-AC-DWG-009
	East of Gin Close Way	Off-street tramstop / Potential park and ride site	MMD-305248-AC-DWG-011
	Giltbrook Retail Park	Off-street tramstop	MMD-305248-AC-DWG-011

The above listed tramstops have been positioned to serve existing residential areas, proposed developments and businesses as much as practicable. However it should be noted that no tramstops have been proposed in the centre of Kimberley due to the difficulty of routing a tramway through the narrow streets and the presence of dense residential estates on the periphery of the town centre. The tramstop proposed for Option 2 in the area of the demolished old station building (east of Station Road) is nearest to Kimberley town centre. Improved pedestrian links and local bus services would be beneficial in linking future tramstops to Kimberley.

3.4 Structures

The following table provides details of structures identified for each option:

Table 3.2 Proposed structures

Option	Description of structure	Drawing reference
Common section	■ Highway bridge on Low Wood Road over proposed tramway spanning approximately 20m with associated wingwalls	MMD-305248-AC-DWG-004
	■ Culvert for drainage channel in former LNER railway corridor	MMD-305248-AC-DWG-005
1	■ Ramp structure West of Main Road and Omer Court properties. Ramp length dependent on level difference	MMD-305248-AC-DWG-008
	■ Skewed tramway bridge over A610 spanning approximately 80m with associated approach ramps and wingwalls	MMD-305248-AC-DWG-010
	■ Skewed tramway bridge over Awsworth Lane spanning approximately 30m with associated approach ramps and wingwalls	MMD-305248-AC-DWG-010
	■ Culvert for Gilt Brook	MMD-305248-AC-DWG-011
	■ Structural modifications to existing A610 bridge	MMD-305248-AC-DWG-011
1B	■ Ramp structure West of Main Road and Omer Court properties. Ramp length dependent on level difference	MMD-305248-AC-DWG-008
2	■ Ramp structure within 'Kimberley Nature Area'. Ramp length dependent on level difference	MMD-305248-AC-DWG-017
	■ Culvert for stream within 'Kimberley Nature Area'	MMD-305248-AC-DWG-017

Option	Description of structure	Drawing reference
	■ Skewed tramway bridge over Main Street spanning approximately 30m with associated approach ramps and wingwalls	MMD-305248-AC-DWG-017
	■ Tramway bridge over Church Hill spanning approximately 15m with associated approach ramps and wingwalls	MMD-305248-AC-DWG-018
	■ Skewed tramway bridge over A610 spanning approximately 80m with associated approach ramps and wingwalls	MMD-305248-AC-DWG-018
	■ Culvert for Gilt Brook	MMD-305248-AC-DWG-011
	■ Structural modifications to existing A610 bridge	MMD-305248-AC-DWG-011
2B	■ Ramp structure West of Main Road and Omer Court properties. Ramp length dependent on level difference	MMD-305248-AC-DWG-008
	■ Skewed tramway bridge over A610 spanning approximately 80m with associated approach ramps and wingwalls	MMD-305248-AC-DWG-010
	■ Skewed tramway bridge over Awsworth Lane spanning approximately 30m with associated approach ramps and wingwalls	MMD-305248-AC-DWG-010
	■ Culvert for Gilt Brook	MMD-305248-AC-DWG-011
	■ Structural modifications to existing A610 bridge	MMD-305248-AC-DWG-011

4. Key Environmental Issues

4.1 Introduction

An extension of the NET line from Phoenix Park to Kimberley and Giltbrook Retail Park would have the potential to give rise to environmental effects. The opportunity has therefore been taken at optioneering stage to consider the various options against key environmental issues. The proposed NET Kimberley extension from Phoenix Park would be subject to a Transport and Works Act Order (TWAO). As part of the TWAO consenting process, environmental consideration would be required (almost certainly including an Environmental Impact Assessment (EIA)).

This high level desk-based appraisal is undertaken to support the route optioneering. It has been informed based on the following information sources:

- Meeting with Broxtowe Borough Council (BBC) on 27th April 2015;
- Review of BBC local planning policy;
- magic.defra.gov.uk;
- aqma.defra.gov.uk;
- Environment Agency website;
- English Heritage Website; and
- The Heritage Gateway website.

The route options will be considered in their numerical order and will be appraised against the following environmental topics:

- Noise and vibration;
- Air quality;
- Historic environment;
- Ecology and trees;
- Public open space and Green Belt;
- Geology, soils and contaminated land; and
- Water environment.

A brief summary of key environmental issues identified for each route is provided in Table 4.1.

4.2 Limitations

As the project is in an early stage of development, only limited information of the proposed development is currently known. The environmental issues highlighted in this section should therefore be reviewed and investigated further as part of the process of confirming a preferred option and developing more detailed proposals.

4.3 Review of Options

4.3.1 Common Section

The common section of the proposed route is approximately 2km in length and would be shared by all the route options between Kimberley and Phoenix Park park and ride, at the eastern end of the proposed extension. The common section of the proposed route goes between the existing NET line at Phoenix Park park and ride tram stop and the M1 motorway, approximately 2.3km in length. See Section 3.2.1 and drawing MMD-305248-AC-DWG-001 for more details on the common section of the proposed route.

Noise and Vibration

To the west of Phoenix Park, the proposed route would pass through the Hemphill Hall area. Outline planning consent for a residential development in this location was allowed on appeal by BBC on 06/01/2014 (planning application reference number 12/00539). The consented Hemphill Hall housing development has been designed to accommodate in the future a tram route through the development along its proposed roadways. This will bring the tram route within close proximity to residential receptors that are potentially sensitive to noise and vibration effects, during both construction and operational phases.

The BBC Environmental Health Officer (EHO) would need to be consulted and it is expected that a noise and vibration assessment would be required as part of the consenting process. It is likely that appropriate noise and vibration measures will be expected to be incorporated within a Construction Environmental Management Plan (CEMP) as part of the consenting requirements.

Air Quality

The proposed route will run close to the Hemphill Hall residential development. There is a potential for air quality effects, during both construction and operational phases on the future residents (sensitive receptors) at the Hemphill Hall housing development.

The EHO will need to be consulted and it is expected that an air quality assessment would be required as part of the consenting process. Appropriate air quality measures to address any potentially negative impacts on the sensitive receptors will be expected to be incorporated within a CEMP.

Historic Environment

The existing Hemphill Hall and Hemphill Hall Farmhouse are both Grade II listed buildings, approximately 70m north of the proposed route at the nearest point. The proposed NET Kimberley extension would need to consider any impact upon the cultural heritage of these buildings, including their setting. However, this new Hemphill Hall residential development is likely to act as screening between the NET Kimberley extension and these listed buildings, minimising any impacts.

In addition to the above, there are 42 listed buildings within a 2km buffer of the common section of the proposed route, although it is not considered that there would be potential for them to be directly affected by the proposed route.

Ecology

There are three Sites of Special Scientific Interest (SSSI) within 2km of the common section of the proposed route:

- Sellar's Wood, approximately 270m north of the proposed route;
- Bulwell Wood, approximately 1040m north of the proposed route; and
- Kimberley Railway Cutting, approximately 860m north-west of the proposed route.

At this stage, it is not considered that these SSSIs would be affected by the common section proposed route.

Where the route passes through the Hemphill Hall area, the area is designated in the Broxtowe Local Plan (2004) as a Site of Importance for Nature Conservation.

The planning application for the Hemphill Hall residential development was accompanied by an ecological assessment. This determined that there were no great crested newts *Triturus cristatus*, white-clawed crayfish *Austropotamobius pallipes* or water vole *Arvicola amphibious* present in the waterbodies/waterways in the site. No evidence of badger *Meles meles* or roosting bats were noted, although potential foraging habitats for bats were noted. A single grass snake *Natrix natrix* was recorded, indicating use of this area by reptiles. Therefore there is a potential for reptiles within the common section of the proposed route and appropriate mitigation for reptiles is likely to be required.

To the west of Hemphill Hall, the proposed route follows the former LNER railway corridor. The 2004 Broxtowe Local Plan designates this corridor as a Site of Importance for Nature Conservation.

The NET Kimberley extension would therefore need to consider these and an ecological assessment of this locally-designated site would need to be undertaken as part of the consenting process.

Trees are likely to be required to be felled as part of these proposals, therefore an Arboricultural Assessment would be required as part of the consenting process. Consultation with the BCC Tree Officer will be required; particularly should the removal of any tree under a Tree Preservation order (TPO) be necessary.

Public Open Space and Green Belt

To the west of Phoenix Park, the proposed route would pass through the Hemphill Hall area. The Broxtowe Local Plan Proposals Map (2004) categorises this area as Protected Open Space. However, outline planning consent has been allowed on appeal for a housing development within this area of Protected Open Space (planning application reference number 12/00539).

As the proposed route crosses westwards across the A610, it enters into an area which is designated in the 2004 Broxtowe Local Plan as Green Belt (policy K5). The development would therefore need to prove it is acceptable to be placed in the Green Belt and that there are no suitable alternatives (although given that Kimberley is surrounded by Green Belt, there are no other options to access Kimberley which do not cross Green Belt). Section 9 of the National Planning Policy Framework (NPPF) requires that 'inappropriate development' within the Green Belt can only be approved under 'very special circumstances'. These 'very special circumstances' for the proposed route will have to be demonstrated as part of the consenting process.

To the west of Hemphill Hall, the route follows the former LNER railway corridor. The 2004 Broxtowe Local Plan designates this corridor as a Long Distance Trail. Consideration of options for maintaining a long-distance trail here would also need to be included as part of the design process and consultation with the Local Authority regarding this would need to be undertaken.

Geology, Soils and Contaminated Land

The bedrock is classified as a Principal Aquifer. Protective measures would be outlined in the CEMP, which will need to be agreed by the Environment Agency (EA).

There are not considered to be potential for land contamination issues due to previous development.

Water Environment

The common section of the proposed route would run through an area of Flood Risk Zone 3 – an area with a 1% chance of flooding in a given year. The EA will require that the proposed route is flood resilient, safe for the lifetime of the project, and that it will not increase flood risk overall. The use of sustainable drainage systems will need to be examined as part of the proposal.

Summary for the Common Section of the Proposed Route

Key environmental issues for the common section include:

- An ecological assessment would be required and appropriate mitigation measures, if required, to address any ecological and nature conservation issues;
- Noise and vibration survey would be required to consider the likely impacts on the future residents at the Hempshill Hall residential development;
- Appropriate air quality mitigation measures would be required to address any potential for impacts on the future residents at Hempshill Hall residential development;
- Scheme passes through an area of Green Belt; and
- The scheme would need to ensure it is flood resilient.

4.3.2 Option 1

Option 1 focusses on using the former LMS railway corridor to form the new trackbed for this option, taking it on a more northerly route through Kimberley.

Noise and Vibration

Significant works are envisaged to be required for New Farm Lane, with nearby residential and business receptors in this area forming residential and business receptors to the scheme.

Where the route joins the former LMS railway corridor, it again is close to potentially sensitive residential receptors, until it reaches the other end of Kimberley. The works here will take place within an existing cutting, which will help reduce these impacts.

The BBC EHO would need to be consulted and it is likely that a noise and vibration assessment would be required as part of the consenting process. Appropriate noise and vibration measures will be expected to be incorporated within a CEMP.

Air Quality

Significant works are envisaged to be required for New Farm Lane, with nearby residential and business receptors in this area forming residential and business receptors to the scheme.

Where the route joins the former LMS railway corridor, it again is in close proximity to potentially sensitive residential receptors, as it is until it crosses the A610 on the western side of Kimberley.

The BBC EHO would need to be consulted and it is likely that an air quality assessment would be required as part of the consenting process. Appropriate noise and vibration measures will be expected to be incorporated within a CEMP.

Historic Environment

As the route progresses westwards, it passes through the former Brewery site, which is currently proposed to be subject of a residential redevelopment. A hybrid application for this development has been submitted to BBC (application number 13/00570), but at the time of writing a decision on this was still pending. The Brewery Site includes a Grade II listed building, located approximately 60m north of Option 1 at the nearest point. The conservation of this building, including its setting, would need to be considered as part of Option 1.

At this point, Option 1 passes through the Kimberley Conservation Area. Therefore, the design of Option 1 would need to be sympathetic towards the historic fabric of this area; features such as Overhead Line Equipment (OLE) should be designed and located to take account of the Conservation Area where possible. If building demolition is required within the Kimberley Conservation Area for Option 1, Conservation Area Consent will be required, and consultation with the Conservation Officer should be undertaken.

In addition to the Brewery site, Option 1 passes within 2km of 31 listed buildings. This option is not considered to have the potential to affect these features.

Ecology

The majority of Option 1 will be located within the Kimberley Railway Cutting Site SSSI, designated for its palaeo-botanical features. It is expected that Natural England would expect the scheme to be designed to preserve the integrity of the SSSI and where possible allow access for maintaining the SSSI. Early consultation with Natural England and the local Wildlife Trust (who manage the site) is therefore advised, in order to determine any Natural England consenting requirements. To the west of the A610, Option 1 passes into an area designated by the Broxtowe Local Plan (2004) as a Site of Importance for Nature Conservation. Therefore, the Option would need to demonstrate that it either does not affect this site's designation, or that the scheme, including its incorporated mitigation, outweighs any harm done. Consultation with the Local Authority regarding this would be required, and the scheme should seek no net loss of biodiversity.

In addition to the above, this route passes within 2km of five areas of designated Ancient Woodland and four SSSIs. This route alignment is not considered to have the potential to affect these sites.

Trees are likely to be required to be felled as part of these proposals, therefore an Arboricultural Assessment would be required as part of the consenting process. In the vicinity of the Kimberley Brewery development, the route passes an area of trees protected under a collective Tree Preservation Order. Option 1 should seek to avoid felling of any of these trees. Where this is not possible, the loss of these trees would need to be mitigated for as detailed within the arboricultural assessment. Consultation with the local Tree Officer would need to be undertaken.

Public Open Space and Green Belt

Immediately west of Kimberley, the route passes through an area designated by the Broxtowe Local Plan (2004) as Green Belt, under policy K5. Section 9 of the NPPF requires that 'inappropriate development' within the Green Belt can only be approved under 'very special circumstances'. These 'very special circumstances' for the proposed route will have to be demonstrated as part of the consenting process.

No public open space would be directly affected by Option 1.

Geology, Soils and Contaminated Land

Within Option 1, part of the section of former LNER railway is an area of historic landfill named “Railway Cutting” which accepted inert and industrial waste between September 1974 and December 1985. This historic landfill site has gas control measures in place. Remediation and pollution control measures are likely to be required here as part of construction works.

The route then leaves the former LNER railway corridor, going north-westwards towards the former LMS railway corridor. Between the former LNER and LMS railway corridors, the proposed route passes through an area currently used as a coal store. This site has the potential to have land contamination issues and so phase 1 and 2 ground investigative surveys may be required to ascertain what the level of contamination is. Remediation and pollution prevention measures may therefore need to be prescribed as a result of investigations.

In the area where Option 1 crosses the A610 dual-carriageway, it passes through two areas of historic landfill (one on either side of the road). On the east side of the A610 is the Kimberley Depot/Kimberley Tip area of historic landfill, which accepted inert, industrial, commercial and household waste between December 1952 and December 1979. On the west side of the A610 is the Kimberley Green area of historic landfill, which accepted inert, commercial, industrial and household waste between December 1969 and December 1985.

These historic landfill sites have the potential to have land contamination issues and so phase 2 ground investigation studies will be required to ascertain what the level of contamination is. Remediation and pollution prevention measures may therefore need to be prescribed as a result of investigations.

In the area around Awsworth Lane, the superficial deposits are classified as a Secondary A Aquifer. This option also passes above bedrock classified as Principal, Secondary A and Secondary B Aquifers. Protective measures will need to be outlined in the CEMP, with prior agreement from the Local Authority and the EA.

Water Environment

At the western end of Option 1 on the south side of the A610 at Giltbrook Retail Park, the route crosses into an area of Flood Zone 3, where this a 1% chance of flooding in a given year. It would also cross an unnamed water body in this area. The EA will require Option 1 is flood resilient, safe for the lifetime of the project, and that it will not increase flood risk overall. The use of sustainable drainage systems will need to be examined as part of the proposal.

Summary

Key environmental issues for Option 1 include:

- Presence of the SSSI, which would require consent and engagement with Natural England. Consultation with Natural England and the local Wildlife Trust would need to be undertaken as part of this process, including investigation of potential mitigation;
- Close proximity of potentially sensitive receptors to noise and air quality;
- Part of Option 1 passes through an area of Flood Zone 3;

- Potential contamination issues associated with historic landfill and current use of a site along the route currently used as a coal stores;
- Option 1 passes through a Conservation Area; and
- Option 1 passes through an area of Green Belt.

4.3.3 Option 1A

Option 1A provides a road-running option through central Kimberley along Kimberley Road, Nottingham Road and Main Road.

Noise and Vibration

Option 1A would involve street running through central Nuthall and Kimberley. There are residential, business and community receptors present along nearly the entire length of this Option. The close proximity of these receptors means they will be vulnerable to noise and vibration effects during construction and operational phases of the proposed route.

The BBC EHO will need to be consulted and it is expected that a noise and vibration assessment would be required as part of the consenting process. Appropriate noise and vibration measures will be expected to be incorporated within a CEMP.

Air Quality

Option 1A would involve street running through central Nuthall and Kimberley. There are residential, business and community receptors present along nearly the entire length of this Option. The close proximity of these receptors means they will be vulnerable to air quality effects during construction and operational phases of the proposed route.

In the area around Back Lane, the option briefly passes through an Air Quality Management Area (AQMA), named Broxtowe no.4, which is declared for nitrogen dioxide associated with the M1 motorway traffic. Appropriate mitigation will need to be considered to ensure that the conditions within the AQMA will not be worsened as a result of the proposed route.

The BBC EHO would need to be consulted and appropriate air quality measures will be expected to be incorporated within a CEMP.

Historic Environment

The route passes through the Nuthall and Kimberley Conservation Areas. Therefore, features such as OLE should be designed and located to take account of the Conservation Area where possible. If building demolition is required within these Conservation Areas, Conservation Area Consent will be required and consultation with the Conservation Officer should be undertaken. There are also several listed buildings located in this area. The scheme would need to take into account the setting of these listed buildings. Development to them (such as attachment of OLE fixings) would require listed building consent.

In addition to the above, the scheme passes within 2km of a further 24 listed buildings. It is not considered to have the potential to affect these additional historic features.

Ecology

This route passes within 2km of five areas of Ancient Woodland and three SSSIs. It is not considered that Option 1A has the potential to affect these sites.

Trees may be required to be felled as part of these proposals, therefore an Arboricultural Assessment would be required as part of the consenting process. Consultation with the Local Authority Tree Officer will be required, with removal of any tree under a TPO requiring consent from the Local Planning Authority.

Public Open Space and Green Belt

At the eastern end of Option 1A, where it leaves the common section, it is located within an area designated as Green Belt by the Broxtowe Local Plan (2004), policy K5. Section 9 of the NPPF requires that 'inappropriate development' within the Green Belt can only be approved under 'very special circumstances'. These 'very special circumstances' for the proposed route will have to be demonstrated as part of the consenting process.

Protected public open space will not be affected.

Geology, Soils and Contaminated Land

The route passes over bedrock areas classified as a Principal Aquifer and Secondary A Aquifer. Protective measures would be outlined in the CEMP, as agreed by the BCC EHO.

Water Environment

Option 1A does not cross or pass close to any water bodies or pass through areas designated as Flood Zones 2 or 3. It is not considered to have a likely potential to increase flood risk elsewhere although this may need to be assessed as part of the consenting process.

Summary

Key environmental issues for Option 1A include:

- Close proximity of potentially sensitive receptors along the entire route of Option 1A to noise and air quality, including an AQMA;
- Option 1A passes through two Conservation Areas and adjacent to listed buildings; and
- Option 1A passes through an area of Green Belt.

4.3.4 Option 1B

Option 1B leaves Option 1 where it crosses Main Street, and the option runs along Eastwood Road as far as the Giltbrook Retail Park. This is a street-running option within existing road corridors.

Noise and Vibration

This option runs along a residential road for most of its length. It is therefore located close to residential receptors, with likely potential impacts upon residential receptors from noise and vibration during both construction and operational phases.

The BBC EHO would need to be consulted and a noise and vibration assessment is likely to be required as part of the consenting process. Appropriate noise and vibration measures will be expected to be incorporated within a CEMP.

Air Quality

This option runs along a residential road for most of its length. It is therefore located close to residential receptors, with likely potential impacts upon residential receptors from air quality.

The EHO would need to be consulted and an air quality assessment is likely to be required as part of the consenting process. Appropriate air quality measures will be expected to be incorporated within a CEMP.

Historic Environment

Where Option 1B leaves Option 1 at Main Street, it is located within the Kimberley Conservation Area. Therefore, the design of Option 1B will need to be sympathetic towards the historic fabric of this area; features such as OLE should be designed and located to take account of the Conservation Area where possible.

The route passes within 2km of 31 listed buildings. The route also passes approximately 1.9km south of the Greasley Castle Scheduled Monument. It is not considered that Option 1B would have the potential to affect the Scheduled Monument and other historic features.

Ecology

The route alignment does not pass through or adjacent to any ecologically-designated sites. It passes within 2km of two SSSIs, but is not considered to have any potential to affect them.

Public Open Space and Green Belt

Towards the western end of this option at Gilt Hill, Option 1B passes adjacent to an area designated as Green Belt by the Broxtowe Local Plan (2004), under policy K5. However, the proposal here is for the scheme to remain on the road, and so any permanent loss of Green Belt land here would be minimal. Section 9 of the NPPF requires that 'inappropriate development' within the Green Belt can only be approved under 'very special circumstances'. If the route requires the use of Green Belt land then these 'very special circumstances' for the proposed route will have to be demonstrated as part of the consenting process.

This route does not use any designated public open space.

Geology, Soils and Contaminated Land

This option passes through areas of bedrock classified as both Principal and Secondary A Aquifers. Protective measures would need to be outlined in the CEMP, with prior agreement with the Local Authority and the EA.

Water Environment

Option 1B does not cross or pass close to any water bodies or pass through areas designated as Flood Zones 2 or 3. At Giltbrook Park, this option does come within approximately 80m of an area of Flood Zone 3. Therefore an assessment of whether this option would cause increased flooding in that area may need to be undertaken.

Summary

Key environmental issues for Option 1B include:

- Close proximity of potentially sensitive receptors along most of the route of Option 1B to noise and air quality;
- Passes through Kimberley Conservation Area; and
- Passes adjacent to an area designated as Green Belt.

4.3.5 Option 2

Option 2 makes use of the former LNER railway corridor, leaving from the Option 1 alignment near New Farm Lane. It then re-joins Option 1 north of Awsworth Lane.

Noise and Vibration

Where Option 2 is located within the urban area of Kimberley, it passes close to residential receptors, as well as Kimberley School. These receptors will be sensitive to noise and vibration effects during both construction and operation.

The BBC EHO should be consulted on any potential noise and vibration matters. It is expected that a noise and vibration assessment would be required as part of the consenting process. Appropriate noise and vibration measures will be expected to be incorporated within a CEMP.

Air Quality

As the route enters the urban area of Kimberley, it passes within close proximity to residential receptors, as well as Kimberley School. These receptors will be sensitive to any effects on air quality.

The EHO should be consulted and it is expected that an air quality assessment would be required as part of the consenting process. Appropriate air quality measures will be expected to be incorporated within a CEMP.

Historic Environment

Where Option 2 crosses Station Road, Main Street and Church Hill, there are limited options for a break-through from the former LNER railway cutting. This is because development has taken place since the railway line was operational. This location is within the boundaries of the Kimberley Conservation Area. Therefore, where building demolition is required, Conservation Area Consent will need to be sought. Consultation with the Conservation Officer should be undertaken for any proposed works within a Conservation Area.

Option 2 passes within 2km of 30 listed buildings. It is not considered that Option 2 has the potential to affect these features.

Ecology

West of Kimberley, Option 2 passes through an area classed as a Site of Importance for Nature Conservation by the Broxtowe Local Plan (2004). Consultation with the Local Authority regarding this would be required, and the scheme should seek no net loss of biodiversity.

The option passes within 2km of four areas of Ancient Woodland and four SSSIs. It is not considered that the scheme would have the potential to affect these sites.

Trees are likely to be required to be felled as part of these proposals, therefore an Arboricultural Assessment would be required as part of the consenting process. Consultation with the local Tree Officer will be required.

Public Open Space and Green Belt

The former LNER railway corridor this option makes use of is classed as a long-distance trail by the Broxtowe Local Plan (2004). Consultation would therefore need to be undertaken regarding this with the Local Authority and the scheme would need to look to retain long-distance trail provision.

Parts of Option 2 pass through areas classified as Green Belt under policy K5 of the Broxtowe Local Plan (2004). Section 9 of the NPPF requires that 'inappropriate development' within the Green Belt can only be approved under 'very special circumstances'. These 'very special circumstances' for the proposed route will have to be demonstrated as part of the consenting process.

In the area around Buckingham Way, the former LNER corridor is understood to have been developed to form a bund to act as a screening feature to conceal an industrial bakery for residential. This bund would need to be developed for use by trams as part of Option 2, and therefore the visual amenity of these properties would need to be considered, along with a landscaping plan that takes this into account.

Option 2 would involve some loss of Open Space as designated by the Broxtowe Local Plan (2004) in the following areas:

- in the vicinity of Buckingham Way;
- in an area called "Kimberley Nature Park" (not an official ecological designation), located between Newdigate Street and Station Road; and
- it is also likely to require some loss of open space (including sports playing pitches) in the grounds of Kimberley School / Kimberley Leisure Centre.

Discussion with the Local Planning Authority will be required to determine whether any replacement facilities/compensations will be required due to the potential loss of any open space arising from the proposed development.

Geology, Soils and Contaminated Land

In the area where Option 2 crosses the A610 dual-carriageway, it passes through two areas of historic landfill (one on either side of the road). On the east side of the A610 is the Kimberley Depot/Kimberley Tip

area of historic landfill, which accepted inert, industrial, commercial and household waste between December 1952 and December 1979. On the west side of the A610 is the Kimberley Green area of historic landfill, which accepted inert, commercial, industrial and household waste between December 1969 and December 1985.

Part of the section of former railway is an area of historic landfill named "Railway Cutting" which accepted inert and industrial waste between September 1974 and December 1985. This site has gas control measures in place.

For these areas of historic landfill, phase 2 ground investigation works will be required to be carried out, with remediation and pollution control measures being likely to be required here as part of construction works.

This option passes through areas of bedrock classified as Principal, Secondary A and Secondary B Aquifers. Protective measures would need to be outlined in the CEMP, as agreed with the BBC EHO.

Water Environment

Option 2 does not cross or pass close to any water bodies or pass through areas designated as Flood Zones 2 or 3. An assessment of whether the route would cause an increase in flooding elsewhere may have to be undertaken as part of the consenting process.

Summary

Key environmental issues for Option 2 include:

- Close proximity of potentially sensitive receptors to noise and air quality;
- Requirement for demolition within a Conservation Area;
- Passes through locally-designated sites for ecology;
- Use of designated open space; and
- Contamination issues due to use of land which are historic landfill sites.

4.3.6 Option 2A

Option 2A diverts from Option 2 approximately 200m west of the Main Road crossing, and follows an alignment through the existing school playing fields.

Noise and Vibration

Option 2A passes close to residential and community (Kimberley School) receptors. These receptors will be sensitive to noise and vibration, during both construction and operation.

The BBC EHO should be consulted on any potential noise and vibration matters. It is expected that a noise and vibration assessment would be required as part of the consenting process. Appropriate noise and vibration measures will be expected to be incorporated within a CEMP.

Air Quality

Option 2A passes close to residential and community (Kimberley School) receptors. These receptors will be sensitive to air quality effects during both construction and operation.

The BBC EHO should be consulted and on any potential air quality matters. It is expected that an air quality assessment would be required as part of the consenting process. Appropriate air quality measures will be expected to be incorporated within a CEMP.

Historic Environment

This alignment does not pass through a Conservation Area. It passes within 2km of 20 listed buildings, but it is not considered that Option 2A has the potential to affect them.

Ecology

The route alignment does not pass through any ecologically designated sites. It passes within 2km of four SSSIs, but is not considered to have the potential to affect them.

Trees may be required to be felled as part of these proposals, therefore an Arboricultural Assessment would be required as part of the consenting process. Consultation with the local Tree Officer will be required.

Public Open Space and Green Belt

Option 2A involves running through land currently used as school playing pitches, with the Broxtowe Local Plan (2004) classifying this as Open Space. Given Option 2A's design here, provision of replacement pitches within the site would be difficult. Mitigation to the loss of playing pitch space and open space would need to be considered, and compensation measures may be required.

Discussion with the Local Planning Authority will be required to determine whether any replacement facilities/compensations will be required due to the potential loss of any open space arising from the proposed development.

Geology, Soils and Contaminated Land

The bedrock here is classified as a Principal Aquifer. Protective measures would need to be outlined in the CEMP, as agreed with the BBC EHO.

Water Environment

Option 2A does not cross or pass close to any water bodies or pass through areas designated as Flood Zones 2 or 3. It is not considered to have a likely potential to increase flood risk elsewhere, although this may need to be assessed as part of the consenting process.

Summary

Key environmental issues for Option 2A include:

- Close proximity of potentially sensitive receptors to noise and air quality; and
- Loss of designated public open space, currently used for playing pitch provision associated with a school and leisure facility.

4.3.7 Option 2B

Option 2B involves a street running link between Option 2 and Option 1, using Main Road.

Noise and Vibration

For almost all the entire length of Option 2B it is in close proximity to residential and business receptors as this option involves street running. The close proximity of these receptors means they have the potential to be sensitive receptors, during both the construction and operational phases.

The BBC EHO should be consulted on any potential noise and vibration matters. It is expected that a noise and vibration assessment would be required as part of the consenting process. Appropriate noise and vibration measures will be expected to be incorporated within a CEMP.

Air Quality

For almost all the entire length of Option 2B it is in close proximity to residential and business receptors as this option involves street running. The close proximity of these receptors means they have the potential to be sensitive receptors during both the construction and operational phases.

The BBC EHO should be consulted on any potential air quality issues. It is expected that an air quality assessment would be required as part of the consenting process. Appropriate air quality measures will be expected to be incorporated within a CEMP.

Historic Environment

Option 2B does not pass adjacent to any Listed Buildings or in a Conservation Area. It passes within 2km of 20 listed features, but is not considered to have the potential to affect them.

Ecology

The route alignment does not pass through any ecologically designated sites. It passes within 2km of four areas of Ancient Woodland and four SSSIs. The scheme is not considered to have the potential to affect these sites.

Trees may be required to be felled as part of these proposals, therefore an Arboricultural Assessment would be required as part of the consenting process. Consultation with the local Tree Officer will be required, with removal of any tree under a TPO requiring consent from the Local Planning Authority.

Public Open Space and Green Belt

This option does not pass through any designated open space or Green Belt.

Geology, Soils and Contaminated Land

The bedrock here is classified as a Principal Aquifer. Protective measures would need to be outlined in the CEMP, as agreed with the BBC EHO.

Water Environment

Option 2B does not cross or pass close to any water bodies or pass through areas designated as Flood Zones 2 or 3. It is not considered to have a likely potential to increase flood risk elsewhere, although this may need to be assessed as part of the consenting process.

Summary

Key environmental issues for Option 2B include:

- Close proximity of potentially sensitive receptors to noise and air quality.

4.4 Proposed Route Options Summary

The following table provides a summary of the key environmental issues associated with the common section and each route option.

Table 4.1 Summary of key environmental issues associated with the proposed route

Environmental criteria	Common section	Option 1	Option 1A	Option 1B	Option 2	Option 2A	Option 2B
Noise and Vibration	Potential for noise and vibration issues on the future residents at the Hemphill Hall development.	Potential for noise and vibration effects on residential receptors in Kimberley.	Potential for noise and vibration effects as Option 1A passes close to sensitive receptors that are located along most of the route option.	Potential for noise and vibration effects as Option 1B passes close to sensitive receptors located along most of the route option.	Potential for noise and vibration effects as Option 2 passes close to sensitive receptors for much of its length in Kimberley.	Potential for noise and vibration effects as Option 2A passes close to residential receptors and within the grounds of Kimberley School.	Potential for noise and vibration effects as Option 2 B passes close to residential and business receptors for entire length.
Air quality	Not within an AQMA. Potential air quality effects on the future residents at the Hemphill Hall development.	Not within an AQMA. Potential air quality effects as this route option would pass close to residential receptors for much of its length in Kimberley.	Option 1A would pass through an AQMA (declared for nitrogen dioxide). Potential air quality impacts on sensitive receptors that are located almost along the entire length of Option 1A.	Not within an AQMA. Potential for air quality effects for sensitive receptors that are located along most of the route option.	Not within an AQMA. Potential for air quality effect as Option 2 passes close to sensitive receptors for much of its length in Kimberley.	Not within an AQMA. Potential for air quality effect as Option 2A passes close to residential receptors and within the grounds of Kimberley School.	Not within an AQMA. Potential for air quality effect as Option 2B passes close to residential and business receptors for entire length.
Historic environment	Potential for effect on of Grade II listed buildings at Hemphill Hall (located approximately 70m from the common section).	Potential for effect on: <ul style="list-style-type: none"> Grade II listed building associated with Kimberley Brewery (approximately within 60m of Option 1); Kimberley Conservation Area. 	Potential effect on: <ul style="list-style-type: none"> Nuthall and Kimberley Conservation Areas;and listed buildings in Nuthall area. 	Potential for effect on Kimberley Conservation Area.	Demolition of buildings in a Conservation Area would have a potential for effect on the Conservation Area. Conservation Area consent will be required for building demolition.	No historic assets identified at this stage	No historic assets identified at this stage
Ecology and trees	Potential effect on: <ul style="list-style-type: none"> a locally-designated Site of Importance for 	Passes through Kimberley Railway Cutting, a SSSI for paleo-botany. Consent would be	No important ecological features identified at this stage.	No important ecological features identified at this stage.	Passes through a site locally-designated as a Site of Importance for Nature	No important ecological features identified at this stage.	No important ecological features identified at this stage.

Environmental criteria	Common section	Option 1	Option 1A	Option 1B	Option 2	Option 2A	Option 2B
	Nature Conservation; <ul style="list-style-type: none"> reptiles - Known to be present in vicinity of Hempshill Hall; and potential bat foraging habitats. 	required from Natural England for development to take place here. Represents a potential significant effect on programme and so would need to be managed early into the project. Also passes through locally-designated Sites of Importance for Nature Conservation. Collective TPO in vicinity of Kimberley Brewery site.			Conservation.		
Open space and Green Belt	Potential effect on Protected Open Space in the Hempshill Hall area. Development within Green Belt will require further justification in the consenting process. Part of the alignment is classed as a Long Distance Trail.	Passes through areas designated as Green Belt. Development within Green Belt will require further justification in the consenting process.	Passes through an area of Green Belt near Nuthall. Development within Green Belt will require further justification in the consenting process.	Passes adjacent to an area designated as Green Belt. Development within Green Belt will require further justification in the consenting process.	Potential loss of visual bund in Buckingham Way area. Passes through areas of Green Belt. Development within Green Belt will require further justification in the consenting process Much of route length is a locally-designated Long Distance Trail. Would result in some loss of locally-designated open space.	Would require the loss of playing pitch provision. Uses land locally-designated as open space.	No designated formal open space or Green Belt identified at this stage.
Geology, soils and land contamination	Bedrock classified as a Principal	Passes through an area where	Bedrock classified as Principal and	Bedrock classified as both Principal	Much of length is historic landfill.	Bedrock classified as a Principal	Bedrock classified as a Principal

Environmental criteria	Common section	Option 1	Option 1A	Option 1B	Option 2	Option 2A	Option 2B
	Aquifer. No potential for land contamination identified at this stage.	superficial deposits are classified as a Secondary A Aquifer. Bedrock classified as Principal, Secondary A and Secondary B Aquifers. Potential for land contamination as Option 1 passes through a coal stores site and areas of historic landfill.	Secondary A Aquifers. No potential for land contamination identified at this stage.	and Secondary A Aquifers. No potential for land contamination identified at this stage.	Bedrock classified as Principal, Secondary A and Secondary B Aquifers.	Aquifer. No potential for land contamination identified at this stage.	Aquifer. No potential for land contamination identified at this stage.
Water environment	Area around Hemphill Hall is in Flood Zone 3. Consultation and agreement with the EA will be required for development within Flood Zone 3.	Area close to Giltbrook Retail Park classed as Flood Zone 3. Consultation and agreement with the EA will be required for development within Flood Zone 3.	No potential effect on the water environment is identified at this stage	No potential effect on the water environment is identified at this stage	No potential effect on the water environment is identified at this stage	No potential effect on the water environment is identified at this stage	No potential effect on the water environment is identified at this stage

At optioneering stage, the high level environmental appraisal has identified the following particular actions that need to be undertaken as the project progresses:

- Noise and vibration survey and assessment – for all options;
- Air quality assessment – for all options;
- Ecology – discussion with Natural England and local wildlife trust regarding Kimberley Cutting SSSI – for Option 1;
- Ecology – discussion with BBC regarding use of locally-designated sites – Common Section, Option 1 and Option 2;
- Public Open Space and Green Belt – discussion with BBC regarding Common Section, Option 1, Option 1A, Option 1B, Option 2 and Option 2A;
- Phase 1 and 2 land studies – for Option 1 and Option 2; and
- Water environment – discussion with EA regarding flood risk issues for Common Section and Option 1.

This is an initial list based on the limited work to date, and would need to be reviewed and developed should the scheme progress.

5. High Level Traffic Assessment

5.1 Assessment of Initial Option

A high level desktop assessment of the initial options was carried out to identify those existing priority junctions that would require signalisation and those existing signal junctions that would require modification to facilitate tram operation; in both instances, tram priority would also be required. A high level review of potential traffic implications was also carried out at this time. The results of this high level assessment were;

5.1.1 Option 1

As this option runs along either green belt land or the former railway corridor for its entirety, there will be no interaction between traffic and tram other than at a number of locations where the proposed route crosses carriageways that will need to be controlled by traffic signals. These locations are outlined here:

- New Farm Lane tram crossing – New Farm Lane is a lightly trafficked road with few properties on it, it is envisaged that providing a tram crossing here will have little detrimental effect to the tram or general traffic at the proposed location.
- Main Road tram crossing – Main Road is the B600 with a number of properties and side roads leading off it, as such it is expected to be heavily trafficked at the proposed location of this tram crossing. It may also be necessary to take the junction with Newdigate Road into account within the traffic signals; this would alter the tram crossing to a signalised junction with an allowance made for the tram. It should be possible to give the tram full priority, but the impact on traffic will need to be assessed.
- Hardy Street tram crossing - Hardy Street is a lightly trafficked road with few properties on it, it is envisaged that providing a tram crossing here will have little detrimental effect to the tram or general traffic at the proposed location.
- Eastwood Road tram crossing – Eastwood Road is one of the main roads in Kimberley, with a few side roads leading off it to existing residential estates. It is expected to be heavily trafficked at the proposed location of this tram crossing. It should be possible to give the tram full priority, but the impact on traffic will need to be assessed.
- Gin Close Way tram crossing – Gin Close Way is the A6096 and the proposed location of the tram crossing is adjacent to the junction of the A6096 with the A610, because of this it is envisaged Gin Close Way will be heavily trafficked at this location. It should be possible to give the tram full priority, but the impact on traffic will need to be assessed.
- A610/A6069/B6010 junction- This junction is a partially signalised roundabout, with the proposed Option 1 route crossing the western side of the junction. The Gin Close Way approach is signalised at the roundabout; the layout and traffic signals will require modification to take the tram into account. The eastbound offslip from the A610 is currently give-way; depending on the alignment of Option 1 at this location, it may be necessary to signalise this approach as well. The interaction of the trams and traffic will need to be carefully assessed at this roundabout.

5.1.2 Option 1A

This route follows the Option 1 route until it crosses the M1, where it turns left and runs to Kimberley Road via Back Lane and Watnall Road. It runs on street along Kimberley Road, Nottingham Road, Main Street and Eastwood Road before it re-joins Option 1 in the vicinity of Church Hill. Kimberley Road, Nottingham

Road, Main Street and Eastwood Road all have residential roads running off them and are expected to be busy.

None of the junctions on this on street section are currently signalised, but it will be necessary to signalise the Kimberley Road/Watnall Road junction to enable the tram to join/leave Kimberley Road with priority. The junction of Main Street and Victoria Street is currently a mini roundabout and it will be necessary to signalise this junction to enable the tram to be given priority. The interaction of the trams and traffic will need to be assessed at both of these junctions. There are two zebra crossings on Main Street and these will need to be converted into traffic signal controlled crossings, PUFFIN or TOUCAN, to enable the tram to be given priority.

5.1.3 Option 1B

This route follows Option 1 until the point it crosses Eastwood Road, where it turns right and runs on street on Eastwood Road towards the Giltbrook retail park. The off street section of this Option will pass through the New Farm Lane and Main Road tram crossings as described for Option 1.

It will be necessary to create a signalised junction where Option 1B leaves the former rail corridor and joins Eastwood Road to enable the tram to proceed with priority. It should not be necessary to signalise any of the junctions on Eastwood Road between the former rail corridor and the roundabout adjacent with the Giltbrook retail park, although there is an existing controlled pedestrian crossing adjacent to Maws Lane and this will need to be modified to enable the tram to be given priority. The junction adjacent to the Giltbrook retail park is a priority roundabout and this will need to be converted to a signalised junction to enable the tram to cross onto the land between the retail park and the A610/A6069/B6010 junction with priority.

5.1.4 Option 2

This route follows Option 1 to a point approximately 350m west of the M1, the point at which Option 1 heads north towards the northern former railway corridor. Option 2 continues along the southern former railway corridor and re-joins Option 1 further west adjacent to the proposed Gin Close Way tram crossing. This option is entirely off street with traffic interaction at a number of locations where the proposed route crosses carriageways that will need to be controlled by traffic signals; including New Farm Lane tram crossing, Gin Close Way tram crossing and the A610/A6069/B6010 junction as described for Option 1.

Having left Option 1 the locations for traffic signals before re-joining it are;

- Main Road tram crossing – This will be in the vicinity of Buckingham Way and Corbiere Avenue, Main Road is the B600 with a number of properties and side roads leading off it, as such it is expected to be heavily trafficked at the proposed location of this tram crossing. There is an existing controlled pedestrian crossing at this location and this will need to be incorporated in the tram crossing. It should be possible to give the tram full priority, but the impact on traffic will need to be assessed.
- Newdigate Road tram crossing – Newdigate Road has a number of properties and side roads leading off it, and as such it is expected to be heavily trafficked at the proposed location of this tram crossing. It should be possible to give the tram full priority, but the impact on traffic will need to be assessed.
- Awsworth Lane tram crossing - Awsworth Lane is a lightly trafficked road with few properties on it, it is envisaged that providing a tram crossing here will have little detrimental effect to the tram or general traffic at the proposed location.

5.1.5 Option 2A

This Option follows the route of Option 2 up to the Kimberley School fields, where it turns left and terminates within the compound of a school field. This Option will have two signal controlled tram crossings; at New Farm Lane, as described for Option 1, and at Main Road, as described for Option 2.

5.1.6 Option 2B

This Option is a combination of Options 1 and 2; following Option 1 to a point approximately 350m west of the M1, at which point it continues along the southern former railway corridor as per Option 2 till it reaches Main Road. Here the route heads north on Main Road until it re-joins Option 1 at the point where it crosses Main Road. The majority of this Option is off street with traffic interaction at a number of locations where the proposed route crosses carriageways that will need to be controlled by traffic signals; including New Farm Lane tram crossing, Awsworth Lane tram crossing, Gin Close Way tram crossing and the A610/A6069/B6010 junction as described for Option 1.

In addition to the tram crossing/junctions that will need signal control as described for Option 1; this Option will also require the following locations to be signal controlled.

- Southern Main Road junction – This will be in the vicinity of Buckingham Way and Corbiere Avenue, Main Road is the B600 with a number of properties and side roads leading off it, as such it is expected to be heavily trafficked at the proposed location of this junction; the junction is required to enable the tram to join/leave Main Road with priority. There is an existing controlled pedestrian crossing at this location and this will need to be incorporated in the traffic signals for the junction. It should be possible to give the tram full priority, but the impact on traffic will need to be assessed.
- Northern Main Road junction – This will be in the vicinity of Newdigate Road and it may be necessary to take this into account within the traffic signals; the junction is required to enable the tram to join/leave Main Road with priority. As with the Southern junction, Main Road is expected to be heavily trafficked at the proposed location of this junction. It should be possible to give the tram full priority, but the impact on traffic will need to be assessed.

5.1.7 Park and Ride Sites

Two initial locations for potential Park and Ride sites were also identified, adjacent to Low Wood Road and adjacent to the A610 opposite the Giltbrook Retail Park. These were reviewed as part of the high level desktop assessment.

The site adjacent to Low Wood Road is in close proximity to the existing Phoenix Park Park and Ride facility and therefore may not appear to be in an ideal location. However it should be noted that the Phoenix Park Park and Ride has been observed to be at full capacity and may not be able to deal with an increase in future demand. Hence a new Park and Ride facility off Low Wood Road would increase the parking capacity and cater for future demand.

The site adjacent to the A610 appeared to be the better location as it is at the end of the initial options, so will catch drivers before they head further along the A610. It may attract traffic from the M1 making that stretch of the A610 busier, but it would also probably take some of the traffic off the A610 that is currently going to the Park and Ride site at Phoenix Park. A new access junction to the Park and Ride site off the A610 would be required for general traffic.

5.2 Refinement of Options

A meeting was held with Broxtowe Borough Council on 8th June and the number of Options was reduced to four by discounting 1A and 2A; the remaining four options were refined and alignment and constraint plans were produced. Following this work a site visit was undertaken of the remaining four options on 15th June, and a subsequent meeting with members of Nottinghamshire County Council's Traffic Signals Team was held on 18th June to gain a more detailed insight into the existing traffic conditions and any future developments that might impact on tram operation. The potential Park and Ride site adjacent to Low Wood Road was retained, but the potential site adjacent to the A610 was discounted with one new potential site identified. This Park and Ride site is located south of the A610 with an access off Gin Close Way.

The following sections identify observations from the site visit and comments from Nottinghamshire County Council's Traffic Signals Team regarding the four remaining options.

5.2.1 Option 1

During the site visit it was observed that queues from the A610 junction build up on Low Wood Road during the morning peak, and extend beyond the entrance to the proposed Park and Ride site at this location; from the meeting it is apparent that this does not occur during the evening peak. The Park and Ride access should be signalised and co-ordinated with the traffic signals at the junction. Concerns were expressed during the meeting that the proposed site was very close to the existing Park and Ride site at Phoenix Park.

Both the site visit and the meeting confirmed that the proposed tram crossing of New Farm Lane should not be a problem.

It was observed that, at the location where the route is proposed to cross Main Road, Newdigate Road is a popular cut through to Kimberley; this was confirmed by the County's Traffic Signal Engineers during the meeting. It was also mentioned that Main Road could get busier at this location due to the proposed Rolls Royce development at Hucknall Aerodrome.

At the proposed tram crossing of Hardy Street, it was highlighted that there could be visibility problems to the crossing from the south, which would need to be investigated and addressed in the next stage. The old brewery site is currently being developed, which could mean Hardy Road becomes busier.

The route is proposed to cross Eastwood Road and proceed to the north of the existing Kimberley depot. The depot site is earmarked for potential residential development and it was discussed that it was likely that access to the development would have to be along the tram route for some of its length.

At the far end of the route, Gin Close Way gets very busy in the evening peak heading towards the roundabout junction with the A610 and this is likely to impact the proposed junction for the Park and Ride site at this location; which is currently proposed to be a priority junction. The County's signal engineers did not like the proposed arrangement of a signalised tram crossing with priority junctions for the Park and Ride site and builders merchants; they requested that this be looked at with a view to providing a signalised junction encompassing all three accesses, which was co-ordinated with the traffic signals at the junction. They also stated that while Gin Close Way is busy during the evening peaks, it is not the busiest approach to the A610 junction; so the operation of the roundabout as a whole would need to be reviewed if this option was taken forward, including visibility at some of the exits. It was queried during the meeting whether the Park and Ride site could be extended up to the roundabout.

5.2.2 Option 1B

In the meeting with the County's Traffic Signal Engineers, the safety of cyclists at the proposed junction where the route joins the carriageway at Eastwood Road was questioned. As the route for this Option heads along Eastwood Road, there was concern about the angle cyclists would need to cross the tracks.

A view was also expressed by the County's Engineers during the meeting that the on-street section of this Option along Eastwood Road could be slow due to the topography and layout of the carriageway. It was also noted that there would be loss of parking.

The junction of Eastwood Road with Maws Lane is a priority junction with an adjacent signal controlled pedestrian crossing, but the County has been asked to investigate signalising the junction and incorporating the pedestrian crossing; this has proved difficult.

The potential modifications to the layout of the roundabout outside the Giltbrook retail park were discussed during the meeting, and the County's Signal Engineers believe this would be better as a signalised crossroads. The northern approach to the roundabout currently experiences queuing back from the junction with Gilt Way during the evening peak, while the southern approach occasionally experiences queuing back from the A610 junction in the morning peak. The internal roundabout in the Gilt Brook retail park regularly creates queues back to the roundabout outside the retail park.

5.2.3 Option 2

At the location where the proposed route crosses Main Road there is an existing signalised pedestrian crossing that will need to be incorporated into the signalised tram crossing required. On the site visit it was apparent that the crossing is well used by both pedestrians and cyclists. It was felt that a tram crossing at this location would not be detrimental to general traffic.

During both the site visit and the meeting, the visibility to the proposed tram crossing where the route crosses Newdigate Street was queried; although it was felt this was not insurmountable. The County's signal engineers also requested that pedestrian crossings be incorporated into the design due to the close proximity of the school. The need for the access adjacent to the tram crossing was also questioned as it is very close.

It was observed on the site visit that the location of the proposed signalised junction where the route crosses Station Road is very quiet and there should be no detrimental impact on traffic; but the flows need to be understood due to the one-way section of Station Road to the west of the proposed junction.

The view of the County's traffic signal engineers of the proposed tram crossing of Awsworth Lane was that it is a very quiet road and there would be no detrimental impact to traffic with the tram running.

5.2.4 Option 2B

This option basically consists of a short stretch of on-street running on Main Road joining what would be the first part of Option 2 to the second part of Option 1. As such it would change the proposed tram crossing of Main Road adjacent to Corbiere Avenue (Option 2) into a signalised junction, and the layout of the proposed signalised junction of Newdigate Road with Main Road (Option 1) to accommodate the different tram movements required in the Option.

The County's traffic signal engineers viewed the two junctions as added complications and questioned if they, and this Option, were really needed.

5.3 Order of route preference from a traffic perspective (suggestion by Nottinghamshire County Council)

At the conclusion of the meeting with Nottinghamshire County Council's traffic signal engineers, they expressed an order of preference as to which Option they would like to see taken forward; this was

- Option 1 or Option 2 – they felt that these Options were very similar
- Option 2B
- Option 1B – this one was least preferable due to the on-street section along Eastwood Road

5.4 Alternative Network Improvements

Should none of the Options be taken forward, and a tramway not be constructed, it may be necessary to provide improvements to the road network to ease congestion that would otherwise be eased by the provision of a regular tram service. Potential improvements could include, but not be limited to;

- Provide additional lanes on the A610
- Modifications to the roundabouts at junctions of A610 with the M1 and the A6002 to improve capacity
- Provide tidal flow sections on the A610
- Local improvements on Eastwood Road to improve capacity

6. Park and Ride sites

Two locations have been studied for the potential of serving as park and ride facilities for the tramway extension to Kimberley and Giltbrook retail park. One is located on the west of Low Wood Road and the other is located to the east of Gin Close Way. They are shown on the following drawings:

- MMD-305248-AC-DWG-001 – Route Options Overview
- MMD-305248-AC-DWG-004 – Option 1, Sheet 3 of 10
- MMD-305248-AC-DWG-011 – Option 1, Sheet 10 of 10

The size of each park and ride area shown on the drawings above is based on an approximate parking capacity of 500 vehicles, based crudely on the Toton park and ride facility currently under construction as part of NET Phase Two.

6.1 Park and ride facility off Low Wood Road

This potential park and ride facility is located on the common section of all proposed route options and therefore can serve as a park and ride for all 4 options (Options 1, 1B, 2 and 2B). It is located in close vicinity to the existing Phoenix Park park and ride. It has been observed that the current Phoenix Park facility is at full capacity and may not be able to cater for any increasing demand. Therefore an additional facility would alleviate current conditions and cater for future demand.

An indicative access off Low Wood Road for this park and ride facility is shown on drawing MMD-305248-AC-DWG-004. This new junction would potentially be signalised. Some major highway widening works on Low Wood Road may be required to cater for the additional traffic generated by the new park and ride facility, particularly during peak hours.

6.2 Park and ride facility off Gin Close Way

This potential park and ride facility is only applicable to Options 1, 2 and 2B as it is located off Gin Close Way. A park and ride facility in this location has the potential to appeal to vehicle users heading east towards Nottingham from areas such as Giltbrook, Eastwood and Langley Mill. It would also supplement the existing Phoenix Park park and ride facility which is currently observed to be at full capacity.

An indicative access of Gin Close Way for this park and ride facility is shown on drawing MMD-305248-AC-DWG-011. This new junction would potentially be signalised. Some major highway widening works on Gin Close Way may be required to cater for the additional traffic generated by the new park and ride facility, particularly during peak hours.

7. Geotechnical Ground Risk

A separate geo-environmental desk study has been carried out to assess the ground risks for the various tramway extension options discussed (refer to report 305248-AC-DOC-002 Geo-environmental Desk Study and Preliminary Risk Assessment for details). Key risks and findings are highlighted in the extract from the report below:

Table 7.1 Summary of ground risk per option

Route Option	Overall Risk Rating	Key Risks
Common	Low	Potential settlement issues associated with Made Ground Bund adjacent to Phoenix Park & Ride and Alluvial Deposits through Hemphill Hall Development.
1	Moderate	Bearing capacity and settlement issues associated with running along GN&R landfill; Kimberley Cutting SSSI impact; Potential structural impact on underlying Main Road tunnel; Potential settlement issues associated with Alluvial Deposits; Potential for shallow mine workings/shafts; Potential for buried foundations.
1A	Negligible–Low	Low risk of potential settlement issues at the eastern extreme of this route within greenfield area; Low risk at western extreme of this route due to potential for shallow mine workings. Elsewhere on street running of negligible – low risk.
1B	Low	Potential settlement issues associated with shallow mine workings
2	Moderate-High	High risk of bearing capacity and settlement issues associated with running along GNR landfill (over a significantly greater length than Option 1) over the eastern 3 rd of the route; Moderate risk relates to the remainder of the route due to potential instability of existing GN&R embankment; potential for shallow mine workings/shafts and potential for buried foundations.
2A	Negligible–Low	-
2B	Negligible–Low	-

- The Common Section, Option 1, Option 1A, Option 2 and Option 2A traverse a Principal Aquifer (Cadeby Formation) over much of their length, with the western extents traversing a Secondary A Aquifer (Pennine Middle & Lower Coal Measures). There is a risk that trackform drainage if allowed to infiltrate into surrounding ground would contaminate the underlying aquifer, therefore positive drainage and interceptors may be required to mitigate this risk. Early discussion with the Environment Agency with respect to this risk is advised.
- Similarly there are numerous coal mining shafts and a significant potential for shallow coal mine workings over much of the area between Kimberley and the Giltbrook Retail Park terminus. Early liaison with the Coal Authority and on site detailed inspections are advised with respect to this risk.

8. Cost Estimates

8.1 Cost estimates

A summary table for the initial estimates for solely construction work and materials for Options 1, 1B, 2 and 2B is shown below. The estimates are at 2Q2015 prices and include allowances for a number of indirect costs to the contractor such as prelims (25%), traffic management (5%), design (10%), testing and commissioning (3%) and risk (5%). However the costs do not include for optimism bias, inflation or any Client and Sponsor costs. Detailed breakdowns of the estimates are included in Appendix B.

Table 7.1 Summary costs for Kimberley and Giltbrook retail park extension options

Route Option	Route Length (km)	Total Route Cost (£m)
Option 1	6.2	153
Option 1B (via Option1)	6.0	129
Option 2	6.2	139
Option 2B (via Option 2 & 1)	6.3	157

8.2 Assumptions and exclusions

This estimate is based on the assumptions below:

- Tram signalling deemed to be at crossover/turnouts and at stops shown on the drawings only.
- New signal interface with UTC deemed to be the total number of highway signalled junctions.
- A nominal Allowance has been made for noise and EMC mitigation measures.
- Disposal of excavated material assumed - 50% inert, 50% contaminated.
- Ground conditions are currently unknown and therefore the estimate is based on good conditions (i.e. CBR values > 5%).
- Mid-point height taken for ramps and retaining wall calculations.
- Width for site clearance taken as 8m wide on highways.
- An allowance has been made for lighting columns along route length.
- An allowance has been made for Utility diversion costs
- Tram stops are to a standard specification, no high quality public realm works allowed for.
- Parallel feeder cables can run in the 12 way duct route, and cost for cable is included within OLE costs.
- An allowance has been made for low voltage power for full length of route.
- Assumed standard kerbing.
- Assumed no works to footway required other than that covered by ancillary works to the highway. It does not allow for urban realm upgrades to paving.
- Three new substations included for each option
- Notional provisional sum allowance included for modification to NET Line One track.
- Provisional sum allowance for additional tram vehicles and modification/expansion of existing depot.
- Provisional sum allowance for land acquisitions.

Specific exclusions to the cost estimates include:

- No drainage attenuation is required.
- No allowance has been made for Sponsor costs.
- No allowance for contingency

- VAT
- The estimate is a base estimate - there is an allowance for estimating uncertainty but no allowance for project risk or any other allowances included within the rates apart from any allowances to compensate for urban area working.
- There is no allowance for works to any basements.
- No allowance has been made for operating, maintaining or renewal costs.
- No allowance has been made for specific landscaping or environmental mitigation works.
- No allowance has been made for Asbestos removal and disposal.

9. Programme

9.1 General

During the scheme development to TWA application process, the following linked technical workstreams are typically required:

- Route option selection
- Technical scheme development
- Environmental surveys, scoping and assessment
- Public consultation (formal and informal), plus major stakeholder consultation and negotiation
- Land referencing
- TWA application preparation including legal inputs and preparation of application material. This will also cover material for linked processes such as any listed building or conservation area consent applications, deemed planning consents and protected species processes

Other linked workstreams will be ongoing in parallel, including for example strategic transport modelling, appraisal and business case work

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Table 8.1 Summary of key activities for technical workstreams from scheme development to TWA application

Workstream	Current status	Future Work	Comments
Technical scheme development	<p>Initial route options developed as part of this study, including indicative park and ride locations and accesses.</p> <p>Preliminary traffic assessment for route options, highlighting impacts on existing flows and junctions with the introduction of the tramway</p>	<p>Confirm preferred scheme (or develop further options), including confirming safeguarding arrangements through all potential development sites.</p> <p>Confirm tramstop locations for preferred scheme.</p> <p>Confirm preferred location for park and ride facility and required parking capacity.</p> <p>Confirm and document robust audit trail for arriving at preferred scheme.</p> <p>Continue to develop scheme proposals. This will include:</p> <ul style="list-style-type: none"> • addressing consultation and stakeholder feedback • iteration with emerging environmental impact assessment to seek to minimise or mitigate impacts and maximise environmental benefits • considering value engineering opportunities • further technical development including traffic capacity modelling, further development of engineering layout and traffic management proposals, development of construction methodology 	<p>Formal 'Design Freeze' process recommended to allow EIA to be based on frozen design and to allow TWA application preparation to commence in earnest. This should include for iteration between design processes and emerging environmental assessments.</p>
Environmental surveys, scoping and assessment	<p>Preliminary desk-based appraisal for route options highlighting key environmental issues</p>	<p>Baseline surveys across various environmental topics and consultation with statutory bodies required.</p> <p>Geo-environmental targeted intensive investigation</p> <p>Preparation of EIA scoping report and obtaining formal scoping opinion.</p> <p>Environmental Impact Assessment, inputs to design iteration to mitigate / minimise environmental impacts, preparation of formal Environmental Statement including detailed discipline reporting.</p> <p>Associated documentation including Sustainability Appraisal, Equalities Impact Assessment, Health Impact Assessment, Flood Risk Assessment.</p>	
Public and stakeholder consultation	<p>Discussions with Broxtowe Borough Council</p>	<p>Formal public consultation exercise, meeting current good practice.</p> <p>Ongoing consultation with main stakeholders including Hemphill Hall developer, Kimberley brewery site developer, Kimberley School, Kimberley depot site developer, Giltbrook retail park operator and businesses, other landowners / occupiers, Highways England, highway authority and HS2.</p> <p>Development of consultation database, looking to build audit trail of contact with affected parties and others.</p>	<p>Current good practice includes a 12 week formal public consultation period.</p> <p>Major stakeholder negotiation prior to TWA essential to confirm that the scope of the TWA application is sufficient to cater for any issues arising.</p>
Land referencing	<p>No formal land referencing undertaken</p>	<p>Initial 'soft' land referencing from publicly available information including land registry if required.</p> <p>Formal land referencing including formal Request for Information (RFI).</p>	

Workstream	Current status	Future Work	Comments
		Iteration with engineering workstream to develop and confirm land requirements to be included within TWA. Service of TWA notices.	
TWA application preparation	No specific work	Preparation of formal application documents. Critical ones include: <ul style="list-style-type: none">• Order document• Application for deemed planning consent• Works Plans• Environmental statement and supporting documents	

9.2 Potential programme

An outline programme from commencement of work in earnest through to TWA application, Public Inquiry and Secretary of State (SoS) decision is included in Appendix C. An indicative tender and bidding period and a high level construction programme is also included.

Based on experience on other similar schemes, we envisage a minimum programme around 18 months from commencement of scheme development and environmental works through to TWA application, with a further 14 months from application to SoS decision. This assumes that necessary surveys (including seasonal ecology surveys) are undertaken at a suitable time which does not delay the overall programme. Typically, a final scheme design freeze would be required a minimum of 3 months from the TWA application date to allow the EIA and land referencing to be finalised, with potentially additional time required to allow for sign-off processes within the Promoter. The overall programme required is influenced by a number of minimum periods required for individual activities – including for example the statutory period for formal scoping opinion, good practice for formal public consultation, reasonable timescales for awaiting responses to land referencing RFIs, and internal approval processes. The programme indicated also takes into account a range of typical timescales between key activities from application through to SoS decision, some of which are governed by maximum timescales set out in the TWA Inquiries Rules. We note that some of these timescales are influenced by factors outside the project team's control – including for example availability of an Inspector for the Public Inquiry.

It is of course important to take into account consultation feedback (and to be able to demonstrate at future Public Inquiry that this feedback has indeed been taken into account). It may be possible to achieve a shorter overall timescale than the 18 months indicated; achieving a shorter timescale would be dependent on the consultation resulting in only limited changes to the scheme design, and be dependent on the EIA and land referencing proceeding to some extent at risk prior to knowing the outcome of the consultation. It will also require overlap of certain activities rather than undertaking one after each other.

We also note that this indicative programme makes no specific allowance for other separate workstreams, such as transport modelling and business case development, and identification and securing of funding. These processes may well drive the overall scheme programme, and therefore delivery of TWA powers in approximately 2.5 years as indicated is likely to be the minimum period required.

An indicative allowance is made for the procurement process; the length of this process would vary depending on procurement method including whether the procurement was of a design and build contractor only, with operations and maintenance achieved through variation of the existing concession contract. Following the tender process and awarding of contract, the design and construction period for the tramway extension is estimated to take approximately 3 years, with an additional 6 months for testing and commissioning.

10. Operational Issues

10.1 Run time

Run time assessments have been carried out for the four shortlisted options, starting from the existing Phoenix Park tramstop and terminating at Giltbrook retail park. Results of the assessments are tabulated below:

Table 9.1 Summary of run times for route options

Option	Approximate route length	Number of proposed tramstops (excluding Phoenix Park)	Total run time (secs)	Total run time (mins & secs)
1	6.29km	5	722	12 mins 2 secs
1B (via 1)	5.98km	5	734	12 mins 14 secs
2	6.20km	5	728	12 mins 8 secs
2B (via 2 and 1)	6.31km	5	736	12 mins 16 secs

All run times are generated based on the following set of assumptions:

- A speed restriction of 35kph when running along the spine road of Hempshill Hall residential estate
- A speed restriction of 35kph when passing under the M1 motorway bridge
- A speed restriction of 35kph when running through the Kimberley brewery site
- A speed restriction of 35kph when running through the Kimberley depot site
- Trams reduced to a speed of 35kph on approach to junctions
- Trams have full priority at signalised junctions or crossings, therefore no delay has been attributed to run times
- In off-street sections, trams can travel at a top speed of 70kph
- 25 second dwell time at all proposed tramstops

The above run times have been generated based solely on the horizontal alignment of route options, as no vertical alignment design has been carried out. There may be scope to improve run times with track cant when the vertical alignment design is developed but there may also be a possibility of an increase in run times due to adverse vertical alignment conditions.

10.2 Operating service pattern

According to the recent Concessionaire's Proposals drafted by Tramlink Nottingham, the NET Line One service is initially proposed to operate with a 6+6 service pattern at peak hours – i.e. 6 trams per hour per direction from Phoenix Park and 6 from Hucknall. This service will be increased to an 8+8 service pattern after 2 years and 4 months from the 'NET Line One Services Commencement Date'.

There are various potential operating scenarios that could be adopted for the network with the Giltbrook retail park extension:

- The existing NET Line One service pattern could be extended to Giltbrook retail park instead of terminating at Phoenix Park. This would mean an 8 trams per hour service from Giltbrook retail park to the city centre.
- Services to Giltbrook retail park could be superimposed on top of the existing NET Line One service – for example a 4 trams per hour service to Giltbrook retail park on top of the 8 trams per hour service to Phoenix Park. This scenario would require a new turnback facility at Phoenix Park for trams that are not

continuing to Giltbrook retail park. The additional services proposed in this scenario may create a strain on the existing single track section between Phoenix Park and Highbury Vale tramstops.

- Some of the existing NET Line One services to Phoenix Park could be extended to serve Giltbrook retail park, with potential for some additional services superimposed on top – for example a 6 trams per hour service terminating at Phoenix Park and a 4 trams per hour service to Giltbrook retail park. This scenario would also require a new turnback facility and may create a strain on the existing single track section with an increased frequency of 10 trams per hour.

Further discussions would be required with NCiC and Tramlink Nottingham to develop the optimum service pattern, taking into account any future planned changes to the operating timetable. On the assumption that the existing service frequency to Phoenix Park is maintained and extended towards Kimberley and Giltbrook retail park, 4 new vehicles may potentially be required.

11. Potential Future Extension

11.1 General

The possibility of an extension of the tramway westwards from Giltbrook retail park has been identified in this report. An indicative route from Giltbrook retail park to Langley Mill and a further extension towards Amber Valley is shown on drawing MMD-305248-AC-DWG-201 in Appendix A.

Detailed consideration of this route is beyond the scope of this study. However initial consideration of potential routes indicate that a route running on existing greenfield areas and crudely following the A610 alignment and Ripley Greenway appears technically feasible but would require land acquisitions and demolitions. Further consideration will also be required for potential spurs to serve residential areas in Eastwood and Heanor. The indicated position and orientation of the Giltbrook retail park terminus stop shown on drawing MMD-305248-AC-DWG-011 will require modification when the tramway extension to Langley Mill and Amber Valley are taken forward to the next stage of study / design.

Beyond this, key areas to focus on technical feasibility would include:

- the cross section of Station Road in Langley Mill and A6007 High Street in Loscoe, including provision for servicing / parking, cycling and existing bus stops to accommodate potential on-street running trams
- the cross section under the railway bridge on Station Road in Langley Mill, including height clearance for the tram and associated overhead line equipment
- vertical alignment on the approach to Tinsley Road bridge over the A610, and any structural issues with the existing bridge to accommodate tramway trackform and loading
- potential tramstop locations besides the termini in Langley Mill and Amber Valley
- key environmental issues as the route is mostly running in greenfield areas
- junction / traffic capacity issues at tramway crossings and on-street sections

12. Key Risks / Opportunities and Conclusions

This report has considered a number of options for a potential NET extension from the existing Line One Phoenix Park terminus to Kimberley and Giltbrook retail park.

Six initial options were identified in the first stage of this study, with two being route options discussed in the 2001 Atkins feasibility study. Two park and ride sites were also identified in this stage of the study, one adjacent to Low Wood Road and one to the south of A610, opposite Giltbrook retail park.

Following a review meeting with BBC on 8th June 2015, four options were taken to the next stage of study. The two options dropped from further study was Option 1A, which runs on-street along Kimberley Road, Nottingham Road and Main Street, and Option 2A, which spurs off Option 2 and terminates within Kimberley School grounds.

In the second stage of this study, route Options 1, 1B, 2 and 2B were assessed in greater detail in terms of capital costs, run times and key environmental and traffic issues. The park and ride site adjacent to Low Wood Road has been retained in its originally proposed location while the park and ride site originally proposed to the south of A610 was moved to a site adjacent to Gin Close Way, which was considered more accessible to the tramway. The following table provides a summary for these options:

Table 11.1 Summary of Options

Option ref	Summary description	Approx. route length	Run time	Land take / Demolition	Tramstop locations	Key spatial & Engineering issues	Environmental issues	Traffic issues	Capital cost estimate	Park and ride
1	Route commences from Phoenix Park park & ride, runs along former LNER and LMS railway corridors and terminates in Giltbrook retail park. One of the route options studied in 2001 Atkins report	6.29km	12 mins 2 secs	Land acquisition or potential demolition from properties: <ul style="list-style-type: none"> - No.1 Omer Court - No.2 Omer Court - No.3 Omer Court - No.4 Omer Court - No.33a Main Road - No.131 Newdigate Road - No.133 Newdigate Road - Kimberley Depot 	5 No tramstops proposed in the following locations: <ul style="list-style-type: none"> - West of Low Wood Road - East of Main Road - East of Hardy Street - East of Gin Close Way - Giltbrook retail park 	<ul style="list-style-type: none"> ■ New structures required: <ul style="list-style-type: none"> - Highway bridge for Low Wood Road over tramway - Culvert for drainage channel in former LNER railway corridor - Ramp structure west of Main Road and Omer Court properties - Tramway bridge over A610 - Tramway bridge over Awsworth Lane - Earth embankment between A610 and Awsworth Lane bridges - Culvert for Gilt Brook - Structural modifications to existing A610 bridge ■ Exact height clearance under M1 bridge will need to be confirmed ■ Restricted height clearance under A610 bridge ■ Potential difficulty routing tramway through Hempshill Hall. Kimberley Brewery and Kimberley Depot developments. 	<ul style="list-style-type: none"> ■ Potential effects on: <ul style="list-style-type: none"> - Grade II listed buildings at Hempshill Hall and Kimberley Brewery - Kimberley Conservation Area - Site of Importance for Nature Conservation - Protected Open Space in the Hempshill Hall area ■ Passes through Kimberley Railway Cutting, a SSSI for paleo-botany. Potential to have significant effect on programme. ■ Passes through Green Belt – may require further justification in consenting process. 	<ul style="list-style-type: none"> ■ Direct route, largely off-street ■ 6 No. new tram signalised crossings at: <ul style="list-style-type: none"> - New Farm Lane - Main Road - Hardy Street - Eastwood Road - Gin Close Way - A610 / A6069 / B6010 junction 	£164m	Potential park and ride sites: <ul style="list-style-type: none"> - Site west of Low Wood Road with access via Low Wood Road - Site east of Gin Close Way with access via Gin Close Way
1B (via 1)	Route diverges from Option 1 at Eastwood Road, runs on-street along Eastwood Road and terminates in Giltbrook retail park	5.98km	12 mins 14 secs	Land acquisition and potential demolition of properties: <ul style="list-style-type: none"> - No.1 Omer Court - No.2 Omer Court - No.3 Omer Court - No.4 Omer Court - No.33a Main Road - No.131 Newdigate Road - No.133 Newdigate Road 	5 No tramstops proposed in the following locations: <ul style="list-style-type: none"> - West of Low Wood Road - East of Main Road - East of Hardy Street - Eastwood Road - Giltbrook retail park 	<ul style="list-style-type: none"> ■ New structures required: <ul style="list-style-type: none"> - Highway bridge for Low Wood Road over tramway - Culvert for drainage channel in former LNER railway corridor - Ramp structure west of Main Road and Omer Court properties ■ Exact height clearance under M1 bridge will need to be confirmed. ■ Potential difficulty routing tramway through Hempshill Hall and Kimberley Brewery developments 	<ul style="list-style-type: none"> ■ Potential effects on: <ul style="list-style-type: none"> - Grade II listed buildings at Hempshill Hall and Kimberley Brewery - Kimberley Conservation Area - Site of Importance for Nature Conservation - Protected Open Space in the Hempshill Hall area ■ Passes through Kimberley Railway Cutting, a SSSI for paleo-botany. Potential to have significant effect on programme. ■ Passes through Green Belt – may require further justification in consenting process. 	<ul style="list-style-type: none"> ■ Largely off-street up to Eastwood Road, 1.2km on-street running along Eastwood Road and Gilt Hill ■ 6 No. new tram signalised crossings at: <ul style="list-style-type: none"> - New Farm Lane - Main Road - Hardy Street - Eastwood Road - Giltbrook retail park roundabout ■ Complicated junction arrangement through Giltbrook retail park roundabout. Existing queues at peak hours. Substantial traffic modelling required to identify optimum layout 	£135m	Potential park and ride sites: <ul style="list-style-type: none"> - Site west of Low Wood Road with access via Low Wood Road <p>No suitable site for a park and ride facility identified near the A610 unless proposed tramway is extended south</p>
2	Route commences	6.20km	12 mins 8 secs	Land acquisition and potential	5 No tramstops proposed in	<ul style="list-style-type: none"> ■ New structures required: 	<ul style="list-style-type: none"> ■ Potential effects on: 	<ul style="list-style-type: none"> ■ Direct route, largely 	£150m	Potential park and

Option ref	Summary description	Approx. route length	Run time	Land take / Demolition	Tramstop locations	Key spatial & Engineering issues	Environmental issues	Traffic issues	Capital cost estimate	Park and ride
	from Phoenix Park park & ride, runs along former LNER railway corridor and terminates in Giltbrook retail park			demolition of properties: <ul style="list-style-type: none"> - No.18 Chestnut Drive - No.20 Chestnut Drive - No.22 Chestnut Drive - No.24 Chestnut Drive - No.26 Chestnut Drive - No.28 Chestnut Drive - Kimberley School - Former railway station building - No.1 Station Road - No.1A Station Road - No.1 Church Hill - No.2 Church Hill 	the following locations: <ul style="list-style-type: none"> - West of Low Wood Road - East of Main Road / North of Buckingham Way - East of Station Road / Old station building - East of Gin Close Way - Giltbrook retail park 	<ul style="list-style-type: none"> - Highway bridge for Low Wood Road over tramway - Culvert for drainage channel in former LNER railway corridor - Ramp structure within 'Kimberley Nature Area' - Culvert for stream within 'Kimberley Nature Area' - Tramway bridge over Main Street - Tramway bridge over Church Hill - Tramway bridge over A610 - Culvert for Gilt Brook - Structural modifications to existing A610 bridge - Exact height clearance under M1 bridge will need to be confirmed. - Restricted height clearance under A610 bridge - Potential difficulty in bridging over Main Street due to insufficient clearance - Potential difficulty routing tramway through Hempshill Hall development 	<ul style="list-style-type: none"> - Grade II listed buildings at Hempshill Hall - Kimberley Conservation Area - Site of Importance for Nature Conservation - Protected Open Space in the Hempshill Hall area - Passes through Green Belt – may require further justification in consenting process. - Conservation Area - Consent required for building demolition within Conservation Area - Potential loss of visual bund in Buckingham Way area 	off-street <ul style="list-style-type: none"> - 6 No. new tram signalised crossings at: <ul style="list-style-type: none"> - New Farm Lane - Main Road - Newdigate Road - Awsworth Lane - Gin Close Way - A610 / A6069 / B6010 junction 		ride sites: <ul style="list-style-type: none"> - Site west of Low Wood Road with access via Low Wood Road - Site east of Gin Close Way with access via Gin Close Way
2B (via 2 and 1)	Route diverges from Option 2 at Main Road, runs on-street for a short section and re-joins Option 1 to run along former LMS railway corridor. Terminates in Giltbrook retail park.	6.31km	12 mins 16 secs	Land acquisition or potential demolition from properties: <ul style="list-style-type: none"> - No.1 Omer Court - No.2 Omer Court - No.3 Omer Court - No.4 Omer Court - No.33a Main Road - No.131 Newdigate Road - No.133 Newdigate Road - Kimberley Depot 	5 No tramstops proposed in the following locations: <ul style="list-style-type: none"> - West of Low Wood Road - Main Road - East of Hardy Street - East of Gin Close Way - Giltbrook retail park 	<ul style="list-style-type: none"> - New structures required: <ul style="list-style-type: none"> - Highway bridge for Low Wood Road over tramway - Culvert for drainage channel in former LNER railway corridor - Ramp structure west of Main Road and Omer Court properties - Tramway bridge over A610 - Tramway bridge over Awsworth Lane - Earth embankment between A610 and Awsworth Lane bridges - Culvert for Gilt Brook - Structural modifications to existing A610 bridge - Exact height clearance under M1 bridge will need to be confirmed - Restricted height clearance under A610 bridge - Potential difficulty routing tramway through Hempshill Hall. Kimberley Brewery and Kimberley Depot developments. 	<ul style="list-style-type: none"> - Potential effects on: <ul style="list-style-type: none"> - Grade II listed buildings at Hempshill Hall and Kimberley Brewery - Kimberley Conservation Area - Site of Importance for Nature Conservation - Protected Open Space in the Hempshill Hall area - Passes through Kimberley Railway Cutting, a SSSI for paleo-botany. Potential to have significant effect on programme. - Passes through Green Belt – may require further justification in consenting process. 	Largely off-street with a short section of on-street running tramway along Main Road (130m approx..) <ul style="list-style-type: none"> - 7 No. new tram signalised crossings at: <ul style="list-style-type: none"> - New Farm Lane - Main Road (South) - Main Road (North) - Hardy Street - Eastwood Road - Gin Close Way - A610 / A6069 / B6010 junction 	£168m	Potential park and ride sites: <ul style="list-style-type: none"> - Site west of Low Wood Road with access via Low Wood Road - Site east of Gin Close Way with access via Gin Close Way

At this stage of scheme development, it has not been possible to identify a clear order of preference for the four shortlisted options. Further technical work including 3-dimensional alignment development, environmental assessment and consultation would be required to provide a robust basis for preferred option selection.

The key project and technical risks and opportunities identified within this study, together with recommendations for next steps to address these, are highlighted as follows:

Table 11.2 Summary of key risks and opportunities

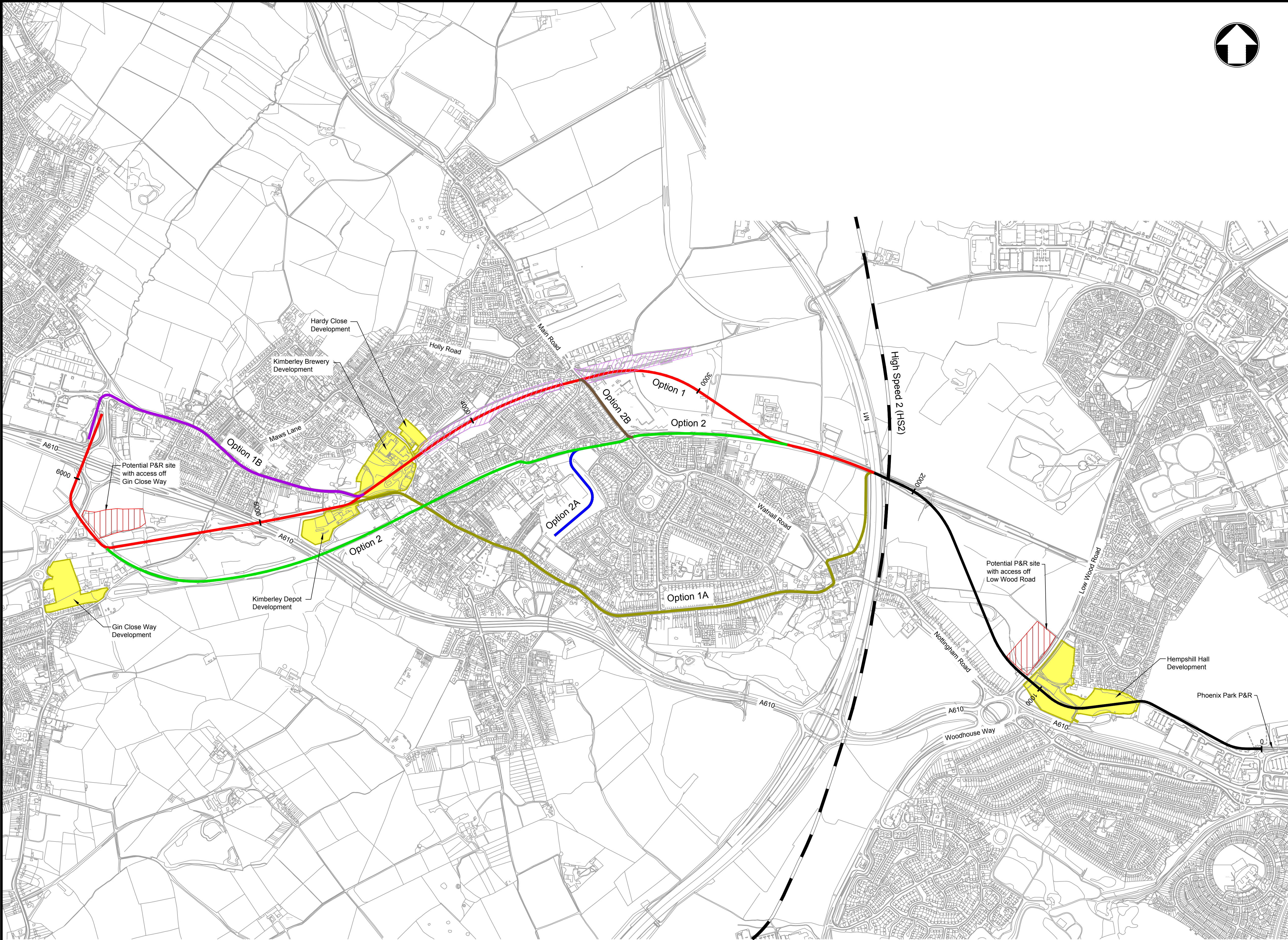
Risk / Opportunity	Impacts	Suggested actions to mitigate
Technical complexity of connection to NET Line One	Unexpected difficulties in tying in with NET Line One. Could result in greater disruption to NET Line One services and a less than optimum operational arrangement	Use topographical survey to inform more detailed investigation of existing track and surrounding park and ride levels. Determine optimum layout for modification of park and ride access
Significant environmental issue identified	Acceptability of NET extension questioned. Significant environmental mitigation required	Progress environmental studies including desktop and baseline surveys. To include in particular interface with SSSI in former LMS railway corridor
Interfaces with residential development sites	Planning applications for new developments progressed with limited allowance / safeguarding for NET extension	Ongoing discussions with BBC and developers / stakeholders, including agreeing what further information is needed. Likely to include further iteration on tramway and highway interface arrangements
Operating pattern, patronage and business case undefined	Strength of business and economic case for extension called into question. Difficulties in securing funding. Additional services to Kimberley and Giltbrook retail park may create a strain on single track section between Phoenix Park and Highbury Vale	Initial patronage / business case work, including consideration of different scenarios in relation to tram operating patterns. Ongoing discussion with Tramlink Nottingham
Vertical alignment proves more difficult than expected	Current design based on OS mapping with assumptions on relative ground levels. Detailed consideration results in more complex / more costly / slower track alignment geometry	Further design development against topographical survey information, particularly in areas identified as constraints. Including in particular height clearance under A610 bridge (Options 1, 1B, 2B) and at bridge over Main Street (Option 2)
Objection from major stakeholder	Sustained opposition to scheme proposals, including through TWA process	Further design development (utilising topographical survey) to confirm potential impacts on landowners and other stakeholders. Initial discussions with stakeholders.
Highway layout and junction capacity	Reduced tramway operating speeds through residential developments. Reduced priority to trams at existing Line One junctions due to increase in tram frequency generally. Exacerbating traffic conditions at peak hours	Further discussions with BBC and developers in relation to highway interface. Traffic assessment to be undertaken
Opportunity to improve the case for the extension proposition through further expansion	Improved case for extension	Consider in further detail potential onward expansion to Langley Mill and Amber Valley

Appendices

Appendix A. Scheme Drawings	62
Appendix B. Cost Estimates	63
Appendix C. TWA Programme	64

Appendix A. Scheme Drawings

Drawing No.	Drawing Title
MMD-305248-AC-DWG-001	Route Options Overview
MMD-305248-AC-DWG-001A	Route Options Overview – Aerial Mapping
MMD-305248-AC-DWG-002 to 011	Option 1 Route Alignment and Constraints Sheets 1 to 10
MMD-305248-AC-DWG-012 to 014	Option 1B Route Alignment and Constraints Sheets 1 to 3
MMD-305248-AC-DWG-015 to 019	Option 2 Route Alignment and Constraints Sheets 1 to 5
MMD-305248-AC-DWG-020	Option 2B Route Alignment and Constraints Sheet 1 of 1
MMD-305248-AC-DWG-101	Proposed Cross Section – M1 Underpass
MMD-305248-AC-DWG-102	Proposed Cross Section – Main Road tramstop
MMD-305248-AC-DWG-103	Proposed Cross Section – Eastwood Road
MMD-305248-AC-DWG-104	Proposed Cross Section – Gilt Hill
MMD-305248-AC-DWG-201	Potential Future Extensions to Langley Mill and Amber Valley



Notes

Key to symbols

Common section for all options

Option 1

Option 1A

Option 1B

Option 2

Option 2A

Option 2B

Indicative alignment of High Speed 2 (HS2)

Designated SSSI area

Potential P&R sites
(size and position indicative only)

Development sites

1000

Option 1 chainage reference

Reference drawings

P2	10.08.15	HT	Preliminary issue	DG	CTCG
P1	26.06.15	RD	Preliminary issue	DG	CTCG
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Title

NET Extension to Kimberley and Giltbrook Retail Park
Route Options Overview

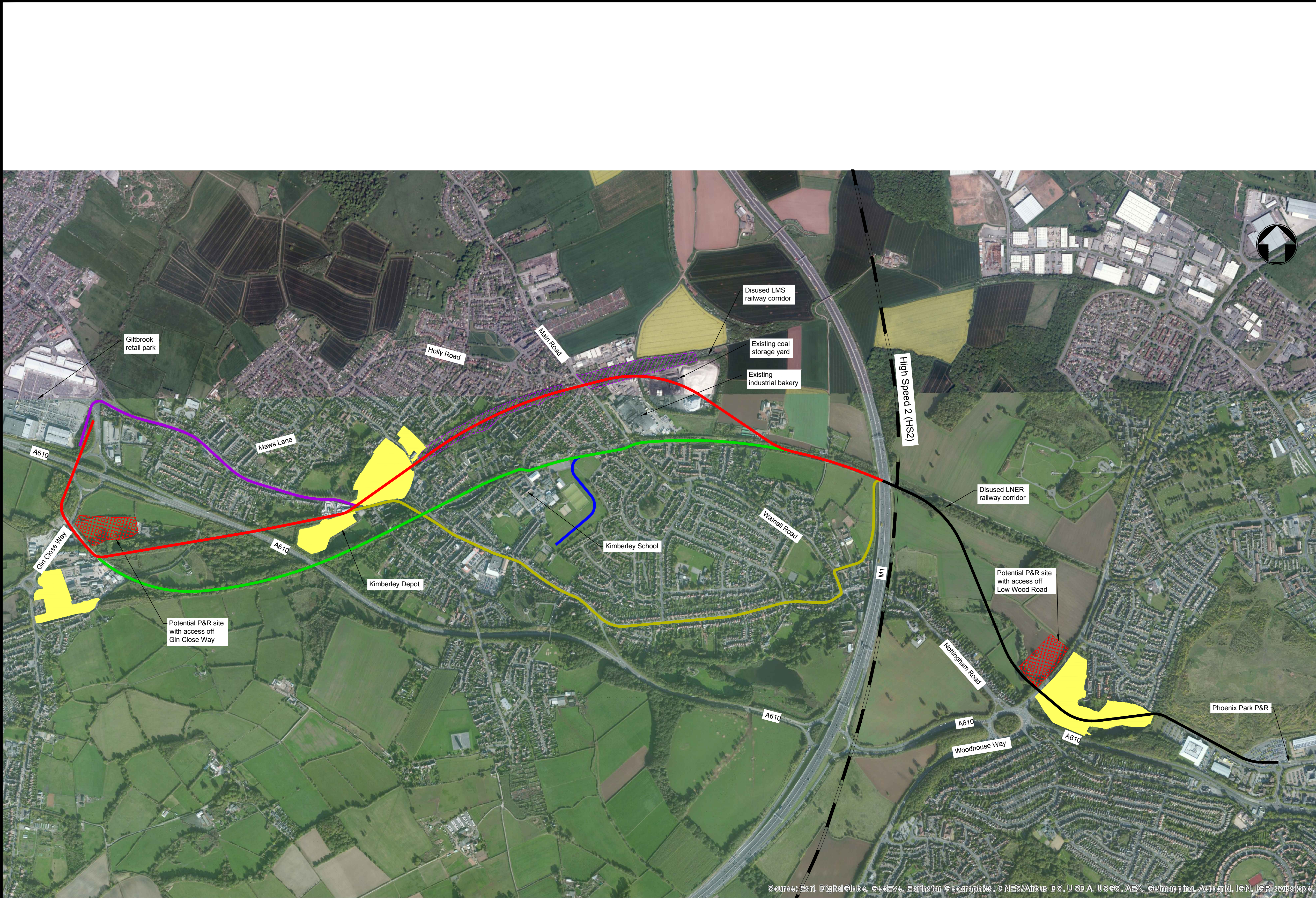
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Originals (CAD)\Outgoing Drawings\MMD-305248-AC-DWG-001.dwg Aug 14, 2015 - 4:41PM gjd46454



Notes

Key to symbols

- Common section for all options
- Option 1
- Option 1A
- Option 1B
- Option 2
- Option 2A
- Option 2B
- Indicative alignment of High Speed 2 (HS2)
- Designated SSSI area
- Potential P&R sites (size and position indicative only)
- Development sites

Reference drawings

P1	26.06.15	RD	Preliminary issue	DG	CTCG
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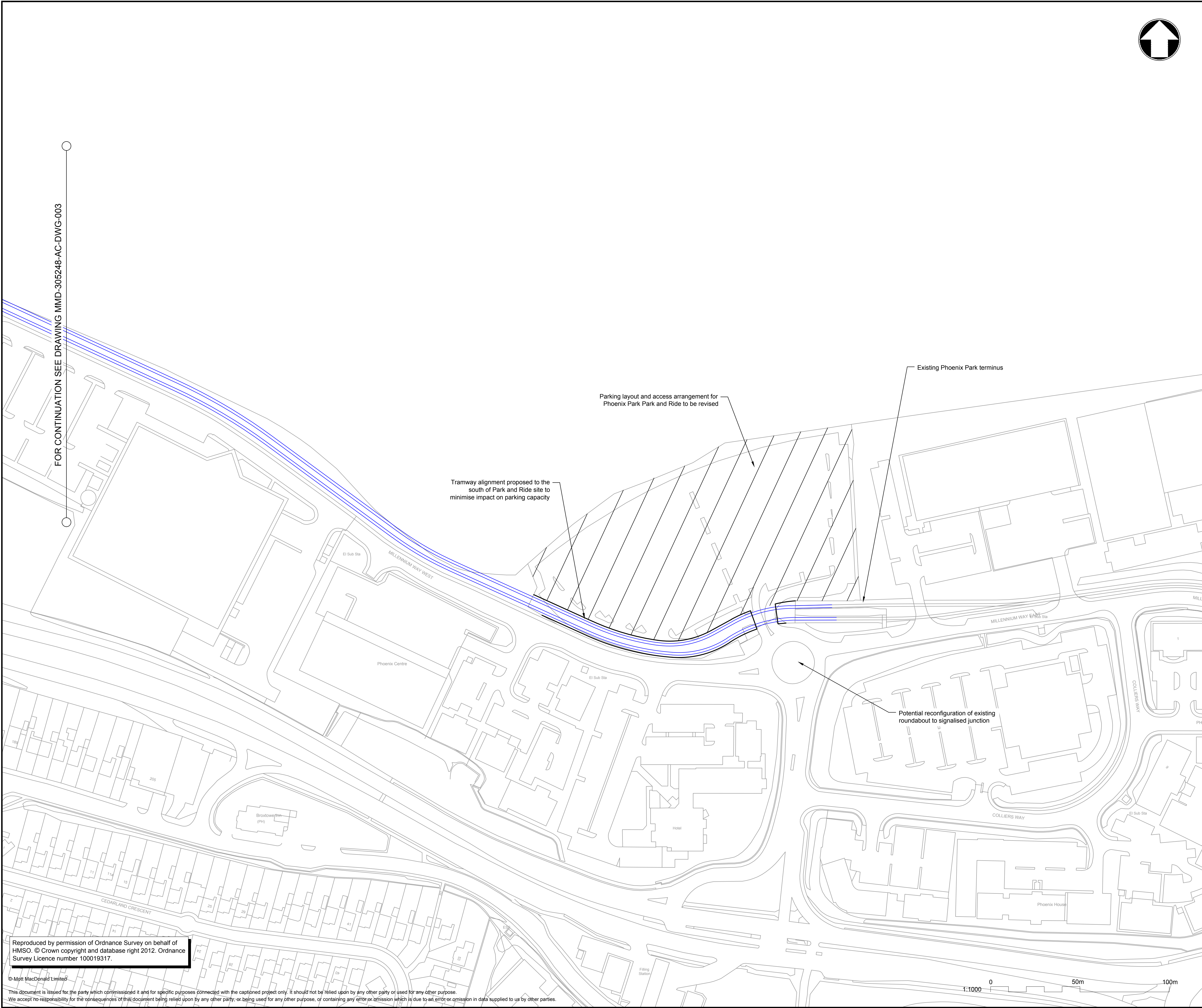
NET Extension to Kimberley and Giltbrook Retail Park
Route Options Overview
Aerial Mapping

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Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG
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Title

NET Extension to Kimberley and
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Option 1 - Route Alignment and
Constraints Plan
Sheet 1 of 10

Designed	D. Giam	DG	Eng check	D. Giam	DG
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Dwg check	R. Karamanis	RK	Approved	C Gibson	CTCG

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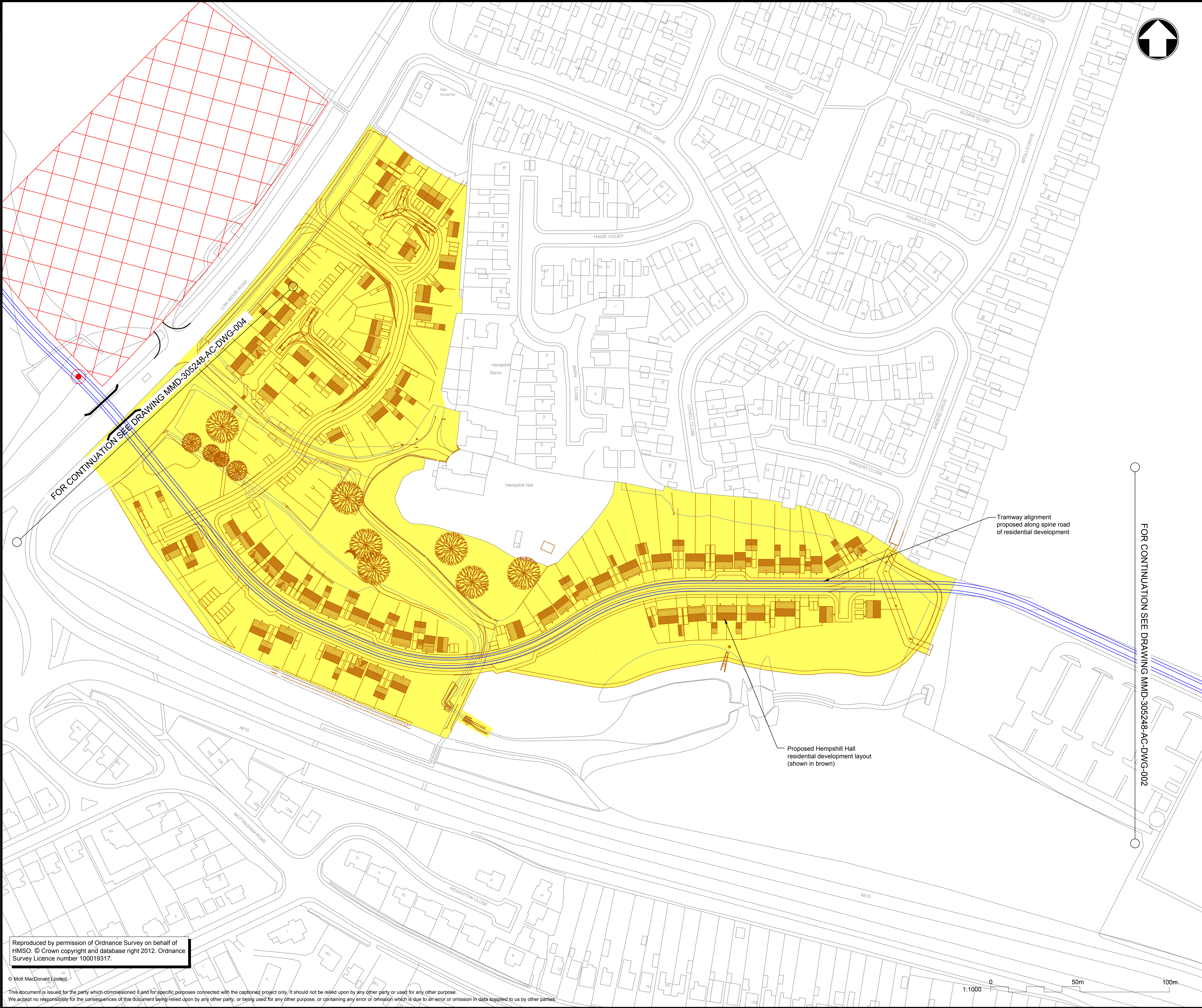
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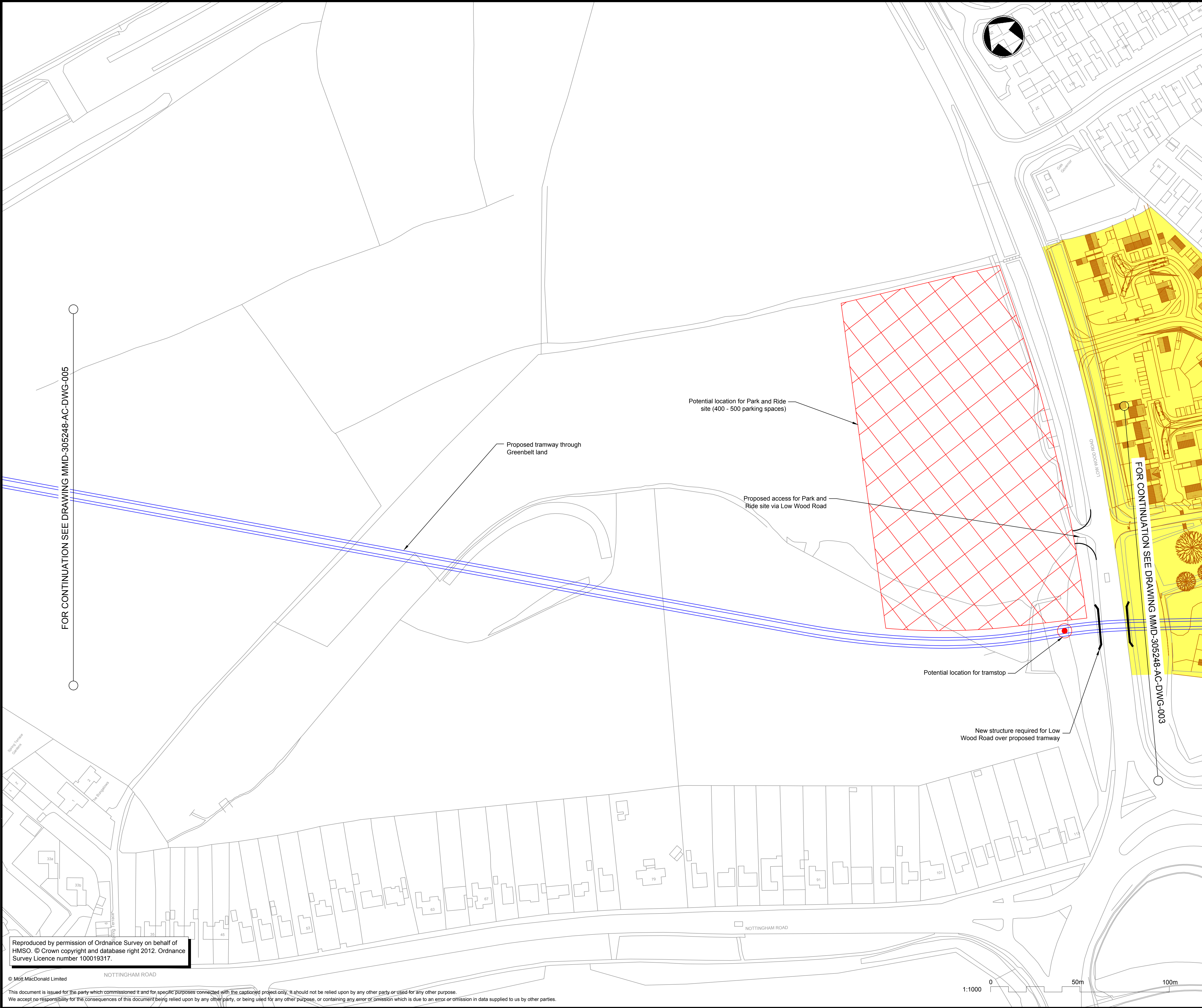
NET Extension to Kimberley and
Giltbrook Retail Park
Option 1 - Route Alignment and
Constraints Plan
Sheet 2 of 10

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NET Extension to Kimberley and
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Option 1 - Route Alignment and
Constraints Plan
Sheet 3 of 10

Designed	D. Giam	DG	Eng check	D. Giam	DG
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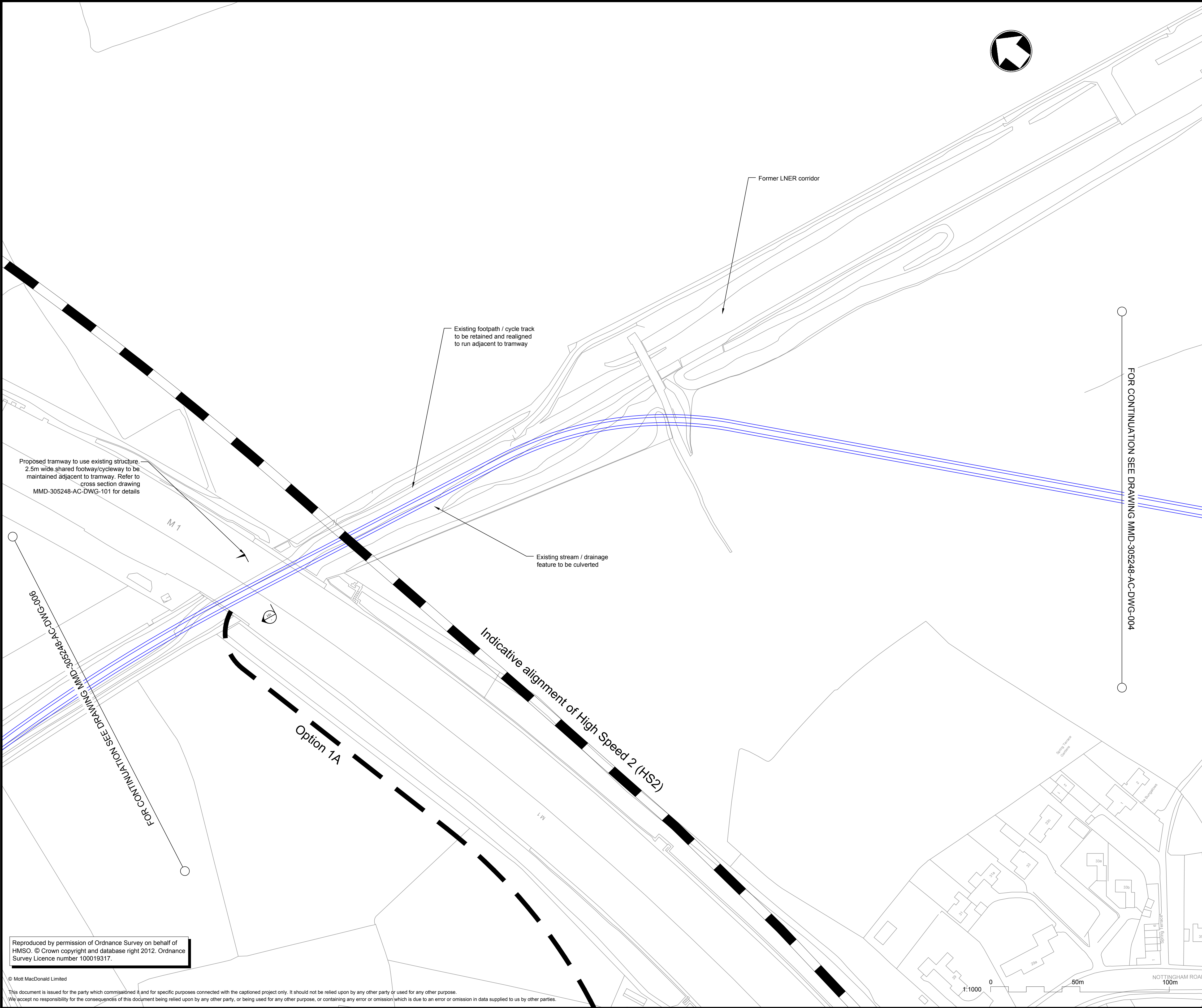
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Notes

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- Proposed Park and Ride site
- Designated SSSI area
- Proposed development along / in close proximity to tramway route
- Proposed bridge structure
- Proposed tramstop location
- Proposed demolition
- Proposed land-take areas

Reference drawings

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NET Extension to Kimberley and
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Option 1 - Route Alignment and
Constraints Plan
Sheet 4 of 10

Designed	D. Giam	DG	Eng check	D. Giam	DG
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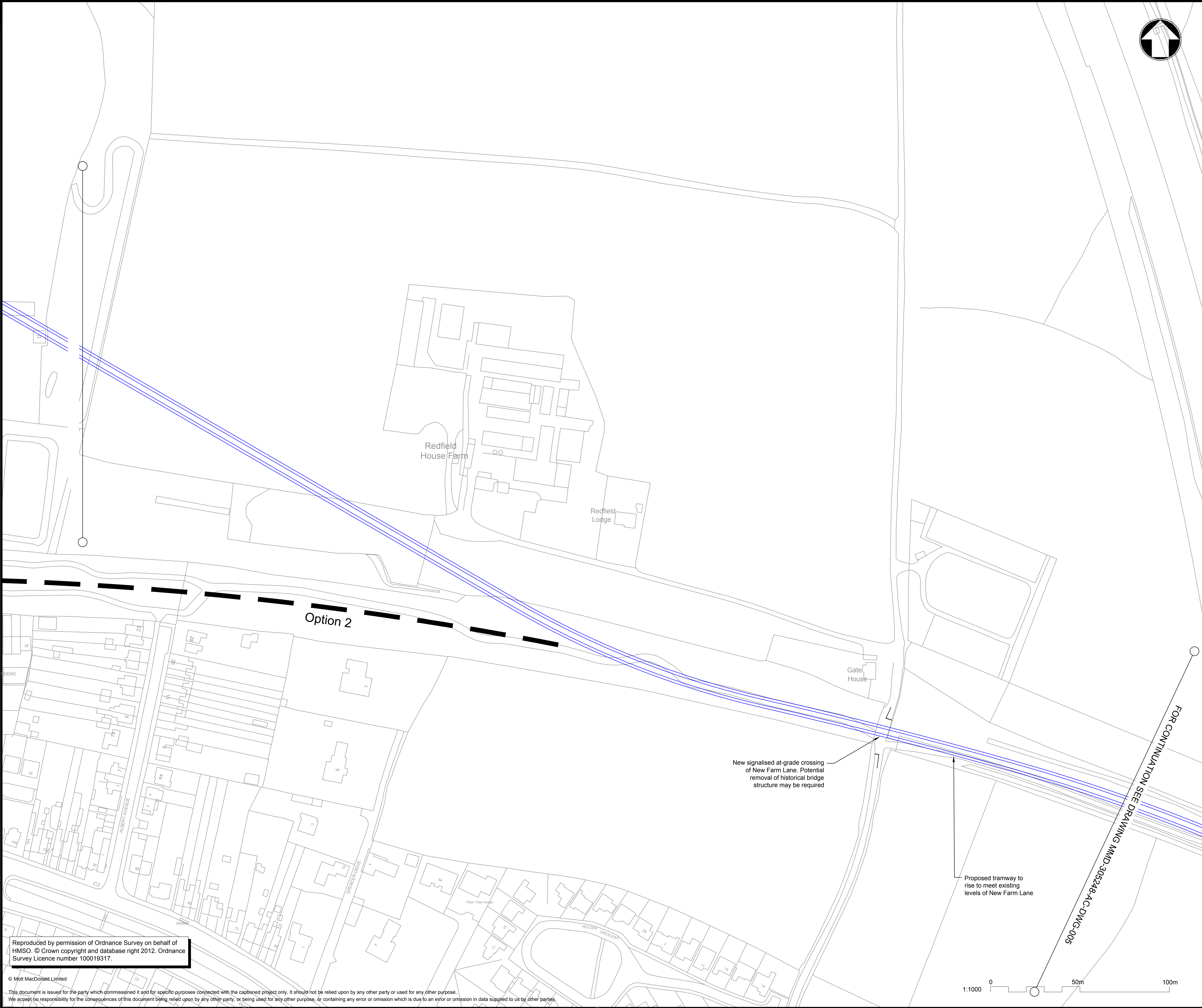
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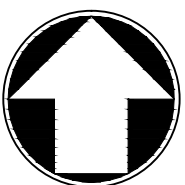
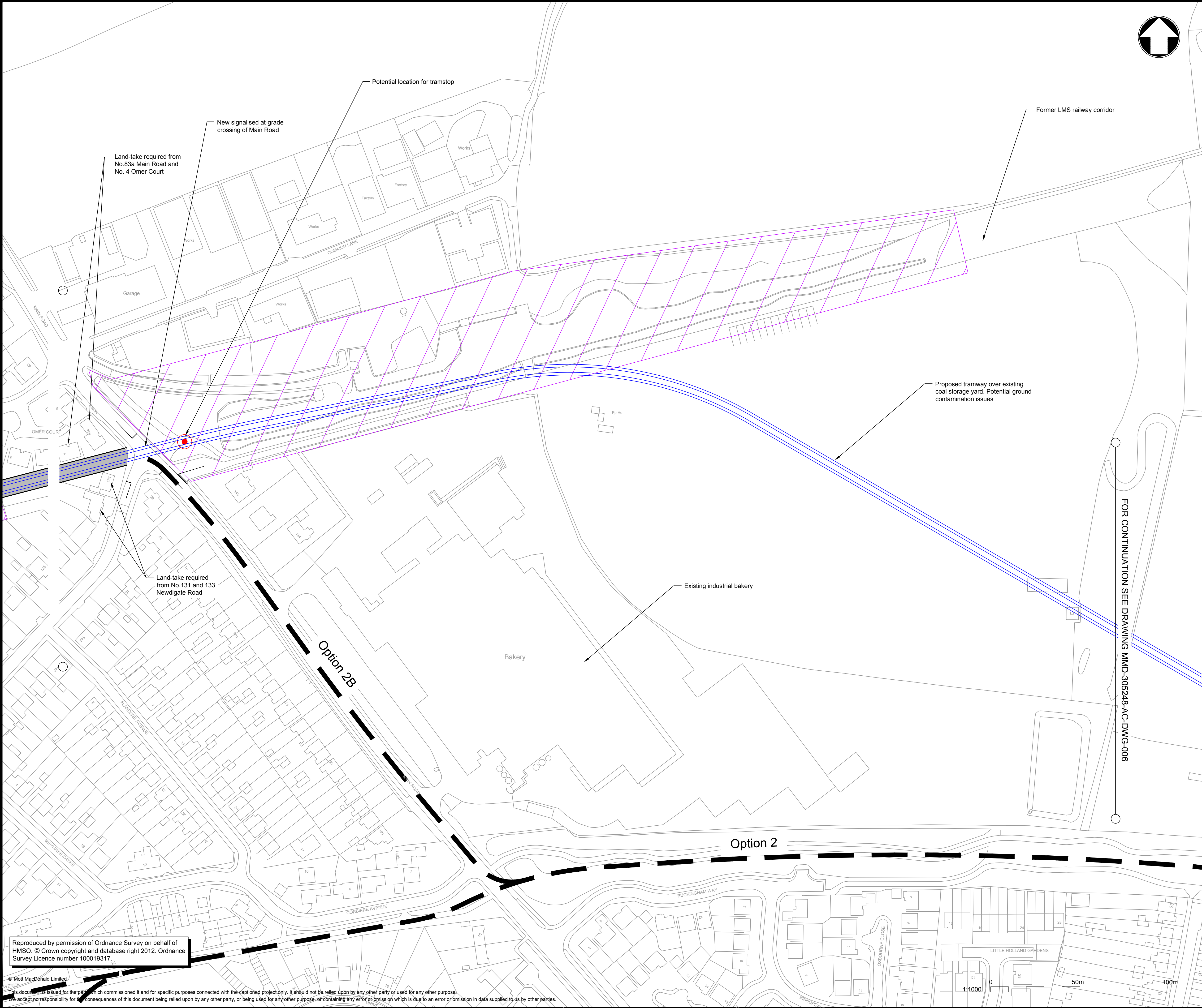
NET Extension to Kimberley and
Giltbrook Retail Park
Option 1 - Route Alignment and
Constraints Plan
Sheet 5 of 10

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Notes					

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	Proposed Park and Ride site				
	Designated SSSI area				
	Proposed development along / in close proximity to tramway route				
	Proposed bridge structure				
	Proposed tramstop location				
	Proposed demolition				
	Proposed land-take areas				

Reference drawings					
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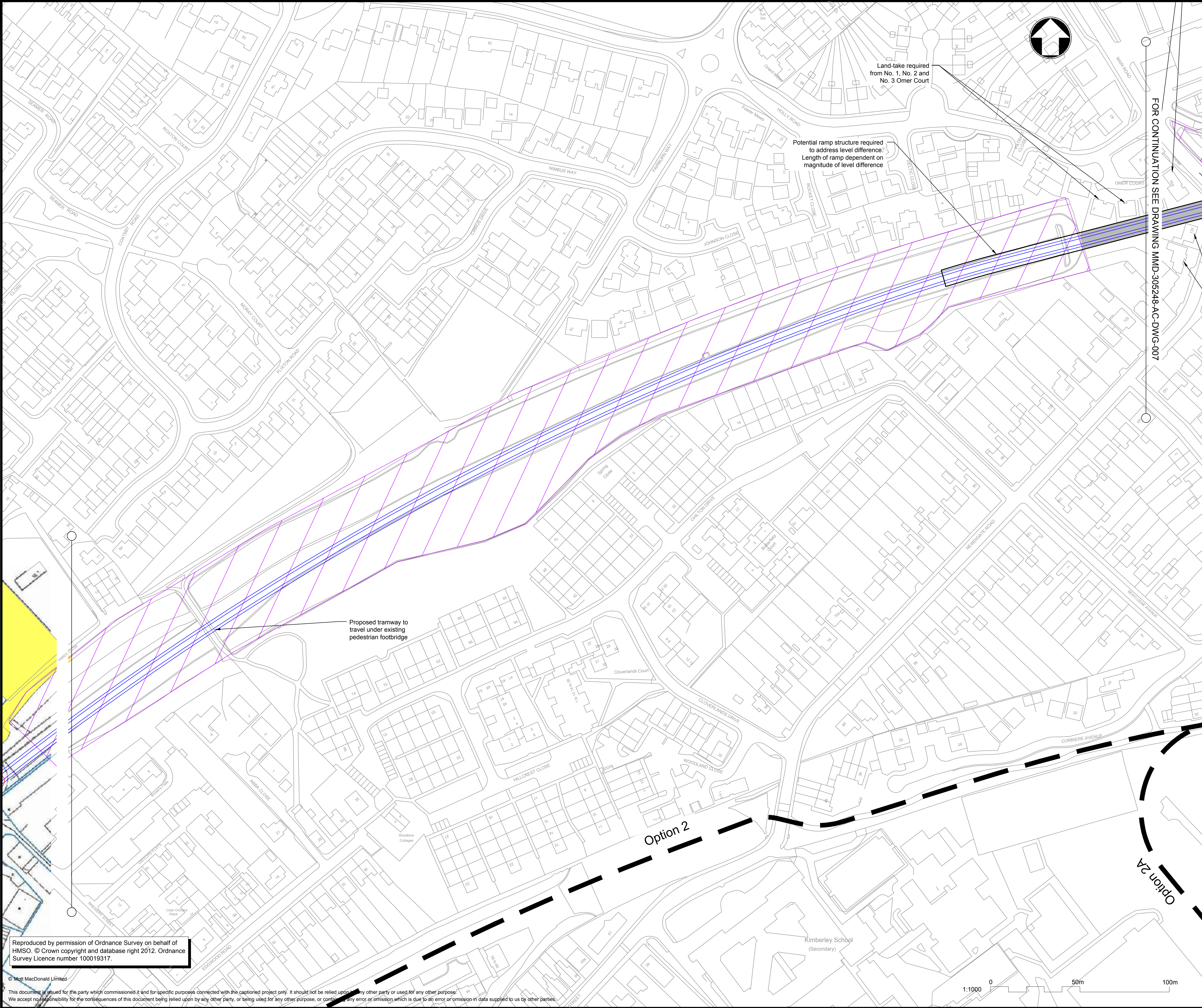
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NET Extension to Kimberley and Giltbrook Retail Park Option 1 - Route Alignment and Constraints Plan Sheet 6 of 10					
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- Proposed Park and Ride site
- Designated SSSI area
- Proposed development along / in close proximity to tramway route
- Proposed bridge structure
- Proposed tramstop location
- Proposed demolition
- Proposed land-take areas

Reference drawings

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Rev	Date	Drawn	Description	Ch'k'd	App'd

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NOTTINGHAM EXPRESS TRANSIT

Title

NET Extension to Kimberley and
Giltbrook Retail Park
Option 1 - Route Alignment and
Constraints Plan
Sheet 7 of 10

Designed	D. Giam	DG	Eng check	D. Giam	DG
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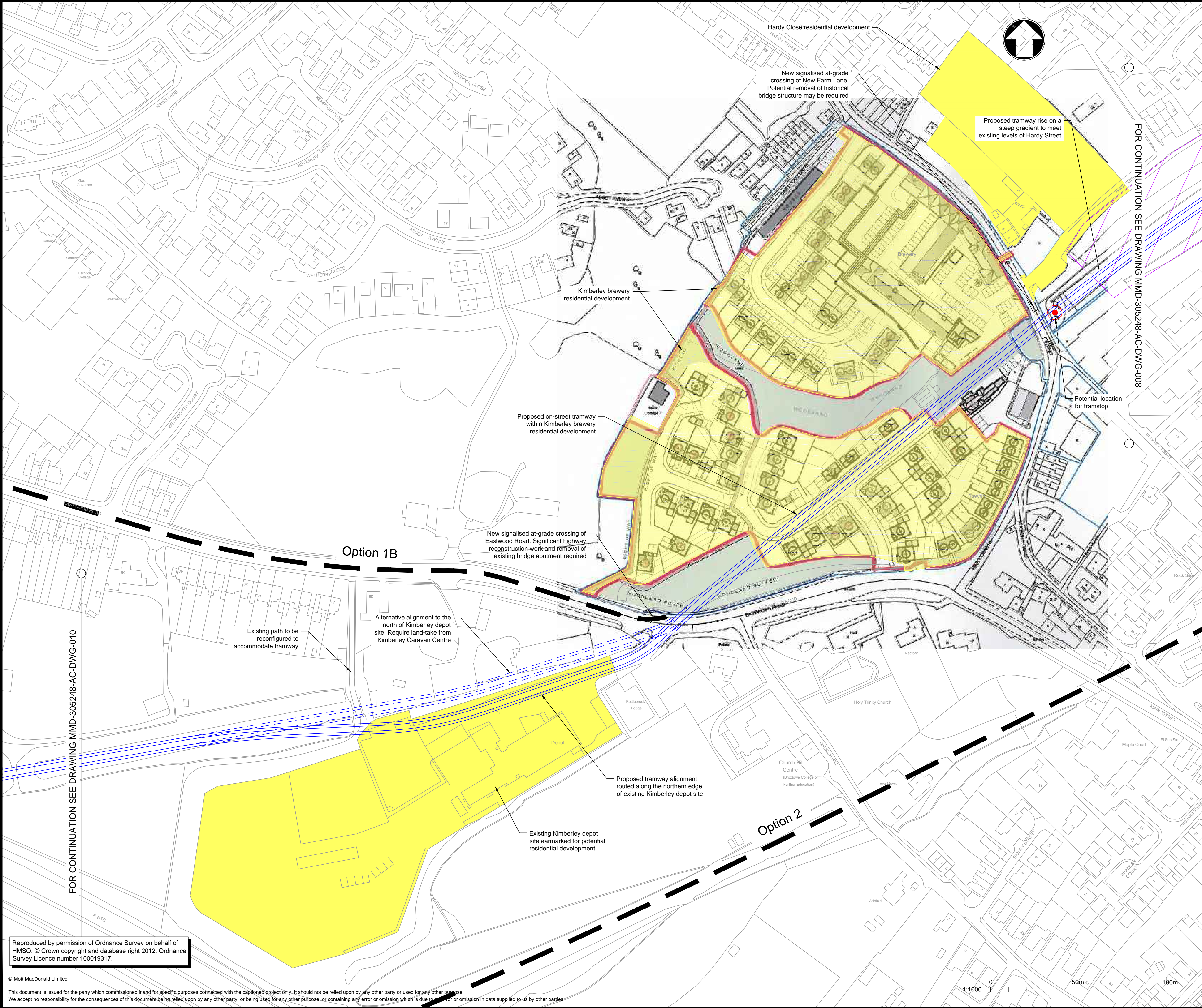
Drawing Number

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Notes

Key to symbols

- Proposed tramway alignment
- Proposed Park and Ride site
- Designated SSSI area
- Proposed development along / in close proximity to tramway route
- Proposed bridge structure
- Proposed tramstop location
- Proposed demolition
- Proposed land-take areas

Reference drawings

P1	26.06.15	RD	Preliminary issue	DG	CTCG
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Title

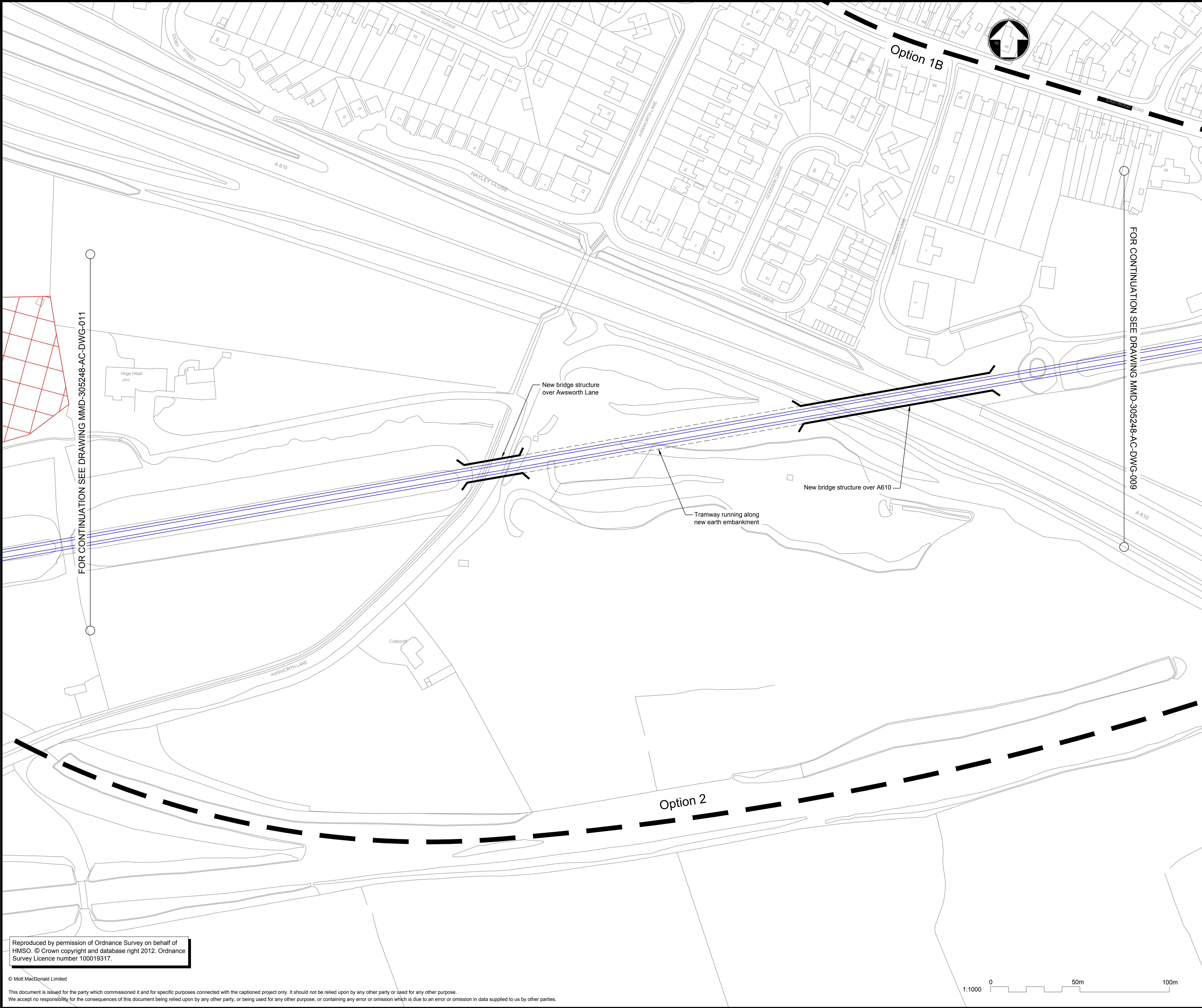
NET Extension to Kimberley and Giltbrook Retail Park
Option 1 - Route Alignment and Constraints Plan
Sheet 8 of 10

Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R. Dickens	RD	Coordination	D. Giam	DG
Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG
Scale at A1	1:1000	Status	PRE	Rev	P1

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Notes

Key to symbols

Reference drawings

Proposed tramway alignment

Proposed Park and Ride site

Designated SSSI area

Proposed development along / in close proximity to tramway route

Proposed bridge structure

Proposed tramstop location

Proposed demolition

Proposed land-take areas

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NOTTINGHAM EXPRESS TRANSIT

Title

NET Extension to Kimberley and Giltbrook Retail Park
Option 1 - Route Alignment and Constraints Plan
Sheet 9 of 10

Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R.Dickens	RD	Coordination	D. Giam	DG
Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG
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Drawing Number

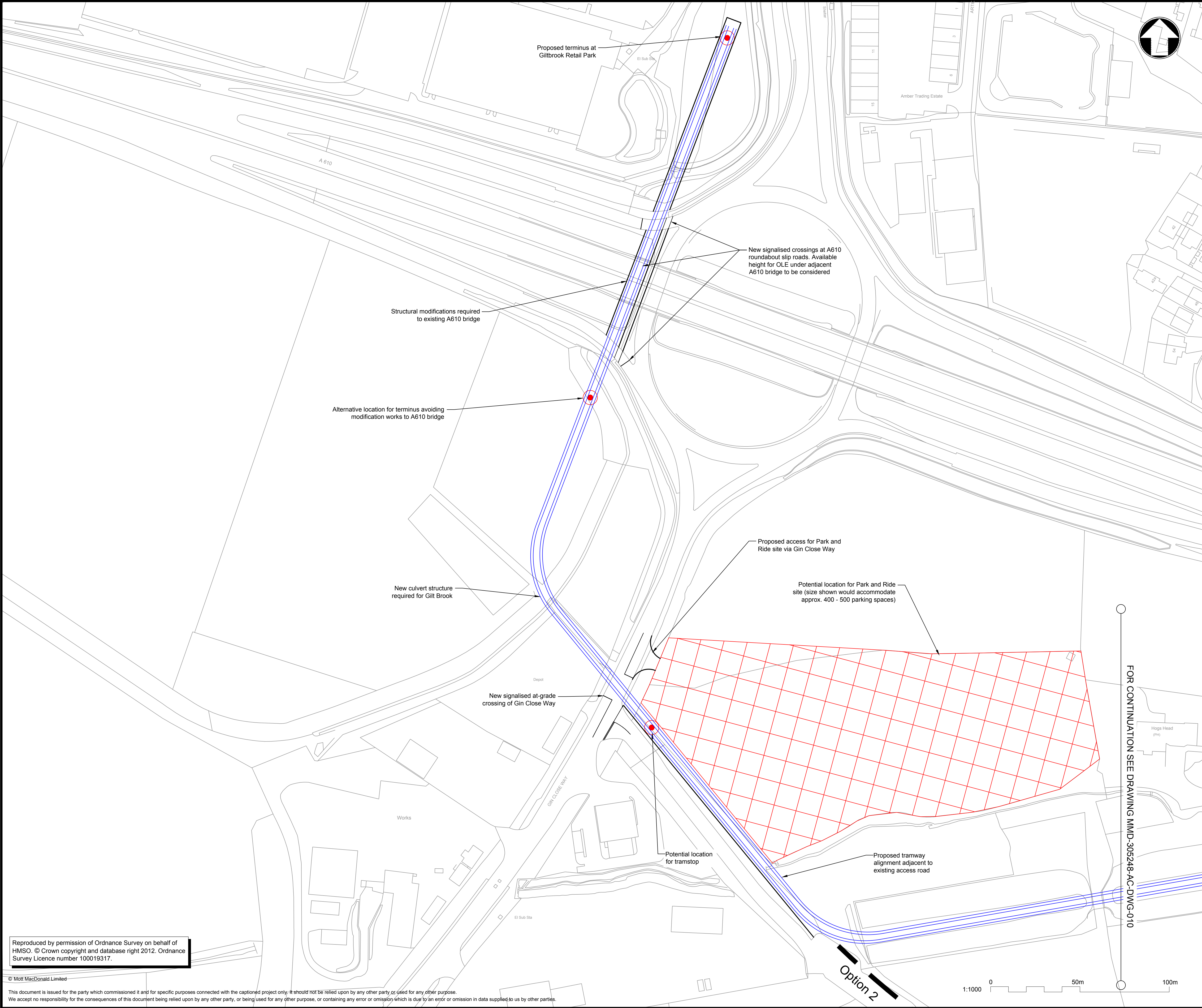
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Notes

Key to symbols

Reference drawings

Proposed tramway alignment

Proposed Park and Ride site

Designated SSSI area

Proposed development along / in close proximity to tramway route

Proposed bridge structure

Proposed tramstop location

Proposed demolition

Proposed land-take areas

Rev

Date

Drawn

Description

Ch'k'd

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NOTTINGHAM EXPRESS TRANSIT

Title

NET Extension to Kimberley and Giltbrook Retail Park
Option 1 - Route Alignment and Constraints Plan
Sheet 10 of 10

Designed

D. Giam

DG

Eng check

D. Giam

DG

Drawn

R.Dickens

RD

Coordination

D. Giam

DG

Dwg check

R. Karamanis

RK

Approved

C. Gibson

CTCG

Scale at A1

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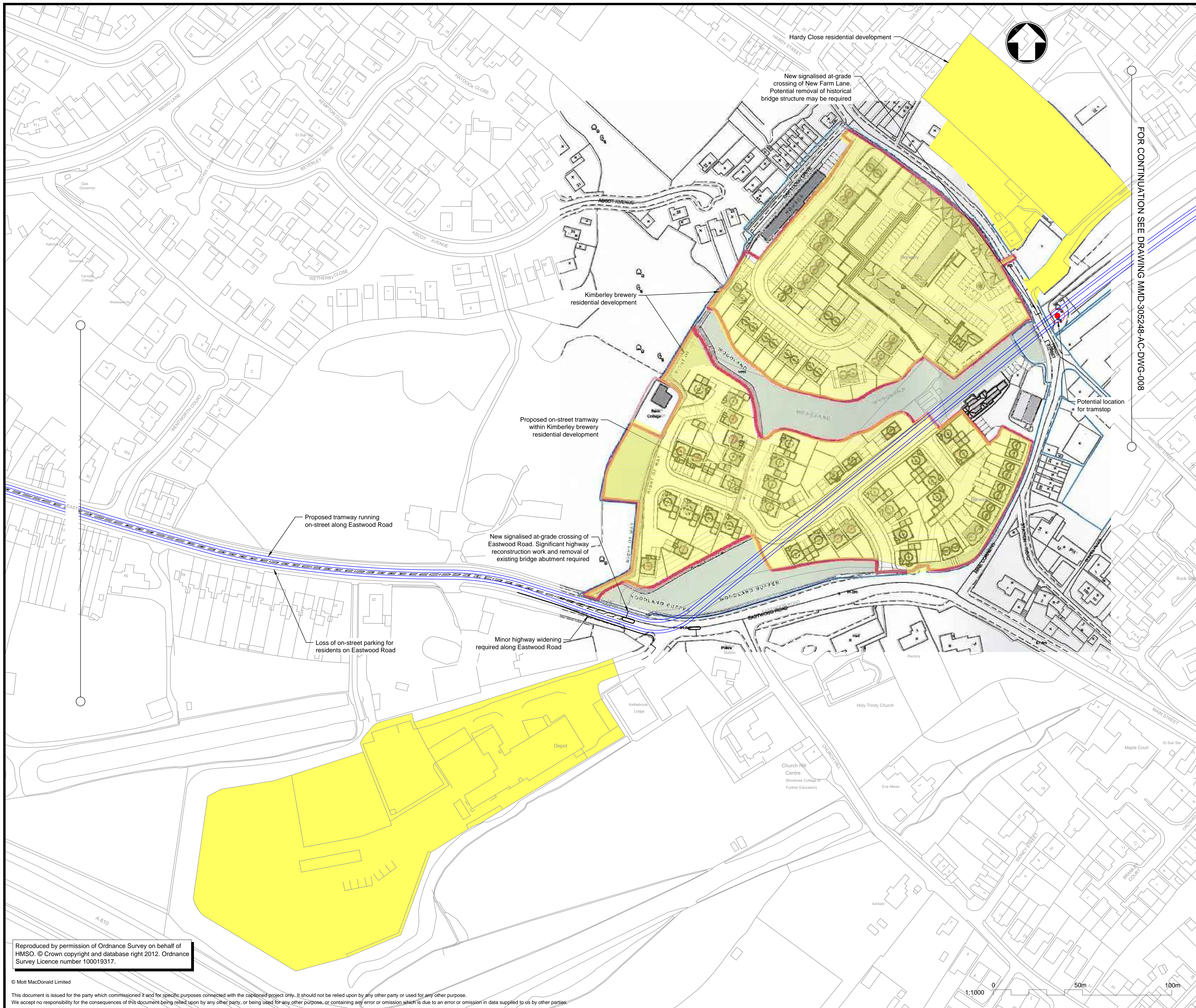
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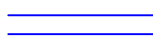

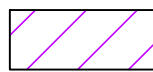
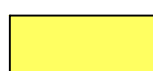
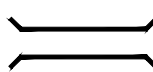



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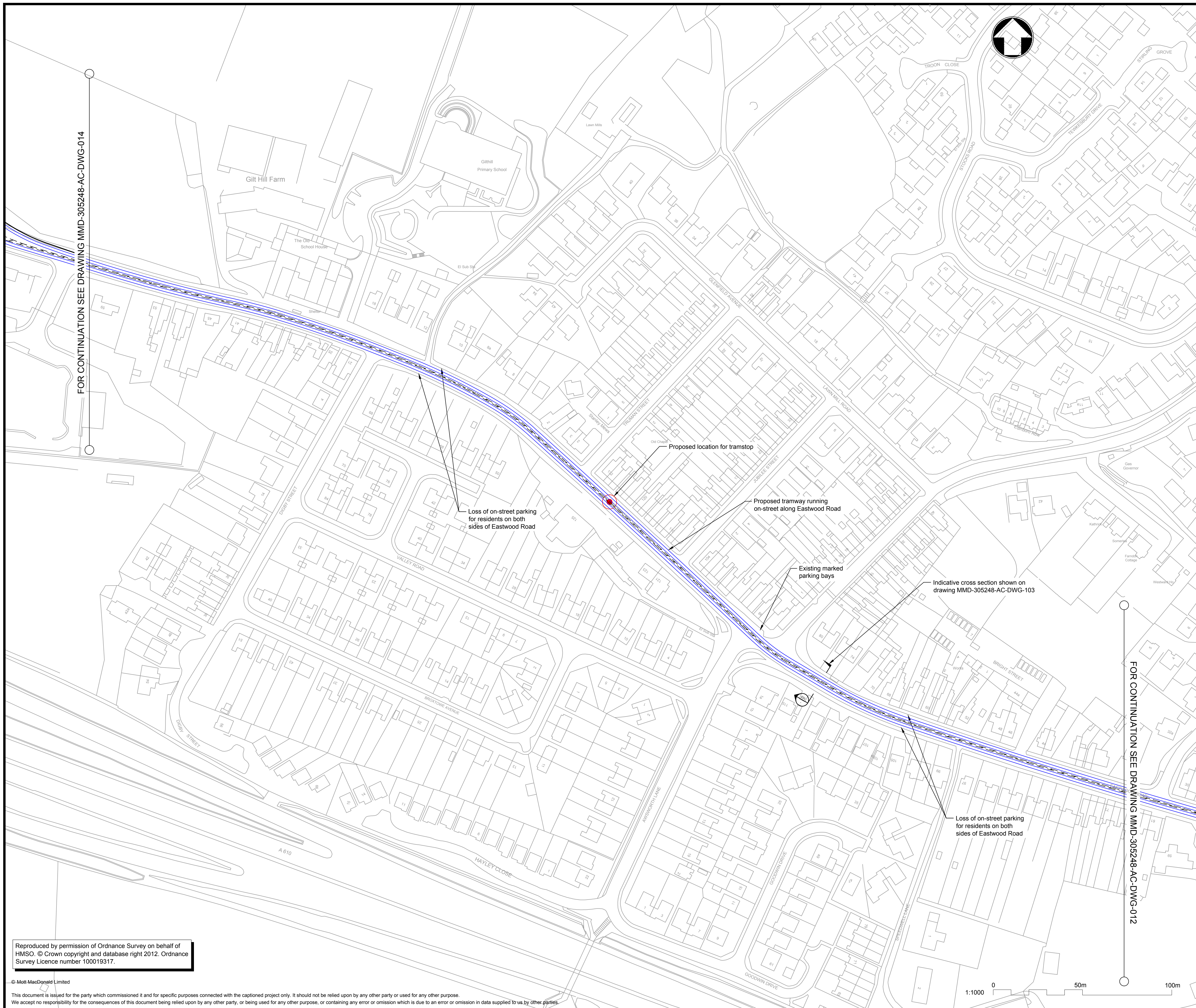
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gia454



Notes					
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| Reference drawings | P1 | 26.06.15 | RD | Preliminary issue | DG | CTCG | | Rev | Date | Drawn | Description | Ch'k'd | App'd | | **Mott MacDonald** Spring Bank House 33 Stamford Street Altrincham, WA14 1ES United Kingdom T +44 (0)161 926 4000 F +44 (0)161 926 4100 W www.mottmac.com | | | | | | | Client *The Promoters NET Project Office Loxley House Station Street Nottingham NG2 3NG NOTTINGHAM EXPRESS TRANSIT | | | | | | | Title NET Extension to Kimberley and Giltbrook Retail Park Option 1B - Route Alignment and Constraints Plan Sheet 1 of 3 | | | | | | | Designed | D. Giam | DG | Eng check | D. Giam | DG | | Drawn | R. Dickens | RD | Coordination | D. Giam | DG | | Dwg check | R. Karamanis | RK | Approved | C. Gibson | CTCG | | Scale at A1 | | Status | | Rev | | | 1:1000 | | PRE | | P1 | | | Drawing Number | | | | | | | MMD-305248-AC-DWG-012 | | | | | | | | | | | |



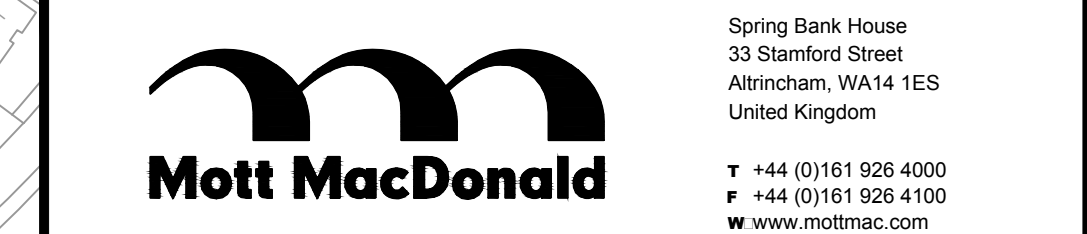
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Key to symbols

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|  | Proposed Park and Ride site |
|  | Designated SSSI area |
|  | Proposed development along / in close proximity to tramway route |
|  | Proposed bridge structure |
|  | Proposed tramstop location |
|  | Proposed demolition |
|  | Proposed land-take areas |

2.	Reference drawings
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NOTTINGHAM EXPRESS TRANSIT

Title	NET Extension to Kimberley and Giltbrook Retail Park Option 1B - Route Alignment and Constraints Plan Sheet 2 of 3
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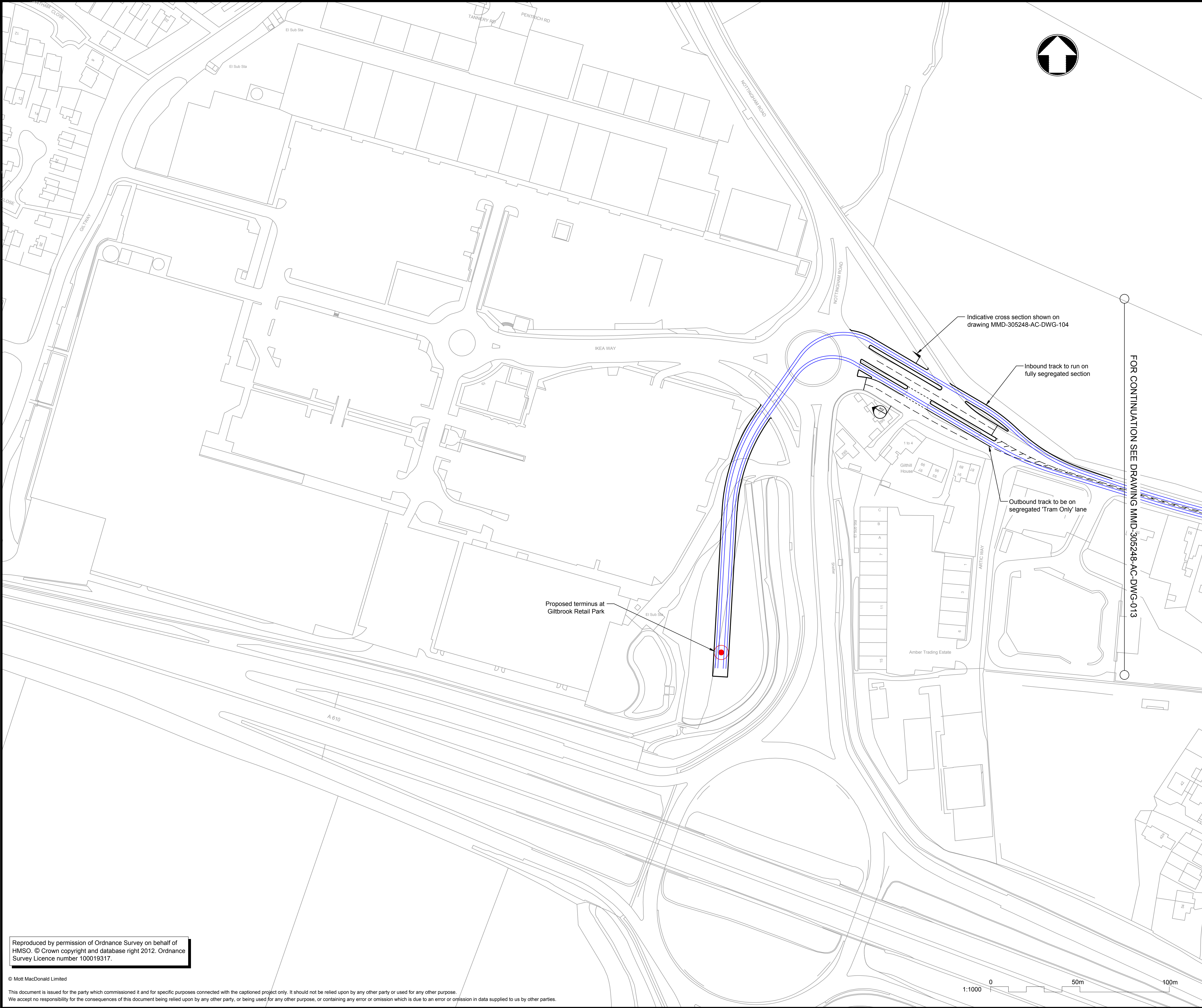
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Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG
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Notes

Key to symbols

Proposed tramway alignment

Proposed Park and Ride site

Designated SSSI area

Proposed development along / in close proximity to tramway route

Proposed bridge structure

Proposed tramstop location

Proposed demolition

Proposed land-take areas

Reference drawings

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NOTTINGHAM EXPRESS TRANSIT

Title

NET Extension to Kimberley and
Giltbrook Retail Park
Option 1B - Route Alignment and
Constraints Plan
Sheet 3 of 3

Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R.Dickens	RD	Coordination	D. Giam	DG
Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG
Scale at A1	1:1000	Status	PRE	Rev	P1

Drawing Number

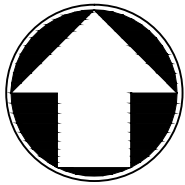
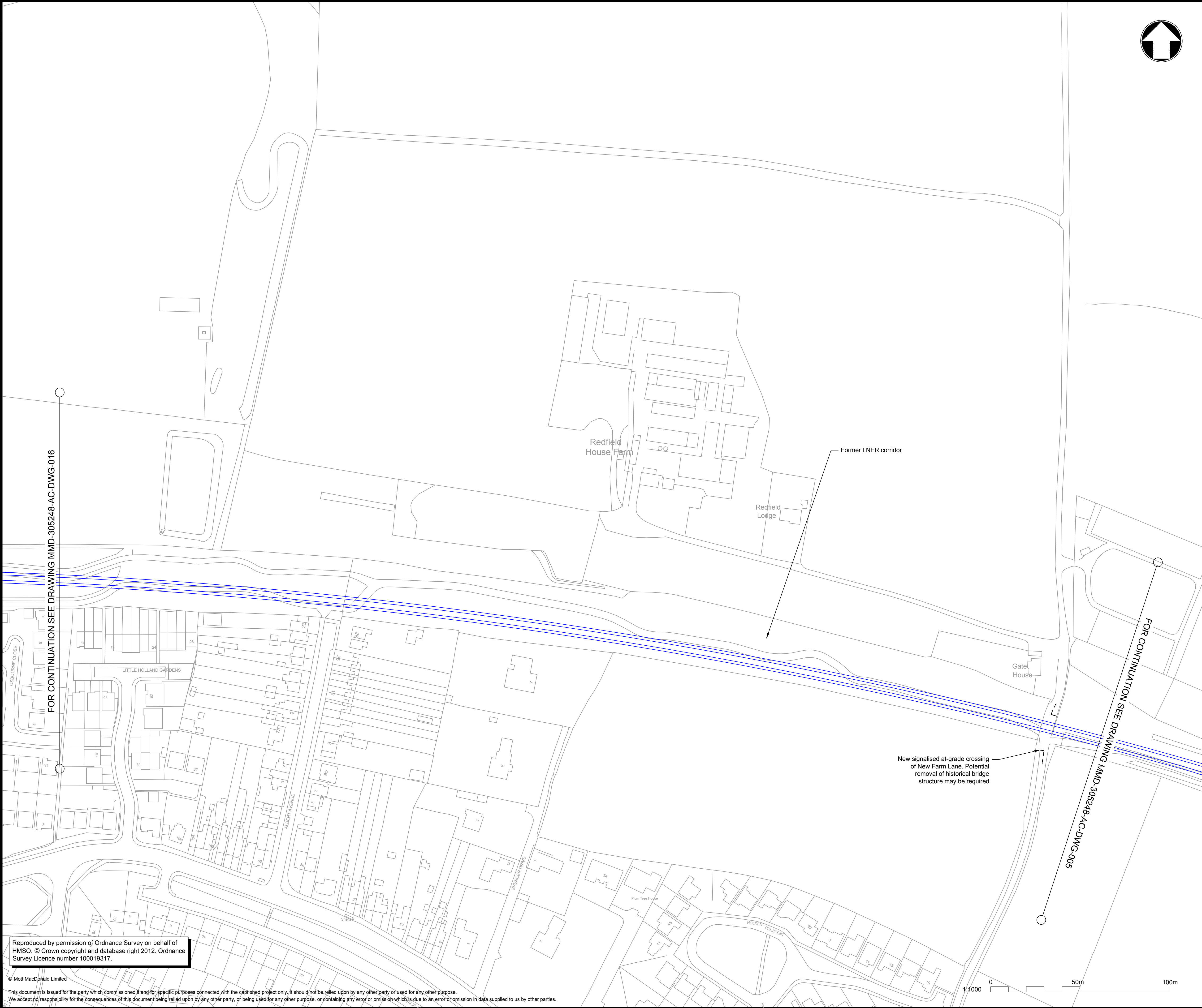
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Notes					

Key to symbols					
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	Proposed Park and Ride site				
	Designated SSSI area				
	Proposed development along / in close proximity to tramway route				
	Proposed bridge structure				
	Proposed tramstop location				
	Proposed demolition				
	Proposed land-take areas				

Reference drawings					
P1	26.06.15	RD	Preliminary issue	DG	CTCG
Rev	Date	Drawn	Description	Ch'k'd	App'd



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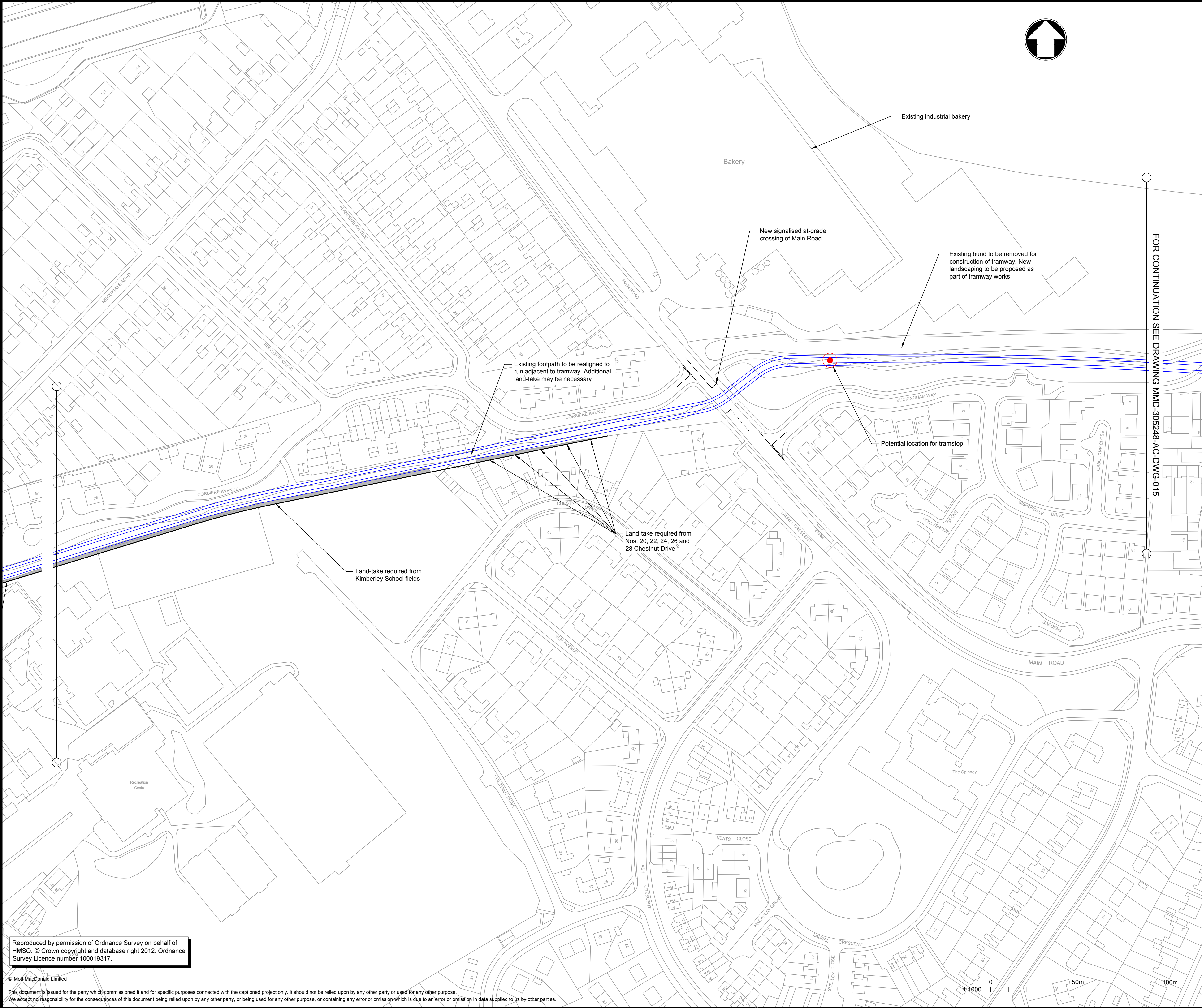
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NOTTINGHAM EXPRESS TRANSIT

Title					
NET Extension to Kimberley and Giltbrook Retail Park Option 2 - Route Alignment and Constraints Plan Sheet 1 of 5					
Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R.Dickens	RD	Coordination	D. Giam	DG
Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG
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NOTTINGHAM EXPRESS TRANSIT

Title

NET Extension to Kimberley and
Giltbrook Retail Park
Option 2 - Route Alignment and
Constraints Plan
Sheet 2 of 5

Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R.Dickens	RD	Coordination	D. Giam	DG
Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG

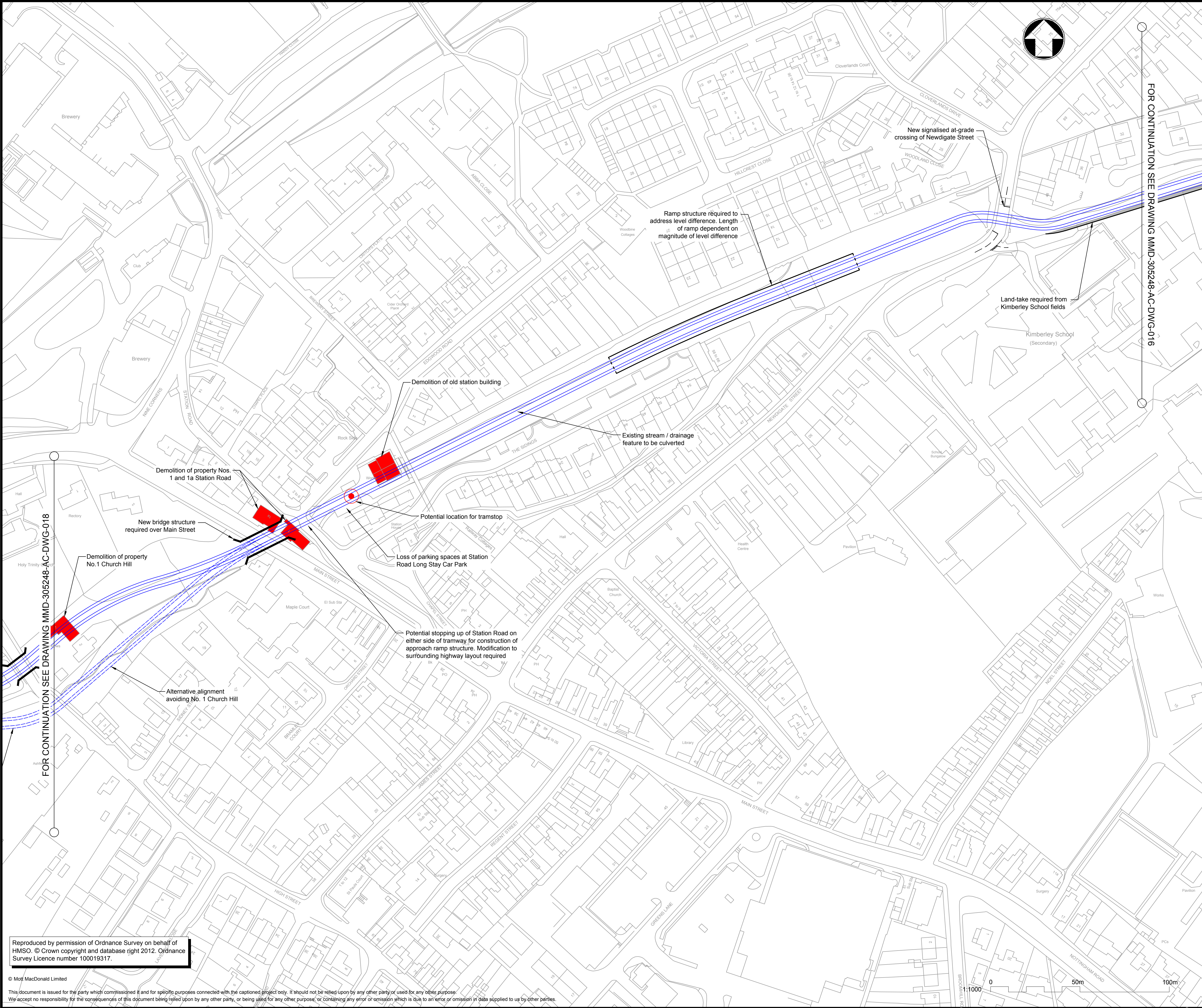
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Notes

Key to symbols

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- Designated SSSI area
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- Proposed demolition
- Proposed land-take areas

Reference drawings

P1	26.06.15	RD	Preliminary issue	DG	CTCG
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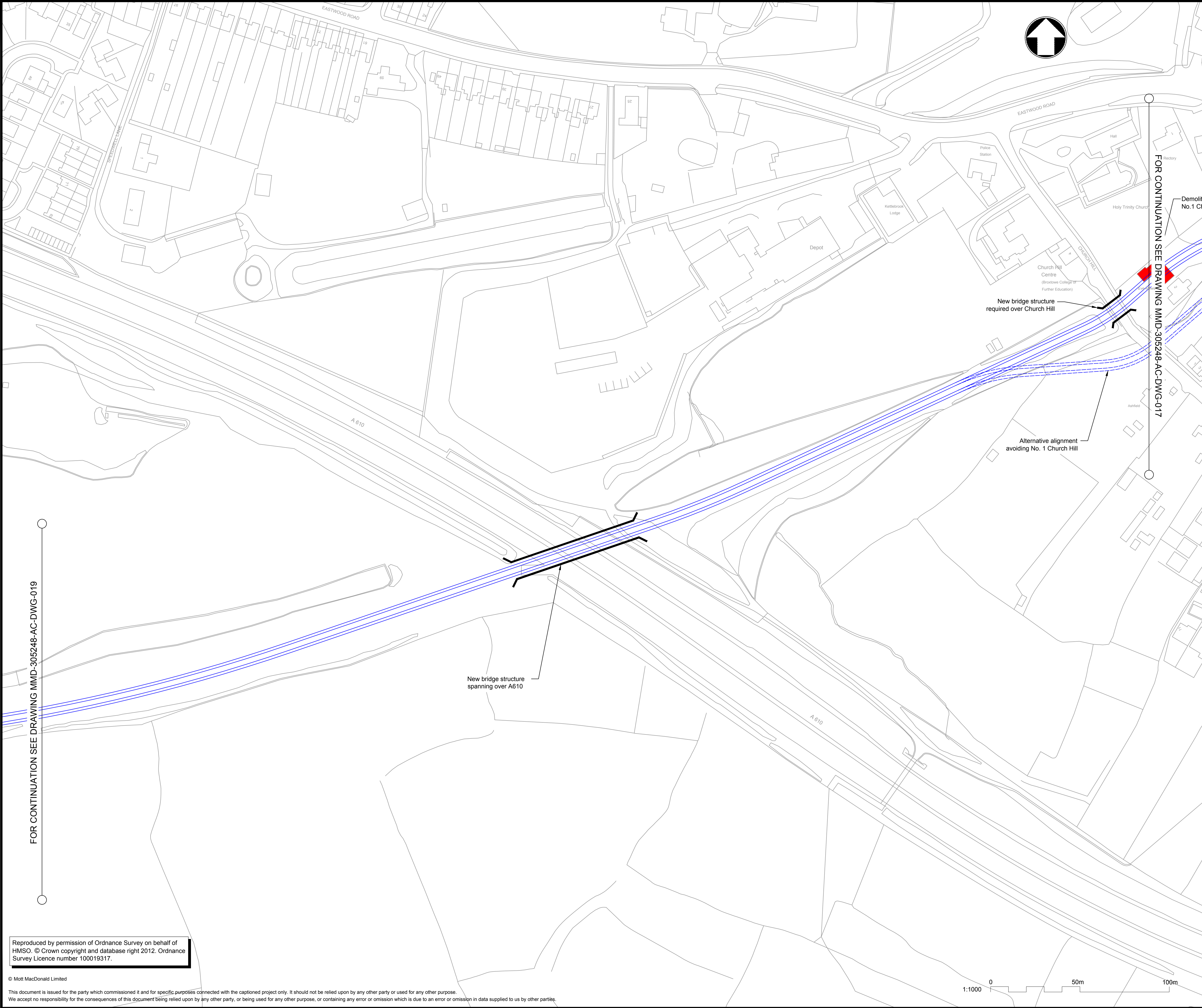
**NET Extension to Kimberley and Giltbrook Retail Park
Option 2 - Route Alignment and Constraints Plan
Sheet 3 of 5**

Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R. Dickens	RD	Coordination	D. Giam	DG
Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG
Scale at A1	1:1000	Status	PRE	Rev	P1

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Notes

Key to symbols

Reference drawings

P1	26.06.15	RD	Preliminary issue	DG	CTCG
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NOTTINGHAM EXPRESS TRANSIT

Title

NET Extension to Kimberley and
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Option 2 - Route Alignment and
Constraints Plan
Sheet 4 of 5

Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R.Dickens	RD	Coordination	D. Giam	DG
Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG

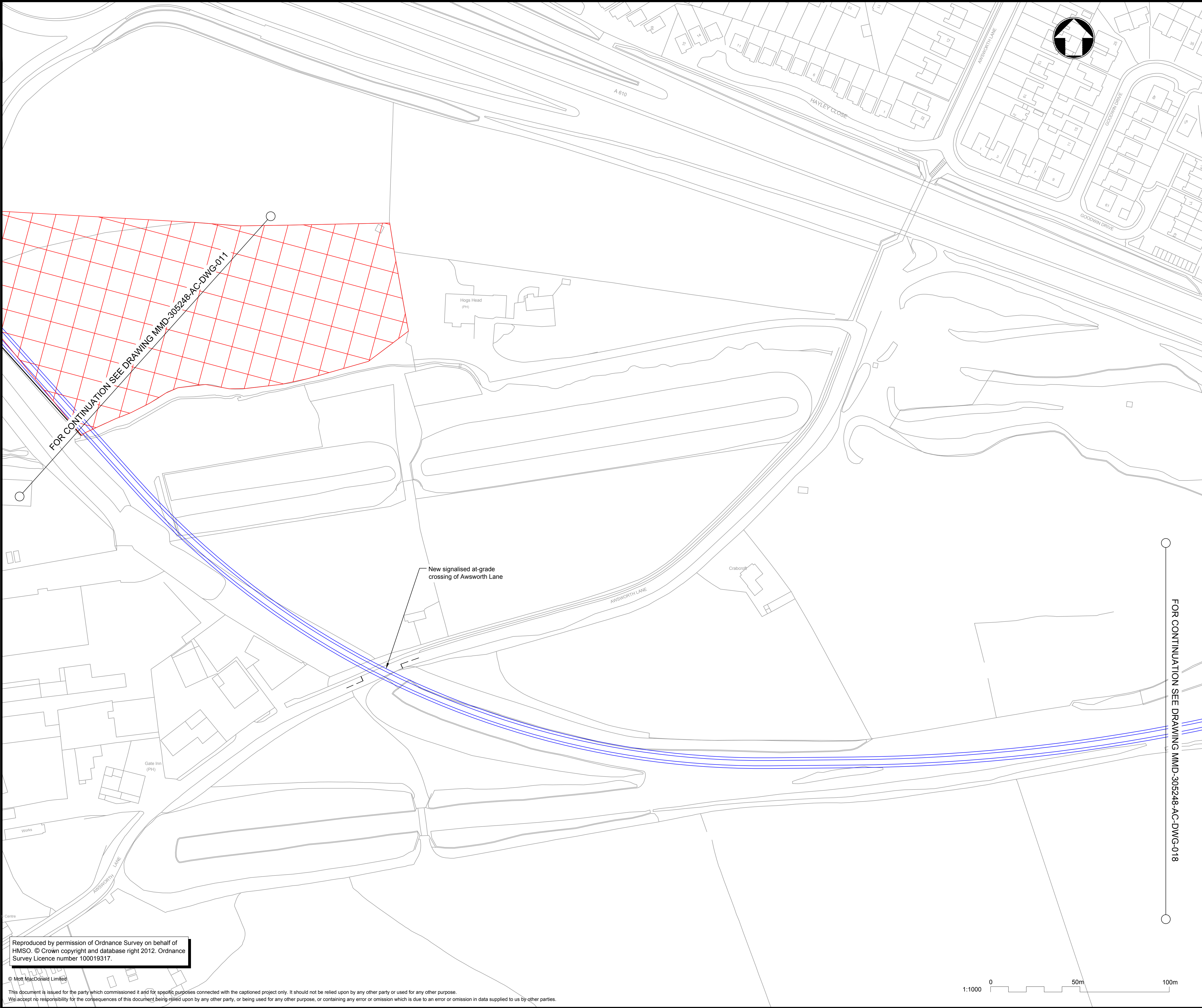
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Status
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P1

Drawing Number

MMD-305248-AC-DWG-018



Notes

Key to symbols

Reference drawings

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NOTTINGHAM EXPRESS TRANSIT

Title

NET Extension to Kimberley and
Giltbrook Retail Park
Option 2 - Route Alignment and
Constraints Plan
Sheet 5 of 5

Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R.Dickens	RD	Coordination	D. Giam	DG
Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG

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Rev
P1

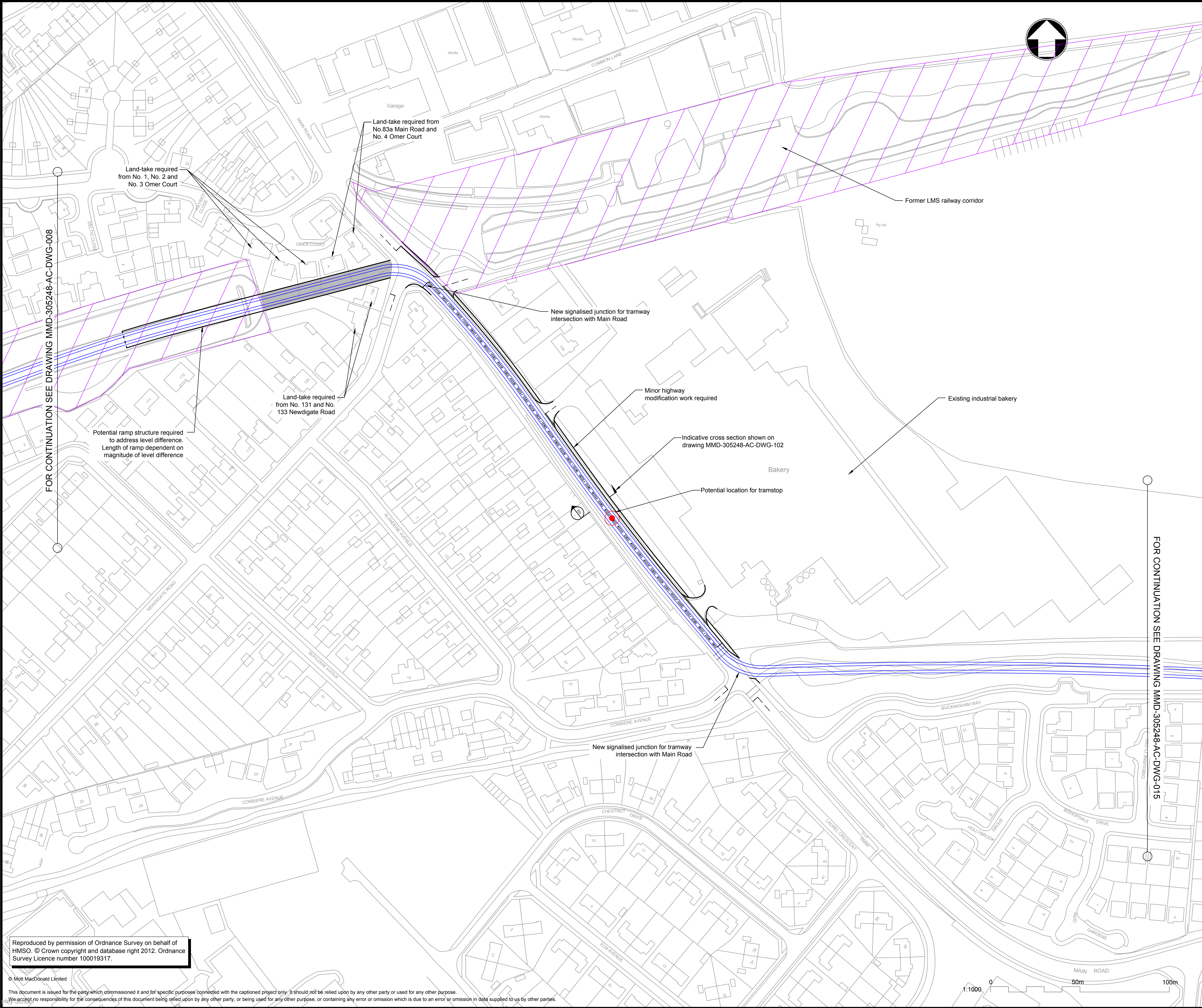
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Notes

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Title

NET Extension to Kimberley and Giltbrook Retail Park
Option 2B - Route Alignment and Constraints Plan
Sheet 1 of 1

Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R.Dickens	RD	Coordination	D. Giam	DG
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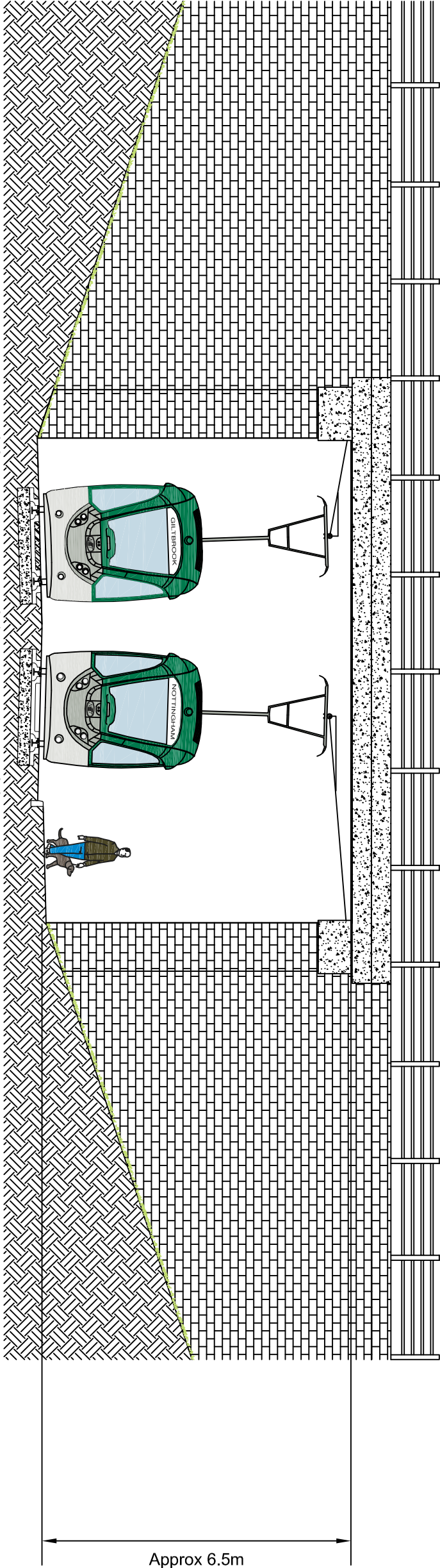
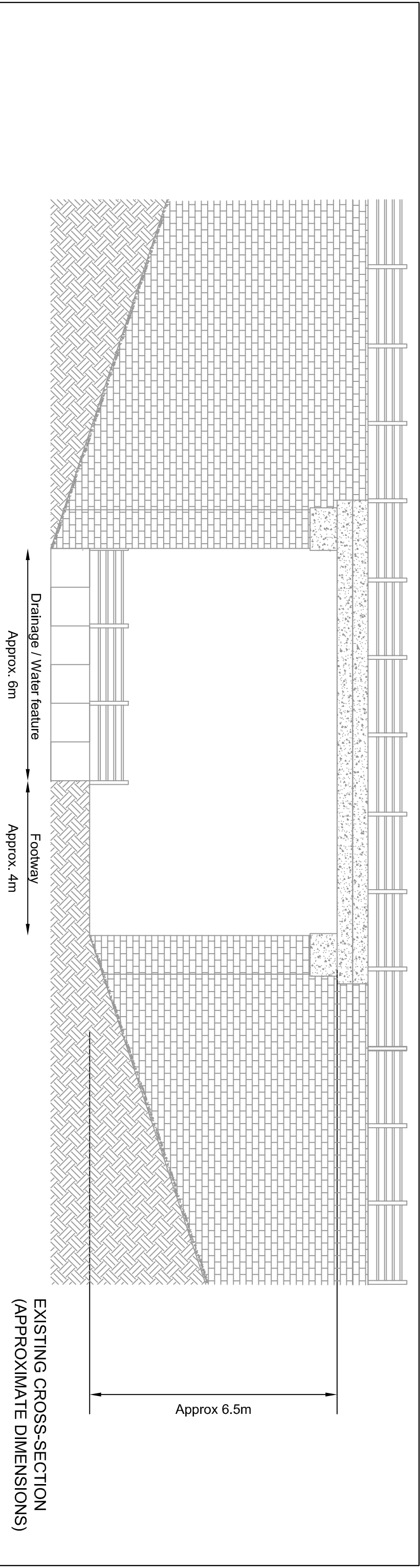
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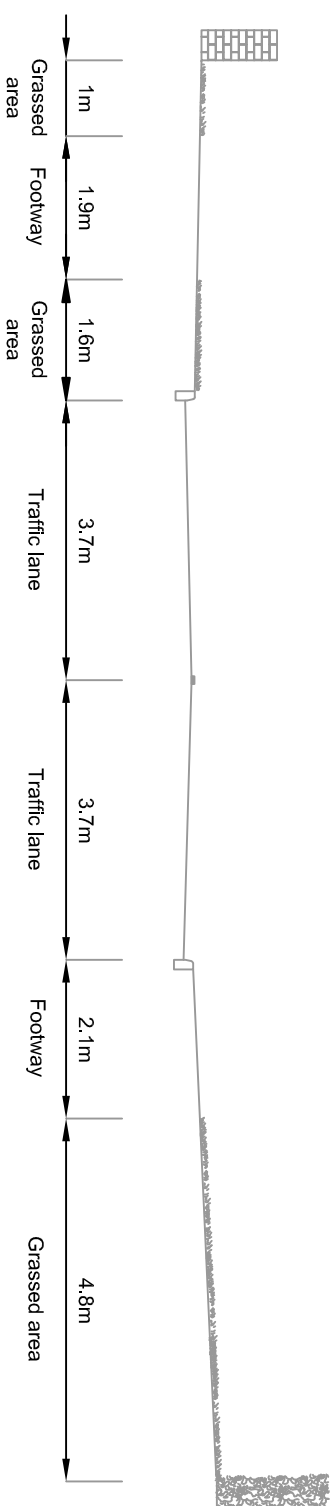
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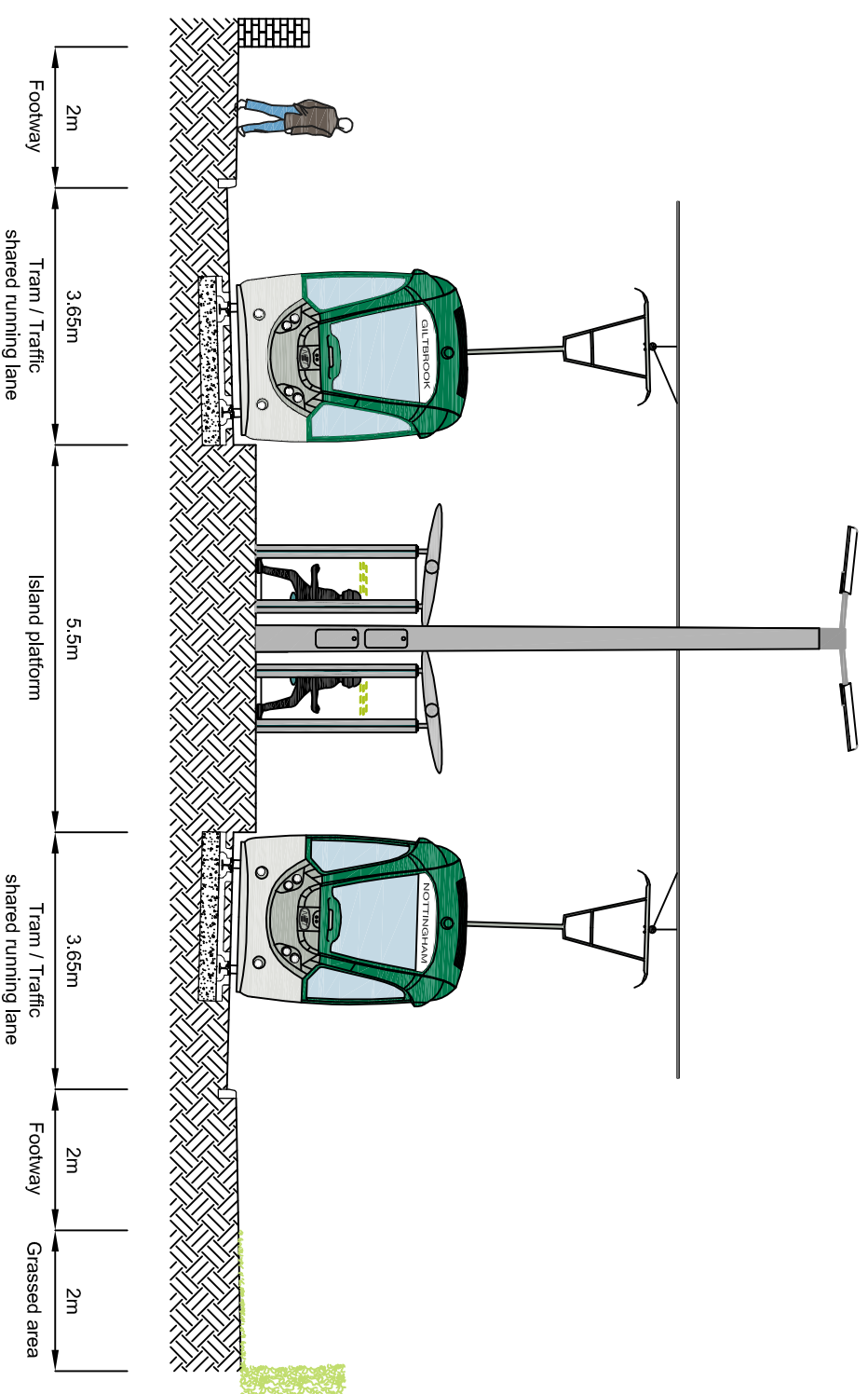
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P1	26.06.15	RK	Preliminary issue	DG	CTCG	NET Extension Kimberley to Giltbrook Retail Park Cross Section - M1 Underpass			Checked	DG												
									Approved	CTCG												
									Scale at A3													
									1:100													
Drawing Number						Rev	Status															
MMD-305248-AC-DWG-101						P1	PRE															





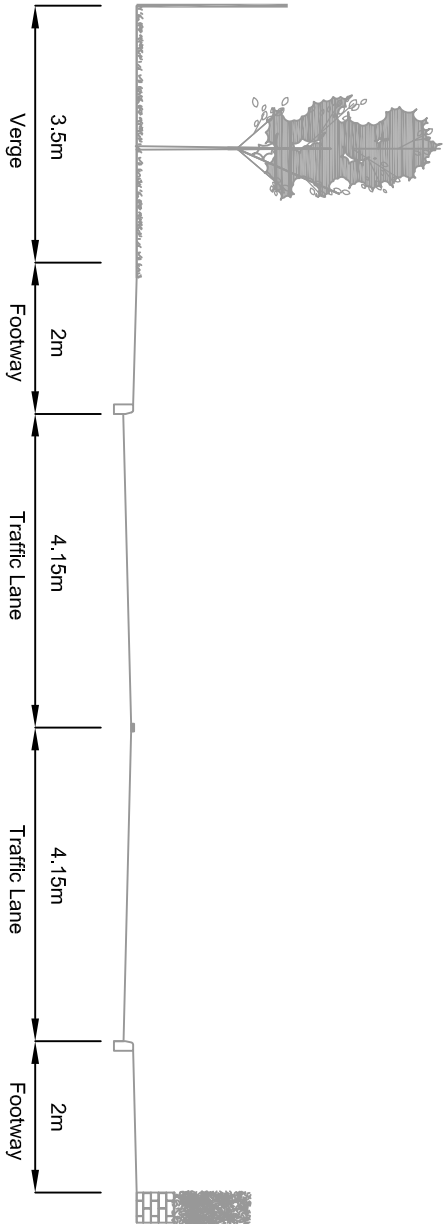
EXISTING CROSS-SECTION
(APPROXIMATE DIMENSIONS)



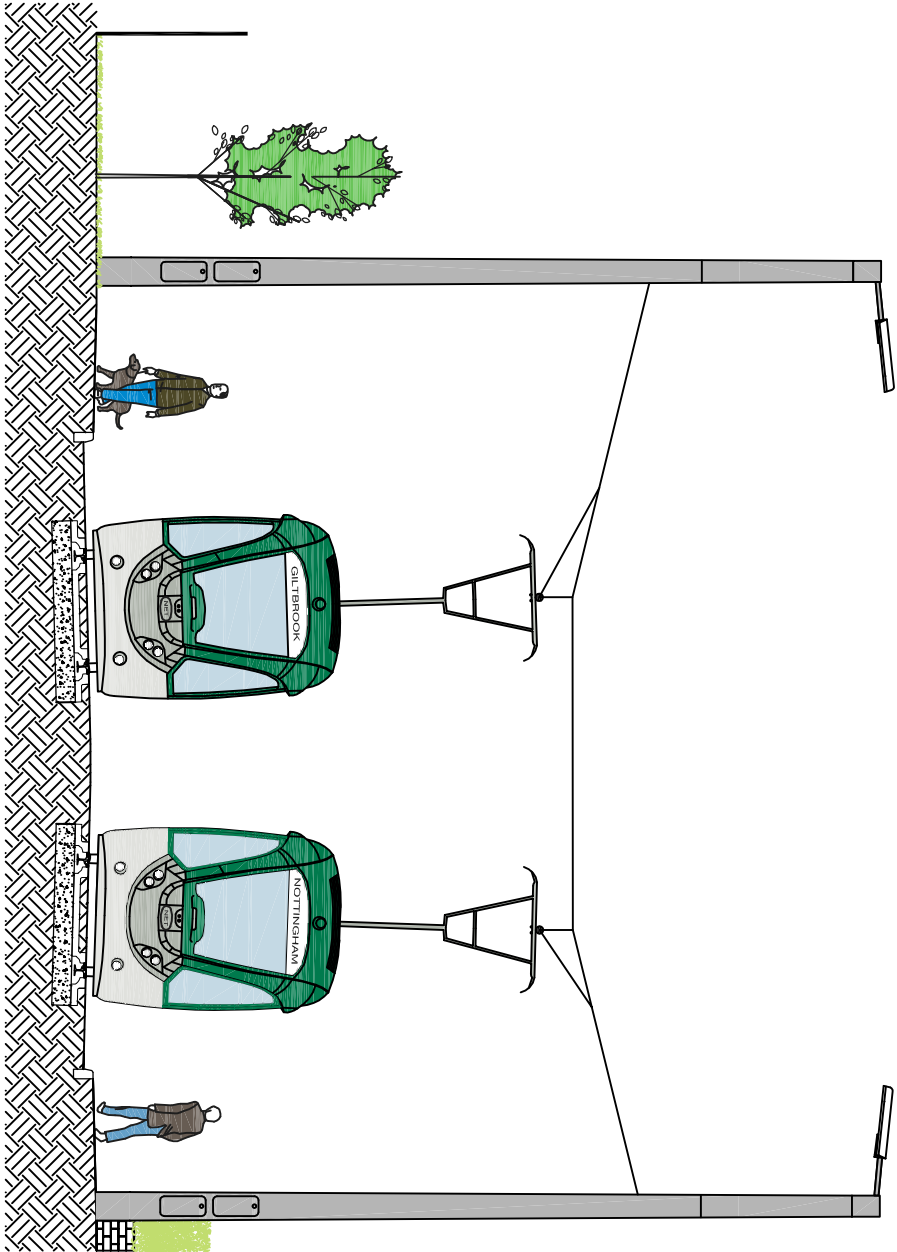
PROPOSED CROSS-SECTION

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Rev	Date	Drawn	Description	Chk'd	App'd	Title NET Extension Kimberley to Giltbrook Retail Park Cross Section - Main Road Tramstop	Drawn	RK
P1	26.06.15	RK	Preliminary issue	DG	CTCG		Checked	DG
							Approved	CG
							Scale at A3	
							1:100	
						Drawing Number	Rev	Status
						MMD-305248-AC-DWG-102	P1	PRE





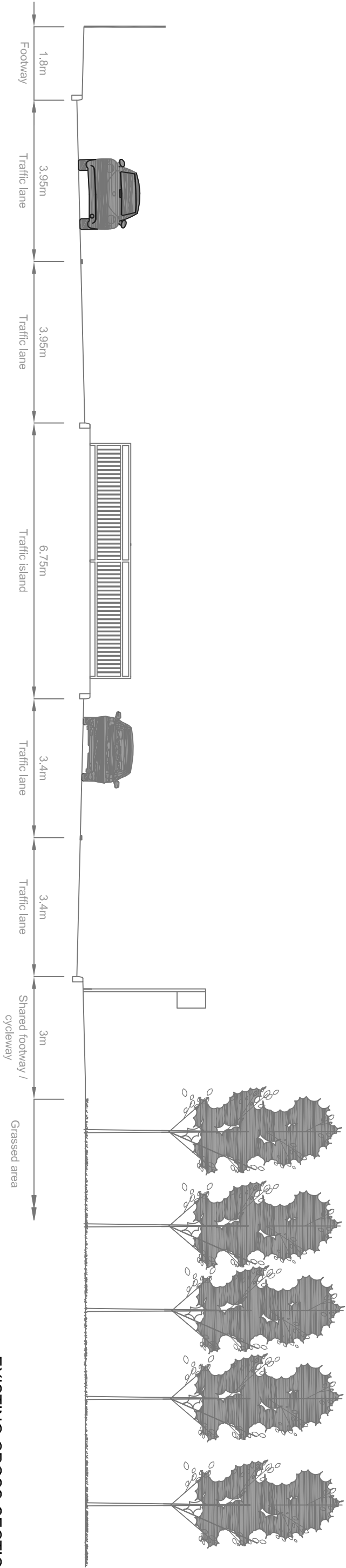
EXISTING CROSS-SECTION
(APPROXIMATE DIMENSIONS)



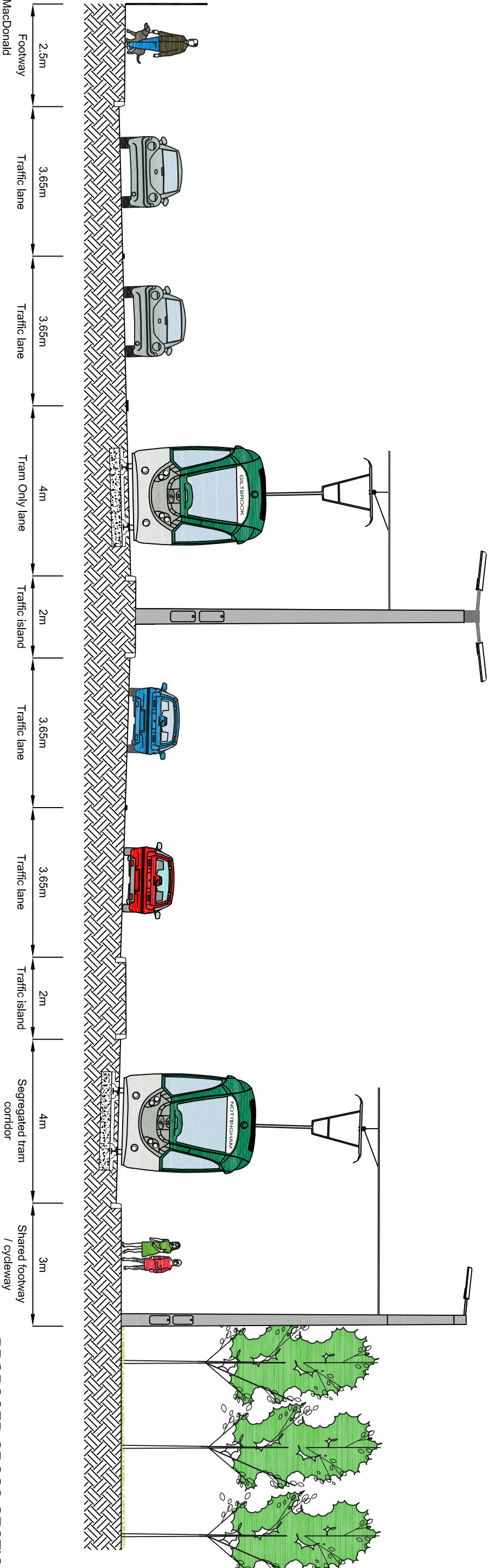
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The Promoters NET Project Office Loxley House Station Street Nottingham NG2 3NG										<div></div> <div>NOTTINGHAM EXPRESS TRANSIT</div>											
Rev		Date		Drawn		Description		Ch'k'd		App'd		Title NET Extension Kimberley to Gilbrook Retail Park Cross Section - Eastwood Road									
P1		26.06.15		RK		Preliminary issue		DG		CTCG											
Drawing Number												MMD-305248-AC-DWG-103									
Rev		Status																			
P1		PRE																			





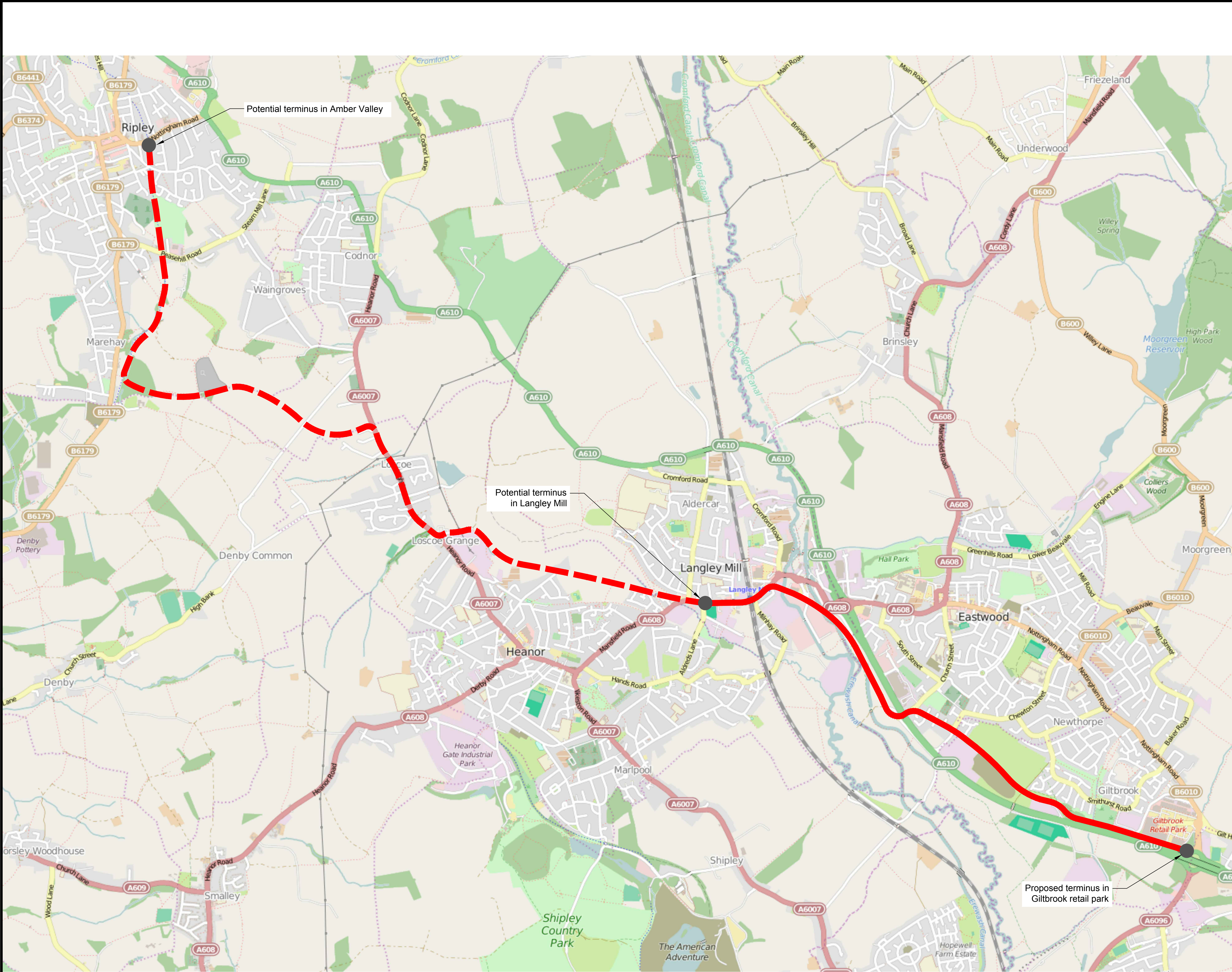
EXISTING CROSS-SECTION
(APPROXIMATE DIMENSIONS)



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The Promoters NET Project Office Loxley House Station Street Nottingham NG2 3NG										<div><div>NOTTINGHAM EXPRESS TRANSIT</div></div>									
Rev	Date	Drawn	Description	Ch'k'd	App'd	Title					Drawn	RK							
P1	26.06.15	RK	Preliminary issue	DG	CTCG	NET Extension Kimberley to Giltbrook Retail Park Cross Section - Gilt Hill					Checked	DG							
						Drawing Number MMD-305248-AC-DWG-104					Approved	CG							
											Scale at A3 1:100								
																Rev	Status		
											P1	PRE							



Notes

Key to symbols

Proposed termination points

Indicative tramway extension route to Langley Mill

Indicative tramway extension route to Amber Valley

Reference drawings

P1	26.06.15	RD	Preliminary issue	DG	CTCG
Rev	Date	Drawn	Description	Ch'k'd	App'd

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Client

The Promoters
NET Project Office
Loxley House
Station Street
Nottingham
NG2 3NG

NET

NOTTINGHAM EXPRESS TRANSIT

Title

NET Extension to Kimberley and
Giltbrook Retail Park
Potential Future Extensions to
Langley Mill and Amber Valley

Designed	D. Giam	DG	Eng check	D. Giam	DG
Drawn	R.Dickens	RD	Coordination	D. Giam	DG
Dwg check	R. Karamanis	RK	Approved	C. Gibson	CTCG

Scale at A1	Status	Rev
NTS	PRE	P1

Drawing Number

MMD-305248-AC-DWG-201

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P:\Manchester\Northwest\Projects (Even)\305248 NET Phase Two Client Support\AC Kimberley Extension\AC-04 Outgoing MM Drawings\AC-04-01 Originals (CAD)\Outgoing Drawings\MMD-305248-AC-DWG-201.dwg Aug 14, 2015 - 5:37PM bar67388

Appendix B. Cost Estimates

NET Extension
Option 1 (Rev02)
Kimberley Extension Feasibility Study



Version: Rev02 - 17-Jul-15
Base Date: 2Q2015

	Route Km 2.47				Route Km 1.10				Route Km 0.97				Route Km 1.31				Route Km 0.38				Route Km 6.23			
	Phoenix P&R to New Farm Lane				New Farm Lane to Main Road				Main Road to Eastwood Road				Eastwood Road to Gin Close Way				Gin Close Way to Giltbrook Retail Park				Total			
	Unit	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k		
Trackwork / Routeworks																								
Trackwork: Embedded																								
On-street in highway - double track	km	0.48	£ 5,000	£ 2,400	0.05	£ 5,000	£ 250	0.05	£ 5,000	£ 250	0.10	£ 5,000	£ 500	0.10	£ 5,000	£ 500	0.78	£ 5,000	£ 3,900	0.78	£ 5,000	£ 3,900		
Segregated or paved areas - double track	km	0.30	£ 4,000	£ 1,200	0.00	£ 4,000	£ -	0.22	£ 4,000	£ 880	0.16	£ 4,000	£ 640	0.10	£ 4,000	£ 400	0.78	£ 4,000	£ 3,120	0.78	£ 4,000	£ 3,120		
Trackwork: Ballasted / Structure																								
Ballasted - new double track	km	1.69	£ 3,000	£ 5,070	1.05	£ 3,000	£ 3,150	0.70	£ 3,000	£ 2,100	0.70	£ 3,000	£ 2,100	0.18	£ 3,000	£ 540	4.32	£ 3,000	£ 12,960	0.35	£ 700	£ 245		
On structure (rail plinths) - new double track	km		£ 700	£ -		£ 700	£ -		£ 700	£ -	0.35	£ 700	£ 245	0.00	£ 700	£ -	0.35	£ 700	£ 245	0.35	£ 700	£ 245		
Ancillary highway, pavement, environmental works																								
Minor Ancillary Highway Works - double track	km	0.44	£ 2,500	£ 1,100	0.00	£ 2,500	£ -	0.22	£ 2,500	£ 550	0.16	£ 2,500	£ 400	0.00	£ 2,500	£ -	0.82	£ 2,500	£ 2,050	0.72	£ 3,500	£ 2,520		
Major Ancillary Highway Works - double track	km	0.35	£ 3,500	£ 1,225	0.09	£ 3,500	£ 315	0.05	£ 3,500	£ 175	0.13	£ 3,500	£ 455	0.10	£ 3,500	£ 350	0.72	£ 3,500	£ 2,520	0.10	£ 5,000	£ 500		
Critical Ancillary Highway Works - double track	km	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.10	£ 5,000	£ 500	0.10	£ 5,000	£ 500	0.10	£ 5,000	£ 500		
Total Trackwork				£ 10,995		£ 3,715			£ 3,955			£ 4,340			£ 2,290				£ 25,295					
Electrification & Traction Power																								
New double 750Vdc track - On-street	km	0.48	£ 850	£ 408	0.05	£ 850	£ 43	0.05	£ 850	£ 43	0.1	£ 850	£ 85	0.1	£ 850	£ 85	0.78	£ 850	£ 663	5.45	£ 750	£ 4,088		
New double 750Vdc track - Segregated/Ballasted	km	1.99	£ 750	£ 1,493	1.05	£ 750	£ 788	0.92	£ 750	£ 690	1.21	£ 750	£ 908	0.28	£ 750	£ 210	5.45	£ 750	£ 4,088	3.00	£ 1,500	£ 4,500		
Substations 750Vdc track	Nr	1.0	£ 1,500	£ 1,500	0.5	£ 1,500	£ 750	0.5	£ 1,500	£ 750	0.5	£ 1,500	£ 750	0.5	£ 1,500	£ 750	3.00	£ 1,500	£ 4,500					
Total Electrification & Traction Power				£ 3,401		£ 1,580			£ 1,483			£ 1,743			£ 1,045				£ 9,251					
Signalling & Telecoms																								
New Tram Management System - Signalling, Control and Communication - On Street	km	0.78	£ 1,200	£ 936	0.05	£ 1,200	£ 60	0.27	£ 1,200	£ 324	0.26	£ 1,200	£ 312	0.20	£ 1,200	£ 240	1.56	£ 1,200	£ 1,872					
New Tram Management System - Signalling, Control and Communication - Off Street	km	1.69	£ 500	£ 845	1.05	£ 500	£ 525	0.70	£ 500	£ 350	1.05	£ 500	£ 525	0.18	£ 500	£ 90	4.67	£ 500	£ 2,335					
Total Signalling & Telecoms				£ 1,781		£ 585			£ 674			£ 837			£ 330				£ 4,207					
Structures																								
Overbridge - A6002 Low Wood Road	m2Deck	400	£ 8	£ 3,000		£ 8	£ -		£ 8	£ -		£ 8	£ -		£ 8	£ -	400.0	£ 8	£ 3,000					
Upgrade Works to Existing M1 Overbridge by HA (solid parapets, bridge guard, etc)	item	1	£ 600	£ 600			£ -			£ -			£ -			£ -	1	£ 600	£ 600					
Major Earthworks	100/m3	29	£ 5	£ 145	100	£ 5	£ 500		£ 5	£ -		£ 5	£ -		£ 5	£ -	129.0	£ 5	£ 645					
Culvert LNER Corridor drainage	m	160	£ 2	£ 320			£ -			£ -			£ -			£ -	160.0	£ 2	£ 320					
Ramp - Reinforced Earth/ Retained Earth Structure	m		£ 5	£ -			£ -	180	£ 5	£ 900	80	£ 5	£ 400			£ -	260.0	£ 5	£ 1,300					
Demo existing bridge abutment - Eastwood Road	item		£ 25	£ -			£ -			£ -	1	£ 25	£ 25			£ -	1.0	£ 25	£ 25					
Underbridge - Main Street	m2Deck		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -	0.0	£ 7.5	£ -					
Viaduct over A610	m2Deck		£ 5	£ -		£ 5.0	£ -		£ 5.0	£ -	3150	£ 5.0	£ 15,750			£ 5.0	3150.0	£ 5.0	£ 15,750					
Gilt Brook Culvert	m2Deck		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -	200.0	£ 7.5	£ 1,500					
A610 Existing Bridge Reconstructed	m2Deck		£ 10	£ -			£ -			£ -			£ -	200	£ 10	£ 6,000	600.0	£ 10	£ 6,000					
Allowance for miscellaneous structures & earthworks (allow 2.5% of track/routeworks)	%	1	2.5%	£ 275	1	2.5%	£ 93	1	2.5%	£ 99	1	2.5%	£ 109	1	2.5%	£ 57	1	2.5%	£ 632					
Total Structures				£ 4,340		£ 593			£ 999			£ 16,284			£ 7,557				£ 29,772					
Stations																								
New Stops		1	£ 750	£ 750	1	£ 750	£ 750	1	£ 750	£ 750	1	£ 750	£ 750	1	£ 750	£ 750	5	£ 750	£ 3,750					
Additional for Level Separation (Lifts, Ramps, etc)		1	£ 500	£ 500	1	£ 500	£ 500	1	£ 500	£ 500	0	£ 500	£ -	0	£ 500	£ -	3	£ 500	£ 1,500					
Total Stations				£ 1,250		£ 1,250			£ 1,250			£ 750			£ 750				£ 5,250					
Ancillary Works																								
New Tram Stabling & Additional Depot Provision	per LRV	2	£ 500	£ 1,000	0.5	£ 500	£ 250	0.5	£ 500	£ 250	0.5	£ 500	£ 250	0.5	£ 500	£ 250	4	£ 500	£ 2,000					
Network Management Centre	item		£ -	£ -		£ -	£ -		£ -	£ -		£ -	£ -		£ -	£ -	0	£ -	£ -					
Connection to Line 1 (Possession Working)	item	1	£ 500	£ 500			£ -			£ -			£ -			£ -	1	£ 500	£ 500					
Park & Ride Site - 400 to 500 Spaces	item	1	£ 2,500	£ 2,500		£ 2,500	£ -		£ 2,500	£ -		£ 2,500	£ -		£ 2,500	£ -	1	£ 2,500	£ 2,500					
Phoenix Park & Ride - Amend layout and entrance	item	1	£ 750	£ 750			£ -			£ -			£ -			£ -	1	£ 750	£ 750					
Total Ancillary Works				£ 4,750		£ 250			£ 250			£ 250			£ 250				£ 5,750					
Total Construction Direct Costs				£ 26,516		£ 7,973			£ 8,610			£ 24,203			£ 12,222				£ 79,525					
Construction Indirect Costs																								
Contractor's Preliminaries	%	1	25%	£ 6,629	1	25%	£ 1,993	1	25%	£ 2,153	1	25%	£ 6,051	1	25%	£ 3,056			£ 19,882					
Contractor's Traffic Management	%	1	5%	£ 1,326	1	5%	£ 399	1	5%	£ 431	1	5%	£ 1,210	1	5%	£ 611			£ 3,977					
Contractor's Design	%	1	10%	£ 2,652	1	10%	£ 797	1	10%	£ 861	1	10%	£ 2,420	1	10%	£ 1,222			£ 7,952					
Contractor's Testing & Commissioning	%	1	3%	£ 663	1	3%	£ 199	1	3%	£ 215	1	3%	£ 605	1	3%	£ 306			£ 1,988					
Contractor's Risk	%	1	5%	£ 1,326	1	5%	£ 399	1	5%	£ 431	1	5%	£ 1,210	1	5%	£ 611			£ 3,977					
Total Construction Indirect Costs				£ 12,596		£ 3,787			£ 4,091			£ 11,496			£ 5,806				£ 37,776					
Total Construction Costs				£ 39,112		£ 11,760			£ 12,701			£ 35,699			£ 18,028				£ 117,301					
Other Project Costs																								
Utility Costs																								
Utility Diversions - In Street	km	0.78	5000	£ 3,900	0.05	5000	£ 250	0.27	5000	£ 1,350	0.26	5000	£ 1,300	0.20	5000	£ 1,000	1.56	£ 5,000	£ 7,800					
Utility Diversions - Off Street	km	1.69	2000	£ 3,380	1.05	2000	£ 2,100	0.70	2000	£ 1,400	1.05	2000	£ 2,100	0.18	2000	£ 360	4.67	£ 2,000	£ 9,340					
Management of Utility Diversions	%	1	10%	£ 728	1	10%	£ 235	1	10%	£ 275	1	10%	£ 340	1	10%	£ 136			£ 1,714					
Land Acquisition Costs																								
Land Purchase	item	1	5%	£ 1,956	1	5%	£ 588	1	5%	£ 635	1	5%	£ 1,785	1	5%	£ 901			£ 5,865					
Compensation	item			inc			inc			inc			inc			inc			£ -					
Third Party Agreements & Accommodation Works	item			inc			inc			inc			inc			inc			£ -					
LRV,s																								
LRV's - Low Floor	Nr	2	2800	£ 5,600	0.5	2800	£ 1,400	0.5	2800	£ 1,400	0.5	2800	£ 1,400	0.5	2800	£ 1,400	4	£ 2,800	£ 11,200					
Total Other Project Costs				£ 15,564		£ 4,573			£ 5,060			£ 6,925			£ 3,797				£ 35,919					
Total Direct Project Costs				£ 54,676		£ 16,333			£ 17,761			£ 42,624			£ 21,825				£ 153,220					
Client & Sponsor Costs																								
Development Costs, TWA, Public Consultation, etc	%	1	5%	£ 2,734	1	5%	£ 817	1	5%	£ 888	1	5%	£ 2,131	1	5%	£ 1,091			£ 7,661					
Procurement & Delivery Management	%	1	5%	£ 2,734	1	5%	£ 817	1	5%	£ 888	1	5%	£ 2,131	1	5%	£ 1,091			£ 7,661					
NR Costs - PM Costs, Possessions, Isolations, TOC & FOC	%		3%	£ -		3%	£ -		3%	£ -		3%	£ -		3%	£ -			£ -					
Schedule 4 Costs																								
Total Client & Sponsor Costs				£ 5,468		£ 1,634			£ 1,776			£ 4,262			£ 2,182				£ 15,322					
Total Project Costs (Exc Risk/OB & Inflation)				£ 60,144		£ 17,967			£ 19,537			£ 46,886			£ 24,007				£ 168,542					
Risk/Optimism Bias (DfT WebTAG Guidance 66%)	%	1	66%	£ 39,695	1	66%	£ 11,858	1	66%	£ 12,895	1	66%	£ 30,945	1	66%	£ 15,845	1	66%	£ 111,238					
Total Project Costs (Inc Risk/OB)				£ 99,839		£ 29,825			£ 32,432			£ 77,831			£ 39,852				£ 279,780					
Inflation (Based upon 5 year programme) (DfT WebTAG Guidance @ 5.4% per annum)	% per yr	5	5.4%	£ 14,029	5	5.4%	£ 4,191	5	5.4%	£ 4,557	5	5.4%	£ 10,937	5	5.4%	£ 5,600	5	5.4%	£ 39,314					
Total Project Costs (Inc Risk/OB & Inflation)				£ 113,868		£ 34,016			£ 36,989			£ 88,768			£ 45,452				£ 319,094					

**NET Extension
Option 1B (Rev02)
Kimberley Extension Feasibility Study**



Version: Rev02 - 17-Jul-15
Base Date: 2Q2015

Route Km			2.47			Route Km			1.10			Route Km			0.97			Route Km			1.42			Route Km			5.96		
Phoenix P&R to New Farm Lane				New Farm Lane to Main Road				Main Road to Eastwood Road				Eastwood Road to Giltbrook Retail Park				Total													
	Unit	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k													
Trackwork / Routeworks																													
Trackwork: Embedded																													
On-street in highway - double track	km	0.48	£ 5,000	£ 2,400	0.05	£ 5,000	£ 250	0.05	£ 5,000	£ 250	1.32	£ 5,000	£ 6,600	1.90	£ 5,000	£ 9,500													
Segregated or paved areas - double track	km	0.30	£ 4,000	£ 1,200	0.00	£ 4,000	£ -	0.22	£ 4,000	£ 880	0.10	£ 4,000	£ 400	0.62	£ 4,000	£ 2,480													
Trackwork: Ballasted / Structure																													
Ballasted - new double track	km	1.69	£ 3,000	£ 5,070	1.05	£ 3,000	£ 3,150	0.70	£ 3,000	£ 2,100	0.00	£ 3,000	£ -	3.44	£ 3,000	£ 10,320													
On structure (rail plinths) - new double track	km		£ 700	£ -		£ 700	£ -		£ 700	£ -	0.00	£ 700	£ -	0.00	£ 700	£ -													
Ancillary highway, pavement, environmental works																													
Minor Ancillary Highway Works - double track	km	0.44	£ 2,500	£ 1,100	0.00	£ 2,500	£ -	0.22	£ 2,500	£ 550	0.10	£ 2,500	£ 250	0.76	£ 2,500	£ 1,900													
Major Ancillary Highway Works - double track	km	0.35	£ 3,500	£ 1,225	0.09	£ 3,500	£ 315	0.05	£ 3,500	£ 175	1.02	£ 3,500	£ 3,570	1.51	£ 3,500	£ 5,285													
Critical Ancillary Highway Works - double track	km	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.30	£ 5,000	£ 1,500	0.30	£ 5,000	£ 1,500													
Total Trackwork				£ 10,995			£ 3,715			£ 3,955			£ 12,320			£ 30,985													
Electrification & Traction Power																													
New double 750Vdc track - On-street	km	0.48	£ 850	£ 408	0.05	£ 850	£ 43	0.05	£ 850	£ 43	1.32	£ 850	£ 1,122	1.90	£ 850	£ 1,615													
New double 750Vdc track - Segregated/Ballasted	km	1.99	£ 750	£ 1,493	1.05	£ 750	£ 788	0.92	£ 750	£ 690	0.10	£ 750	£ 75	4.06	£ 750	£ 3,045													
Substations 750Vdc track	Nr	1.0	£ 1,500	£ 1,500	0.5	£ 1,500	£ 750	0.5	£ 1,500	£ 750	1.0	£ 1,500	£ 1,500	3.00	£ 1,500	£ 4,500													
Total Electrification & Traction Power				£ 3,401			£ 1,580			£ 1,483			£ 2,697			£ 9,160													
Signalling & Telecoms																													
New Tram Management System - Signalling, Control and Communication - On Street	km	0.78	£ 1,200	£ 936	0.05	£ 1,200	£ 60	0.27	£ 1,200	£ 324	1.42	£ 1,200	£ 1,704	2.52	£ 1,200	£ 3,024													
New Tram Management System - Signalling, Control and Communication - Off Street	km	1.69	£ 500	£ 845	1.05	£ 500	£ 525	0.70	£ 500	£ 350	0.00	£ 500	£ -	3.44	£ 500	£ 1,720													
Total Signalling & Telecoms				£ 1,781			£ 585			£ 674			£ 1,704			£ 4,744													
Structures																													
Overbridge - A6002 Low Wood Road	m2Deck	400	£ 8	£ 3,000		£ 8	£ -		£ 8	£ -		£ 8	£ -	400.0	£ 8	£ 3,000													
Upgrade Works to Existing M1 Overbridge by HA (solid parapets, bridge guard, etc)	item	1	£ 600	£ 600			£ -			£ -			£ -	1	£ 600	£ 600													
Major Earthworks	100/m3	29	£ 5	£ 145	100	£ 5	£ 500		£ 5	£ -		£ 5	£ -	129.0	£ 5	£ 645													
Culvert LNER Corridor drainage	m	160	£ 2	£ 320			£ -			£ -			£ -	160.0	£ 2	£ 320													
Ramp - Reinforced Earth/ Retained Earth Structure	m		£ 5	£ -			£ -	180	£ 5	£ 900		£ 5	£ -	180.0	£ 5	£ 900													
Demo existing bridge abutment - Eastwood Road	item		£ 25	£ -			£ -			£ -	1	£ 25	£ 25	1.0	£ 25	£ 25													
Underbridge - Main Street	m2Deck		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -	0.0	£ 7.5	£ -													
Viaduct over A610	m2Deck		£ 5.0	£ -		£ 5.0	£ -		£ 5.0	£ -		£ 5.0	£ -	0.0	£ 5.0	£ -													
Gilt Brook Culvert	m2Deck		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -	0.0	£ 7.5	£ -													
A610 Existing Bridge Reconstructed	m2Deck		£ 10	£ -			£ -			£ -			£ -	0.0	£ 10	£ -													
Allowance for miscellaneous structures & earthworks (allow 2.5% of track/routeworks)	%	1	2.5%	£ 275	1	2.5%	£ 93	1	2.5%	£ 99	1	2.5%	£ 308	1	2.5%	£ 775													
Total Structures				£ 4,340			£ 593			£ 999			£ 333			£ 6,265													
Stations																													
New Stops		1	£ 750	£ 750	1	£ 750	£ 750	1	£ 750	£ 750	2	£ 750	£ 1,500	5	£ 750	£ 3,750													
Additional for Level Separation (Lifts, Ramps, etc)		1	£ 500	£ 500	1	£ 500	£ 500	1	£ 500	£ 500	0	£ 500	£ -	3	£ 500	£ 1,500													
Total Stations				£ 1,250			£ 1,250			£ 1,250			£ 1,500			£ 5,250													
Ancillary Works																													
New Tram Stabling & Additional Depot Provision	per LRV	2	£ 500	£ 1,000	0.5	£ 500	£ 250	0.5	£ 500	£ 250	1	£ 500	£ 500	4	£ 500	£ 2,000													
Network Management Centre	item		£ -	£ -		£ -	£ -		£ -	£ -		£ -	£ -	0	£ -	£ -													
Connection to Line 1 (Possession Working)	item	1	£ 500	£ 500			£ -			£ -			£ -	1	£ 500	£ 500													
Park & Ride Site - 400 to 500 Spaces	item	1	£ 2,500	£ 2,500		£ 2,500	£ -		£ 2,500	£ -		£ 2,500	£ -	1	£ 2,500	£ 2,500													
Phoenix Park & Ride - Amend layout and entrance	item	1	£ 750	£ 750			£ -			£ -			£ -	1	£ 750	£ 750													
Total Ancillary Works				£ 4,750			£ 250			£ 250			£ 500			£ 5,750													
Total Construction Direct Costs				£ 26,516			£ 7,973			£ 8,610			£ 19,054			£ 62,154													
Construction Indirect Costs																													
Contractor's Preliminaries	%	1	25%	£ 6,629	1	25%	£ 1,993	1	25%	£ 2,153	1	25%	£ 4,764			£ 15,539													
Contractor's Traffic Management	%	1	5%	£ 1,326	1	5%	£ 399	1	5%	£ 431	1	5%	£ 953			£ 3,109													
Contractor's Design	%	1	10%	£ 2,652	1	10%	£ 797	1	10%	£ 861	1	10%	£ 1,905			£ 6,215													
Contractor's Testing & Commissioning	%	1	3%	£ 663	1	3%	£ 199	1	3%	£ 215	1	3%	£ 476			£ 1,553													
Contractor's Risk	%	1	5%	£ 1,326	1	5%	£ 399	1	5%	£ 431	1	5%	£ 953			£ 3,109													
Total Construction Indirect Costs				£ 12,596			£ 3,787			£ 4,091			£ 9,051			£ 29,525													
Total Construction Costs				£ 39,112			£ 11,760			£ 12,701			£ 28,105			£ 91,679													
Other Project Costs																													
Utility Costs																													
Utility Diversions - In Street	km	0.78	5000	£ 3,900	0.05	5000	£ 250	0.27	5000	£ 1,350	1.42	5000	£ 7,100	2.52	£ 5,000	£ 12,600													
Utility Diversions - Off Street	km	1.69	2000	£ 3,380	1.05	2000	£ 2,100	0.70	2000	£ 1,400	0.00	2000	£ -	3.44	£ 2,000	£ 6,880													
Management of Utility Diversions	%	1	10%	£ 728	1	10%	£ 235	1	10%	£ 275	1	10%	£ 710	1	10%	£ 1,948													
Land Acquisition Costs																													
Land Purchase	item	1	5%	£ 1,956	1	5%	£ 588	1	5%	£ 635	1	5%	£ 1,405			£ 4,584													
Compensation	item			inc			inc			inc			inc			£ -													
Third Party Agreements & Accommodation Works	item			inc			inc			inc			inc			£ -													
LRV,s																													
LRV's - Low Floor	Nr	2	2800	£ 5,600	0.5	2800	£ 1,400	0.5	2800	£ 1,400	1	2800	£ 2,800	4	£ 2,800	£ 11,200													
Total Other Project Costs				£ 15,564			£ 4,573			£ 5,060			£ 12,015			£ 37,212													
Total Direct Project Costs				£ 54,676			£ 16,333			£ 17,761			£ 40,120			£ 128,891													
Client & Sponsor Costs																													
Development Costs, TWA, Public Consultation, etc	%	1	5%	£ 2,734	1	5%	£ 817	1	5%	£ 888	1	5%	£ 2,006			£ 6,445													
Procurement & Delivery Management	%	1	5%	£ 2,734	1	5%	£ 817	1	5%	£ 888	1	5%	£ 2,006			£ 6,445													
NR Costs - PM Costs, Possessions, Isolations, TOC & FOC	%		3%	£ -		3%	£ -		3%	£ -		3%	£ -			£ -													
Schedule 4 Costs																													
Total Client & Sponsor Costs				£ 5,468			£ 1,634			£ 1,776			£ 4,012			£ 12,890													
Total Project Costs (Exc Risk/OB & Inflation)				£ 60,144			£ 17,967			£ 19,537			£ 44,132			£ 141,781													
Risk/Optimism Bias (DfT WebTAG Guidance 66%)	%	1	66%	£ 39,695	1	66%	£ 11,858	1	66%	£ 12,895	1	66%	£ 29,127	1	66%	£ 93,575													
Total Project Costs (Inc Risk/OB)				£ 99,839			£ 29,825			£ 32,432			£ 73,259			£ 235,356													
Inflation (Based upon 5 year programme) (DfT WebTAG Guidance @ 5.4% per annum)	% per yr	5	5.4%	£ 14,029	5	5.4%	£ 4,191	5	5.4%	£ 4,557	5	5.4%	£ 10,294	5	5.4%	£ 33,071													
Total Project Costs (Inc Risk/OB & Inflation)				£ 113,868			£ 34,016			£ 36,989			£ 83,553			£ 268,427													

£ 268,427

NET Extension
Option 2 (Rev02)
Kimberley Extension Feasibility Study



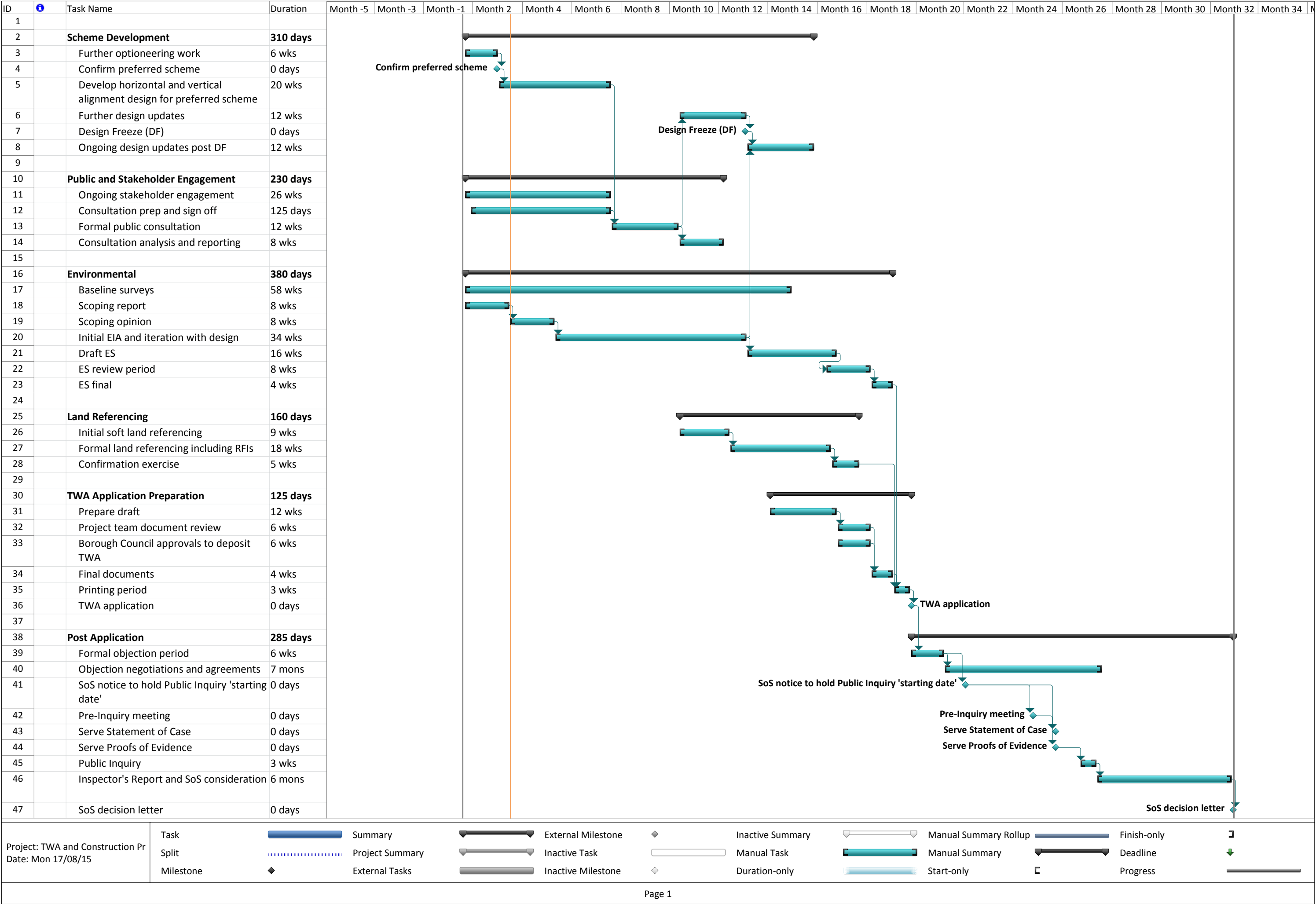
Version: Rev02 - 17-Jul-15
Base Date: 2Q2015

		Route Km 2.47			Route Km 0.80			Route Km 2.50			Route Km 0.38			Route Km 6.15		
		Phoenix P&R to New Farm Lane			New Farm Lane to Main Road			Main Road to Gin Close Way			Gin Close Way to Giltbrook Retail Park			Total		
	Unit	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k
Trackwork / Routeworks																
Trackwork: Embedded																
On-street in highway - double track	km	0.48	£ 5,000	£ 2,400	0.05	£ 5,000	£ 250	0.21	£ 5,000	£ 1,050	0.10	£ 5,000	£ 500	0.84	£ 5,000	£ 4,200
Segregated or paved areas - double track	km	0.30	£ 4,000	£ 1,200	0.00	£ 4,000	£ -	0.06	£ 4,000	£ 240	0.10	£ 4,000	£ 400	0.46	£ 4,000	£ 1,840
Trackwork: Ballasted / Structure																
Ballasted - new double track	km	1.69	£ 3,000	£ 5,070	0.75	£ 3,000	£ 2,250	2.15	£ 3,000	£ 6,450	0.18	£ 3,000	£ 540	4.77	£ 3,000	£ 14,310
On structure (rail plinths) - new double track	km		£ 700	£ -		£ 700	£ -	0.08	£ 700	£ 56	0.00	£ 700	£ -	0.08	£ 700	£ 56
Ancillary highway, pavement, environmental works																
Minor Ancillary Highway Works - double track	km	0.44	£ 2,500	£ 1,100	0.00	£ 2,500	£ -	0.00	£ 2,500	£ -	0.00	£ 2,500	£ -	0.44	£ 2,500	£ 1,100
Major Ancillary Highway Works - double track	km	0.35	£ 3,500	£ 1,225	0.08	£ 3,500	£ 280	0.38	£ 3,500	£ 1,330	0.10	£ 3,500	£ 350	0.91	£ 3,500	£ 3,185
Critical Ancillary Highway Works - double track	km	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.10	£ 5,000	£ 500	0.10	£ 5,000	£ 500
Total Trackwork				£ 10,995			£ 2,780			£ 9,126			£ 2,290			£ 25,191
Electrification & Traction Power																
New double 750Vdc track - On-street	km	0.48	£ 850	£ 408	0.05	£ 850	£ 43	0.21	£ 850	£ 179	0.10	£ 850	£ 85	0.84	£ 850	£ 714
New double 750Vdc track - Segregated/Ballasted	km	1.99	£ 750	£ 1,493	0.75	£ 750	£ 563	2.29	£ 750	£ 1,718	0.28	£ 750	£ 210	5.31	£ 750	£ 3,983
Substations 750Vdc track	Nr	1.0	£ 1,500	£ 1,500	0.5	£ 1,500	£ 750	1.0	£ 1,500	£ 1,500	0.5	£ 1,500	£ 750	3.00	£ 1,500	£ 4,500
Total Electrification & Traction Power				£ 3,401			£ 1,355			£ 3,396			£ 1,045			£ 9,197
Signalling & Telecoms																
New Tram Management System - Signalling, Control and Communication - On Street	km	0.78	£ 1,200	£ 936	0.05	£ 1,200	£ 60	0.27	£ 1,200	£ 324	0.20	£ 1,200	£ 240	1.30	£ 1,200	£ 1,560
New Tram Management System - Signalling, Control and Communication - Off Street	km	1.69	£ 500	£ 845	0.75	£ 500	£ 375	2.23	£ 500	£ 1,115	0.18	£ 500	£ 90	4.85	£ 500	£ 2,425
Total Signalling & Telecoms				£ 1,781			£ 435			£ 1,439			£ 330			£ 3,985
Structures																
Overbridge - A6002 Low Wood Road	m2Deck	400	£ 8	£ 3,000		£ 8	£ -		£ 8	£ -		£ 8	£ -	400.0	£ 8	£ 3,000
Upgrade Works to Existing M1 Overbridge by HA (solid parapets, bridge guard, etc)	item	1	£ 600	£ 600			£ -			£ -			£ -	1	£ 600	£ 600
Major Earthworks	100/m3	29	£ 5	£ 145	34	£ 5	£ 170		£ 5	£ -		£ 5	£ -	63.0	£ 5	£ 315
Culvert LNER Corridor drainage	m	160	£ 2	£ 320			£ -			£ -			£ -	160.0	£ 2	£ 320
Ramp - Reinforced Earth/ Retained Earth Structure	m		£ 5	£ -			£ -	460	£ 5	£ 2,300			£ -	460.0	£ 5	£ 2,300
Demo existing bridge abutment - Eastwood Road	item		£ 25	£ -			£ -			£ -			£ -	0.0	£ 25	£ -
Underbridge - Main Street	m2Deck		£ 7.5	£ -		£ 7.5	£ -	300	£ 7.5	£ 2,250		£ 7.5	£ -	300.0	£ 7.5	£ 2,250
Viaduct over A610	m2Deck		£ 7.5	£ -			£ -	720	£ 7.5	£ 5,400			£ -	720.0	£ 7.5	£ 5,400
Gilt Brook Culvert	m2Deck		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -	200	£ 7.5	£ 1,500	200.0	£ 7.5	£ 1,500
A610 Existing Bridge Reconstructed	m2Deck		£ 10	£ -			£ -			£ -	600	£ 10	£ 6,000	600.0	£ 10	£ 6,000
Allowance for miscellaneous structures & earthworks (allow 2.5% of track/routeworks)	%	1	2.5%	£ 275	1	2.5%	£ 70	1	2.5%	£ 228	1	2.5%	£ 57	1	2.5%	£ 630
Total Structures				£ 4,340			£ 240			£ 10,178			£ 7,557			£ 22,315
Stations																
New Stops		1	£ 750	£ 750	1	£ 750	£ 750	2	£ 750	£ 1,500	1	£ 750	£ 750	5	£ 750	£ 3,750
Additional for Level Separation (Lifts, Ramps, etc)		1	£ 500	£ 500	1	£ 500	£ 500		£ 500	£ -	0	£ 500	£ -	2	£ 500	£ 1,000
Total Stations				£ 1,250			£ 1,250			£ 1,500			£ 750			£ 4,750
Ancillary Works																
New Tram Stabling & Additional Depot Provision	per LRV	2	£ 500	£ 1,000	0.5	£ 500	£ 250	1	£ 500	£ 500	0.5	£ 500	£ 250	4	£ 500	£ 2,000
Network Management Centre	item		£ -	£ -		£ -	£ -		£ -	£ -		£ -	£ -	0	£ -	£ -
Connection to Line 1 (Possession Working)	item	1	£ 500	£ 500			£ -			£ -			£ -	1	£ 500	£ 500
Park & Ride Site - 400 to 500 Spaces	item	1	£ 2,500	£ 2,500		£ 2,500	£ -		£ 2,500	£ -		£ 2,500	£ -	1	£ 2,500	£ 2,500
Phoenix Park & Ride - Amend layout and entrance	item	1	£ 750	£ 750			£ -			£ -			£ -	1	£ 750	£ 750
Total Ancillary Works				£ 4,750			£ 250			£ 500			£ 250			£ 5,750
Total Construction Direct Costs				£ 26,516			£ 6,310			£ 26,139			£ 12,222			£ 71,187
Construction Indirect Costs																
Contractor's Preliminaries	%	1	25%	£ 6,629	1	25%	£ 1,577	1	25%	£ 6,535	1	25%	£ 3,056			£ 17,797
Contractor's Traffic Management	%	1	5%	£ 1,326	1	5%	£ 315	1	5%	£ 1,307	1	5%	£ 611			£ 3,559
Contractor's Design	%	1	10%	£ 2,652	1	10%	£ 631	1	10%	£ 2,614	1	10%	£ 1,222			£ 7,119
Contractor's Testing & Commissioning	%	1	3%	£ 663	1	3%	£ 158	1	3%	£ 653	1	3%	£ 306			£ 1,780
Contractor's Risk	%	1	5%	£ 1,326	1	5%	£ 315	1	5%	£ 1,307	1	5%	£ 611			£ 3,559
Total Construction Indirect Costs				£ 12,596			£ 2,996			£ 12,416			£ 5,806			£ 33,814
Total Construction Costs				£ 39,112			£ 9,306			£ 38,555			£ 18,028			£ 105,001
Other Project Costs																
Utility Costs																
Utility Diversions - In Street	km	0.78	5000	£ 3,900	0.05	5000	£ 250	0.27	5000	£ 1,350	0.20	5000	£ 1,000	1.30	£ 5,000	£ 6,500
Utility Diversions - Off Street	km	1.69	2000	£ 3,380	0.75	2000	£ 1,500	2.23	2000	£ 4,460	0.18	2000	£ 360	4.85	£ 2,000	£ 9,700
Management of Utility Diversions	%	1	10%	£ 728	1	10%	£ 175	1	10%	£ 581	1	10%	£ 136	1	10%	£ 1,620
Land Acquisition Costs																
Land Purchase	item	1	5%	£ 1,956	1	5%	£ 465	1	5%	£ 1,928	1	5%	£ 901			£ 5,250
Compensation	item			inc			inc			inc			inc			£ -
Third Party Agreements & Accommodation Works	item			inc			inc			inc			inc			£ -
LRV,s																
LRV's - Low Floor	Nr	2	2800	£ 5,600	0.5	2800	£ 1,400	1	2800	£ 2,800	0.5	2800	£ 1,400	4	£ 2,800	£ 11,200
Total Other Project Costs				£ 15,564			£ 3,790			£ 11,119			£ 3,797			£ 34,270
Total Direct Project Costs				£ 54,676			£ 13,096			£ 49,674			£ 21,825			£ 139,271
Client & Sponsor Costs																
Development Costs, TWA, Public Consultation, etc	%	1	5%	£ 2,734	1	5%	£ 655	1	5%	£ 2,484	1	5%	£ 1,091			£ 6,964
Procurement & Delivery Management	%	1	5%	£ 2,734	1	5%	£ 655	1	5%	£ 2,484	1	5%	£ 1,091			£ 6,964
NR Costs - PM Costs, Possessions, Isolations, TOC & FOC	%		3%	£ -		3%	£ -		3%	£ -		3%	£ -			£ -
Schedule 4 Costs																
Total Client & Sponsor Costs				£ 5,468			£ 1,310			£ 4,968			£ 2,182			£ 13,928
Total Project Costs (Exc Risk/OB & Inflation)				£ 60,144			£ 14,406			£ 54,642			£ 24,007			£ 153,199
Risk/Optimism Bias (DfT WebTAG Guidance 66%)	%	1	66%	£ 39,695	1	66%	£ 9,508	1	66%	£ 36,064	1	66%	£ 15,845	1	66%	£ 101,112
Total Project Costs (Inc Risk/OB)				£ 99,839			£ 23,914			£ 90,706			£ 39,852			£ 254,311
Inflation (Based upon 5 year programme) (DfT WebTAG Guidance @ 5.4% per annum)	% per yr	5	5.4%	£ 14,029	5	5.4%	£ 3,360	5	5.4%	£ 12,746	5	5.4%	£ 5,600	5	5.4%	£ 35,735
Total Project Costs (Inc Risk/OB & Inflation)				£ 113,868			£ 27,274			£ 103,452			£ 45,452			£ 290,046

£ 290,046

Phoenix P&R to New Farm Lane				New Farm Lane to Main Road			Along Main Road			Main Road to Eastwood Road			Eastwood Road to Gin Close Way			Gin Close Way to Giltbrook Retail Park			Total			
	Unit	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k	Quant	Rate £k	Total £k
Trackwork / Routeworks																						
Trackwork: Embedded																						
On-street in highway - double track	km	0.48	£ 5,000	£ 2,400	0.05	£ 5,000	£ 250	0.33	£ 5,000	£ 1,650	0.05	£ 5,000	£ 250	0.10	£ 5,000	£ 500	0.10	£ 5,000	£ 500	1.11	£ 5,000	£ 5,550
Segregated or paved areas - double track	km	0.30	£ 4,000	£ 1,200	0.00	£ 4,000	£ -	0.00	£ 4,000	£ -	0.22	£ 4,000	£ 880	0.16	£ 4,000	£ 640	0.10	£ 4,000	£ 400	0.78	£ 4,000	£ 3,120
Trackwork: Ballasted / Structure																						
Ballasted - new double track	km	1.69	£ 3,000	£ 5,070	0.75	£ 3,000	£ 2,250	0.00	£ 3,000	£ -	0.70	£ 3,000	£ 2,100	0.70	£ 3,000	£ 2,100	0.18	£ 3,000	£ 540	4.02	£ 3,000	£ 12,060
On structure (rail plinths) - new double track	km		£ 700	-		£ 700	-		£ 700	-		£ 700	-	0.35	£ 700	£ 245	0.00	£ 700	-	0.35	£ 700	£ 245
Ancillary highway, pavement, environmental works																						
Minor Ancillary Highway Works - double track	km	0.44	£ 2,500	£ 1,100	0.00	£ 2,500	£ -	0.00	£ 2,500	£ -	0.22	£ 2,500	£ 550	0.16	£ 2,500	£ 400	0.00	£ 2,500	£ -	0.82	£ 2,500	£ 2,050
Major Ancillary Highway Works - double track	km	0.35	£ 3,500	£ 1,225	0.08	£ 3,500	£ 280	0.33	£ 3,500	£ 1,155	0.05	£ 3,500	£ 175	0.13	£ 3,500	£ 455	0.10	£ 3,500	£ 350	1.04	£ 3,500	£ 3,640
Critical Ancillary Highway Works - double track	km	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.00	£ 5,000	£ -	0.10	£ 5,000	£ 500	0.10	£ 5,000	£ 500
Total Trackwork				£ 10,995		£ 2,780				£ 2,805			£ 3,955			£ 4,340			£ 2,290			£ 27,165
Electrification & Traction Power																						
New double 750Vdc track - On-street	km	0.48	£ 850	£ 408	0.05	£ 850	£ 43	0.33	£ 850	£ 281	0.05	£ 850	£ 43	0.10	£ 850	£ 85	0.10	£ 850	£ 85	1.11	£ 850	£ 944
New double 750Vdc track - Segregated/Ballasted	km	1.99	£ 750	£ 1,493	0.75	£ 750	£ 563	0.00	£ 750	£ -	0.92	£ 750	£ 690	1.21	£ 750	£ 908	0.28	£ 750	£ 210	5.15	£ 750	£ 3,863
Substations 750Vdc track	Nr	1.0	£ 1,500	£ 1,500	0.5	£ 1,500	£ 750		£ 1,500	£ -	0.5	£ 1,500	£ 750	0.5	£ 1,500	£ 750	0.5	£ 1,500	£ 750	3.00	£ 1,500	£ 4,500
Total Electrification & Traction Power				£ 3,401		£ 1,355				£ 281			£ 1,483			£ 1,743			£ 1,045			£ 9,306
Signalling & Telecoms																						
New Tram Management System - Signalling, Control and Communication - On Street	km	0.78	£ 1,200	£ 936	0.05	£ 1,200	£ 60	0.33	£ 1,200	£ 396	0.27	£ 1,200	£ 324	0.26	£ 1,200	£ 312	0.20	£ 1,200	£ 240	1.89	£ 1,200	£ 2,268
New Tram Management System - Signalling, Control and Communication - Off Street	km	1.69	£ 500	£ 845	0.75	£ 500	£ 375	0.00	£ 500	£ -	0.70	£ 500	£ 350	1.05	£ 500	£ 525	0.18	£ 500	£ 90	4.37	£ 500	£ 2,185
Total Signalling & Telecoms				£ 1,781		£ 435				£ 396			£ 674			£ 837			£ 330			£ 4,453
Structures																						
Overbridge - A6002 Low Wood Road	m2Deck item	400	£ 8	£ 3,000		£ 8	£ -		£ 8	£ -		£ 8	£ -		£ 8	£ -		£ 8	£ -	400.0	£ 8	£ 3,000
Upgrade Works to Existing M1 Overbridge by HA (solid parapets, bridge guard, etc)		1	£ 600	£ 600			£ -			£ -			£ -			£ -			£ -	1	£ 600	£ 600
Major Earthworks	100/m3	29	£ 5	£ 145	34	£ 5	£ 170		£ 5	£ -		£ 5	£ -		£ 5	£ -		£ 5	£ -	63.0	£ 5	£ 315
Culvert LNER Corridor drainage	m	160	£ 2	£ 320			£ -			£ -			£ -			£ -			£ -	160.0	£ 2	£ 320
Ramp - Reinforced Earth/ Retained Earth Structure	m		£ 5	£ -			£ -		£ 5	£ -	180	£ 5	£ 900	80	£ 5	£ 400			£ -	260.0	£ 5	£ 1,300
Demo existing bridge abutment - Eastwood Road	item		£ 25	£ -			£ -			£ -			£ -	1	£ 25	£ 25			£ -	1.0	£ 25	£ 25
Underbridge - Main Street	m2Deck		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -	0.0	£ 7.5	£ 7.5
Viaduct over A610	m2Deck		£ 5.0	£ -		£ 5.0	£ -		£ 5.0	£ -		£ 5.0	£ -	3150	£ 5.0	£ 15,750			£ -	3150.0	£ 5.0	£ 15,750
Gilt Brook Culvert	m2Deck		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -		£ 7.5	£ -	200	£ 7.5	£ 1,500	200.0	£ 7.5	£ 1,500
A610 Existing Bridge Reconstructed	m2Deck		£ 10	£ -			£ -			£ -			£ -			£ -	600	£ 10	£ 6,000	600.0	£ 10	£ 6,000
Allowance for miscellaneous structures & earthworks (allow 2.5% of track/routeworks)	%	1	2.5%	£ 275	1	2.5%	£ 70	1	2.5%	£ 70	1	2.5%	£ 99	1	2.5%	£ 109	1	2.5%	£ 57	1	2.5%	£ 679
Total Structures				£ 4,340		£ 240				£ 70			£ 999			£ 16,284			£ 7,557			£ 29,489
Stations																						
New Stops		1	£ 750	£ 750	1	£ 750	£ 750		£ 750	£ -	1	£ 750	£ 750	1	£ 750	£ 750	1	£ 750	£ 750	5	£ 750	£ 3,750
Additional for Level Separation (Lifts, Ramps, etc)		1	£ 500	£ 500	1	£ 500	£ 500		£ 500	£ -	1	£ 500	£ 500	0	£ 500	£ -	0	£ 500	£ -	3	£ 500	£ 1,500
Total Stations				£ 1,250		£ 1,250				£			£ 1,250			£ 750			£ 750			£ 5,250
Ancillary Works																						
New Tram Stabling & Additional Depot Provision	per LRV item	2	£ 500	£ 1,000	0.5	£ 500	£ 250	0	£ 500	£ -	0.5	£ 500	£ 250	1	£ 500	£ 500	0	£ 500	£ -	4	£ 500	£ 2,000
Network Management Centre	item		£ -	£ -		£ -	£ -		£ -	£ -		£ -	£ -	1	£ -	£ -		£ -	£ -	0	£ -	£ 0
Connection to Line 1 (Possession Working)	item	1	£ 500	£ 500			£ -			£ -			£ -			£ -			£ -	1	£ 500	£ 500
Park & Ride Site - 400 to 500 Spaces	item	1	£ 2,500	£ 2,500		£ 2,500	£ -		£ 2,500	£ -		£ 2,500	£ -		£ 2,500	£ -		£ 2,500	£ -	1	£ 2,500	£ 2,500
Phoenix Park & Ride - Amend layout and entrance	item	1	£ 750	£ 750			£ -			£ -			£ -			£ -			£ -	1	£ 750	£ 750
Total Ancillary Works				£ 4,750		£ 250				£			£ 250			£ 500			£			£ 5,750
Total Construction Direct Costs				£ 26,516		£ 6,310				£ 3,552			£ 8,610			£ 24,453			£ 11,972			£ 81,413
Construction Indirect Costs																						
Contractor's Preliminaries	%	1	25%	£ 6,629	1	25%	£ 1,577	1	25%	£ 888	1	25%	£ 2,153	1	25%	£ 6,113	1	25%	£ 2,993			£ 20,353
Contractor's Traffic Management	%	1	5%	£ 1,326	1	5%	£ 315	1	5%	£ 178	1	5%	£ 431	1	5%	£ 1,223	1	5%	£ 599			£ 4,072
Contractor's Design	%	1	10%	£ 2,652	1	10%	£ 631	1	10%	£ 355	1	10%	£ 861	1	10%	£ 2,445	1	10%	£ 1,197			£ 8,141
Contractor's Testing & Commissioning	%	1	3%	£ 663	1	3%	£ 158	1	3%	£ 89	1	3%	£ 215	1	3%	£ 611	1	3%	£ 299			£ 2,035
Contractor's Risk	%	1	5%	£ 1,326	1	5%	£ 315	1	5%	£ 178	1	5%	£ 431	1	5%	£ 1,223	1	5%	£ 599			£ 4,072
Total Construction Indirect Costs				£ 12,596		£ 2,996				£ 1,688			£ 4,091			£ 11,615			£ 5,687			£ 38,673
Total Construction Costs				£ 39,112		£ 9,306				£ 5,240			£ 12,701			£ 36,068			£ 17,659			£ 120,086
Other Project Costs																						
Utility Costs																						
Utility Diversions - In Street	km	0.78	5000	£ 3,900	0.05	5000	£ 250	0.33	5000	£ 1,650	0.27	5000	£ 1,350	0.26	5000	£ 1,300	0.20	5000	£ 1,000	1.89	£ 5,000	£ 9,450
Utility Diversions - Off Street	km	1.69	2000	£ 3,380	0.75	2000	£ 1,500	0.00	2000	£ -	0.70	2000	£ 1,400	1.05	2000	£ 2,100	0.18	2000	£ 360	4.37	£ 2,000	£ 8,740
Management of Utility Diversions	%	1	10%	£ 728	1	10%	£ 175	1	10%	£ 165	1	10%	£ 275	1	10%	£ 340	1	10%	£ 136	1	10%	£ 1,819
Land Acquisition Costs																						
Land Purchase	item	1	5%	£ 1,956	1	5%	£ 465	1	5%	£ 262	1	5%	£ 635	1	5%	£ 1,803	1	5%	£ 883			£ 6,004
Compensation	item			inc			inc			inc			inc			inc			inc			£ -
Third Party Agreements & Accommodation Works	item			inc			inc			inc			inc			inc			inc			£ -
LRV.s																						
LRV.s - Low Floor	Nr	2	2800	£ 5,600	0.5	2800	£ 1,400		2800	£ -	0.5	2800	£ 1,400	1	2800	£ 2,800		2800	£ -	4	£ 2,800	£ 11,200
Total Other Project Costs				£ 15,564		£ 3,790				£ 2,077			£ 5,060			£ 8,343			£ 2,379			£ 37,213
Total Direct Project Costs				£ 54,676		£ 13,096				£ 7,317			£ 17,761			£ 44,411			£ 20,038			£ 157,299
Client & Sponsor Costs																						
Development Costs, TWA, Public Consultation, etc	%	1	5%	£ 2,734	1	5%	£ 655	1	5%	£ 366	1	5%	£ 888	1	5%	£ 2,221	1	5%	£ 1,002			£ 7,866
Procurement & Delivery Management	%	1	5%	£ 2,734	1	5%	£ 655	1	5%	£ 366	1	5%	£ 888	1	5%	£ 2,221	1	5%	£ 1,002			£ 7,866
NR Costs - PM Costs, Possessions, Isolations, TOC & FOC	%		3%	£ -		3%	£ -	1	3%	£ -		3%	£ -		3%	£ -		3%	£ -			£ -
Schedule 4 Costs																						
Total Client & Sponsor Costs				£ 5,468		£ 1,310				£ 732			£ 1,776			£ 4,442			£ 2,004			£ 15,732
Total Project Costs (Exc Risk/OB & Inflation)				£ 60,144		£ 14,406				£ 8,049			£ 19,537			£ 48,853			£ 22,042			£ 173,031
Risk/Optimism Bias (DIT WebTAG Guidance 66%)	%	1	66%	£ 39,695	1	66%	£ 9,508	1	66%	£ 5,312	1	66%	£ 12,895	1	66%	£ 32,243	1	66%	£ 14,548	1	66%	£ 114,201
Total Project Costs (Inc Risk/OB)				£ 99,839		£ 23,914				£ 13,361			£ 32,432			£ 81,096			£ 36,590			£ 287,232
Inflation (Based upon 5 year programme) (DIT WebTAG Guidance @ 5.4% per annum)	% per yr	5	5.4%	£ 14,029	5	5.4%	£ 3,360	5	5.4%	£ 1,877	5	5.4%	£ 4,557	5	5.4%	£ 11,395	5	5.4%	£ 5,142	5	5.4%	£ 40,360
Total Project Costs (Inc Risk/OB & Inflation)				£ 113,868		£ 27,274				£ 15,238			£ 36,989			£ 92,491			£ 41,732			£ 327,592

Appendix C. TWA Programme



Page 1