

South Wokingham Distributor Road -Spine Road and Western Gateway Phase 1

LTN 1/20 Cycling Assessment Technical Note

# WMHP-TG-SRWG1-RP-HI-0402

Revision: P02 Date: 15/02/2021









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Wokingham Borough Council

Document no: WMHP-TG-SRWG1-RP-HI-0402

Revision: P02

Date: 15/02/2021

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# Document Issue Record

Project:	South Wokingham Distributor Road - Spine Road and Western Gateway Phase 1
Report Title:	LTN 1/20 Cycling Assessment Technical Note
Client:	Wokingham Borough Council
Document No:	WMHP-TG-SRWG1-RP-HI-0402
Revision:	P02
Status	S2 - Suitable for information
Date:	15/02/2021
Filename:	WMHP-TG-SRWG1-RP-HI-0402-P02.1.docx

Rev	Date	Description and Purpose of Issue	Prepared	Reviewed	Approved
P01	30/10/20	For information	MH	ВН	JC
P02	15/02/21	Updated following SCO comments	MH	ВН	JC

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# 1. LTN 1/12 & LTN 2/08 Cycling Infrastructure Design Standard and WBC Guidance

### 1.1. Overview

This section will provide an assessment of the proposal designed and developed by WSP for planning permission in 2019, Tony Gee and Partners LLP (TGP) were advised that this design has been frozen in its current state and will be subject to no further changes. TGP have been instructed to review the scheme based on Local Transport Notes (LTN) 1/12 and 2/08 to ensure the recommendations within the standards have been fulfilled.

# 1.2. Current WBC Design Standards

The current Wokingham Borough Council (WBC) Cycling Infrastructure Style Guide is based on the Department for Transport's (DfT) LTN 2/08 "Cycling Infrastructure Design" and 1/12 "Shared Use Routes for Pedestrians and Cyclists". LTN 1/12 both supersedes and complements LTN 2/08, for the purpose of this assessment the more relevant standard is LTN 1/12 as this is specifically for shared use routes.

The Spine Road and Western Gateway Phase 1 (SRWG1) scheme prepared by WSP was designed to reflect these standards and includes a 3.0 m wide shared footway/cycleway to both sides of the road along the mainline between Finchampstead Road and Eastern Gateway.

# 1.3. Geometry

#### 1.3.1. Widths

The current proposed design for the footway/cycleway route consists of a 3.0 m wide shared use unsegregated path with 0.5 m or greater buffer width at either side. The 0.5 m buffer width is made up of soft landscaped verge and runs adjacent to the route for most of the scheme. In locations where the verge is not present, such as bus stop locations, the same required 0.5 m buffer is maintained. This design parameter is in accordance with LTN 1/12 Table 7.5 "Minimum widths summary" and Table 7.4 "Additional clearances to maintain effective widths for cyclists".

Where the shared use route passes on the Emm Brook overbridge, a paved width of 3.5 m is provided between road edge and bridge parapet. Bridge parapets and road edges require 0.5 m clearance which when subtracted from the 3.5 m paved width leaves 2.5 m effective width. The desirable minimum effective width in Table 6.4 of WBC Cycling Infrastructure Style Guide 3.0 m, and the absolute minimum width is 2.0 m, therefore the design achieves a greater effective width than the absolute minimum throughout this location.

#### 1.3.2. Gradients

The proposed gradients of the shared use footway/cycleway route are within design guidance parameters for both crossfalls and longitudinal falls. WBC Cycling Infrastructure Style Guide and LTN 1/12 both refer to LTN 2/08 Clause 8.7.2 for guidance on acceptable longfall, where the limiting gradient of 7% is acceptable over 30.0 m and 5% is acceptable over 100 m. All longfall gradients are less than 5% across the scheme.



LTN 2/08 Clause 8.6.1 allows for crossfalls between 1% and 2.5%. Across the scheme, crossfalls are within the range of 2.5%, with the exception of Emm Brook overbridge where crossfalls are 4.8% to accommodate services in this area. This has formerly been accepted by the Technical Approval Authority (TAA), see comment 1 of WMHP-BB-SRWG1-SCO-DM-0007 for further detail.

#### 1.3.3. Vertical alignment

As the shared use footway/cycleway follows the vertical geometry alignment of the proposed mainline which is designed for cars traveling up to 30 mph, the minimum crest K values prescribed in WBC Guidance Clause 3.9.1/3.9.2 which refers to DMRB TD 9/93 Highways Link Design para 4.5 have been met suitably, where a minimum K value along the cycle route below 1.6 are unacceptable.

#### 1.3.4. Horizontal alignment

As the shared use footway/cycleway follows the horizontal geometry alignment of the proposed mainline which is designed for cars traveling up to 30 mph, it is generally considered to meet and exceed the largest minimum desirable horizontal turning radius of bicycles traveling at higher speeds than expected on the designated route (25 m) as per WBC Guidance Clause 3.8.1 which refers to guidance in LTN 2/08. Horizontal geometry at access roads and side roads is different to that along the mainline at each location. The design conforms to the minimum horizontal radii of 4.0 m as per Clause 2.6.4. in LTN 2/08.

#### 1.3.5. Parapets

Bridge parapets have been designed in accordance with LTN 2/08 Clause 10.8.2 with a minimum height of 1.4 m.

#### 1.3.6. Signage

It is assumed that the signage for the proposed scheme shall be designed in accordance with that prescribed in Traffic Signs Regulations Guidance Document (TSRGD) 2002 as per LTN 2/08 Clause 3.1.1 and WBC Guidance Clause 9.1.1.

#### 1.3.7. Junctions and crossings

The proposed design currently has no cycle only considerations for cyclists at crossings on the carriageway in line with the shared use approach; roundabouts, signalised crossings and uncontrolled crossings are present throughout the scheme. The roundabouts on the scheme are defined as standard, in all cases an off-carriageway cycle route with refuge locations at the crossings are provided as recommended in WBC Guidance Clause 7.5.10 for additional safety to cyclists' movements across the junction due to the high expected traffic flows.

Signal controlled junctions have no provision for cyclists to use the carriageway, an offcarriageway route has been designated to utilise refuge locations when crossing the junction as recommended in WBC Guidance Clause 7.3.8 for additional safety to cyclists' movements across the junction due to the high expected traffic flows.

At side road junctions, the off-carriageway cycle route continues across the side road carriageway with the presence of give way road markings for priority and a change in surfacing.



This requires cars and other carriageway users to give way to cycles and pedestrians crossing the side road.

Refuge islands at uncontrolled crossings on the Spine Road mainline meet and exceeded minimum guidance provided in LTN 2/08 Clause 10.2.7 which states that refuges should be 3.0 m wide by 2.0 m deep. Refuges in all locations are 3.0 m which is considered sufficient to accommodate a cycle and trailer by LTN 2/08 while not encroaching into either carriageway.

#### 1.3.8. Surfacing materials

Surfacing is intended to be machine laid AC6 Dense Surf 100/150 Asphaltic Concrete Surface which is also the preferred surface type for cycle tracks as per LTN 2/08 Table 8.3, Clause 8.8.5 and Clause 8.8.6.

# 2. LTN 1/20 Cycling Infrastructure Design Standard

# 2.1. Overview

This section will provide an assessment of the proposal designed and developed by WSP for planning permission in 2019, Tony Gee and Partners LLP (TGP) were advised that this design has been frozen in its current state and will be subject to no further changes. TGP have been instructed to review the scheme based on LTN 1/20 which has been introduced to supersede LTN 1/12 and 2/08. This section will assess the changes made in the updated standards, provide advice on the implications to the scheme and identify sections where this can be implemented.

# 2.2. Relevant changes within LTN 1/20

Local Transport Note 1/20 has been created and published in response to the Governments ambitious plan for cycling released in July 2020, it reflects the most current best practice, standards and legal requirements. This document combines and improves on the information in previous guidance LTN 2/08 and 1/12. Section 2.3 onward will explore the relevant updates from the previous standards to 1/20 to the Spine Road scheme.

# 2.3. Geometry

#### 2.3.1. Widths

The recommended unsegregated width of a shared use footway/cycleway has been updated from an absolute minimum width of 2.0 m to 3.0 m effective width as shown in Table 6-3. This new width requirement is accompanied with the assumption of no more than 300 pedestrians and up to 300 cyclists per hour. Where numbers of cyclists are expected to be greater than this, the width should be increased to 4.5 m. Required buffer widths have generally not changed from previous versions.

The only change to the additional width requirements in LTN 1/20 impacts the Emm Brook overbridge section of the shared use footway/cycleway. The 0.25 m requirement for width reduction for overbridges on short distances as per LTN 2/08 Table 8.2 has been omitted from this update, which now deems the width of 3.5 m to be too narrow to comply with desirable minimum, LTN 1/20 Table 5-3 and Table 6-1; where an additional width of 0.5 m either side is



mandatory, resulting in a required minimum desirable effective width of 4.0 m. The design does however comply with the absolute minimum widths prescribed by both tables, where 0.5 m must be provided for the parapet width, but 0 m is required for horizontal separation from the carriageway (30 mph carriageway speed).

2.3.2. Gradients

Acceptable maximum lengths for gradients has been amended from LTN 2/08 Clause 8.7.2 to LTN 1/20 Table 5-8. The new guidance provides a more refined breakdown of the maximum length of gradients between longfalls of 2%-5% in 0.5% increments. There are 4 locations where the gradients proposed are deemed too steep for the length of section in which they occur:

- West of Access Road 1 Gradient of 3.97% over approx. 80.0 m
- East of Access Road 2 Gradient of 4.18% over approx. 50.0 m
- West of Access Road 2 Gradient of 3.96% over approx. 60.0 m
- East of Access Road 5 Gradient of 3.52% over approx. 60.0 m

LTN 1/20 Clause 5.10.1 stipulates a maximum crossfall of 2.5%. Across the scheme, crossfalls are within the range of 2.5%, with the exception of Emm Brook overbridge where crossfalls are 4.8% to accommodate services in this area. This has formerly been accepted by the Technical Approval Authority (TAA), see comment 1 of WMHP-BB-SRWG1-SCO-DM-0007 for further detail.

#### 2.3.3. Vertical alignment

In addition to 2.2.2., the minimum K value for the proposed design should be 5 for comfort of cyclists as per LTN 1/20 Clause 5.9.5. As the current proposal has been designed for the required highway geometry and the shared use footway/cycleway follows this, it is generally assumed that this clause has been met.

LTN 1/20 Clause 5.11.1. has been updated to consider edge protection to locations with potentially hazardous gradients and unguarded hazards. This includes sections with gradients over 3% where hazards such as fixed objects, steep drops or water hazards should be greater than 4.5 m from the route and lie in the path where an out of control cycle would reach them. Where this is not possible a safety barrier may be required to protect users from the hazard.

#### 2.3.4. Horizontal alignment

LTN 1/20 has improved the guidance on minimum horizontal radii. Where LTN 2/08 and WBC Guidance Clause 3.8.1 relied on two design speeds of 20 kph and 30 kph, LTN 1/20 has refined the advice by providing minimum radii for an additional two speeds of 10 kph and 40 kph. As 1.3.4., the scheme is generally considered to meet and exceed the largest minimum desirable horizontal turning radius of bicycles traveling at higher speeds than expected on the designated route. Horizontal geometry at consortium access roads and side roads is different to that along the mainline at each location. The design conforms to the minimum horizontal radii of 4.0 m as per Table 5-7 in LTN 1/20.



#### 2.3.5. Parapets

The height of bridge parapets in 1.3.5. of 1.4 m complies with LTN 1/20 10.8.14. It should be noted that Highways England's updated standard CD 377 Clause 4.21 requires a 1.5 m high parapet adjacent to a cycleway.

#### 2.3.6. Signage

While LTN 1/20 also refers to the TSRGD for signage as 1.3.6., it has updated guidance to include requirements on the placement of these features. While the signage has not yet been designed for the scheme, in order to comply with LTN 1/20 there are two spatial clauses which must be implemented:

- Clause 13.2.1 A minimum height of 2.4 m must be provided for signage to achieve adequate clearance for the safety of cyclists. Signs on bollards are typically mounted at 0.8 m and those on walls 1.5 m to be easily seen.
- Clause 13.2.2 Sign posts must be placed no closer than 0.5 m and no further than 1.0 m from cycle routes to provide both adequate clearance and visibility of these features.

#### 2.3.7. Junctions and crossings

As already covered in 1.3.7., the proposed design currently has no cycle only considerations for cyclists at crossings on the carriageway, in line with the shared use approach. LTN 1/20 provides greater detail on the steps that can be taken at roundabouts to protect cyclists; however largely shares the same narrative as previous standards. The scheme does meet the requirements of LTN 1/20 Clause 10.7.8 where cyclists traveling at roundabouts with high flows should have a protected space away from traffic and Clause 10.7.11 where refuges are recommended to allow pedestrian and cyclist movements. The current junctions do not fulfil Clause 10.7.12 where parallel crossings are recommended, however these clauses are not deemed necessary as the cycle route proposed is unsegregated shared use.

Signal controlled junctions also have no provision for cyclists to use the carriageway, an offcarriageway route has been designated to utilise staggered refuge locations when crossing the junction as recommended in LTN 1/20 Clause 10.4.17 and Clause 10.4.19 where pedestrian and cyclist movements have been combined to minimise delay to motor traffic. However, in order to fully comply with LTN 1/20 Clause 10.4.19 railings must not be used to accommodate non-standard cycles – this advice is also given in LTN 2/09 and Chapter 6 of the Traffic Signs Manual. It is assumed that signals are coordinated to facilitate minimum crossing times as per LTN 1/20 Clause 10.4.18 and Chapter 6 of the Traffic Signs Manual.

As outlined in 1.3.7., at side road junctions, the off-carriageway cycle route continues across the side road carriageway with the presence of give way road markings for priority and a change in surfacing. This requires cars and other carriageway users to give way to cycles and pedestrians crossing the side road.

Refuge islands on the proposed scheme all have waiting areas 3.0 m wide and 3.0 m long. LTN 1/20 has been updated guidance on the requirements of refuges, such that LTN 1/20 Clause 10.4.7 states refuges must be 3.0 m long minimum in the direction of travel. It is assumed that all refuges have been designed wide enough to accommodate all intended users.



#### 2.3.8. Surfacing materials

Surfacing is intended to be machine laid AC6 Dense Surf 100/150 Asphaltic Concrete Surface. This surfacing choice meets the requirements of LTN 1/20 Section 15.2, specifically Clause 15.2.1, Clause 15.2.2 and 15.2.3 while also satisfying Clause 8.1.2, Clause 8.5.3 and Clause 8.5.4.

# 2.4. Cycling Level of Service (CLoS) Tool

As part of the LTN 1/20 guidance, a Cycling Level of Service (CLoS) Tool has been provided to assess the safety, comfort and accessibility of a scheme proposal. The tool assesses the strengths and weaknesses of the design, and provides a score based on five attribute design criteria:

- Coherency
- Directness
- Safety
- Comfort
- Attractiveness

The assessment tool is also used to determine if a scheme is eligible for Government funding. In order to be considered for funding, the scheme must score above 70% (35/50) and have no critical fails. Where schemes do not meet these minimum criteria, authorities are required to justify their design choices.

# 2.5. Junction Assessment Tool (JAT)

As part of LTN 1/20, a separate tool for junctions has been produced to assess the movements of cyclists through junctions, a particularly risky place for this type of road user. The Junction Assessment Tool (JAT) is based on the same attributes and used for the same function as the CLoS.

This assessment tool has no critical failure criteria, however if any movements fall into the red category, then it will not be considered for Government funding due to the suitability and safety of that movement.

All potential movements through a junction must be assessed. This includes those that are not designated or designed for, for this scheme, this results in movements of cyclists on the road being assessed despite a designated cycle route being prescribed off the carriageway. This assessment requirement has had a significant impact on the potential scoring.

# 3. Summary

# 3.1. Local Transport Notes

This section will summarise and evaluates the assessments conducted for the current design proposal based on the LTN discussed earlier in the document. This section also provides recommendations on potential changes to the scheme in order to improve assessment scores and fulfil guidance from the LTN.



A full comparison table can be found in Appendix A which illustrates the assessment of the design guides.

### 3.1.1. LTN 1/12, LTN 2/08 and WBC Standards

The scheme can be considered almost fully compliant with LTN 1/12 and LTN 2/08, Section 1 provides an overview of the relevant clauses and guidance within the design standards and justification for those aspects of the design which fulfil the requirements. The only non-compliant aspect of the design is the route crossfall in some locations regarding LTN 2/08 Clause 8.6.1.

The design is otherwise considered fully complaint given some assumptions which are not yet known. The width over the Emm Brook watercourse could be compliant as per LTN 2/08 Table 8.2 if confirmed this distance is considered a 'short distance'. As the signage for the scheme is not yet finalised, it has been assumed to conform to both LTN 2/08 Clause 3.1.1 and WBC Standards 9.1.1. Finally, junctions with uncontrolled crossings at side road accesses are assumed to have AADT <6000 in line with LTN 2/08 Table 10.1.

#### 3.1.2. LTN 1/20

The scheme can be considered somewhat compliant with LTN 1/20, Section 2 provides an overview of the relevant clauses and guidance within the design standards and justification for those aspects of the design which fulfil the requirements and identifies areas where designs deviate from the prescribed documents.

In order to complete an assessment, some assumptions have been made to fully review the design under LTN 1/20. The width of the shared use route is compliant with an assumed usage level of less than 300 pedestrians and 300 cyclists per hour as per Table 6-3. An addition to LTN 1/20 is the requirement for edge protection near vertical hazards, which is assumed to be fulfilled as per Clause 5.11.1.

As the signage is not yet finalised, it is assumed to comply with TSRGD requirements and LTN 1/20 Clause 13.2.1 and 13.2.2. Another addition to LTN 1/20 requires signalised junctions to be designed to provide enough time for cyclist's transit over the junction, this has been assumed to be provided as per TSRGD Chapter 6 and LTN 1/20 Clause 10.4.18. Finally, junctions with uncontrolled crossings at consortium access roads are assumed to have AADT <4000 in line with LTN 1/20 Table 10-2.

#### 3.2. CLoS

An assessment has been completed for the design at its current stage for the CLoS, the full document can be found in Appendix B. A discussion of the overall score and potential improvements that can be made to increase the score can be found in this section.

For some scores, there can be no improvement without significant changes to the wider area which is not considered a part of the scheme. For example, Indicator 3 refers to the density of the cycle network within the locality, without additional cycle facilities being implemented outside the scope of the scheme, this score could not be improved.



The CLoS assessment score produced using the tool is 39 or 78% which meets the minimum requirements for the scheme to be considered for funding without justifications from the relevant authority.

Notwithstanding, the following could be investigated to further improve the score:

**Indicator 6** score could be improved by investigating/providing predictions of potential cyclists wait times at junctions to better inform this score.

**Indicator 7** could be improved by widening the proposed 3.0 m wide route to accommodate a segregated shared use footway/cycleway. This can be achieved by either light segregation, simple white line/surface colour and texture segregation or level difference segregation.

**Indicator 13** can be improved by providing a continuation of the footway/cycleway route and potentially priority to non-motorised users (NMU), there will be a reduction between conflict of movements at these junctions by giving users separated routes.

**Indicator 20**, the proposed signage on the scheme needs to be designed and finalised with special considerations to cyclists.

**Indicator 22** has scored 0 at the current design stage, however as adjacent development plots are developed this score is likely to increase. This is due to the scheme generally being away from activity until these plots are populated and the scheme becomes more 'overlooked'.

**Indicator 23** score could be improved by similar means to that recommended for indicator 7. Proposed pedestrian and cyclist average and peak hour movement levels must be provided to assess the current design; however, a segregated cycle route would intuitively increase pedestrian comfort levels.

**Indicator 24** is similar to indicator 20, as the proposed signage on the scheme needs to be designed and finalised with special considerations to cyclists.

# 3.3. JAT

An assessment has been completed for the design at its current stage for the JAT, the full document can be found in Appendix C. A discussion of the overall score and potential improvements that can be made to increase the score can be found in this section.

The assessment tool scored the scheme 0 with all movements scoring red. This is due to not meeting all criteria in that section despite meeting criteria in the amber and green sections. This low score is a result of the assessment of all potential junction movements, should this criteria be amended to include only those junction movements which have been designed for as part of the shared use cycle route, the scores have potential to be improved to an amber or green status.

In order to improve this score with the all movements assessment criteria, traffic flows must be reduced and on carriageway or off-carriageway segregated cycle route facilities must be provided - around junctions at a minimum.



# Appendix A – Summary Table



1. Design Aspect	2. LTN 1/12 – LTN 2/08 – WBC Standards	3. LTN 1/20	4. Comments
Width	Compliant (with assumption only for overbridge) 3m absolute minimum including horizontal clearance (2 x 0.5m)	Compliant 3.0m minimum without vertical objects. 3.5m minimum between adjacent road and parapet.	The design complies with required widths in columns 2 & 3. The overbridge is only compliant with the standards in column 2 if the assumptions discussed in the summary section are applied. The design is compliant with the absolute minimum width prescribed for LTN 1/20.
Gradients	Compliant	Non-Compliant for short sections only	The design is compliant with the longitudinal and crossfall gradients prescribed in the standards of column 2. The design is non-compliant with both longitudinal gradients required by LTN 1/20 in some locations however this is a function of the main road gradients which the cycle facilities are linked to therefore the gradients. Crossfall gradients on the Emm Brook overbridge are proposed to be 4.8% to accommodate services in this area. This has formerly been accepted by the Technical Approval Authority (TAA), see comment 1 of WMHP-BB-SRWG1-SCO-DM- 0007 for further detail.
Vertical Alignment	Compliant	Compliant	The design complies with columns 2 & 3.
Horizontal Alignment	Compliant	Compliant	The design complies with columns 2 & 3.
Parapets	Compliant	Compliant	The design complies with columns 2 & 3.
Signage	ТВС	ТВС	No design undertaken to date.
Junctions and Crossings	Compliant	Compliant	The design complies with columns 2 & 3 under the assumptions provided in the summary section regarding expected AADT which are currently unknown. This also assumes that all clauses which apply to on- carriageway provisions at junctions do not apply to the design as it is an off- carriageway shared use facility.
Surface Materials	Compliant	Compliant	The design complies with columns 2 & 3.



# Appendix B – Cycling Level of Service Tool (CLoS)

# LTN 1/20 Cycling Level of Service (CLoS) Tool

Key Requirement	Factor	Design Principle	Indicators	Critical	0 - Red	1 - Amber	2 - Green	Score	Comments (03/12/2020)
	Connections	Cyclists should be able to easily and safely join and navigate along different sections of the same route and between different routes in the network.	<ol> <li>Ability to join/leave route safely and easily: consider left and right turns.</li> </ol>		Cyclists cannot connect to other routes without dismounting.	Cyclists can connect to other routes with minimal disruption to their journey.	Cyclists have dedicated connections to other routes provided, with no interruption to their journey.	1	Cyclists will have minimal disruption to their journey along the proposed cycle route facilitated by uncontrolled crossings and signalised crossings with refuges.
Cohesion	Continuity and Wayfinding	Routes should be complete with no gaps in provision. 'End of route' signs should not be installed – cyclists should be shown how the route continues. Cyclists should not be 'abandoned', particularly at junctions where provision may be required to ensure safe crossing movements.	2. Provision for cyclists throughout the whole length of the route.		Cyclists are 'abandoned' at points along the route with no clear indication of how to continue their journey.	The route is made up of discrete sections, but cyclists can clearly understand how to navigate between them, including through junctions.	Cyclists are provided with a continuous route, including through junctions.	2	Side roads include give way for priority and continuation of cycle route.
	Density of network	Cycle networks should provide a mesh (or grid) of routes across the town or city. The density of the network is the distance between the routes which make up the grid pattern. The ultimate aim should be a network with a mesh width of 250m.	3. Density of routes based on mesh width ie distances between primary and secondary routes within the network.		Route contributes to a network density mesh width >1000	Route contributes to a network density mesh width 250 – 1000m	Route contributes to a network density mesh width <250m	1	Designated cycle routes are limited in Wokingham town, as such there is a low network density - closest signed shared route is London Road (A329) NCN 422.
	Distance	Routes should follow the shortest option available and be as near to the 'as-the-crow-flies' distance as possible.	4. Deviation of route Deviation Factor is calculated by dividing the actual distance along the route by the straight line (crow-fly) distance, or shortest road alternative.		Deviation factor against straight line or shortest road alternative >1.4	Deviation factor against straight line or shortest road alternative 1.2 – 1.4	Deviation factor against straight line or shortest road alternative <1.2	2	2336 / 2118 = 1.103
Directness	Time: Frequency of required stops or give ways	The number of times a cyclist has to stop or loses right of way on a route should be minimised. This includes stopping and give ways at junctions or crossings, motorcycle barriers, pedestrian-only zones etc.	5. Stopping and give way frequency.		The number of stops or give ways on the route is more than 4 per km.	The number of stops or give ways on the route is between 2 and 4 per km.	The number of stops or give ways on the route is less than 2 per km.	2	Side roads include give way for priority and continuation of cycle route.
	Time: Delay at junctions	The length of delay caused by junctions should be minimised. This includes assessing impact of multiple or single stage crossings, signal timings, toucan crossings etc.	6. Delay at junctions.		Delay for cyclists at junctions is greater than for motor vehicles.	Delay for cyclists at junctions is similar to delay for motor vehicles.	Delay is shorter than for motor vehicles or cyclists are not required to stop at junctions (eg bypass at signals).	1	Signal timing and delays will be considered further during detailed design.
	Time: Delay on links	The length of delay caused by not being able to bypass slow moving traffic.	7. Ability to maintain own speed on links.		Cyclists travel at speed of slowest vehicle (including a cycle) ahead.	Cyclists can usually pass slow traffic and other cyclists.	Cyclists can always choose an appropriate speed.	2	Based on traffic assessment, Spine Road will generally be free-flowing with delays/queues limited to signal junctions at average 1km spacing.
	Gradients	Routes should avoid steep gradients where possible. Uphill sections increase time, effort and discomfort. Where these are encountered, routes should be planned to minimise climbing gradient and allow users to retain momentum gained on the descent.	8. Gradient.		Route includes sections steeper than the gradients recommended in Chapter 5	There are no sections of route steeper than the gradients recommended in Chapter 5	There are no sections of route which steeper than 2%	1	Whilst the gradients are not exceeded the desireable length of the gradient is however this is not included in the scoring criteria.
	Reduce/ remove speed differences where cyclists are sharing the carriageway.	Where cyclists and motor vehicles are sharing the carriageway, the key to reducing severity of collisions is reducing the speeds of motor vehicles so that they more closely match that of cyclists. This is particularly important at points where risk of collision is greater,	9. Motor traffic speed on approach and through junctions where cyclists are sharing the carriageway through the junction.	85th percentile >37mph (60kph)	85th percentile >30mph	85th percentile 20mph- 30mph	85th percentile <20mph	2	At side roads, vehicles are expected to slow to safely turn into the junction. Where >20mph speeds are expected junctions are signalised and cyclists are not expected to cross while traffic is moving.
		such as at junctions.	10. Motor traffic speed on sections of shared carriageway.	85th percentile >37mph (60kph)	85th percentile >30mph	85th percentile 20mph- 30mph	85th percentile <20mph	2	There are no proposed sections of shared carriageway therefore a score of 2 has been given.
Safety	Avoid high motor traffic volumes where cyclists are sharing the carriageway.	Cyclists should not be required to share the carriageway with high volumes of motor vehicles. This is particularly important at points where risk of collision is greater, such as at junctions.	11. Motor traffic volume on sections of shared carriageway, expressed as vehicles per peak hour.	>10000 AADT, or >5% HGV	5000-10000 AADT and 2- 5%HGV	2500-5000 and <2% HGV	0-2500 AADT	0	AADT contained in SWok_AQNoise_Outputs_Summary_ 22_09_2020_issued which is recorded between 6268 and 15384 two way for links 10851 and 11889 shown in WSTM4 Link & Node Identifiers - WG 05102020.
	Risk of collision.	Where speed differences and high motor vehicle flows cannot be reduced cyclists should be separated from traffic – see Figure 4.1. This separation can be achieved at varying degrees through on-road cycle lanes, hybrid tracks and off-road provision. Such segregation should reduce the risk of collision from beside or behind the cyclist.	12. Segregation to reduce risk of collision alongside or from behind.	Cyclists sharing carriageway – nearside lane in critical range between 3.2m and 3.9m wide and traffic volumes prevent motor vehicles moving easily into opposite lane to pass cyclists.	Cyclists in unrestricted traffic lanes outside critical range (3.2m to 3.9m) or in cycle lanes less than 1.8m wide.	Cyclists in cycle lanes at least 1.8m wide on-carriageway; 85th percentile motor traffic speed max 30mph.	Cyclists on route away from motor traffic (off road provision) or in off carriageway cycle track. Cyclists in hybrid/ light segregated rack; 85th percentile motor traffic speed max 30mph.	2	Cycle route provisions have been made through shared footway/cycleway off carriageway.
		A high proportion of collisions involving cyclists occur at junctions. Junctions therefore need particular attention to reduce the risk of collision. Junction treatments include: Minor/side roads – cyclist priority and/or speed reduction across side roads Major roads – separation of cyclists from motor traffic through junctions.	13. Conflicting movements at junctions.		Side road junctions frequent and/ or untreated. Major junctions, conflicting cycle/ motor traffic movements not separated.	Side road junctions infrequent and with effective entry treatments. Major junctions, principal conflicting cycle/ motor traffic movements separated.	Side roads closed or treated to blend in with footway. Major junctions, all conflicting cycle/ motor traffic streams separated.	1	Side road junctions are separated with tactiles and kerbing and major junctions are signalised and provided with refuges to assist conflicting crossing movements.

# LTN 1/20 Cycling Level of Service (CLoS) Tool

Key Requirement	Factor	Design Principle	Indicators	Critical	0 - Red	1 - Amber	2 - Green	Score	Comments (03/12/2020)
	Avoid complex design.	Avoid complex designs which require users to process large amounts of information. Good network design should be self-explanatory and self- evident to all road users. All users should understand where they and other road users should be and what movements they might make.	14. Legible road markings and road layout.		Faded, old, unclear, complex road markings/ unclear or unfamiliar road layout.	Generally legible road markings and road layout but some elements could be improved.	Clear, understandable, simple road markings and road layout.	2	Road markings shall be newly laid, clear and designed to current relevant standards.
Safety	Consider and reduce risk from kerbside activity.	Routes should be assessed in terms of all multi-functional uses of a street including car parking, bus stops, parking, including collision with opened door.	15. Conflict with kerbside activity.	Narrow cycle lanes <1.5m or less (including any buffer) alongside parking/ loading.	Significant conflict with kerbside activity (eg nearside cycle lane < 2m (including buffer) wide alongside kerbside parking).	Some conflict with kerbside activity – eg less frequent activity on nearside of cyclists, min 2m cycle lanes including buffer.	No/very limited conflict with kerbside activity or width of cycle lane including buffer exceeds 3m.	2	The cycle route is to be separated from the carriageway kerbside by a grass verge barrier.
	Reduce severity of collisions where they do occur.	Wherever possible routes should include "evasion room" (such as grass verges) and avoid any unnecessary physical hazards such as guardrail, build outs, etc. to reduce the severity of a collision should it occur.	16. Evasion room and unnecessary hazards.		Cyclists at risk of being trapped by physical hazards along more than half of the route.	The number of physical hazards could be further reduced.	The route includes evasion room and avoids any physical hazards.	2	The cycle route has evasion room on either side in the form of rain gardens, grassy verge and grassy banks. While these are evasion zones they all include hazards such as structures within the rain gardens, trees and uneven surfaces.
	Surface quality.	Density of defects including non cycle friendly ironworks, raised/sunken covers/gullies, potholes, poor quality carriageway paint (eg from previous cycle lane).	17. Major and minor defects.		Numerous minor defects or any number of major defects.	Minor and occasional defects.	Smooth high grip surface.	2	Proposed cycle route surface is to be fresh smooth high grip asphalt with no defects in accordance with BS594987:2010.
Comfort		Pavement or carriageway construction providing smooth and level surface.	18. Surface type.		Any bumpy, unbound, slippery, and potentially hazardous surface.	Hand-laid materials, concrete paviours with frequent joints.	Machine laid smooth and non-slip surface – eg Thin Surfacing, or firm and closely jointed blocks undisturbed by turning heavy vehicles.	2	Proposed cycle route surface is to machine laid in accordance with BS594987:2010.
	Effective width without conflict.	Cyclists should be able to comfortably cycle without risk of conflict with other users both on and off road.	19. Desirable minimum widths according to volume of cyclists and route type (where cyclists are separated from motor vehicles).		More than 25% of the route includes cycle provision with widths which are no more than 25% below desirable minimum values.	No more than 25% of the route includes cycle provision with widths which are no more than 25% below desirable minimum.	Recommended widths are maintained throughout whole route.	2	Recommended minimum width of 3.0m is maintained throughout the cycle route with some locations exceeding the required minimum.
	Wayfinding.	Non-local cyclists should be able to navigate the routes without the need to refer to maps.	20. Signing.		Route signing is poor with signs missing at key decision points.	Gaps identified in route signing which could be improved.	Route is well signed with signs located at all decision points and junctions.	1	Provision of route signage should be considered.
	Social safety and perceived vulnerability of user.	Routes should be appealing and be perceived as safe and usable. Well used, well maintained, lit, overlooked routes are more attractive and	21. Lighting.		Most or all of route is unlit.	Short and infrequent unlit/ poorly lit sections.	Route is lit to highway standards throughout.	2	The cycle route is part of a newly installed link road with adequate lighting to current highway standards.
		therefore more likely to be used.	22. Isolation		Route is generally away from activity.	Route is mainly overlooked and is not far from activity throughout its length.	Route is overlooked throughout its length.	1	The cycle route is generally away from activity/development other than the road. This score is likely to increase and the route is expected to be overlooked and near activity throughout its length once adjacent development is completed.
Attractiveness	Impact on pedestrians, including people with disabilities.	Introduction of dedicated on-road cycle provision can enable people to cycle on- road rather than using footways which are not suitable for shared use. Introducing cycling onto well used footpaths may reduce the quality of provision for both users, particularly if the shared use path does not meet recommended widths.	23. Impact on pedestrians, Pedestrian Comfort Level based on Pedestrian Comfort guide for London (Section 6.1).		Route impacts negatively on pedestrian provision, Pedestrian Comfort is at Level C or below.	No impact on pedestrian provision or Pedestrian Comfort Level remains at B or above.	Pedestrian provision enhanced by cycling provision, or Pedestrian Comfort Level remains at A.	2	Shared-use facilities offer echancement over existing footways.
	Minimise street clutter.	Signing required to support scheme layout.	24. Signs informative and consistent but not verbearing or of inappropriate size.		Large number of signs needed, difficult to follow and/ or leading to clutter.	Moderate amount of signing particularly around junctions.	Signing for wayfinding purposes only and not causing additional obstruction.	1	It is expected that signage will conform to standard clauses and therefore a score of 1 has been given to reflect this.
	Secure cycle parking.	Ease of access to secure cycle parking within businesses and on-street.	25. Evidence of bicycles parked to street furniture or cycle stands.		No additional cycle parking provided or inadequate provision in insecure nonoverlooked areas.	Some secure cycle parking provided but not enough to meet demand.	Secure cycle parking provided, sufficient to meet demand.	2	The scheme is a link road with bus stops only at intermediate locations. As per clause 11.1.1 cycle parking is prescribed on own merit at these locations and therefore a score of 2 has been given.
Total Score							Audit Score Total	40	(70% = 35)



# Appendix C – Junction Assessment Tool (JAT)

#### LTN 1/20 - Junction Assessment Tool (JAT)

Junction	Type of junction	Cycle movement being assessed	0 - Red	1 - Amber	2 - Green	Score	Comments
	Any type of junction.	Any movement.	Cycle movement in potential conflict with heavy motor traffic flow.     Cycle movement mixed with or crossing traffic with 85th percentile speed exceeding 60kph, or where vehicles accelerate rapidly.     Necessary to cross more than one traffic lane (without refuge or protection) to complete cycle movement unless traffic flows are low Cycle movement crosses wide junction entry or exit: e.g. with merge or diverge taper or slip lane.	Cycle movement in potential conflict with moderate traffic flow.     Cycle lanes through junction meeting appropriate desirable minimum width requirements for the movement under consideration.     Raised table at junction crossed by traffic in potential conflict with cycle movement.     Cycle movement made by transiting onto section of shared use footway.	Low traffic speed and volume in mixed traffic environment (e.g. access only streets in a residential area). Cycle movement separated physically and/or in time from motor traffic and also separated from pedestrians. Cycle movement bypasses junction completely, including via good quality grade separation.		
	Simple priority T-junction in addition to and notwithstanding any of the above "any junction" conditions (Note – staggered junctions assessed as two separate T-junctions).	Right turn from minor arm.	Heavy traffic movements and/or high bus and HGV flows in potential conflict with cycle movement, with no physical refuge in the centre of the major road (including ghost island junction).	Central refuge allowing two-stage cycle movement crossing one traffic lane at a time.     Side road entry treatment (table across minor arm).	Cycle movement made via crossing of major arm with dedicated cycle signals or cycle priority.     Continuous footway and cycle track across minor arm.	0	High traffic flow is over 5000 AADT. Based on nearby link AADT contained in SWok_AQNoise_Outputs_Summary_22_09_20 20_issued which is recorded between 6268 and 15384 two way for links 10851 and 11889 shown in WSTMA Link & Nodel dentifiers - WO 05102020. It is assumed to be representative of traffic flows of the existing situation and which likely to be higher post development. There is no physical refuge proposed for this movement. Therefore a score of 0 has been given to the right turn from minor arm. There is no ide road entry treatments or continuation of footway or cycle track proposed at these junctions.
Consortium Plot Access Road		Right turn from major arm.	<ul> <li>Heavy traffic movements and/or high bus and HGV flows in potential conflict with no physical refuge in the centre of major road (including ghost island junction).</li> </ul>	Protected turning refuge allowing two stage cycle movement, crossing one lane at a time.	Cycle movement made via crossing of major arm via dedicated cycle signals or cycle priority.	0	Therefore a score of 0 has been given to left turn from major arm. High traffic flow is over 5000 AADT. Based on nearby link AADT contained in SWok AQNOise_OUTUL 5.ummary. 22.09_20 20_issued which is recorded between 6288 and 15384 two way for links 10851 and 11889 shown in WSTM4 Link & Node Identifiers - WG 05102020. It is assumed to be representative of traffic flows of the existing situation and which likely to be higher post development. There is no physical refuge proposed for this movement. Therefore a score of 0 has been given to the right turn from major arm.
		Ahead on major arm, crossing minor arm.	Congested conditions causing poor visibility for right-turning motor vehicles from major arm.     Junction corner radius ≥9m, including where off- carriageway cycle track crosses minor arm.	Junction free from queueing traffic and cycle lane on major arm meeting desirable minimum width requirements. Junction corner radius <9m, including where off- carriageway cycle track crosses minor arm without priority. Side road entry treatment (table across minor arm).	<ul> <li>Off-carriageway cycle track or stepped cycle track alongside major arm, crossing minor arm with priority over turning traffic.</li> </ul>	0	As with the above assessments for this junction type, high traffic flows are expected which could be considered conjected, however traffic should be flowing under normal conditions. Only one condition from the Amber score section can be met (junction corner radius). Therefore a score of 0 has been given to ahead on majoy arm, corssing minor arm.
Firch ampstead /Eastha mpstead Road	Crossroads – as T junction In addition to and notwithstanding any of the above "any junction" conditions.	Ahead from minor arm.	<ul> <li>Heavy opposing traffic movements with no physical refuge (including ghost island junction).</li> </ul>	<ul> <li>Protected pocket refuge for ahead cycles allowing two stage movement, crossing one lane at a time.</li> </ul>	<ul> <li>Cycle movement made via crossing of major arm via dedicated cycle signals or cycle priority.</li> </ul>	0	Only cross road within the scheme is the junction of Finchampstead Road/Easthampstead Road. This junction is to be updated as a signalised crossroad where cycling refuges are provided. Therefore a score of 0 has been awarded to the Crossroad.

#### LTN 1/20 - Junction Assessment Tool (JAT)

Junction	Type of junction	Cycle movement being assessed	0 - Red	1 - Amber	2 - Green	Score	Comments
Mainline / Easthampatead Road Junction	Traffic Signals - in addition to and notwithstanding any of the above "any junction" conditions.	All movements.	Single or multiple questing lanes with no cycle lanes or tracks on approaches. Junctions with unsignalised left turn merge/diverge and signalised ahead lanes.	Advance Cycle Stop lines, at least 5m deep and where the signals on the approach are on green for -30% of the cycle time.     Signal timings adjusted to provide extended intergreen to suit cycle movement under consideration.     Cycle/pedestrian scramble (toucan crossings with all-red stage).     Early release for cycles, with enough time to clear junction for cycle movement being considered.     Two-stage right turn via ASL or marked area in front of stop line.	<ul> <li>Cycle movement has no potential conflict with motor traffic, e.g. dedicated cycle stage, conflicting traffic movement held or banned.</li> <li>Two-stage right turn with physically protected waiting area.</li> </ul>	0	The current design has multiple queuing lanes with no provision for cycle lanes or tracks within the carriageway on approaches. Therefore a score of 0 has been given to the signalised junctions.
Roundabout adjacent to Tesco	Roundabouts - In addition to and notwithstanding any of the above "any junction" conditions.	All movements.	Any type of roundabout with high traffic throughput.     Normal roundabout with multi-lane flared approaches.     Any type of roundabout with annular cycle lane marked on the circulatory carriageway.	Compact roundabout or raised min roundabout with no more than moderate traffic throughput.     Off-carriageway cycle track with crossings of entries and exits without cycle priority, crossing single traffic lanes with traffic flows < 4000 vehicles per day or 400 HGV/bus flow.	<ul> <li>Off-carriageway cycle track with crossings of entries and exits with signals or cycle priority.</li> </ul>	0	High traffic flow is over 8000 AADT. Based on nearby link AADT contained in SWok, AQNoise, Outputs, Summary, 22, 09, 20 20_issued which is recorded between 6268 and 51384 two way for links 10851 and 11889 shown in WSTM4 Link & Nodel dentifiers - WG 05102020. It is assumed to be representative of traffic flows of the existing situation and which likely to be higher post development. Therefore a score of 0 has been given to the roundabout.
Total Score					Audit Score Total	0	(70% = 28)