notes
1. Read in conjunction with all relevant Architects, Engineers & design team drawings & specifications
2. Any discrepancies must be drawn to the attention of the lead consultant in writing
3. All dimensions are in millimeters unless otherwise noted & are subject to checking on site prior to fabrication or ordering of materials
4. This drawing is the copyright of Bowles & Wyer (and other consultants where referenced)

key

rev	date	by	chk	notes
Orig	17.06.22	FL		n/a

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project title
CARROW WORKS, NORWICH

drawing
ILLUSTRATED LANDSCAPE MASTERPLAN

job number
2962

drawing number
2962-11-13

status
PLANNING

scale 1:1000@A1

0 1000 2000

Appendix H

Accommodation schedules and plans

Project No / Name:	**02022 Carrow Works**
Description	**Illustrative Masterplan Summary Industrial Schedule**
Revision / Date:	**27.06.22**

Illustrative Masterplan Summary Industrial Schedule						
Parcel	**Refurbished Industrial GIA**		**New Build Industrial GIA**		**Total**	
	m^2	**ft^2**	**m^2**	**ft^2**	**m^2**	**ft^2**
1. Gateway	-	-	-	-	-	-
2. Waterside	-	-				
3. Railway Side	-	-	-	-	-	-
4. Build to Rent	-	-	-	-	-	-
5. Private Housing	-	-	-	-	-	-
6. Housing Area 1	-	-	-	-	-	-
7. Housing Area 2	-	-	-	-	-	-
8. Abbey Grounds	-	-	-	-	-	-
9. Abbey Gardens	-	-	-	-	-	-
10. Food Store and Employment	1,182	12,723	1,821	19,601	3,003	32,324
11. Mustard Seed Driers	-	-	-	-	-	-
Total	**1,182**	**12,723**	**1,821**	**19,601**	**3,003**	**32,324**

Note. Commercial areas shown in red are estimates based on existing building areas.
Note. Industrial areas assume the provision of a mezzanine level, calculated at 50% of the GIA.

Project No / Name:	**02022 Carrow Works**
Description	**Illustrative Masterplan Summary Accommodation Schedule**
Revision / Date:	**27.06.22**

Illustrative Masterplan Summary Accommodation Schedule					
Parcel	**Refurbished Apartments**	**New Build Apartments**	**Refurbished Houses**	**New Build Houses**	**Total**
1. Gateway*	125	62	-	-	**187**
2. Waterside	-	530	-	-	**530**
3. Railway Side	-	330	-	-	**330**
4. Build to Rent	-	250	-	-	**250**
5. Private Housing	-	77	-	-	**77**
6. Housing Area 1	-	-	-	110	**110**
7. Housing Area 2	-	-	-	234	**234**
8. Abbey Grounds**	-	-	6	9	**15**
9. Abbey Gardens*	-	25	3	33	**61**
10. Food Store and Employment	-	65	-	-	**65**
11. Mustard Seed Driers	-	-	-	-	**0**
Total	**125**	**1,339**	**9**	**386**	**1,859**

* Refurbished housing and apartments (highlighed in red text) in parcels 1 and 9 are estimates provided to us by the client. These buildings are to be designed in detail by the heritage architect and more accurate figures can be calculated.
** Refurbished housing within parcel 8 has been designed by the heritage architect and figures have been provided based on the detailed drawings.

Project No / Name:	**02022 Carrow Works**
Description	**Illustrative Masterplan Summary Residential Area Schedule**
Revision / Date:	**27.06.22**

Illustrative Masterplan Summary Residential Area Schedule						
Parcel	**GEA**		**GIA**		**Total**	
	m^2	**ft^2**	**m^2**	**ft^2**	**m^2**	**ft^2**
1. Gateway	5,796	62,387	5,269	56,716	11,065	119,103
2. Waterside	49,368	531,397	44,880	483,088	94,248	1,014,485
3. Railway Side	29,638	319,028	26,944	290,025	56,582	609,053
4. Build to Rent	23,684	254,936	21,531	231,760	45,215	486,695
5. Private Housing	8,229	88,578	7,481	80,525	15,710	169,104
6. Housing Area 1	14,126	152,054	12,842	138,231	26,968	290,286
7. Housing Area 2	24,984	268,931	22,713	244,483	47,697	513,414
8. Abbey Grounds	990	10,656	900	9,688	1,890	20,344
9. Abbey Gardens	6,185	66,579	5,623	60,526	11,808	127,105
10. Food Store and Employment	7,543	81,190	6,857	73,809	14,400	154,998
11. Mustard Seed Driers	0	0	0	0	0	0
Total	**170,544**	**1,835,736**	**155,040**	**1,668,851**	**325,584**	**3,504,586**

Note. Residential GEA areas shown in red are estimates based on a 10% increase from the residential GIA.

Project No / Name:	**02022 Carrow Works**
Description	**Illustrative Masterplan Summary Commercial Schedule**
Revision / Date:	**27.06.22**

Illustrative Masterplan Summary Commercial Schedule (GIA)						
Parcel	**Refurbished Commercial GIA**		**New Build Commercial**		**Total**	
	m^2	**ft^2**	**m^2**	**ft^2**	**m^2**	**ft^2**
1. Gateway	14,469	155,744	1,309	14,090	15,778	169,834
2. Waterside			2,833	30,494	2,833	30,494
3. Railway Side			839	9,031	839	9,031
4. Build to Rent					0	0
5. Private Housing					0	0
6. Housing Area 1					0	0
7. Housing Area 2					0	0
8. Abbey Grounds					0	0
9. Abbey Gardens					0	0
10. Food Store and Employment			2,203	23,713	2,203	23,713
11. Mustard Seed Driers	1,974	21,248			1,974	21,248
Total	**16,443**	**176,992**	**7,184**	**77,329**	**23,627**	**254,321**

Note. Commercial areas shown in red are estimates based on existing building areas.

Appendix I

Movement strategies

Notes

Do not scale from this drawing.
All contractors must visit the site and be responsible for taking and checking dimensions.
All construction information should be taken from figured dimensions only.
Any discrepancies between drawings, specifications and site conditions must be brought to the attention of the supervising officer.
This drawing & the works depicted are the copyright of JTP.

This drawing is prepared for the specific project stage in the Drawing Status section below and it is not intended to be used for any other purpose. Whilst all reasonable efforts are used to ensure drawings are accurate, JTP accept no liability for any reliance placed on, or use made of, this plan by anyone for purposes other than those stated in the Drawing Status below.

Key

- Hybrid Application Boundary
- Development Parcel
- Main Site Access (Vehicular, bus, pedestrian, cycle and secondary)
- Pedestrian and Cycle Site Access Only
- Pedestrain Site Access Only
- Emergency Vehicular Access
- Primary Street and Bus Route
- Secondary Street
- Indicative Footpaths and Cycleways
- Pedestrain Only Access to Gardens
- Public Squares
- Scheduled Monument

Notes

The proposed primary and secondary streets include carriageway, green verges, street planting, swales, footways and cycleways.

Alignment of the secondary streets, footways and cyclepaths are indicative only and subject to detailed design.

Alignment and design of the bridge crossing over the river is subject to detailed design.

Rev	Date	Description	Drawn	Chkd
P1	27.06.22	Planning Submission.	BM	IF

Drawing Status
For Planning

Client
Fuel Properties

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Project
Carrow Works, Nowrich

Drawing Title
Parameter Plan
Access & Movement

Scale @A1 1 : 1000 | Job Ref. 02022
Drawing No. PP-06 | Revision. P1
Scale Bar 0 10 20 30 40 50 m
Sheet Code
02022-JTP-PP-06 - Access & Movement - P1

Appendix J

Subway link

Underpass Feasibility Study

Allies and Morrison

February 2022

Contents

1. Introduction

As part of the East Norwich masterplan, a feasibility study has been carried out to assess options for the existing underpass beneath the Great Eastern Main Line railway that separates the Carrow Works site from the Deal Ground.

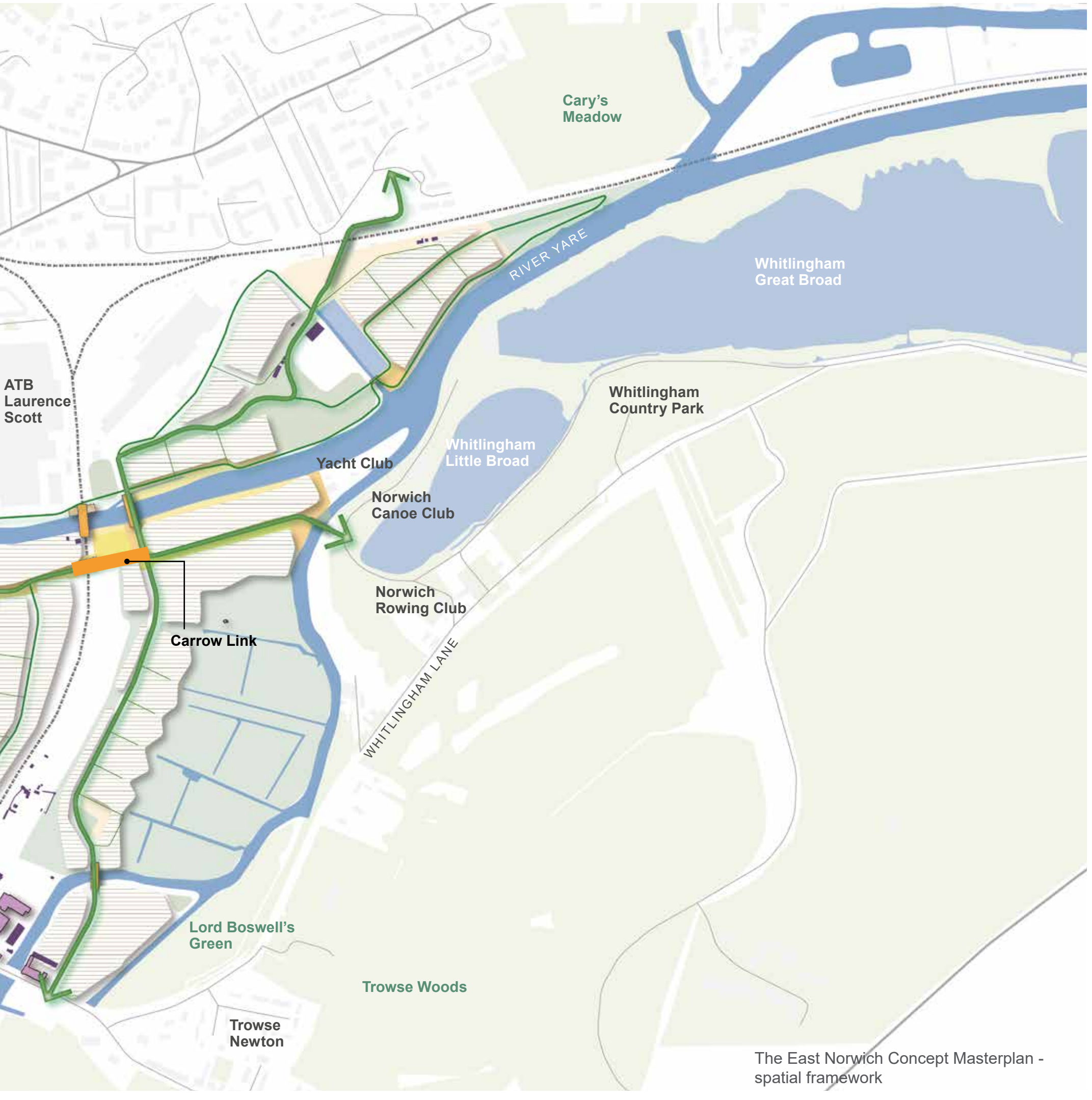
The existing structure is disused and currently boarded up from the western side.

A big opportunity has been sited to propose a new pedestrian and cycle link through the tunnel at its current location between Carrow Works and the Deal Ground. The underpass measures 3m wide and approx. 2.2m high in a recent survey.

A series of options have been proposed and outlined within this document. The purpose of this document is to allow a full appraisal of the feasibility of such works to the tunnel to allow its future integration within the sustainable movement network of the masterplan.

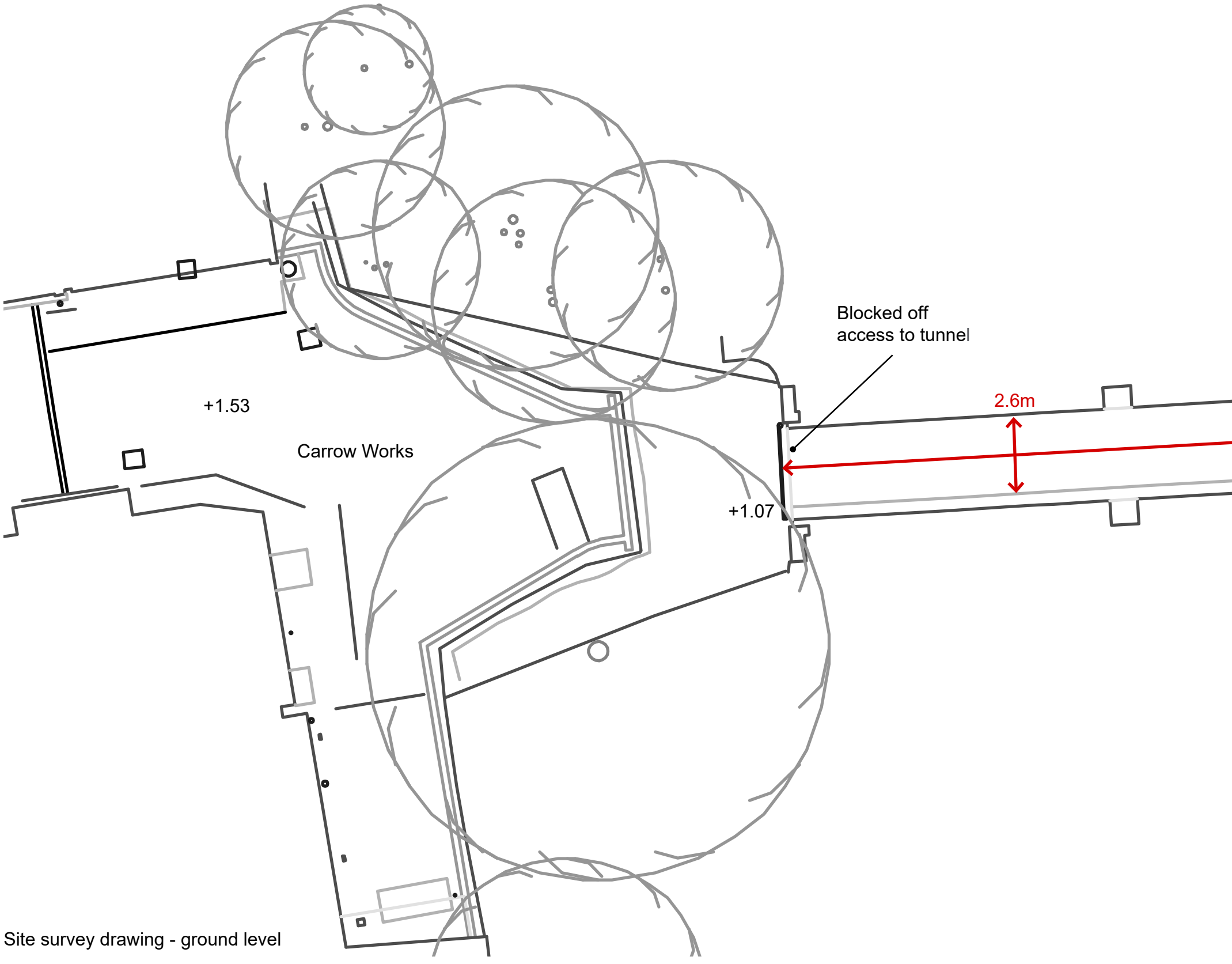
For the purposes of this document, the various proposal options for the underpass have been renamed “Carrow Link”.

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.



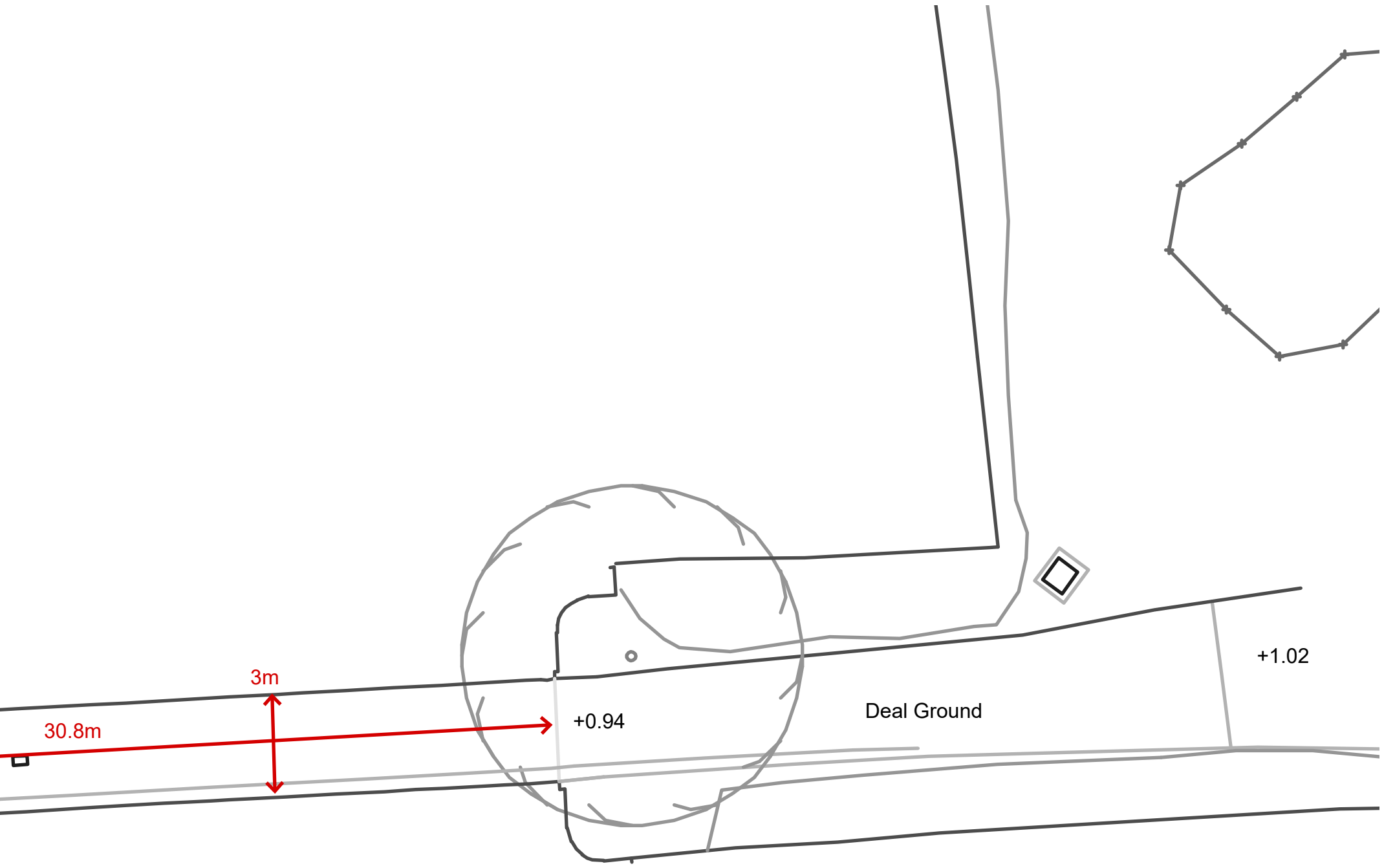
The East Norwich Concept Masterplan - spatial framework

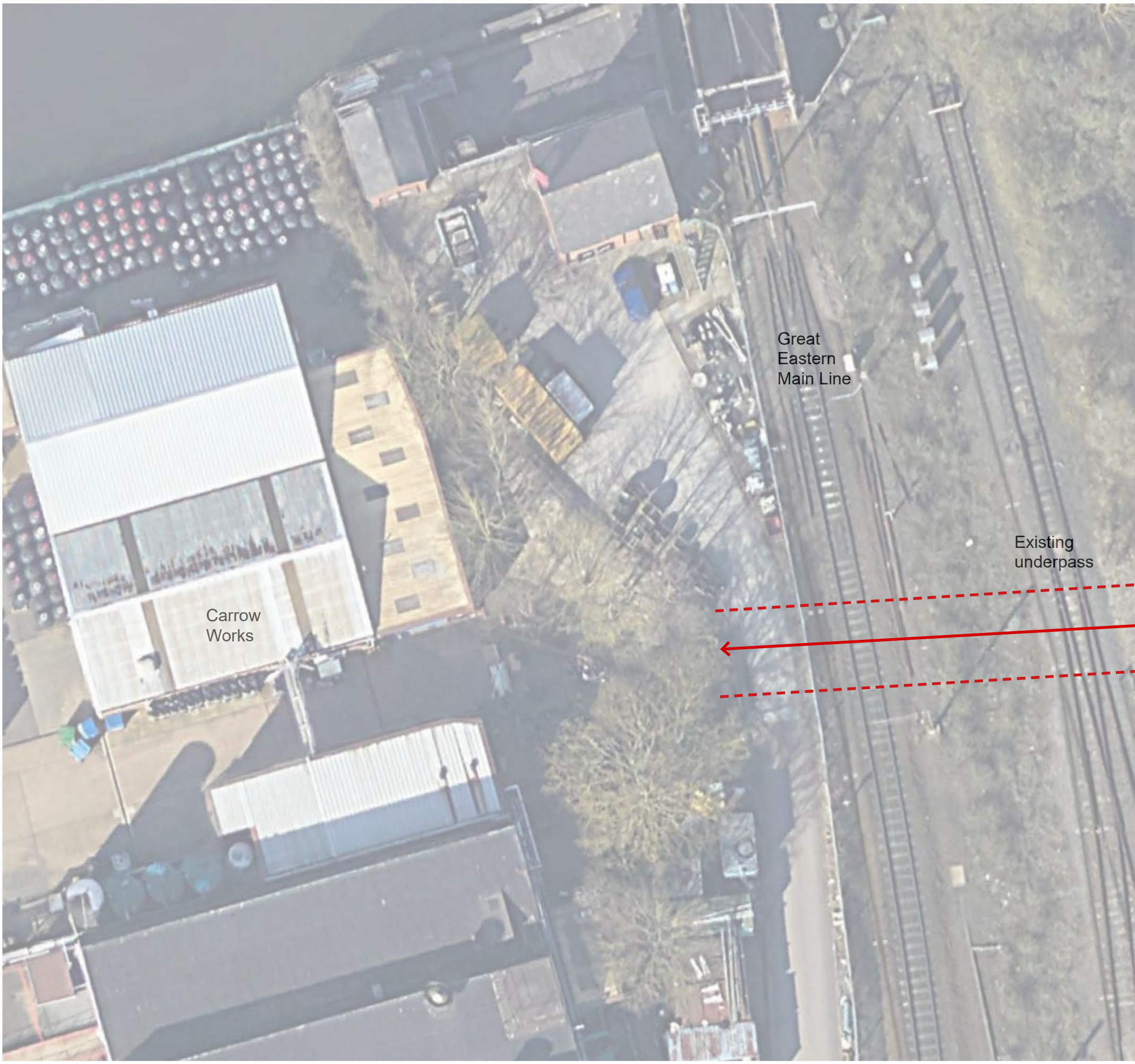
2. Existing Plans and Sections



Site survey drawing - ground level

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.

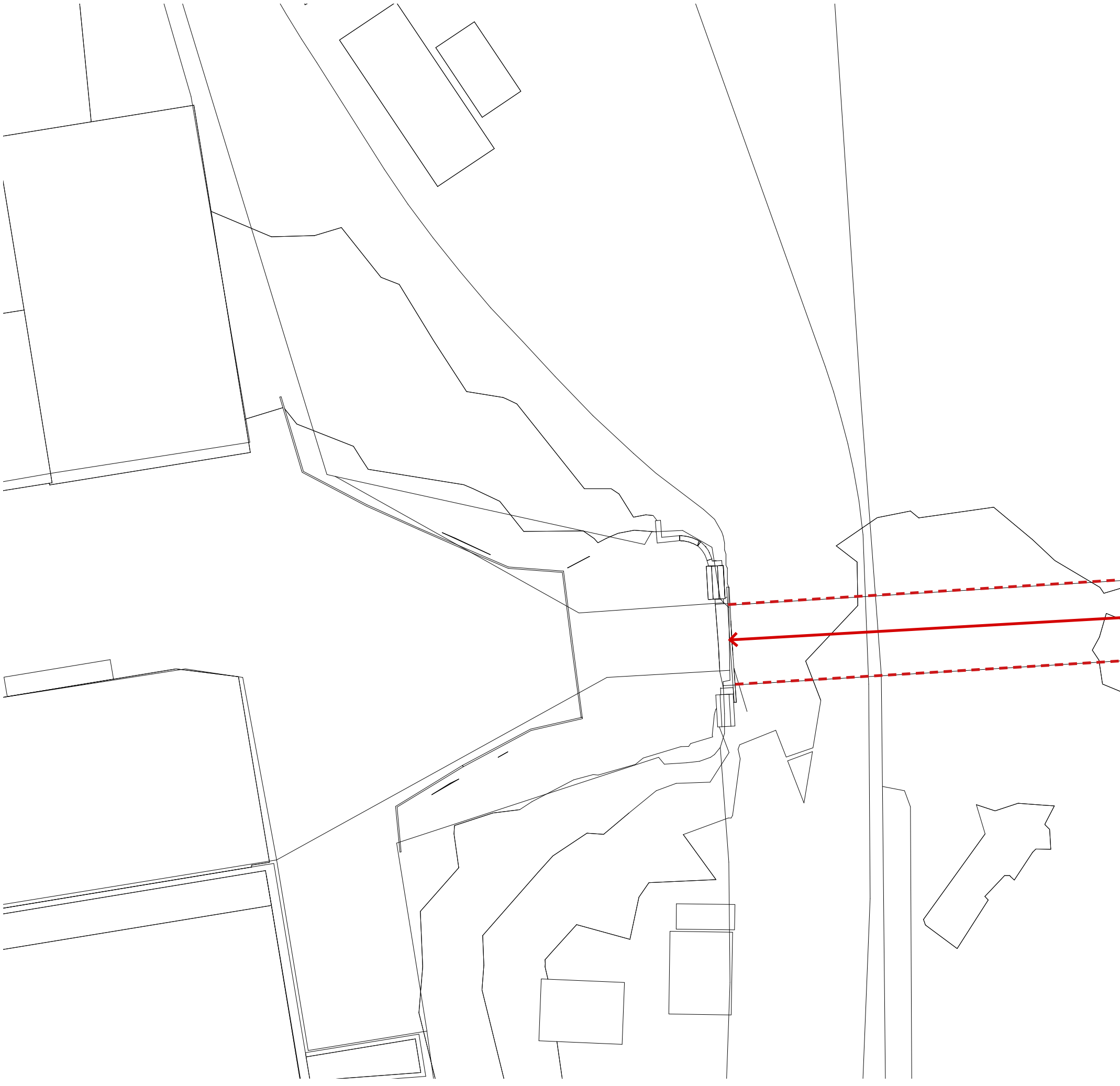

3m
30.8m
+0.94
Deal Ground
+1.02



Site location on aerial photograph

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.


3m
30.8m
Deal Ground
Tarmac Trowse
Asphalt Plant

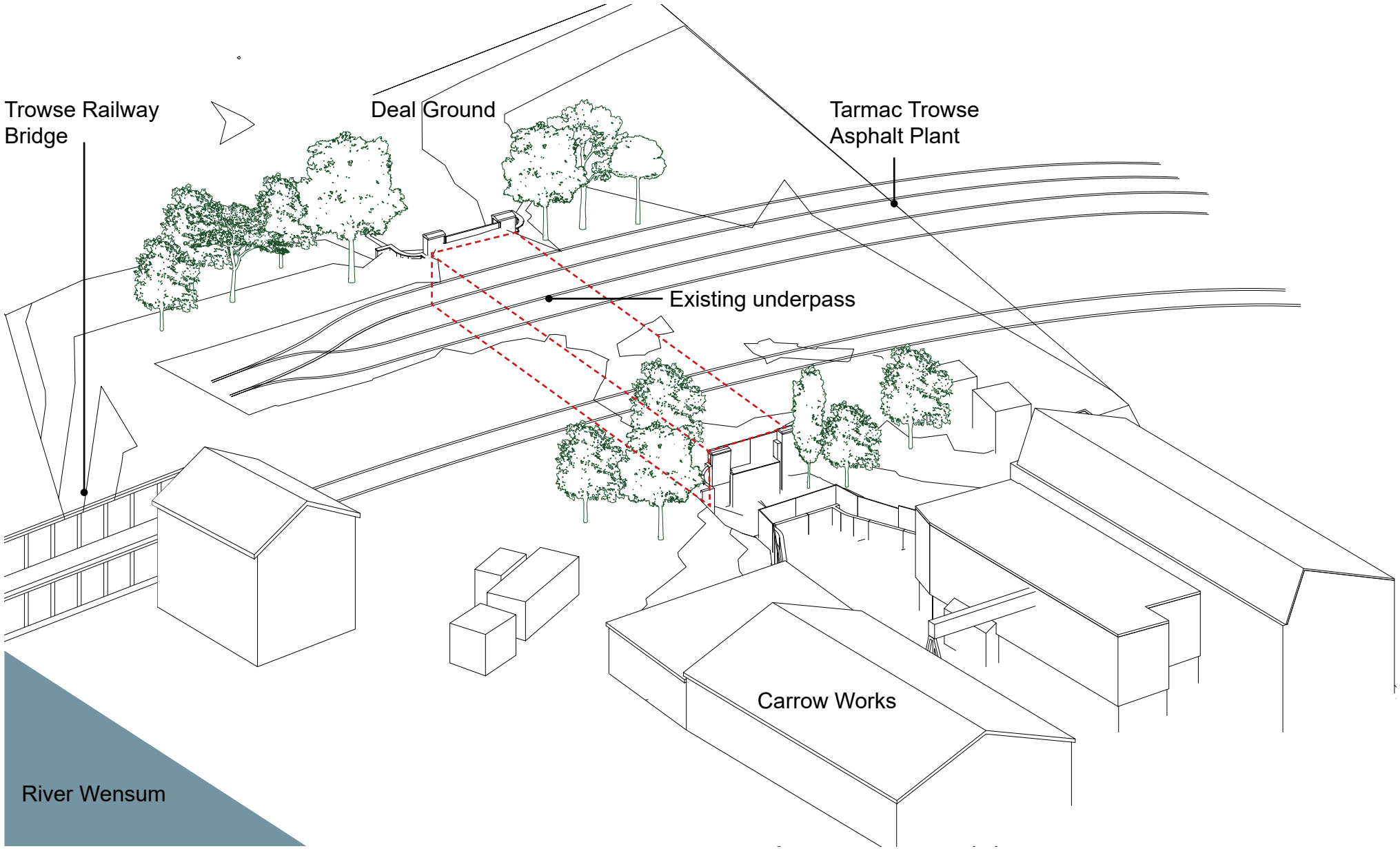


Above rail lines site plan

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.


3m
30.8m
Deal Ground

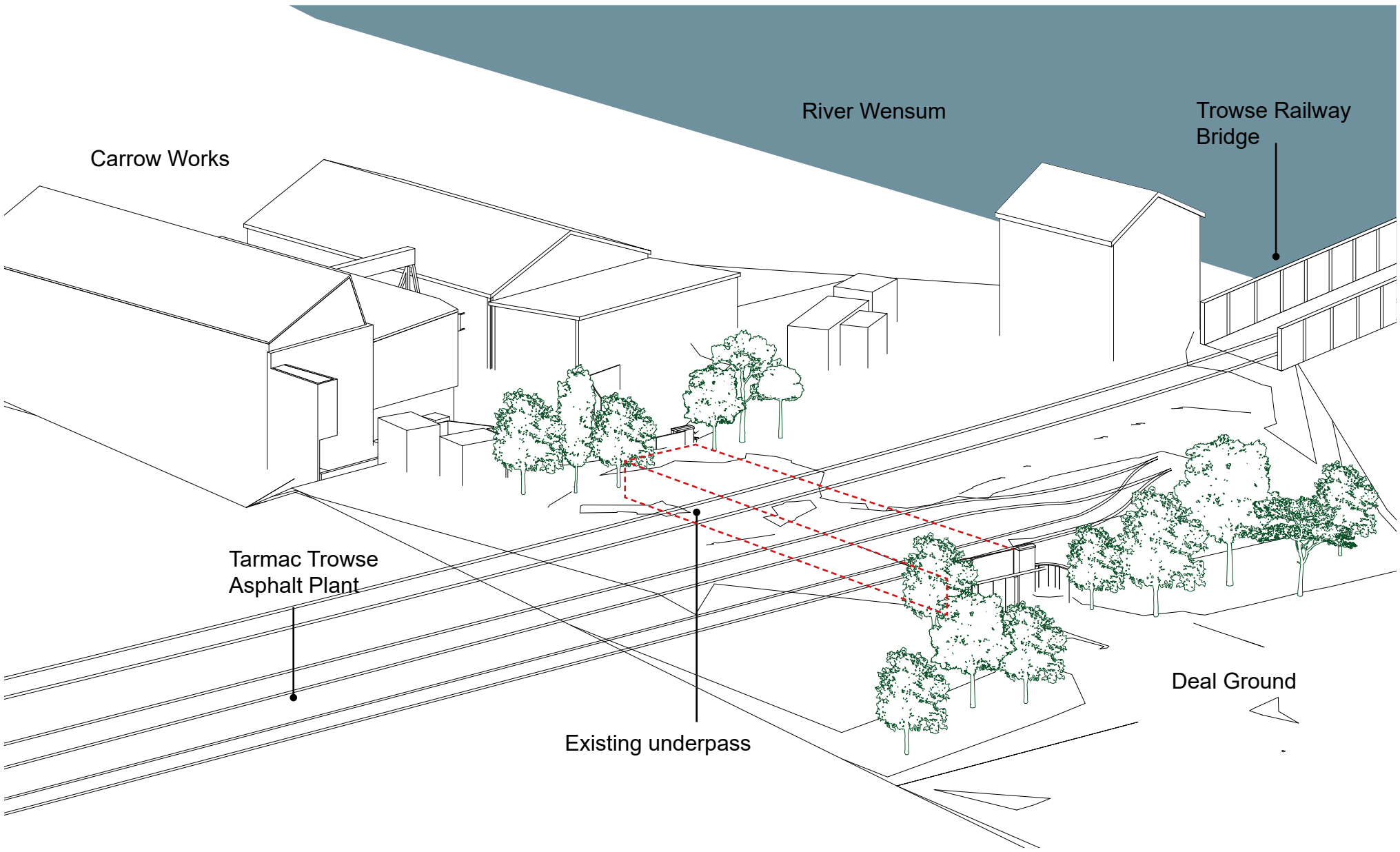
3. Existing Condition



Underpass tunnel from the East entrance on the Carrow Works Site.

Underpass tunnel entrance on the Carrow Works Site.

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.



Underpass tunnel from the East entrance on the Deal Ground.

Underpass tunnel from the East entrance on the Deal Ground.

Underpass tunnel entrance on the Deal Ground.

4. Previous Transport Study

The 2.0 metre width provided for the cycle track complies with LTN 1/20 Table 5-2 absolute minimum requirement for a two-way cycle route with peak cycle hourly flows less than 300.

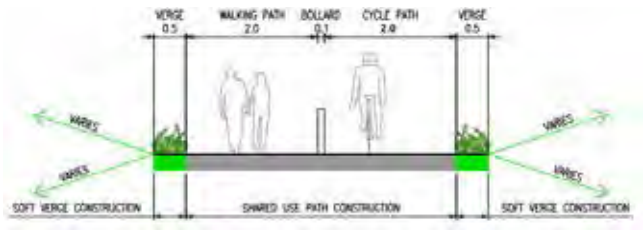


Figure 3-3 - Adopted Shared Use Path Cross Section

3.4.12. The 4 metre width (2 metres either side) also complies with the absolute minimum width for a segregated shared use route as per table E/3.4 Widths of Segregated Shared Use Routes in DMRB CD 143.

3.4.13. The 0.5 metre verge width ensures adequate separation between the route and top of embankment. It also considers constructability and future maintenance requirements.

3.5 IDENTIFIED HIGHWAY LINKS

LINK 1: CARROW WORKS TO LAWRENCE SCOTT SOUTH-NORTH

LINK 1 OVERVIEW

3.5.1. Link 1 comprises a north-south link for all modes from Martineau Lane roundabout into and through the Carrow Works site, providing a connection to the Lawrence Scott area by means of a crossing of the River Wensum. The River crossing is intended to run in parallel with and be as close as possible to, the rail crossing of the Wensum. Dependant on the outcomes of consultation with National Rail. This link will connect to existing roads north of the Wensum of the river (Hardy Road and Kerrison Road).

LINK 1 ALTERNATIVES

3.5.2. The study has considered two alignment options for this link:

- **Link 1 Alternative 1 (Link 1 Alt 1):** This option is approximately 700m in length and creates an angled junction approach to the Martineau Lane roundabout, intended to avoid the south west corner of the Carrow Works site. This link option is outlined on drawing 70071801-WSP-ZZ-ZZ-SK-C-101 included in Appendix B.

Introduction

A study carried out by WSP previously highlighted some potential options for the reconfiguration of the underpass proposing a series of alternatives. The main focus highlighted the issue of width as referenced in the Local Transport Note (LTN) documents to meet the most up to date standards. This has been taken into consideration within the feasibility study.

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.

vehicles to route directly between the Carrow Works and Deal Ground sites, which will impact on the masterplan access strategy.

3.5.74. The intent is for any underpass to span under the entire Network Rail depot area to the west of the railway line and the Tarmac Trowse Asphalt Plant to the east of the railway line. The extent and depth of this crossing will be subject to consultation with Network Rail.

3.5.75. The eastern end of the link crosses a County Wildlife Site and an area designated as Open Space within the Local Plan, so consultation should be undertaken with Natural England and the Local Authority to advise on this. This area also sits within Flood Zone 3, so careful consideration should be given to finished levels to prevent road flooding and dialogue with the Environment Agency and LLFA should be progressed to identify any mitigating measures required.

3.5.76. Link 4 Alt 2 is in close proximity to a Conservation Area and area of Main Archaeological Interest. The exact location of the end of the link would be subject to further design development, but consideration should be given to these constraints. The link is proposed to pass beneath the existing north-south rail line with a height difference at least 7m, including a Network Rail depot area to the west of the railway line and the Tarmac Trowse Asphalt Plant to the east of the rail line. The extent and depth of this crossing will be subject to consultation with Network Rail, and it is uncertain if the minimum headroom of 5.78m can be achieved. Similar to Link 4 Alt 1, a shallow depth structure and/or a height restricted underpass would be required with appropriate warning signs erected, as a Departure from Standard. In this case, the use of the Underpass would be restricted to low sided vehicles, which would impact on the ability to route servicing, HGV and buses through the site.

3.5.77. The eastern extent of the link crosses a County Wildlife Site and an area designated as Open Space within the Local Plan, so consultation should be undertaken with Natural England and the Local Authority to confirm the arrangement shown. This area also sits within Flood Zone 2 and 3, so careful consideration should be given to finished levels to prevent road flooding and dialogue with the Environment Agency and LLFA should be progressed to identify any mitigating measures required.

3.5.78. Link 4 Alt 3 proposes the reuse of the existing rail underpass on the south side of the Wensum as an NMU route, the existing clear height and width of this structure is a constraint on the link and the suitability should be reviewed. The structure is identified as having a 7ft 1’ clearance on site (approx. 2.1m) but its width is currently unknown. Standing water was also observed in the base of the structure, highlighting flooding as a potential issue, drainage of the structure should be considered carefully if it is to be re-used.

3.5.79. With the existing underpass height restricted, the minimum desired headroom of 2.4m (or 2.7m if the length is to be extended beyond 23m) cannot be provided, and neither is the LTN 1/20 relaxation for existing structures to have a minimum headroom of 2.2m. A Departure from Standard would therefore be required with due consideration of lighting, and forward visibility, and with appropriate warning signs. Additionally, if the route is to be used as a cycle route, cyclist may need to dismount on approach to the underpass which may not be acceptable for a highly sustainable development.

Figure 4-10 - Existing Railway Underpass - East Elevation

POTENTIAL FOR RE-USE

4.7.4. The underpass has not been measured directly but the OS mapping provided (accurate to plus or minus 1m) shows it is 27m long. The opening is approximately 3m wide by 2m high (measurements have not been taken at this stage). Current best practice outlined in LTN 1/20 specifies a minimum height of 2.4m for cyclists – increasing to 2.7m for structures exceeding 23m in length. Assuming the peak hour cycle flow is less than 300 then the underpass is probably wide enough to meet the absolute minimum width of 2.0m + 0.5m allowance on either side for clearance from the walls (from Tables 5-2 and 5-3 of LTN 1/20.

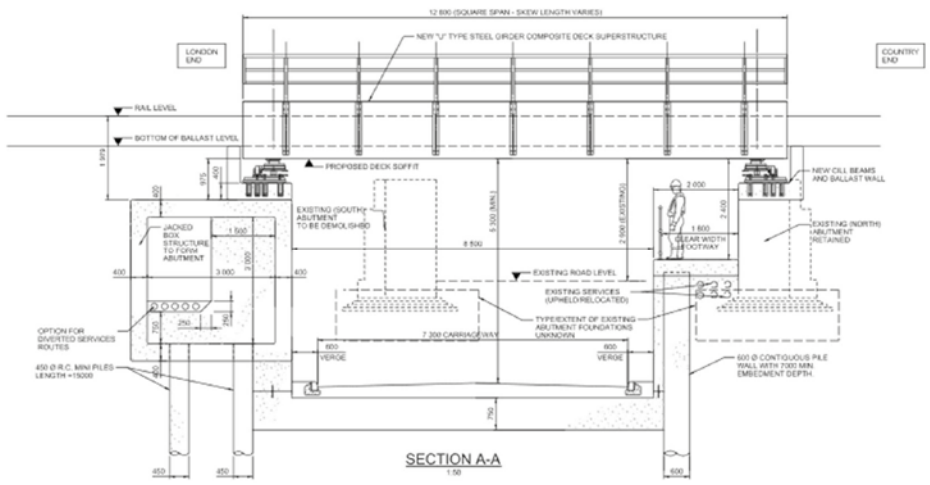


Figure 4-11 - Previous example of Underpass deepening/widening

4.7.5. Lowering and/or widening the underpass will involve major strengthening and underpinning work to the existing abutments and foundations. Due to proximity of the site to the river, a high groundwater table is expected, the preliminary geotechnical study of the site has indicated that the water table could be as high as 1.2m BGL. The new footway level will almost certainly be well below the water table. A concrete ground slab is necessary to prevent seepage of groundwater through the carriageway as well as provide structural support to the underpinning of the existing foundations. The ground slab may need to be anchored to resist groundwater uplift.

4.7.6. The base level of the underpass would need to be lowered by at least 0.7m in order to provide required headroom of 2.7m. Widening the underpass by at least 2.0m would be needed to provide the required footway widths. A new abutment on one side would be constructed as a jacked box structure behind the existing abutment. This will not affect the operation of the railway but will require significant temporary works and temporary land-take to allow its installation. The existing deck over the underpass could then be removed and replaced with a longer span structure as seen in **Figure 4-12**. Contiguous pile walls could also be constructed from within existing underpass to retain the existing abutments. Excavation in front of the contiguous pile wall could then be carried out to deepen the underpass. A concrete ground slab would then be placed to form the new base and provide lateral support to the underpinning of the existing foundations.

Figure 4-12 - Existing Railway Underpass - West Elevation

4.7.7. The underpass is in a beneficial location to provide an east-west foot/cycle link along the south side of the Wensum but does not meet the current minimum geometrical requirements. It's re-use to provide the required quality of infrastructure for this project would be dependent on the works described above.

PURPOSE AND CROSS SECTION

4.7.8. The improved underpass would be designed to carry non-motorised users; therefore, the cross section will consist of a 5.0m wide foot/cycleway on both sides. The underpass walls are a constraint on the edge of the cycle path that reduce the effective width (the concept of "parapet shyness" prevents cyclists using the very edge of the path to avoid their handlebars colliding with the wall). Hence an additional 500mm is provided on both sides of the underpass resulting in a total internal width of 6.0m. The required headroom for new structures is 2.7m from Table 5.9 of LTN 1/20.

COST ESTIMATE

4.7.9. The estimated cost for the Link 4 Alt 3 Existing Underpass upgrades is **£8.8 million**, refer to Appendix D for full breakdown of cost estimate.

4.8 RIVER WENSUM CROSSINGS – LINK 1 AND LINK 3

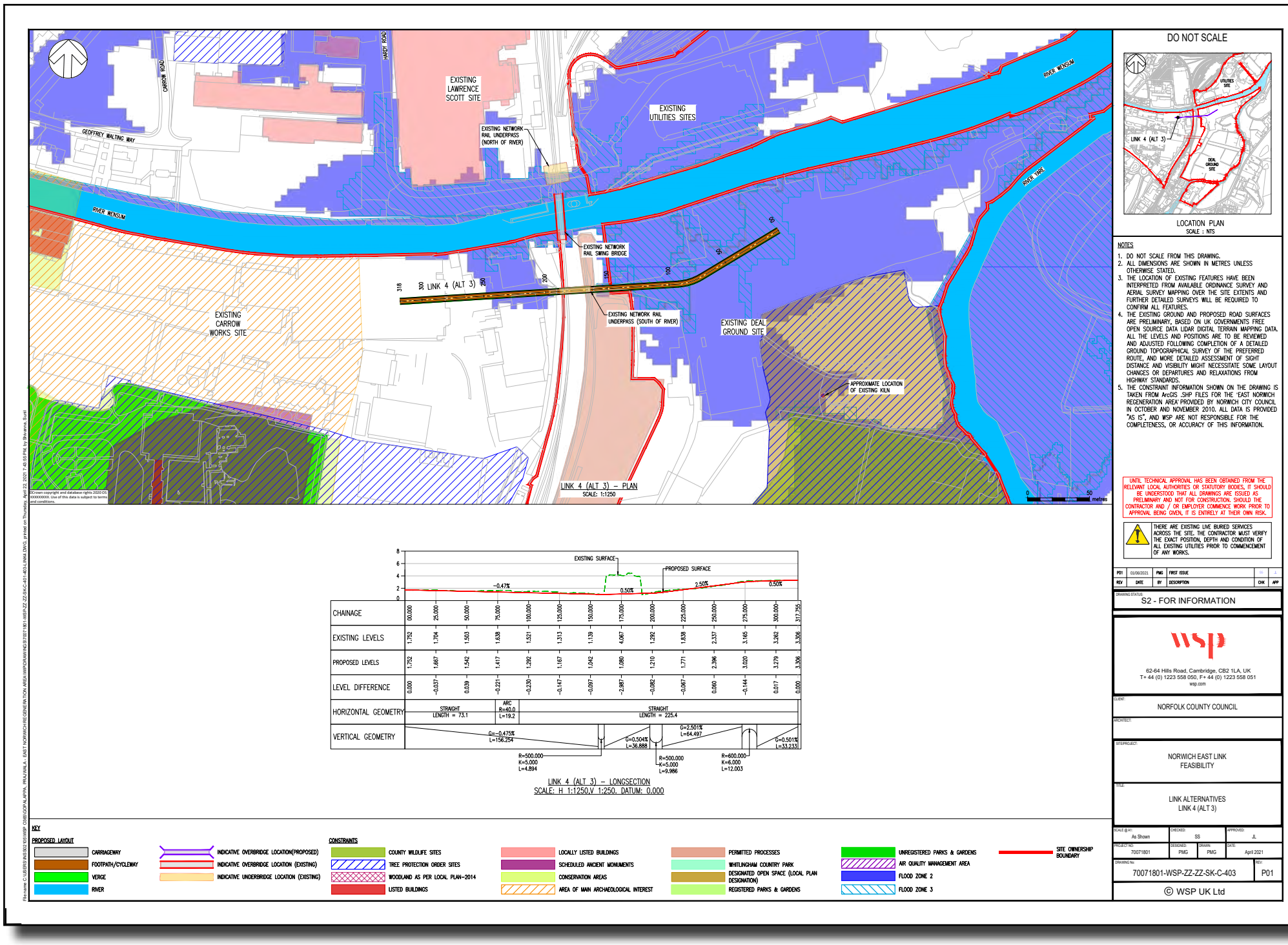
INTRODUCTION

4.8.1. The following section will consider the Wensum Crossings for Links 41 and 3 in combination. The similarities between the two sites and alignments mean that the most feasible forms of structure for each crossing are the same. Given the navigation constraints on the River Wensum this section will consider both lifting and fixed structures.

EXISTING SITE – LINK 1

4.8.2. The proposed Wensum crossing for Link 1 will be situated west of the existing Trowse Swing Bridge, aligned with the north-south section of Hardy Road. The bridge will connect the Carrow Works with the Lawrence Scott Site. The Carrow Site to the south of the Wensum has been developed for light industry and there is a mix of light industry, warehouses and residential buildings to the north. The River Wensum is navigable in this location and ranges from 25-30m in width. Navigation clearances on nearby structures range from 2.74 to 4.27m. The Trowse Swing Bridge opens to the west but does not constrain the location of the proposed structure since the aim is to closely align it with Hardy Road.

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.



Summary

Key recommendations summarised from the original WSP report:

- a segregated bi-directional cycle lane for enhanced safety of cyclists and pedestrians should be provided for the National Cycle route.

- the underpass exceeds 23m and therefore the recommended minimum height of the underpass is 2.7m. If the underpass was shorter, the desired height could be reduced to 2.4m.

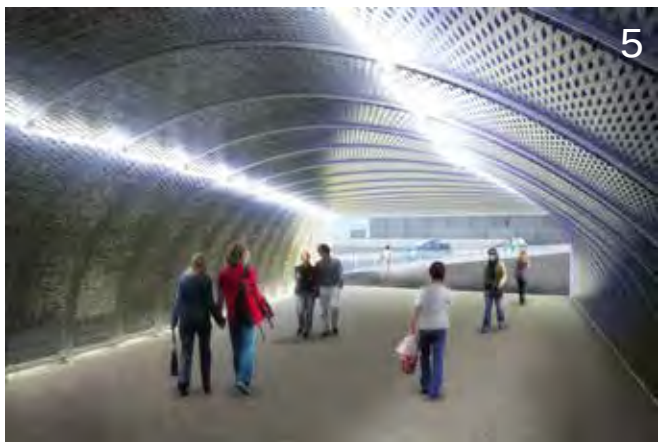
- dismounting due to low headroom is not acceptable as part of a sustainable development

- the new ground level will be below the water table

- the minimum width of the cycle path should be 3m (this is including 0.5m either side for clearance) However the preferred width is 6m including the additional clearances.

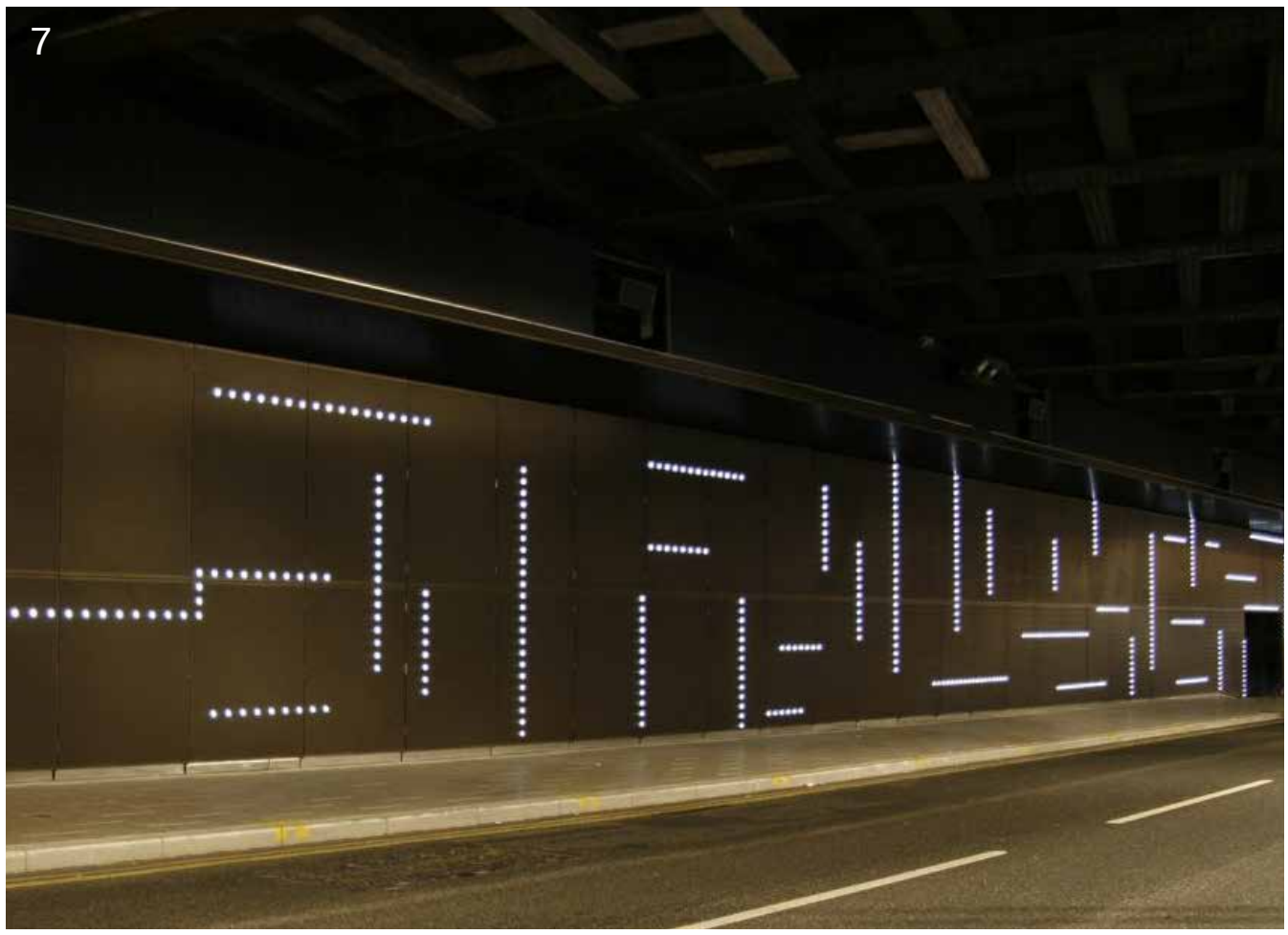
- a 1:21 accessible level gradient should be considered and integrated into the development

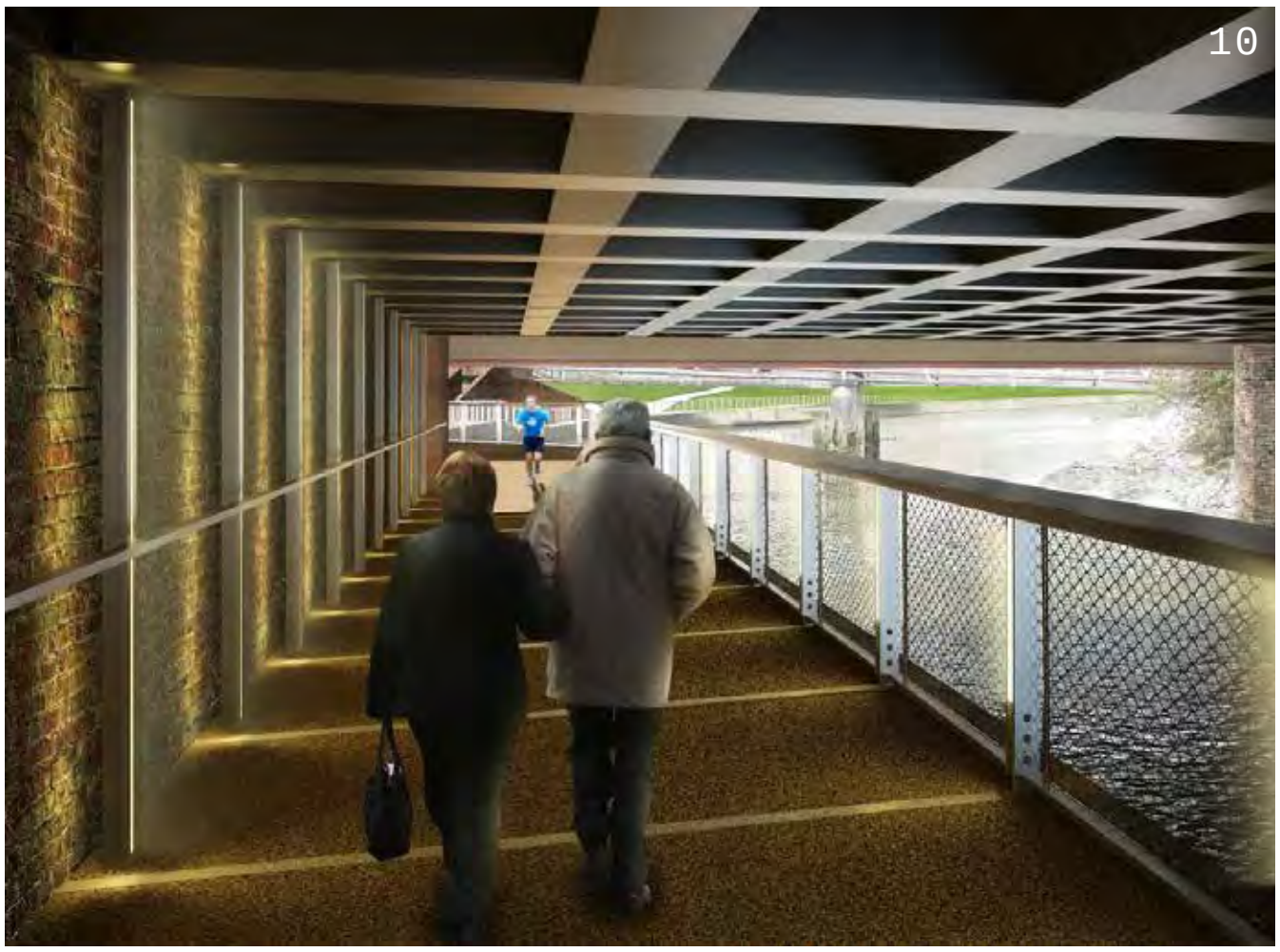
5. Precedent Research



1 Olympic Park Tunnel - Allies and Morrison
2 Southwark Bridge - Panter Hudspith
3 Blackfriars Bridge - Leo Villareal
4 Clink Street - Halo Lighting
5 Olympic Park Tunnel - Allies and Morrison
6 Regents Canal - Color Kinetics

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.





7 Neville Street - Arup/Hans Peter Kuhn

8 Footbridge Olympic Park - Allies and Morrison

9 Waterworks Underpass (completed) - Allies and Morrison

10 Waterworks Underpass (render) - Allies and Morrison

6. Standards

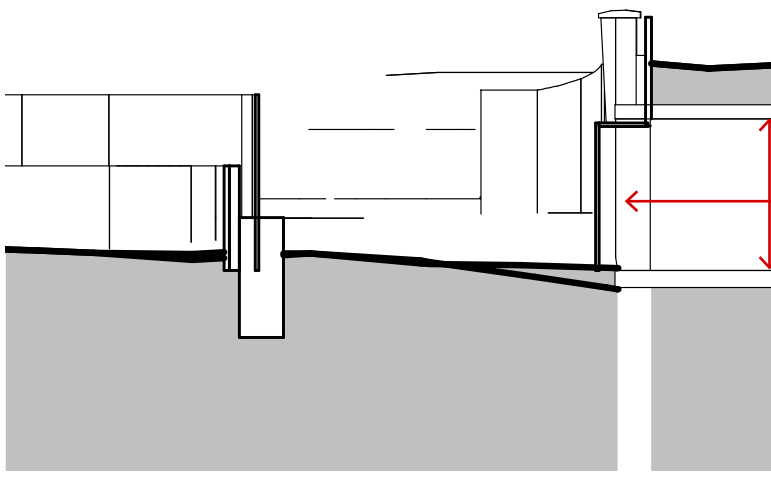
Cycle lane requirements

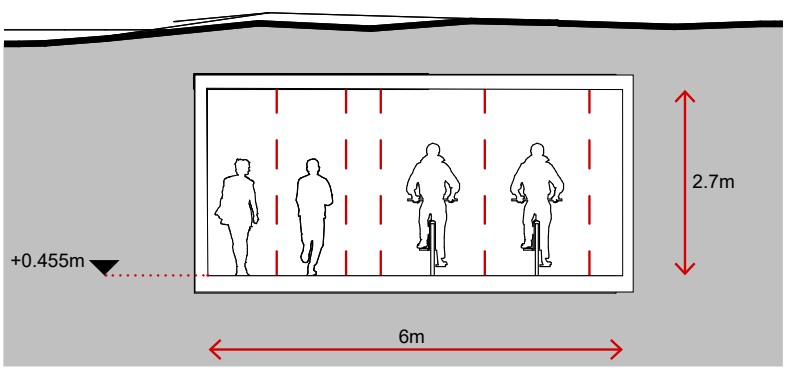
As described earlier in the report, cyclists ideally require a minimum of 2.4m height clearances throughout underpasses and subways. This should be increased to at least 2.7m where an underpass is longer than 23m to allow for more natural light.

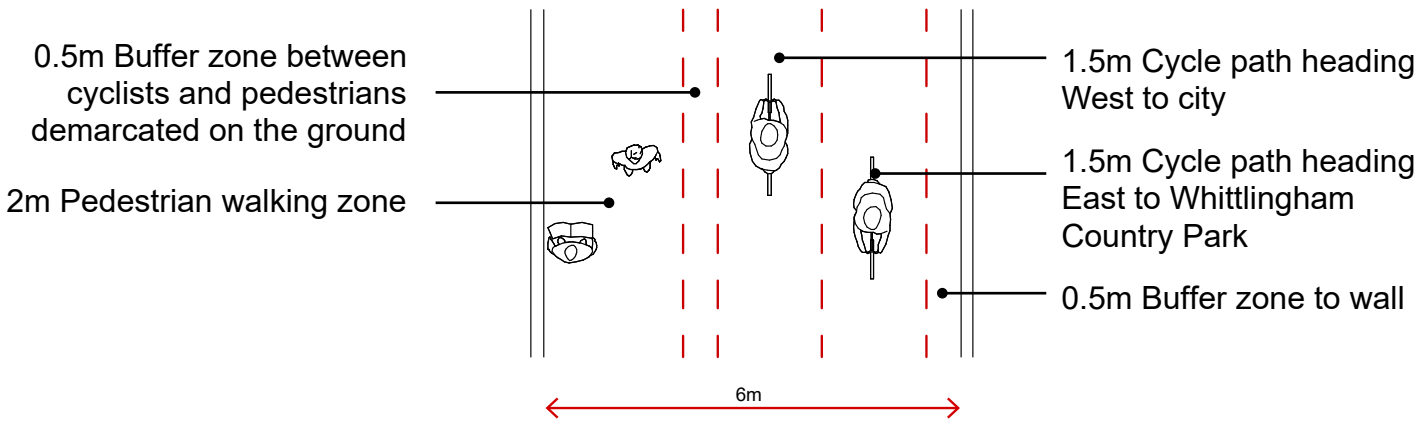
Where there are existing structures, lowering the minimum headroom to 2.2m may be acceptable, based on various relevant factors such as good forward visibility. Where the minimum underpass height cannot be achieved, for example at a low railway bridge on a cycle track, a warning sign should be provided to dismount. Refer to the Traffic Signs guidance which is part of the Department For Transport Local Transport Note (LTN) 1/20 Cycle Infrastructure Design manual.

Footpath requirements

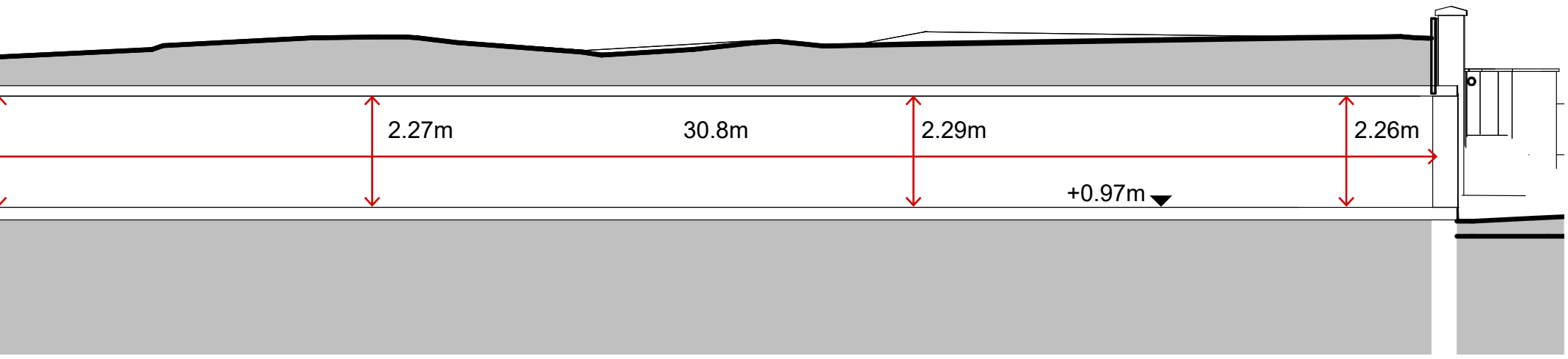
The recommended width for urban footways on local roads is 2.0m. This is sufficient to allow a person walking alongside a pushchair to pass another pram or wheelchair user comfortably. The minimum widths should be considered as a starting point, with higher standards adopted if possible. LTN 2/04



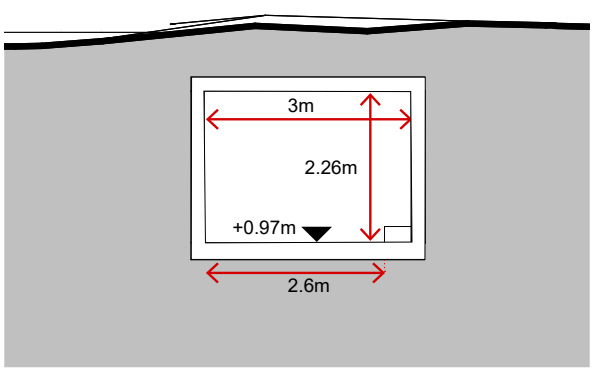




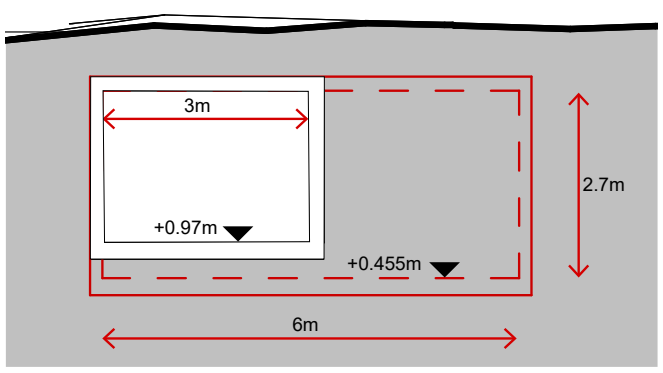
All diagrams are based on an Indicative Scheme and are for illustrative purposes only.



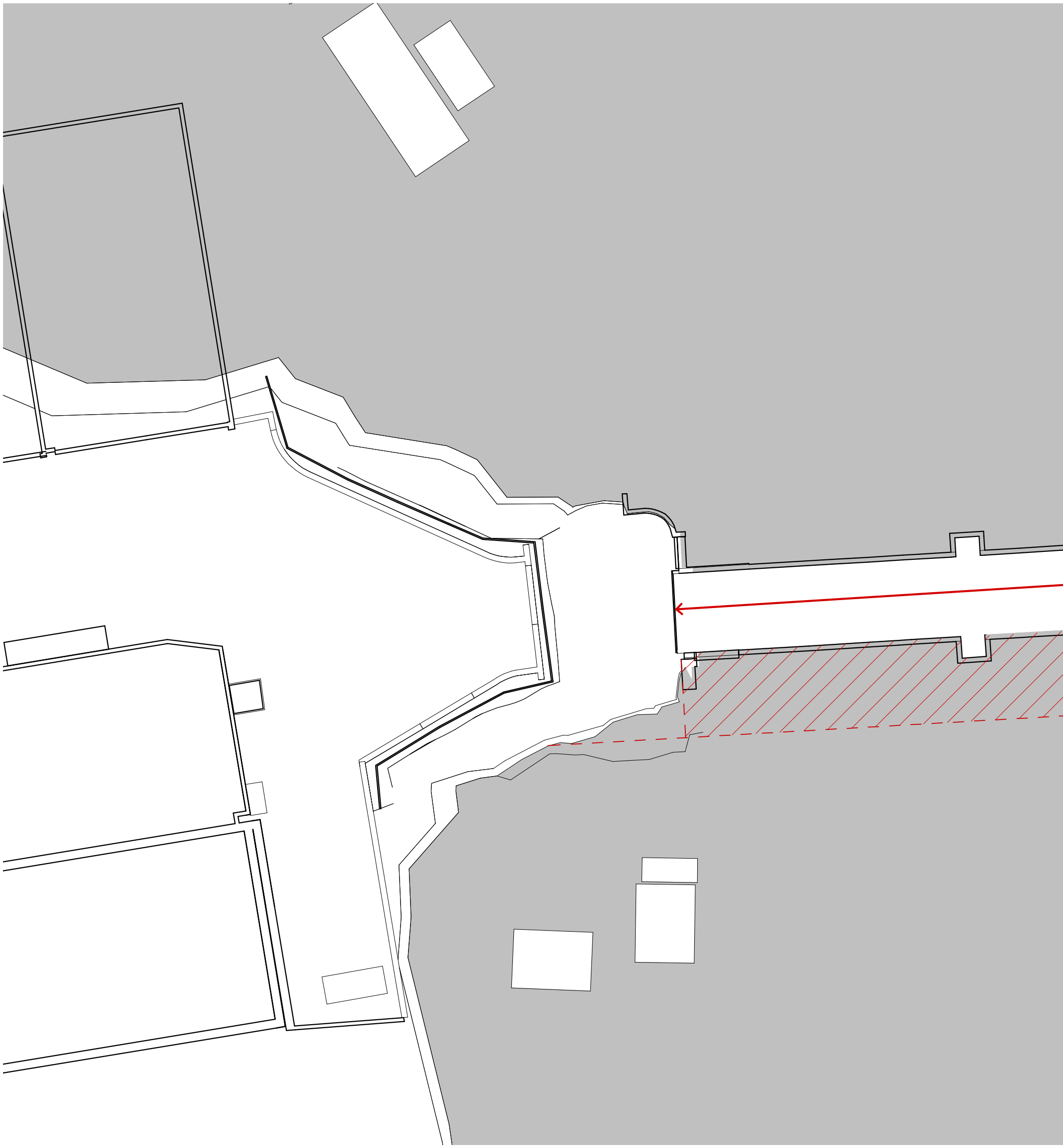
Section through existing underpass tunnel from West to East.



Cross-section of the existing Underpass tunnel.

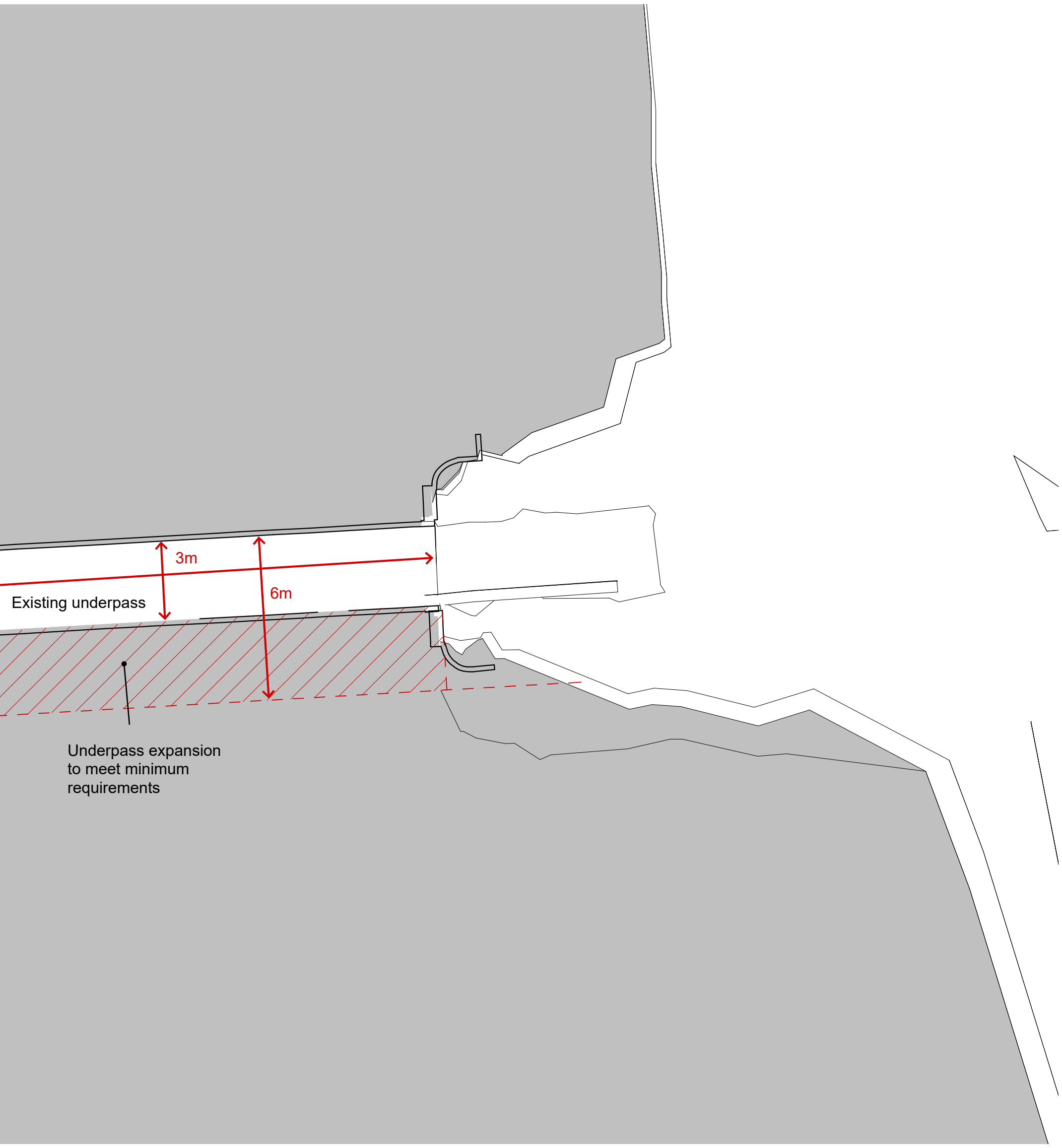


Cross-section of the existing Underpass tunnel overlaid with the required dimensions of the a new tunnel built to current standards for highest level of sustainability for the development

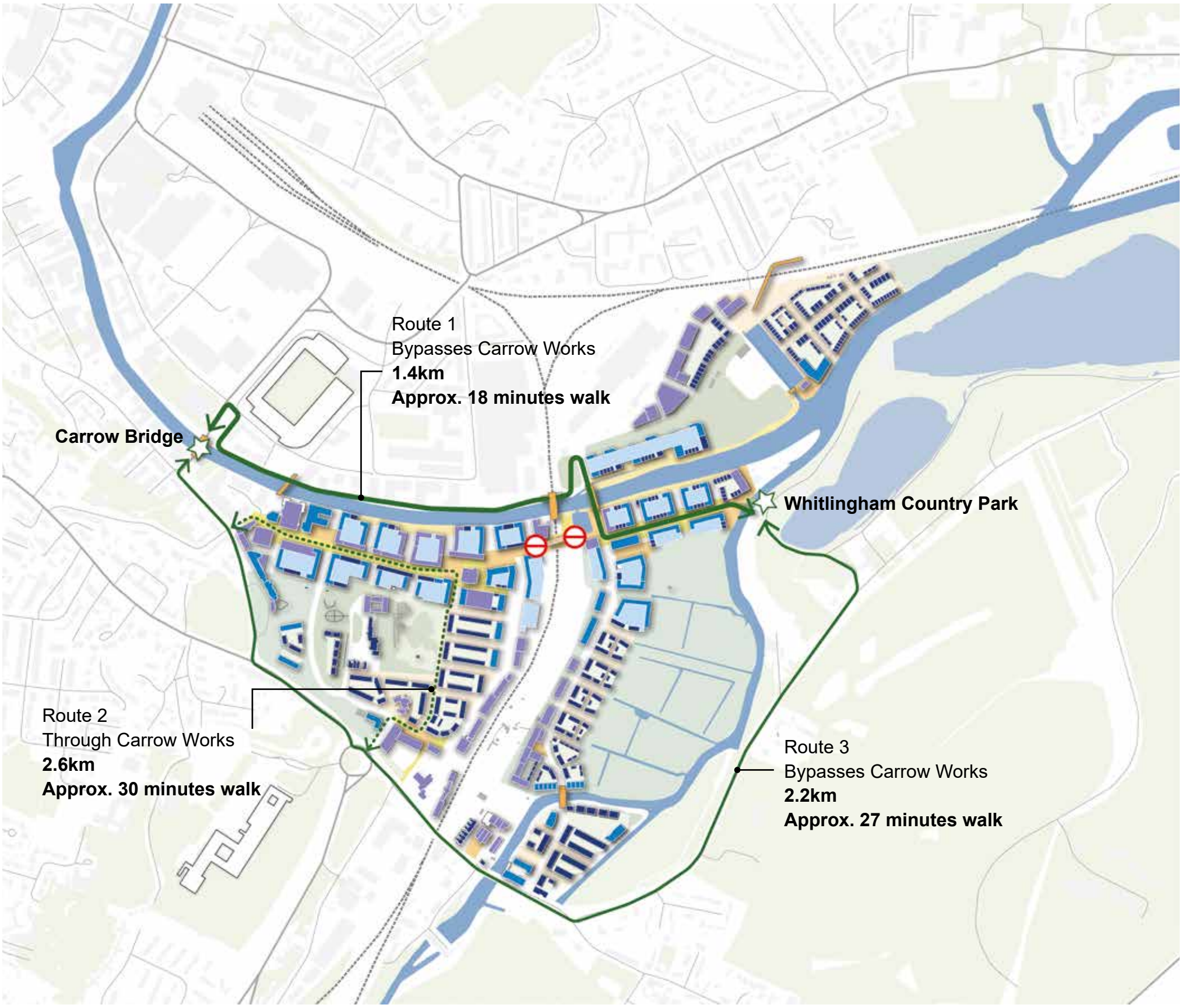


Plan through tunnel at ground level

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.


3m
6m
Existing underpass
Underpass expansion
to meet minimum
requirements

Closed Carrow Link and ground floor land use plan with walking routes

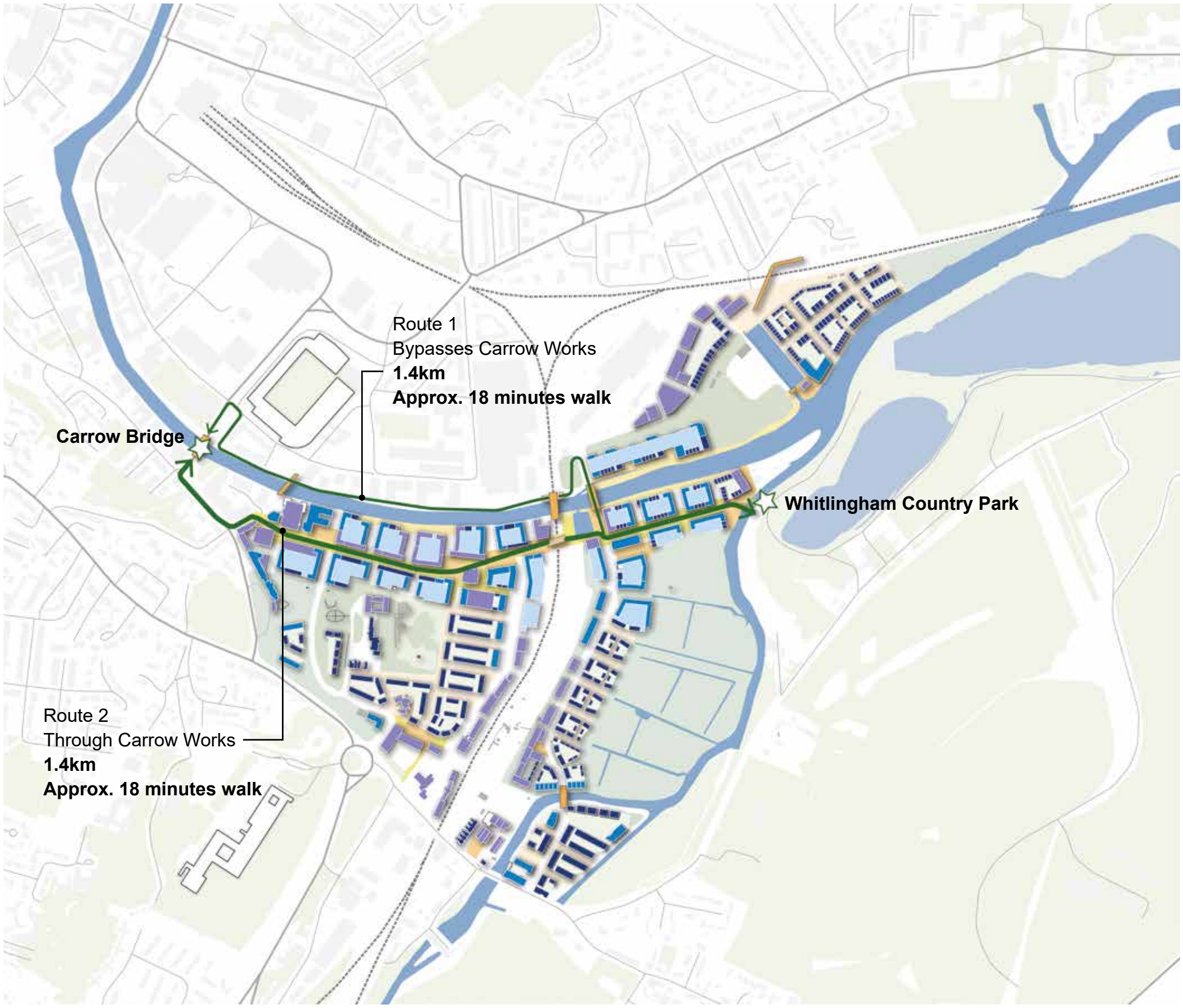


The East Norwich masterplan has been designed to ensure it is accessible and well connected for those walking, cycling or using another form of active travel. New routes, connections and facilities are proposed to enable inhabitants of East Norwich to move around safely and easily. The mix of uses proposed reflects the needs of a new community for Norwich, supporting new and existing residents of all ages, and enabling them to access what they need within a 20 minute journey by foot.

If there is a scenario where the underpass is not upgraded and opened to enable a vital east west connection between the city and the broads, the impact would be significant to the success of the masterplan. The most likely route east - west would in fact divert the pedestrian away from Carrow Works in the most direct scenarios as outlined in the diagram. The pedestrian would be more likely to take the riverside footpath on the northern bank of the River Wensum and over the bridge via the Utilities Site, Deal Ground and finally to Whitlingham. Alternatively they could by pass all sites completely via Kings Street and Bracondale to the country park. In order to attract pedestrians through Carrow Works, this would extend their most direct route by approximately 1.2km.

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.

Upgraded Carrow Link and ground floor land use plan with walking routes



The ground floor land use plan illustrates the potential for active ground floor frontage along the east - west route which is an attractive and valuable distraction to the pedestrian on their way to the destination of Whitlingham Country Park. The route through the underpass is not only a more direct and active footpath but would also be a more valuable commercial generator to any other routes between the city and the country park.

7. Proposals

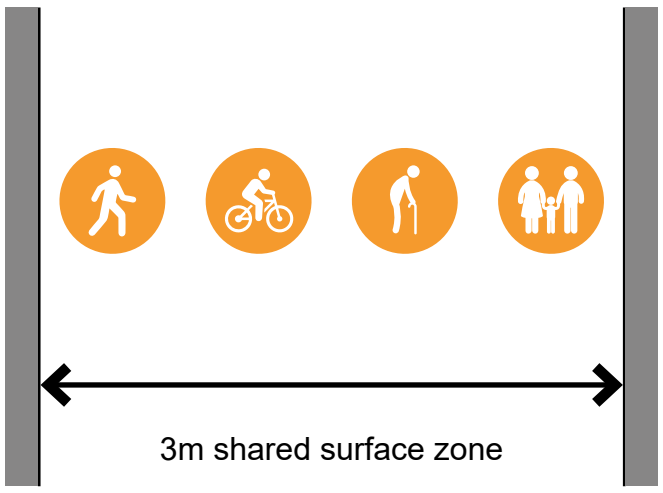
7.1 Carrow Link Option 1

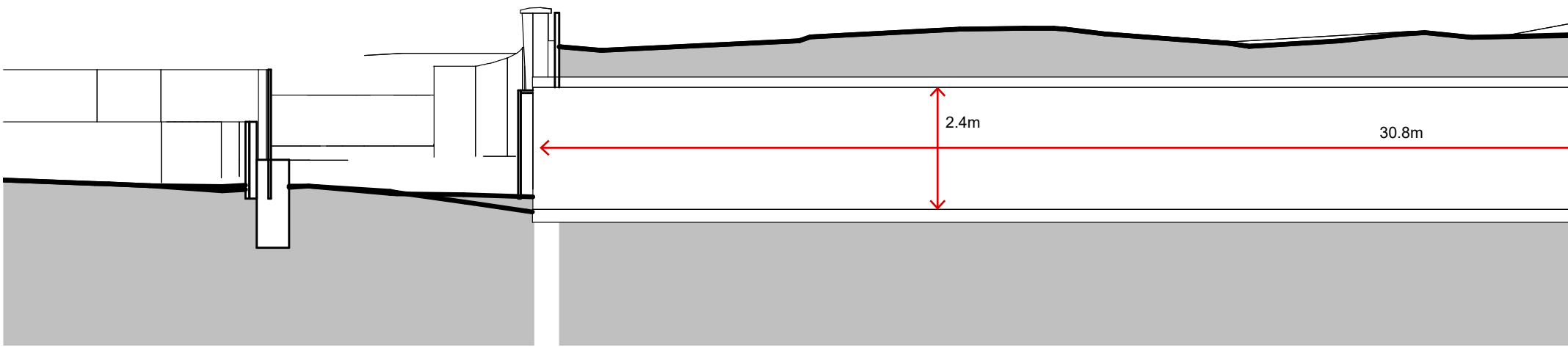
The existing Carrow Link has approximately a 2.26m clear height, a length of over 30m and a width of 3m, therefore the minimum dimensions for a shared and safe cyle route and footpath are not met in the existing form.

However, Option 1 offers a solution to retain the width of the existing underpass with only excavation to increase the height to 2.4m.

The implications of this solution mean that the Carrow Link will not be a segregated route and cyclists will be required to dismount before entering the Carrow Link. Clear signage must be displayed on both openings.

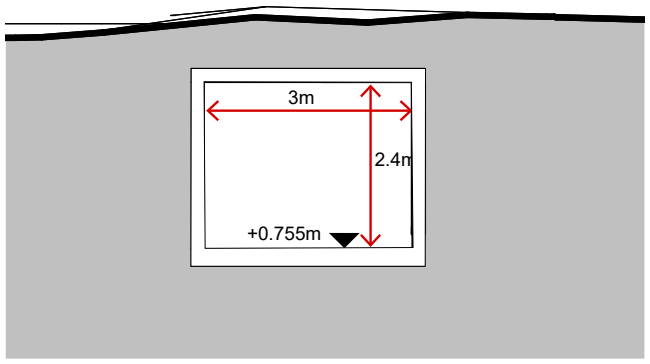
Note that artwork and signage should not impact on the minimum dimensions.



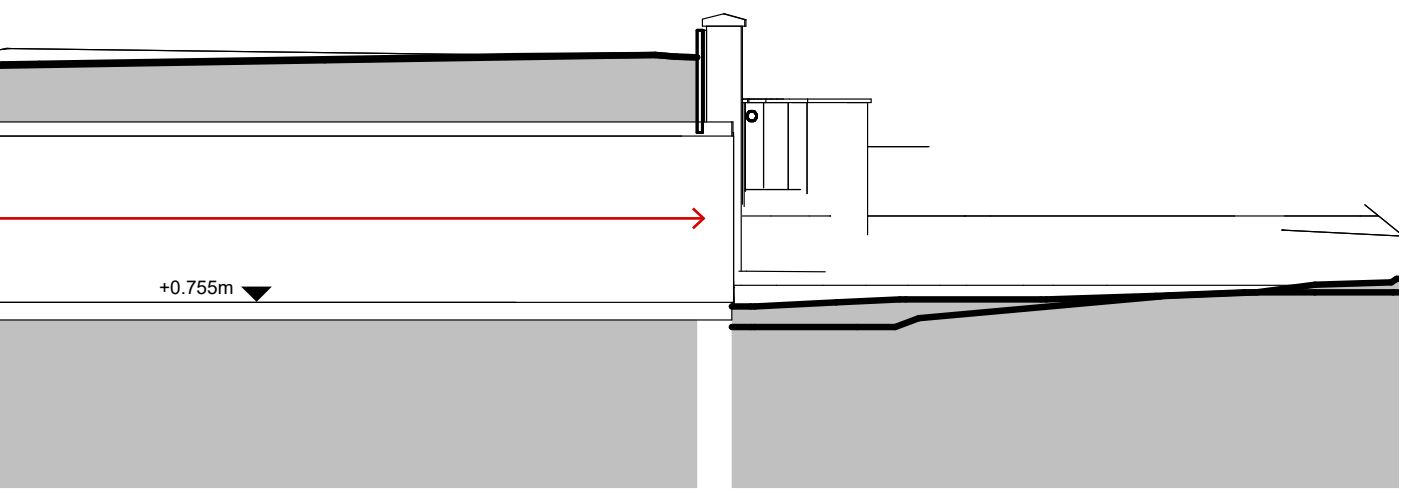


Section through new Carrow Link from West to East.

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.



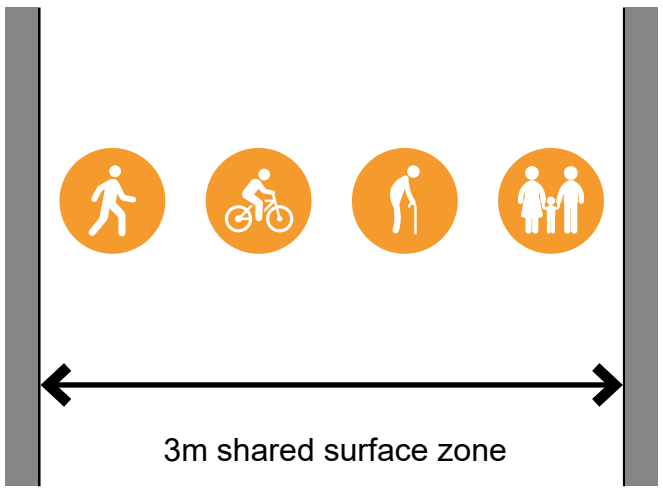
Cross-section of the existing Carrow Link illustrating ground level

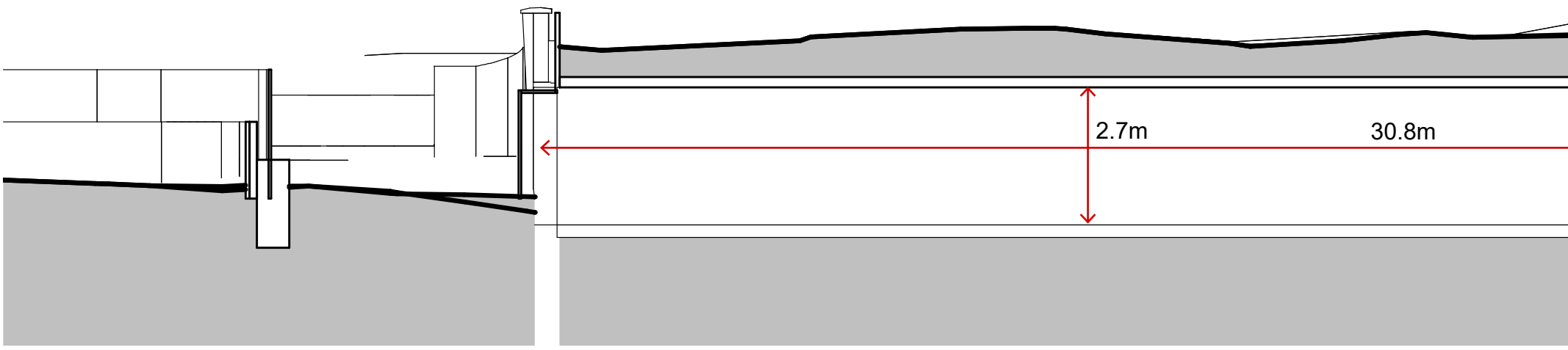


7.2 Carrow Link Option 2

As described in Option 1 the minimum requirements for the size of the Carrow Link is not met in the existing condition. Option 1 offers the absolute minimum solution, however it does not offer the preferred scenario for an exemplar development.

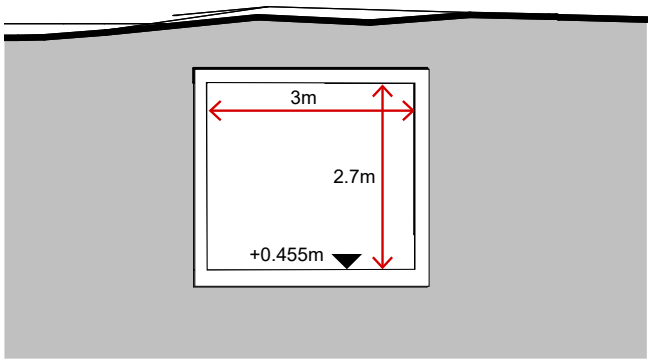
For Option 2, the width of the Carrow Link would remain at 3m with an increased height clearance of 2.7m which is the standard required height for the cycle route through an tunnel longer than 23m. This enables natural light to penetrate through the tunnel, however cyclists will still need to dismount before entering the Carrow Link as with Option 1.



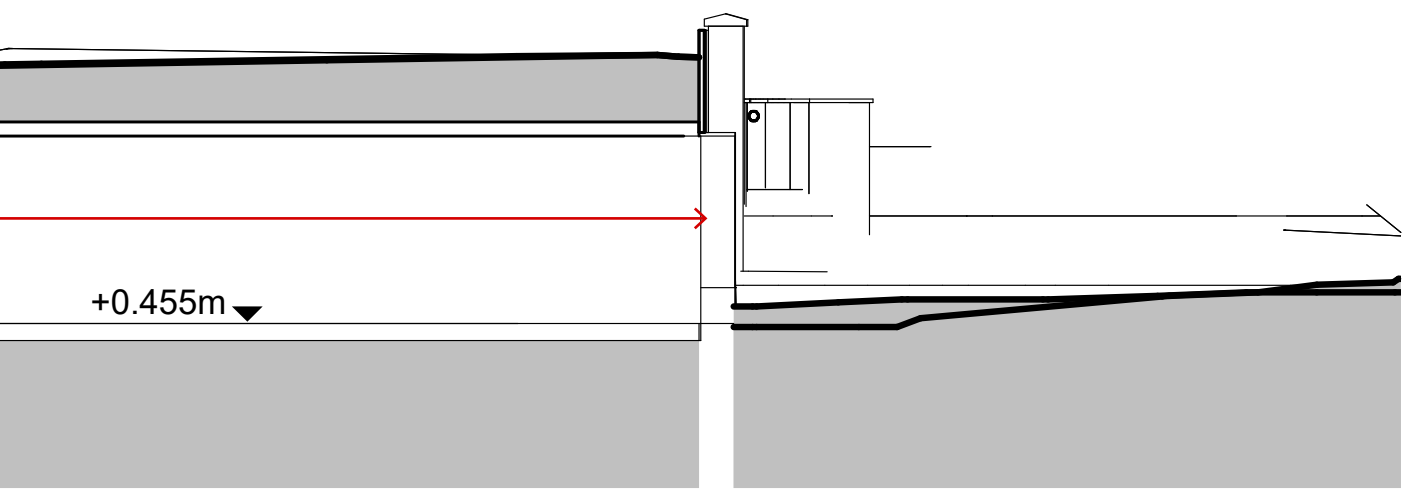


Section through new Carrow Link from West to East.

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.



Cross-section of the existing Carrow Link tunnel with new lowered floor.

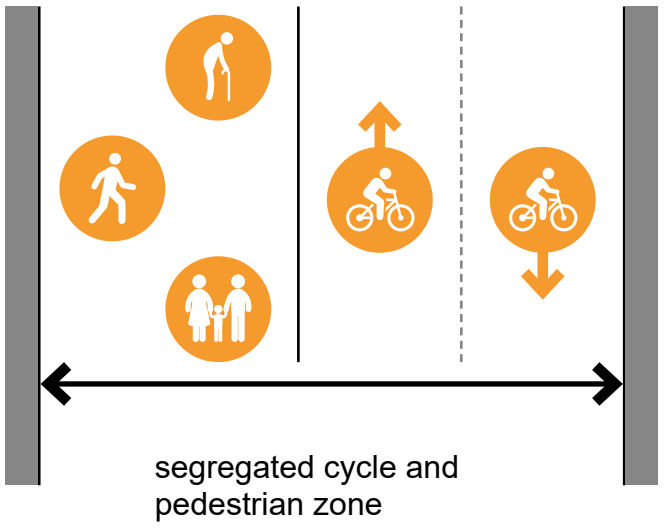


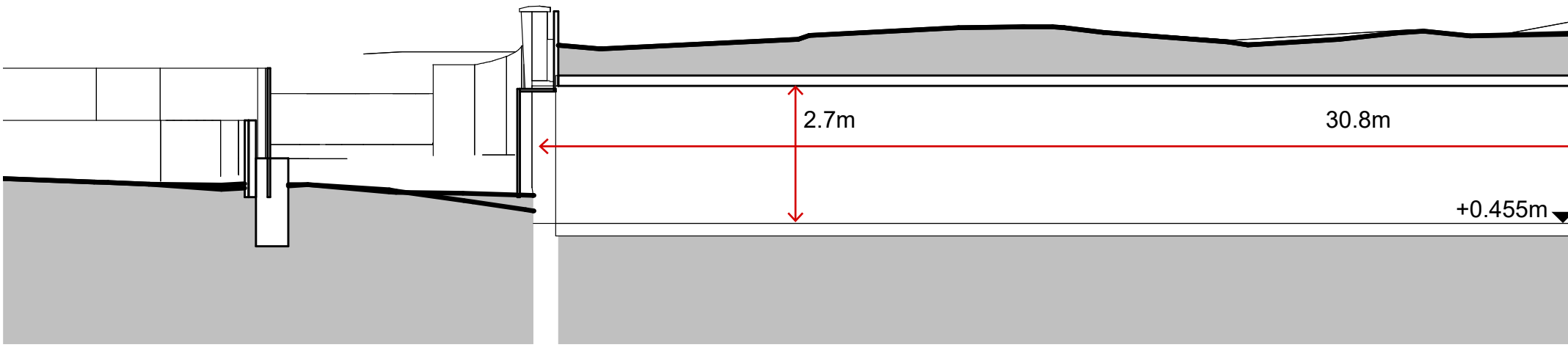
7.3 Carrow Link Option 3

The tunnel in its existing condition is at a minimum 2.26m clear height floor to underside of structure above. The tunnel is over 23m in length at 30.8m therefore the recommendation is that the headroom should be 2.7m. This will require excavating the base of the tunnel out by nearly 0.5m and reinforcing the structure of the tunnel wall. The additional depth will help natural light penetrate further into the tunnel and make a safer, more attractive piece of sustainable infrastructure for the city and local area.

The tunnel sites within Floodzone 3 which has a 1 in 100 year flood risk. When designing cycle and pedestrian infrastructure positioning on higher ground not subject to flooding is recommended. Unfortunately this is not an option in this case and the drainage of the tunnel will be paramount to the success of the new infrastructure.

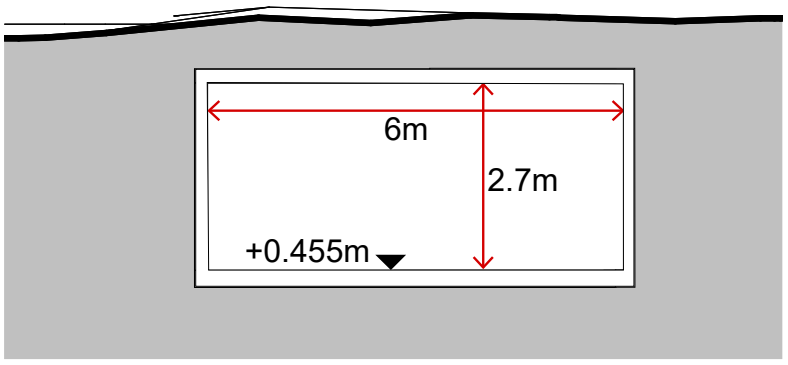
The width of the tunnel is currently 3m, which is not wide enough to provide a segregated cycle route through the tunnel with separate pedestrian access. To facilitate the above, a tunnel width of 6m would be required. This consists of 2m pedestrian path, a 0.5m buffer zone deliniating from the 3m bi-directional cycle path on the other side with another 0.5m buffer zone towards the wall. This would require major excavation to widen the tunnel and increase its depth as well. This new structure would be able to integrate suitable drainage and also provide support to tracks overhead. This work could be a standalone project or integrate with any future development of the railway bridge and twin tracking.



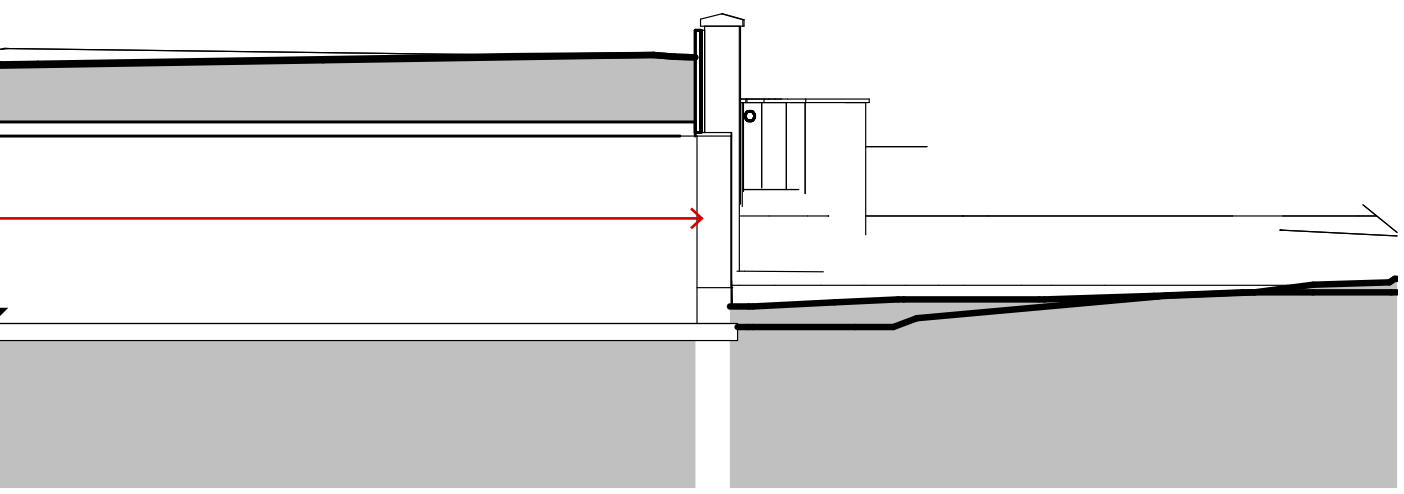


Section through new Carrow Link from West to East.

All diagrams are based on an Indicative Scheme and are for illustrative purposes only.

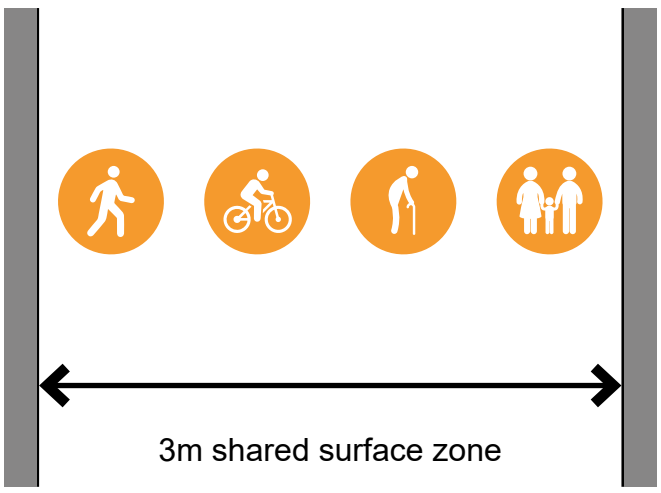


Cross-section of the new 6m wide Carrow Link tunnel.

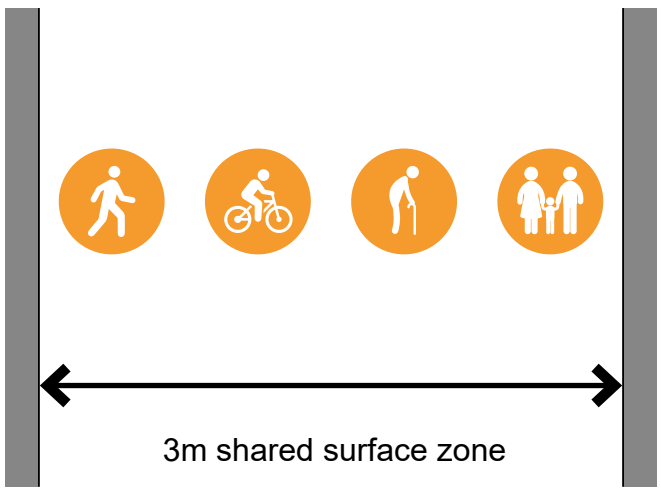


Summary

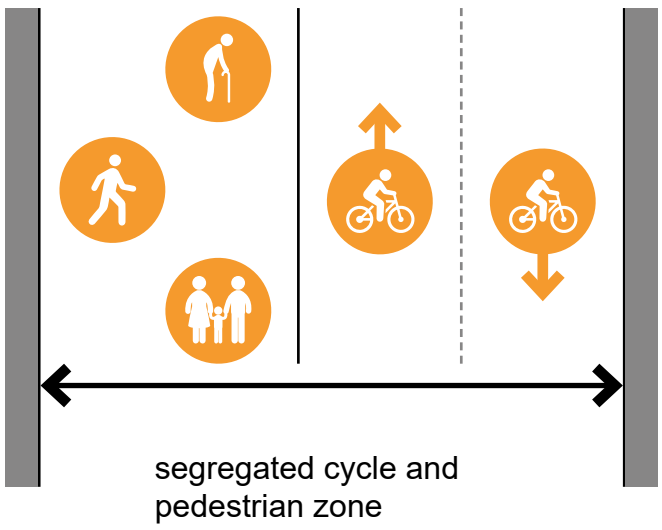
Carrow Link Option 1

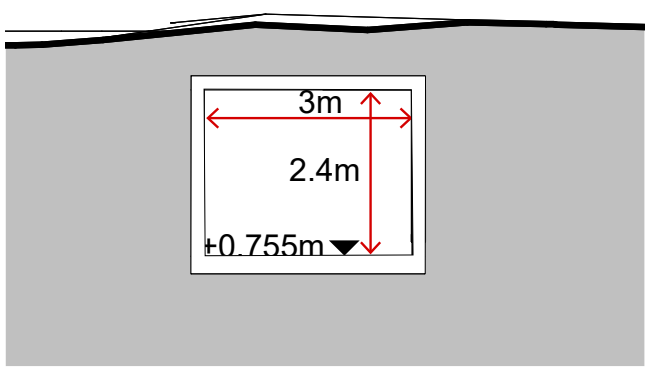


Carrow Link Option 2

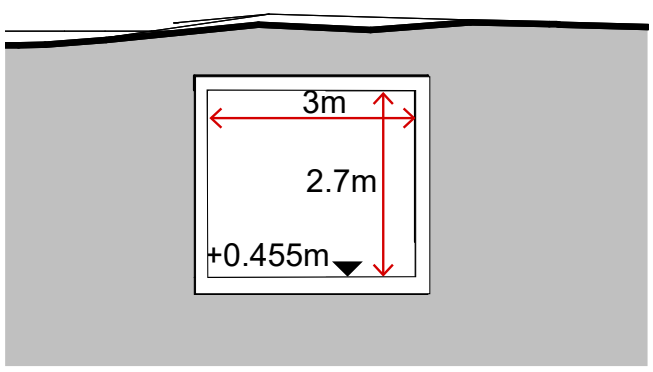


Carrow Link Option 3

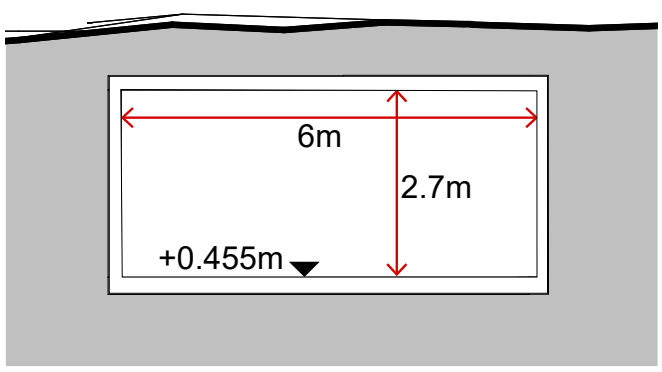




Cross-section of the existing Carrow Link illustrating ground level



Cross-section of the existing Carrow Link tunnel with new lowered floor.



Cross-section of the new 6m wide Carrow Link tunnel.

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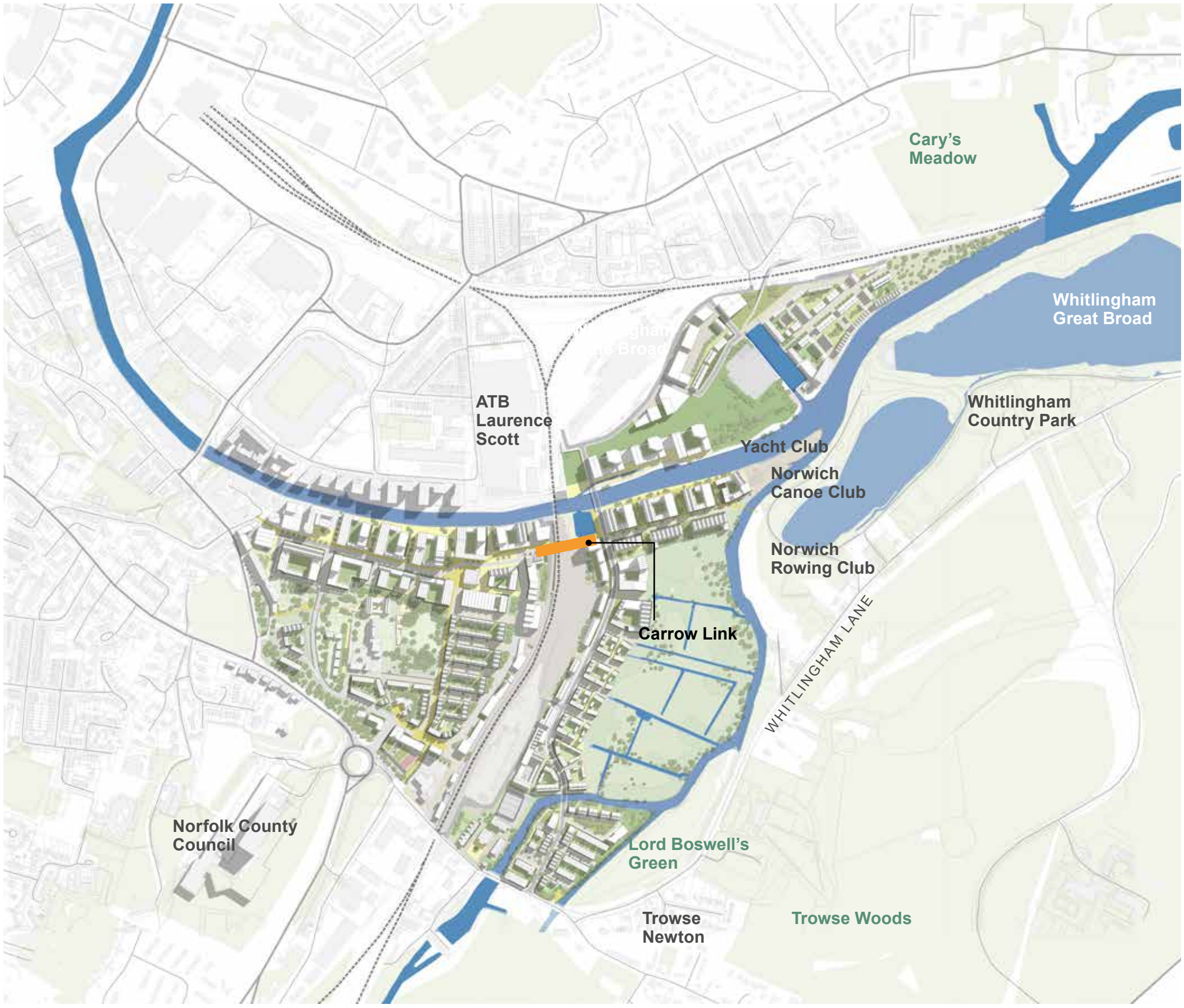
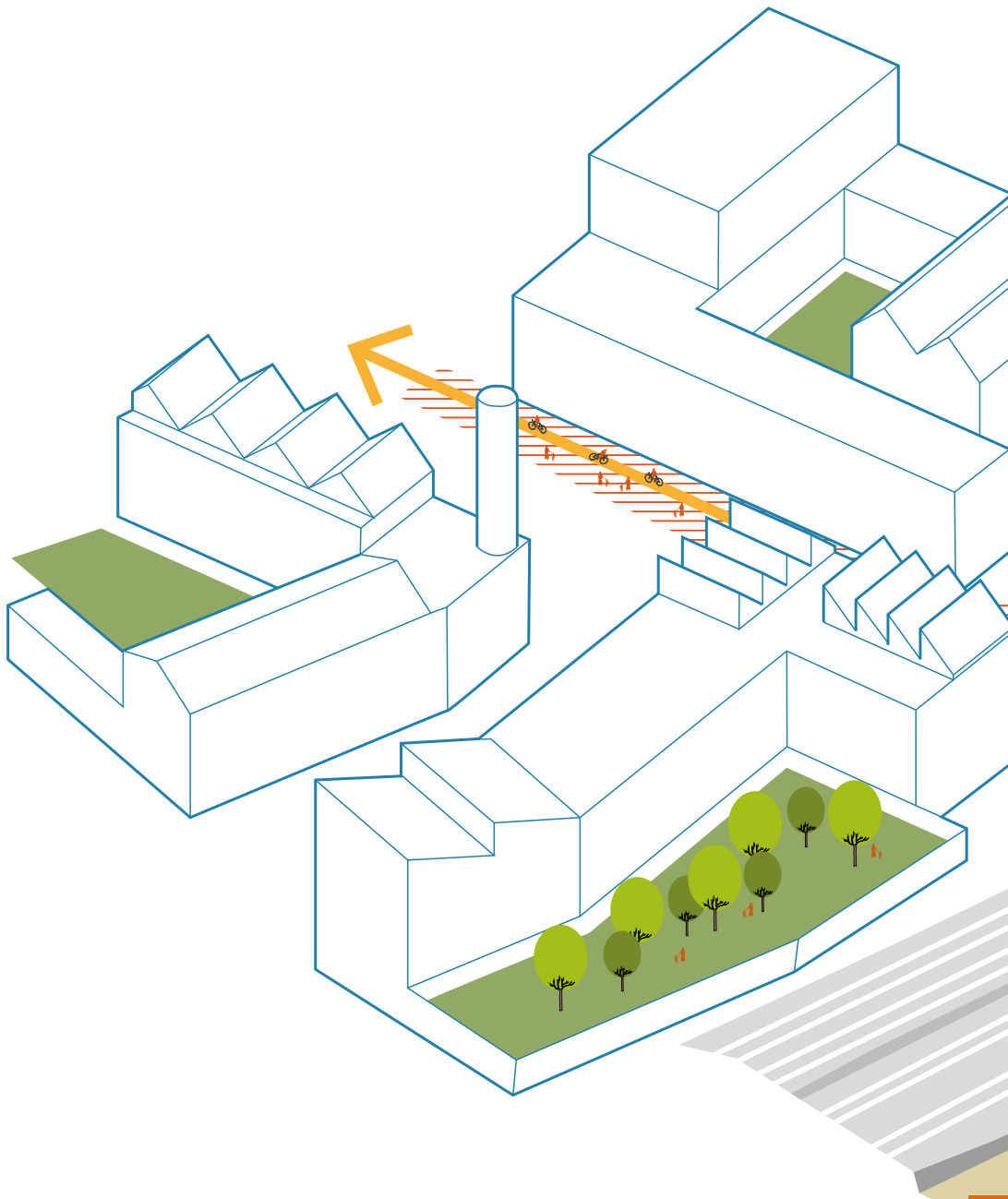


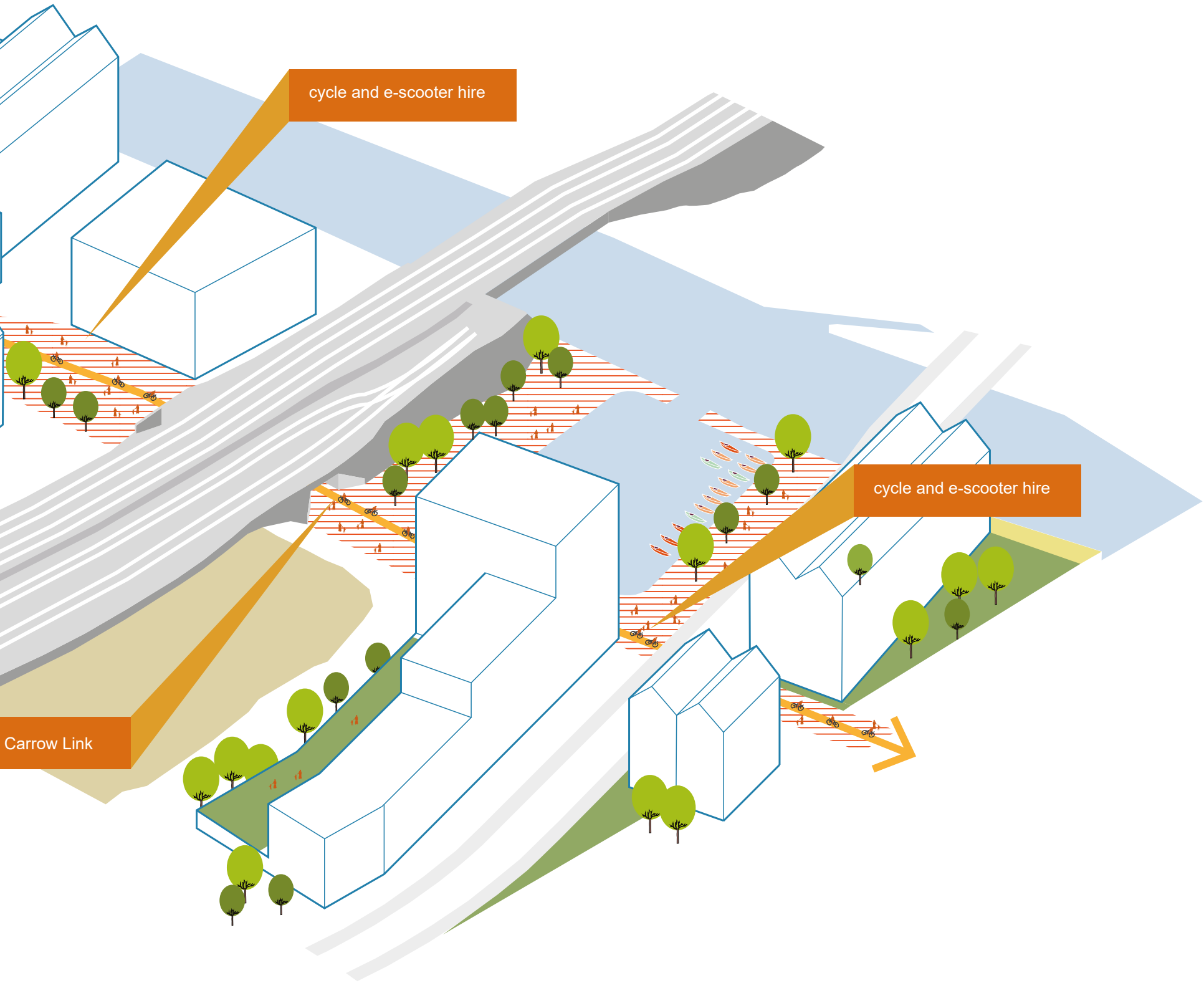
Illustrative masterplan drawing

7.4 Potential Future Option

As part of potential future railway improvements to to the Great Eastern Main Line between London and Norwich, major infrastructure works would need to be undertaken including a new Trowse Railway Bridge. This would involve either installing a new twin track openable or swing bridge or a fixed twin track bridge, subject to future decisions. As part of this major undertaking new foundations and structural reinforcements would be required and a new widened 6m Carrow Link could be integrated into the timely extent of the major infrastructure works. A meanwhile Carrow Link solution should be in place subject to the phasing of these works



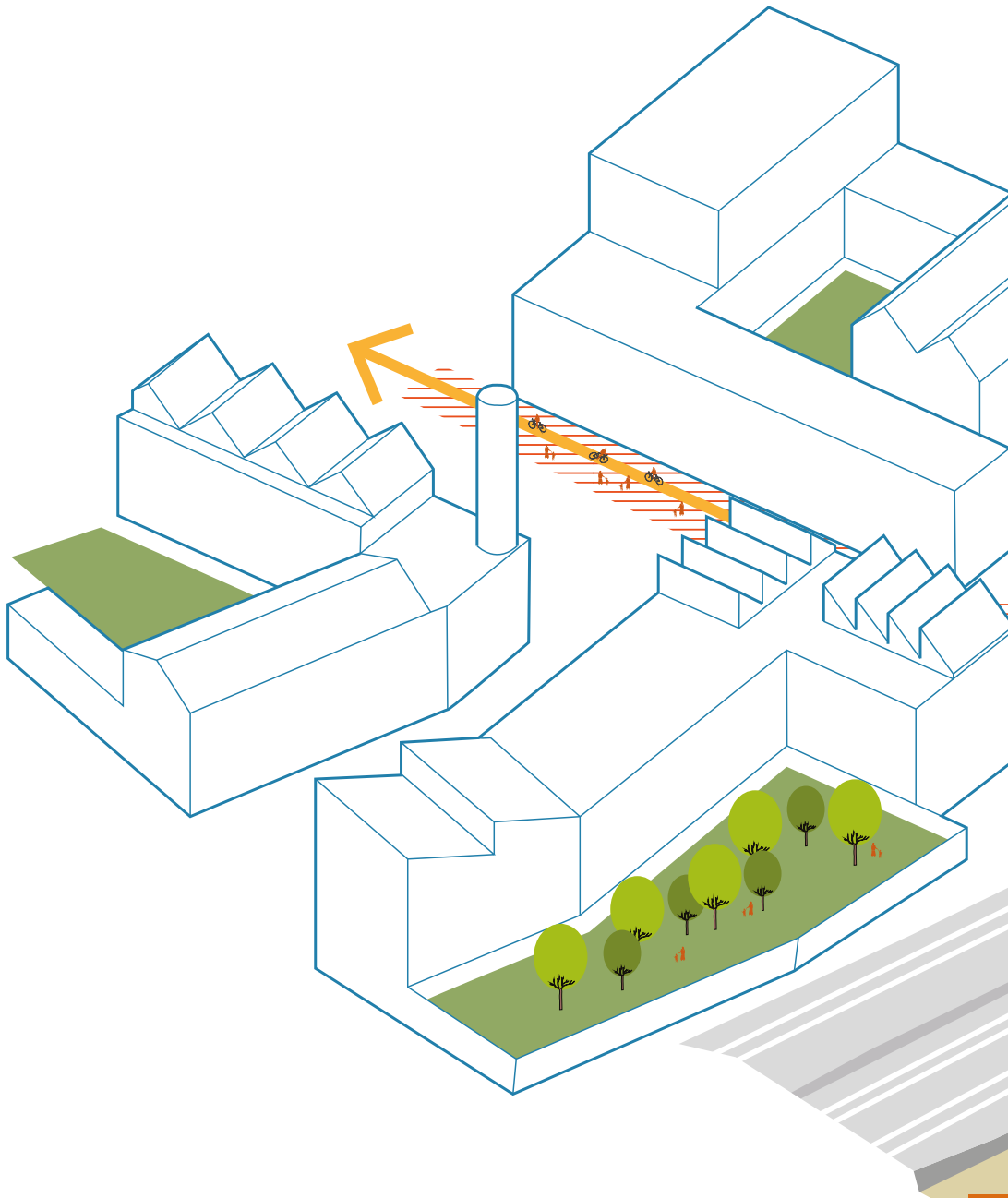
All diagrams are based on an Indicative Scheme and are for illustrative purposes only.


cycle and e-scooter hire
cycle and e-scooter hire
Carrow Link

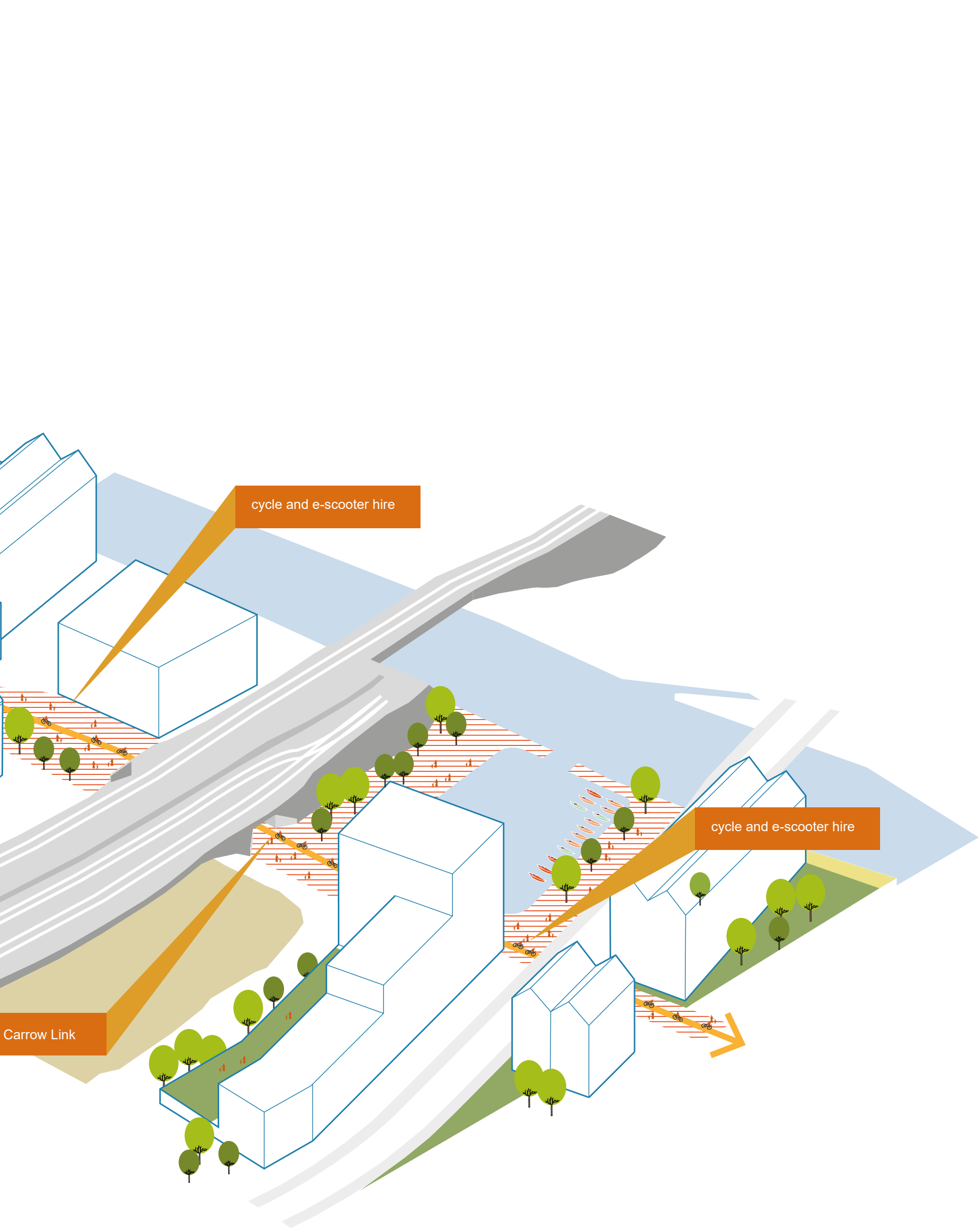
8. Recommendations

New Carrow Link in situ with masterplan development on either side of the railway line. 6m wide Carrow Link with 2.7m deep excavated headroom inside the tunnel illustrated as part of the wider movement network facilitating the realignment of National Cycle Route 1.

The hatched zone indicates the area of most activation which will become a vibrant and busy place to enjoy outdoor space and benefit greatly from the increased pedestrian and cyclist movement.



All diagrams are based on an Indicative Scheme and are for illustrative purposes only.


cycle and e-scooter hire
cycle and e-scooter hire
Carrow Link

Existing tunnel location and width where the depth has been excavated to 2.7m deep. Option using brickwork and lighting, potential mural or artwork installation to inner wall, which could link to local history.

Existing tunnel location and width where the depth has been excavated to 2.7m deep. Option using corten steel and lighting to create a light and inviting space to connect the masterplan.

Existing tunnel location widened to 6m and excavated to 2.7m deep. Option using brickwork and lighting, potential mural or artwork installation to inner wall, which could link to local history.

Existing tunnel location widened to 6m and excavated to 2.7m deep. Option using corten steel and lighting to create a light and inviting space to connect the masterplan.

Appendix K

Vehicle swept Path Analysis